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Marshaling Economic Power Industries



How U.S. policymakers can avoid losing the techno-economic-trade war with China

An anthology of analytical research and policy recommendations

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Marshaling Economic Power Industries

An anthology of research and recommendations for U.S. policymakers to avoid losing the techno-economic-trade war with China

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Forward

The United States risks losing its technological leadership to China at the expense of its economic and national security.[1] That is why the Information Technology and Innovation Foundation (ITIF) established the Hamilton Center on Industrial Strategy.[2] It is dedicated to advancing a comprehensive framework and specific policy agenda to maintain America's competitive edge.[3]

With America now facing an aggressive and often malign challenge from China, there is an urgent need for stronger policy advocacy and thought leadership that articulates the case for robust national strategic-industry policy.[4] This policy must focus on critical, dual-use technologies and industries in advanced, traded sectors of the economy. Such an approach requires firmly rebutting the deeply held view of most economists and many policymakers that all industries are created equal. In other words, no more "potato chips, computer chips—what's the difference?" Strategic-industry policy demands making tough political choices and "picking winners" not individual firms or specific technologies, but rather certain industries and categories of technology that are critical to the nation's future. Finally, it requires a government that is knowledgeable and sophisticated about industry operations and the effects of policy on traded sectors.[5]

Under the Hamilton Center, ITIF undertook an 18-month research project focusing on China's industrial goals and strategies, their impact on U.S. industrial power, how U.S. policymakers and experts should think about this challenge, and what a detailed and comprehensive policy agenda should look like. The project's core thesis is that a specific set of industries acts as a vital wellspring of national power, either because they directly support the defense industrial base or because they limit dependence on U.S. adversaries that could be used for coercion. ITIF calls them "national power industries."

Without major structural change in U.S. policy—akin to the strategy America implemented at the beginning of the Cold War—we believe that the United States' national power industries will weaken significantly, if not die, in turn weakening the U.S. defense industrial base and giving China techno-economic leverage over America in a broad range of areas, not just rare earth minerals. At its core, this challenge requires formulating and implementing a national power industry strategy grounded not just in economics but also in corporate strategy literature.

Without major structural change in U.S. policy—akin to the strategy America implemented at the beginning of the Cold War—we believe that the United States' national power industries will weaken significantly, if not die.

This project focuses on several objectives. First, an overview report published in November 2025 provides an overarching analytical framework and an enumeration of the stakes, including an assessment of the Chinese Communist Party's (CCP's) intent. It then proposes the concept of national power industries, classifying U.S. industries into four categories of relative importance to the power industry competition. The overview report examines why current techno-economic and trade policy doctrines that dominate Washington, DC, are flawed and misguided, then summarizes 18 different strategic directions offered by conventional foreign policy thinking and

explains why these approaches are inadequate. Following this analysis, the overview report draws on corporate strategy literature to outline what a coherent and effective grand strategy for the national power industry competition should look like. Finally, it examines the political economy of implementing such a strategy.

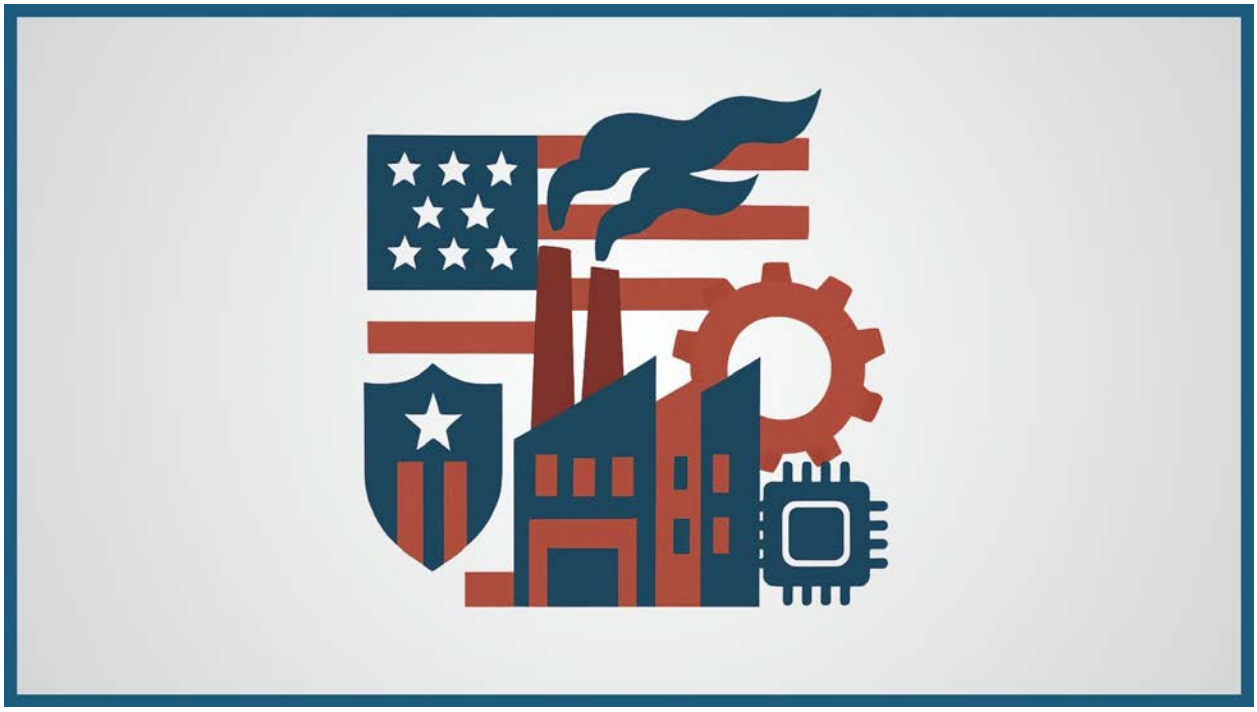
Building from the overview report, the broader research project then produced a series of nine reports providing quantitative and qualitative analyses of the past and present performance of U.S. power industries, including comparisons to China. These quantitative and qualitative analyses examine impacts on the overall U.S. economy, the 50 states, and the competition between China and the United States for global market share in national power industries.

Finally, this project has produced a second series of nine reports outlining a comprehensive agenda for U.S. industrial policy that can be implemented by Congress and the administration. These reports provide nearly 200 specific policies and recommendations for reorganizing government to mobilize for techno-economic war.

Combined, this research project unfolds in 19 policy reports, which are organized into three sections in this anthology: Section I provides the overview. Section II presents the strategic assessments of America's competitive position versus China. Section III then presents policy recommendations for the Congress and the administration.

— Robert D. Atkinson

Section I.
Overview of the US-China Techno-Economic War



Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance

ROBERT D. ATKINSON

China is on the march to dominate advanced industries that underpin national power in the 21st century. To protect U.S. economic strength and national security, policymakers must jettison old techno-economic and trade policy doctrines and adopt a new national power industry strategy.

KEY TAKEAWAYS

- Certain technologically advanced industries—from semiconductors to aerospace to AI—serve as the wellsprings of national power and security in the 21st century. China's strategic campaign to dominate those industries is an existential threat to America.
- These industries are globally traded. When China captures market share, it is at America and the West's expense—and losing market share usually leads to downward spirals in innovation and investment, or even irrevocable loss due to high reentry barriers.
- The CCP follows a predictable strategy across industries: attract foreign investment, coerce tech transfer and steal foreign IP, provide massive subsidies, close domestic markets, and then capture global market share.
- Prevailing policy narratives in Washington largely ignore techno-economic and trade warfare and its implications for U.S. power. Neither engagement, nor denial, nor false confidence in American innovation will suffice in the face of the threat China poses.
- We must abandon consumer-welfare economics and neo-New Dealism and go beyond competitiveness and innovation strategy. We need a "national power industry strategy" that adapts from the field of corporate strategy, where competition is win or lose.
- Time is short. Policymakers must recognize that industries differ in strategic importance, markets won't automatically preserve critical capabilities, production matters as much as innovation, and long-term strategic positioning trumps short-term efficiency.

INTRODUCTION

National power is a country's ability to both prevent other states from taking actions against its core interests and impose its will on other nations. Traditionally, national power was largely determined by military power. In the globally integrated economy of the 21st century, a key enabler of national power is strength in industries that not only support weapons system development and production, but also provide leverage over adversaries and limit their leverage over us. This leverage can be directly related to defense, as when China produces key materials and parts going into U.S. weapons systems (which it currently does) or indirectly such as when China is able to cripple key U.S. industries.[1] We call these key industries that are vital to the country's strategic interests "national power industries."

With this context, let's start with a series of key questions that, if answered in the affirmative, should form an immutable logic chain in support of a paradigmatically different kind of U.S. techno-economic and trade policy.

First, does the United States need to be the strongest power nation on Earth, especially over China? If it doesn't, then status quo economic and trade policies from the Left and Right will suffice.

Second, if it does, then to what extent does national power come from relative strength in certain industries, particularly military, dual-use, and industries that enable the industrial commons that defense and dual-use industries rely on? If power is only loosely related to those types of industries, then the status quo policies will suffice.

Third, if national power is significantly enabled by a certain class of industries, then to what extent is China seeking and capable of gaining relative strength over the United States and its allies in these industries? Related to that, is competition in these industries mostly win-lose, wherein China's gains come at the expense of U.S. (and allied) losses? If the answer is either that China is not succeeding in these industries or that its success does not come at the expense of U.S. capabilities, then status quo policies will suffice.

But if the answer to all these questions is yes—as ITIF argues for in this report—then the implications are profound. The logic chain points inexorably to the conclusion that unless the United States (and its allies) is stronger than China in particular industries and thus has more techno-economic leverage over China than China has over us, then U.S. power vis-à-vis China will be limited and there will be transformative consequences for the global balance of power and U.S. national interests.

That logic chain has, or at least should have, profound implications for U.S. techno-economic and trade policy. It establishes that the conventional neoclassical, consumer-welfare–based economics that has dominated U.S. policymaking for more than 50 years needs to be scrapped for the simple reason that it is agnostic to national industry structure. As such, unless the country adopts a new strategy, not losing the power industry war with China will come down to happenstance and luck. This is because the dominant view in Washington, even among most Democrats, is that markets determine industry structure and all industries are of equal value. Financial services are no different than semiconductor production. It cannot be stressed enough that the acceptance of this core doctrine underpins virtually all U.S. techno-economic and trade policy. It explains the support for free markets and free trade and the aversion to "picking

winners." It explains why economic policy on the Right is about enabling market forces and on the Left about achieving better social policy outcomes by taxing and regulating the private sector. Both are indifferent to industry structure.

In the past, this industry-agnostic, market-economics framework was not detrimental to national power because the United States did not face a competent techno-economic adversary in the form of the Soviet Union. In fact, the Soviet economy was incredibly fragile, and it made the U.S. economy seem like a goliath by comparison.[2] That unfortunately instilled a dangerous hubris into policy thinking that America suffers from to this day. Now that America faces a likely superior techno-economic adversary in the form of China led by the CCP, that doctrine and the policies that flow from it are no longer purpose-fit and need to be retired as quickly as possible.

A world in which the United States (and allies) cannot lose power industry strength is a world that calls for a fundamentally new kind of techno-economic and trade policy.

But the next question is whether the usual alternatives to free-market economics—competitiveness policy, innovation policy, technology policies, and/or manufacturing policy—are the right paths to follow. To be sure, these differ from free-market frameworks in that they privilege certain things over others: a better trade balance in advanced industries, more innovation, more output, and jobs in technology industries and manufacturing. However, while certainly a better fit for the world the United States and allied nations now find themselves in, these approaches are still inadequate because they advocate only for broad outcomes, and like free-market doctrine, they are indifferent to power industry strategy. Even if these policies are adequate and successful—to date, they have been inadequate—there is no guarantee that adopting them would produce requisite capabilities in the industries that the United States most needs to bolster in order to have superior power over China. If we get more toy and lumber manufacturing, but not more machine-tool and semiconductor manufacturing, the United States will lose out to China.

In short, the United States (and its allies) need to be stronger than China in the industries that are wellsprings of national power in order to prevent China from asserting power and leverage over the United States and its allies. And a world in which the United States and its allies cannot lose strength in national power industries is a world that calls for a fundamentally new kind of techno-economic and trade policy.

Circumstances have compelled the United States to make significant structural techno-economic and trade policy changes before: after the War of 1812, after the Civil War, and after WWII. It is once again time for America to make such fundamental changes in policy. The stakes then were less significant for the simple reason that there was much less global integration, and our adversaries were weaker. Today, the stakes and the conditions are fundamentally different. China is the first nation in over 125 years with the ability to challenge the United States from a techno-industrial perspective.

In previous instances, it took wars to trigger this kind of fundamental structural change in policy and institutions. Hopefully, it will not take a kinetic war to bring needed change today. Because if it did, there is every reason to believe that the United States and allies will already have

irrevocably lost many of their power industry capabilities and prohibitive barriers to entry will leave slim prospects for regaining them.

Unfortunately, status quo thinking and vested interests hinder power-industry economics from emerging. First, most foreign policy experts, even while acknowledging the authoritarian rule of Xi Jinping, continue to believe that China is a normal, market-oriented, emerging economy and that "socialism with Chinese characteristics" is just a slogan used for domestic purposes to mask China's true capitalist nature. Second, while there is growing awareness of the West's techno-economic dependence on China, that dependence is generally seen as limited to a few narrow areas, such as rare earth minerals, which are said to be easily fixed with the right policies. Third, the conventional view of international economics is both that trade is welfare-maximizing for all parties and that while companies may compete, countries do not. In other words, there is no battle for global market share in key national power industries. Finally, even the most die-hard China hawks and manufacturing supporters do not view the world in terms of power-industry competition with China. For them, getting more U.S. manufacturing jobs is the goal, whether they support national power or not.

In a world with these assumptions, status-quo responses suffice. The United States and its allies compete with China and others for market share in advanced industries, and we win some and lose some. And to the extent we lose, we just create new industries and firms because of our inherent innovation strengths. Besides, old industries are for losers. To the extent trade barriers arise, they are handled through normal bilateral or multilateral processes. And domestically, the United States can rely on existing economic policies and institutional structures to ensure reasonable levels of competitiveness and prosperity.

U.S. techno-economic and trade policy needs to have as its inspiration and fundamental organizing principle not ensuring economic freedom and efficiency, not social justice, and not stopping climate change—but also not losing in a wide array of strategic industries.

Too many U.S. experts, pundits, and policymakers see the CCP as perhaps a bit more focused on industrial policy and a bit less interested in obeying global trade rules than the West is, but not an assertive Marxist-Leninist actor that stands apart. As such, there is no need for a radical overhaul of U.S. techno-economic and trade policy. (Obviously the Trump administration and most China hawks are not in this camp.) As described herein, there are many reasons for the resistance to accept this new reality. But this new reality needs to be accepted and acted upon.

This report proceeds from the fundamental view that the CCP seeks global hegemony, that it views techno-economic dominance in national power industries as a key pillar of that long-standing campaign, and that it will do virtually anything to win that quest. As such, the United States and its democratic allies who stand for freedom and human rights need to respond by fundamentally rethinking and restructuring their techno-economic and trade policies.

This boils down to a simple but fundamentally far-reaching proposal: U.S. (and allied) techno-economic and trade policy needs to have as its inspiration and fundamental organizing principle, not ensuring economic freedom and efficiency, not prioritizing social justice, not stopping climate change, and not keep AI from taking over—but instead not losing in a wide array of strategic industries. I say "not losing," as opposed to winning, because China is such a

formidable competitor—with a massive domestic and friendly international market (e.g., Belt and Road nations) and an enormous "bank account" to subsidize its way to power industry market share—that it is likely not be possible to keep Chinese firms from being the leaders in many national power industries, especially in non-OECD markets. But what the West can and must do is to avoid losing its own power industry capabilities.[3]

National power industries are not just any manufacturing or even technologically advanced industries. They can be thought of as three categories, from most important to least: military industries, dual-use industries, and enabling industries. Examples of military industries are guided missiles and tank production. Examples of dual use are electronic displays and semiconductors, which are used in both defense and commercial industries. Imagine as a thought exercise that China dominated optics and displays. This would give China the ability to cripple U.S. defense capabilities because optics and display technologies are critical for night-vision goggles, heads-up instrument displays for fighter pilots, rifle scopes, and myriad other military applications. Enabling industries include automobiles and heavy construction equipment, which help support the industrial commons needed for dual-use and defense industries.

Industries such as furniture, cosmetics, sporting goods, wind turbines, wood products, cement, and toys are not national power industries, in part because losing them would not create any serious vulnerabilities to China. Kids might not have many toys, but we can live with that. The same is true for virtually all nontraded sectors, which are, by definition, not subject to competition from foreign imports (e.g., barber shops, personal service providers, etc.)

Because maintaining allied strength in national power industries is critical, policymakers must jettison the deeply held view that governments should not pick winners and that market outcomes are Panglossian in nature—the best of all possible worlds. Markets might optimize per-capita GDP growth (although even here, there are market failures that suggest some government intervention is needed to maximize per-capita GDP growth), but only by luck and happenstance will this generate the power-industry capabilities the United States needs to maintain superiority over China. There is no inherent reason why the United States will produce telecom equipment, semiconductors, electronic displays, circuit boards, and more.

It is time for the United States government to craft a coherent power industry strategy.

And even with robust defense spending, weakness in dual-use and enabling industries would undermine the defense sector, requiring massively larger defense budgets to produce the weapons systems the Department of Defense (DOD) needs in specialized factories with limited economies of scale. Markets, for all their value, are happy to enable the production of financial advisors, legal services, and high-end garments, while allowing dual-use sectors to wither and die in the face of subsidized Chinese production. This is true even with a robust national manufacturing strategy, which might end up with more production of shoes, golf clubs, and two-by-fours, but not optics, machine tools, and lasers, which weapons systems need.

Policymakers already understand this when it comes to the production of weapons such as fighter aircraft and guns. While private companies make these, they do so under government contracts. It's time to extend that thinking to dual-use and enabling industries too—not that in

all or even most cases would these industries be supported by government contracts. But in all cases, there should be well-crafted and effectively implemented government strategies to ensure continued dynamic capabilities in national power industries.

The implications of this simple yet profoundly important change in thought are significant. In short, it is time for the United States government to craft a coherent power industry strategy. No, this does not mean state socialism or crony capitalism and Solyndra. No, it does not mean corporate welfare. But it does require embracing the concept of national power industry strategy, some of which, as described ahead, can be built on the insights from the scholarly and professional literature on corporate strategy.

TODAY'S HISTORICAL TURNING POINT

Despite what some free-market conservatives argue, America's economic and trade policies have not been consistent since the founding of the Republic. Rather, key inflection points have occurred, leading to new beliefs, institutional arrangements, and policies. And each time, America's leaders have made the right choice, although often through trial and error and incremental adjustments. But the transformations have been made that have enabled a more powerful and wealthier nation.

It's worth reviewing these historical pivots. From its colonial founding until the second war with the British (the War of 1812), American leaders largely saw the colonies and then the nation as a peripheral, natural resource economy, dependent on Britain for trade in manufactured goods that were to be paid for through exports of staples (wood, fish, tobacco, furs, etc.). After the revolution, some, such as Alexander Hamilton, recognized that this was fundamentally a relationship of dependency. That is why he "believed that in industry lay our great national destiny."[4] He did not want America to remain a "hewer of wood and drawer of water." Indeed, he argued that government should "cultivate particular branches of trade ... and to discourage others."[5] That's why America's first successful manufacturing firm, the Society of Useful Manufacturers, was funded by the state of New Jersey and leading American financiers that Hamilton convinced to fund it.

Even Jefferson embraced national developmentalism, including protective tariffs.[6] As president, his goal was to repay the national debt and then use the revenues to fund "rivers, canals, roads, arts, manufacturers, education and other great objects."[7] He "encouraged new branches of industry that may be advantageous to the public, either by offering premiums for discoveries, or by purchasing from their proprietors such inventions as shall appear to be of immediate and general utility, and rendering them free to the citizens at large."[8]

But it wasn't until the shock of the war of 1812 that a true consensus for industrial development emerged. Indeed, in 1816 Jefferson wrote, "You tell me I am quoted by those who wish to continue our dependence on England for manufactures. There was a time when I might have been so quoted with more candor, but within the 30 years, which have since elapsed, how are circumstances changed!"[9]

Jefferson was a man who was willing to change his thinking when conditions required doing so. Indeed, the war broadened and heightened calls for more efforts to develop American industry. Henry Clay and other Whigs devised "the American System," consisting of tariffs to protect and promote industry; a national bank to foster commerce; and federal subsidies for roads, canals,

and other domestic improvements. The latter also involved subsidies to targeted industries, including at the state government level. When running in 1832 as a Whig, Abraham Lincoln stated, "[M]y politics are short and sweet, like the old woman's dance. I am in favor of a national bank ... in favor of the internal improvements system, and a high protective tariff."[10] These changes enabled the development of American industries, many driven by waterpower, including textiles, muskets and rifles, shipbuilding, and others.

The next pivot was the Civil War. This time the core change domestically was whether the United States would fully embrace industrialization to become a world power, with the centralization of power and high tariff walls that entailed. Or would it allow industrialization to occur at its own pace with much of the U.S. economy maintained as an agrarian and plantation export economy. Southern plantation states opposed this mission and the institutional changes that it entailed, in part because it meant higher prices for what farmers consumed and reduced overseas markets for what they sold. The Civil War made the choice inexorable, and with the victory of the Northern States, the United States proceeded to industrialize at a rapid rate behind a high tariff wall and with the support of defense industry purchases.

Indeed, for the rest of that century, the United States was the China of its day: an economy in which industrialization was everything and growth was off the charts. This led European countries to despair. As David Kedrosky wrote:

> Frederick Arthur McKenzie's *The American Invaders* and WT Stead's *The Americanization of the World* (both 1901) were just two of an avalanche of publications advertising the rot of Britain and the inevitability of its supersession by its youthful, vigorous former colony. Economists cast about for something, or someone, to blame.[11]

He went on to cite leading British economists Alfred Marshall, who sounded the alarm in 1903 (wish that we had more Alfred Marshalls today in the United States):

> Sixty years ago England had leadership in most branches of industry. It was inevitable that she should cede much to the great land which attracts alert minds of all nations to sharpen their inventive and resourceful faculties by impact on one another. It was inevitable that she should yield a little of it to that land of great industrial traditions which yoked science in the service of man with unrivalled energy. It was not inevitable that she should lose so much of it as she has done.[12]

The next major pivot came with the American victory in WWII and then the rise of an aggressive and expansive Marxist-Leninist Soviet Union. After WWII, the forces for returning to the pre-war status quo were strong. In 1946, Truman's State of the Union speech called for bringing most troops home and demobilizing.[13] And his economic policy was to continue New Deal social programs but embrace Keynesian cycle management.

But it was only after Soviet expansionism into Eastern Europe, the development in 1947 of the "Truman Doctrine," a few years later Stalin giving the green light for Kim Il Sung to invade South Korea, and seven years later the Soviets launching Sputnik that America responded with overwhelming force. The United States chose to assume leadership of the free world, in part because of the fall of the British Empire and the benefits that came with hegemony, but also become someone needed to stop Soviet expansionism.

Indeed, NSC-162-2, a new national security policy generated through the Solarium project initiated by President Eisenhower, argued for a new approach to national policy to address the Soviet threat.[14] Among other things, it called for, "in the face of the Soviet threat, the security of the United States requires … A mobilization base, and its protection against crippling damage, adequate to insure victory in the event of general war."

This new strategic approach meant several things: first, the rejection of tariffs and the embrace of free trade and global integration, in part to ensure more stable democracies around the world aligned with the United States, because at home, the Cold War meant unprecedented massive funding for science and technology.

Second, starting in WWII, the federal government dramatically ramped up its support for advanced industry. By the early 1960s, it spent more on research and development (R&D) than the rest of the world combined.[15] That fueled an enormous array of breakthroughs, including computers, semiconductors, jet aviation, lasers, numerically controlled machine tools, satellites, relational databases, and of course, the Internet. Indeed, NSC-162-2 called the United States to "[c]onduct and foster scientific research and development so as to insure superiority in quantity and quality of weapons systems, with attendant continuing review of the level and composition of forces and the industrial base required for adequate defense and successful prosecution of general war."[16]

Starting in WWII, the federal government dramatically ramped up its support for advanced industry. By the early 1960s, it spent more on R&D than the rest of the world combined.

Turning points are hard. There is a reason societies establish routines, fixed institutions, and common rules. Changing them is hard. Vested interests oppose them. Few experts have the intellectual fortitude to challenge their own frameworks. Voters get comfortable with the status quo. And democratic politics makes change hard. But as history shows, when the disjuncture between external reality and internal frameworks and approaches becomes wide enough, America has been able to successfully embrace pivot points. Perhaps the most important question facing the nation today is, does the U.S. political economy have the capability, absent a military conflict with China, to make the needed changes? The final part of this report examines this question.

America's Current Techno-Economic and Trade System and Why Support for It Persists

After the Soviet threat evaporated in the early 1990s, American leadership assumed that the United States was not only in a unipolar moment, but that, as Francis Fukayama argued, history itself had ended.[17] In other words, Western liberal democratic capitalism had triumphed over all. If he had in fact been correct, there would be no need to write this report, as China would be well on the way to a free-market democracy. But also, he and most others were so enthused by the collapse of the Soviet Union that enthusiasm overrode reality.

As a result, the ideological and policy ideas that went with this phase have not only remained as core to U.S. techno-economic and trade governance, but at least until recently, become even more embedded in American thinking. Since America won, there was and is no real historical turning point other than one that reinforced the primacy of the U.S. system. Four core ideas remain.

First, it is America's role to advance free trade and globalization even if it was not in our narrow interest. Free trade, especially other nations selling to America, helped ensure that they entered the American orbit and not the Soviet one or remained unaligned. The U.S. economy was so strong that it could afford uneven trading arrangements. Indeed, until the early 1970s, the U.S. economy enjoyed trade surpluses. Later, as those surpluses turned to trade deficits and the United States became the importer of last resort, the view was that the U.S. economy was still the strongest, and besides, trade deficits not only didn't matter, but they were also a reflection of economic strength. Ahh, the power of wishful thinking.

On top of that was the pervasive idea held by the foreign policy establishment and economists that not only was *all* trade good, but so too was the movement of U.S. business operations overseas. Indeed, a 2013 survey of Council on Foreign Relations (CFR) members found that 73 percent believed that the U.S. economy would be strengthened if more U.S. companies set up operations overseas. In contrast, just 23 percent of the U.S. public believed this.[18] One is reminded of William Buckely's quip that he would rather live in a society governed by the first 2,000 names in the Boston phone book than one governed by 2,000 Harvard faculty members.[19] Also, 52 percent of CFR members predicted that China would become more democratic by 2023 and 34 percent thought China would be a key future ally by then. President Xi, did you see this survey? If so, why did you not go along with the CFR folks?

As surpluses turned to trade deficits and the United States became the importer of last resort, the view was that the U.S. economy was still the strongest, and besides, trade deficits not only didn't matter, but they were also a reflection of economic strength.

Following in the intellectual path set by classical economist David Ricardo, the consensus view became that trade was always win-win, and there was a comparative advantage wherever a nation's industrial structure was based on—unless distorted by suboptimal government policies—inherent natural comparative advantages. Not only was there no reason for government to alter "natural" industrial structure, but it was also welfare reducing to do so. Moreover, to the extent there were foreign deviations from free trade, they were seen as barriers and distortions that hurt the countries putting them in place, not as attacks on U.S. companies and the U.S. economy. In this regard, free trade is seen as a natural phenomenon producing natural and superior results. The fact that most of the rest of the world neither believed nor practiced this only reinforced the messianic mission of America to teach the heathens the errors of their ways and convert them to the free trade religion.

Second, what ultimately buttressed this the way free booze buttresses an alcoholic was the fact that the U.S. dollar was the reserve currency. The dollar was accepted everywhere, and ultimately, if the United States needed more dollars, unlike any other nation, it could simply print more. This is termed the "exorbitant privilege" that let the United States run massive trade deficits for decades. In realty, it was not a privilege but an albatross around America's neck, allowing policymakers to be indifferent to structural trade deficits. With such massive trade deficits, any other nation would have had to devalue its currency and grow its exports and reduce imports. But not the United States. And so, U.S. manufacturing, including national power industries, shrank. And because there was no real consequence to this—foreign nations continued to pour money into the United States, in part to keep their currency values low and

exports high—it was easy for American pundits and experts to ignore and deny the decay of American power industry capabilities. Indeed, most to this day still defend the reserve currency status of the dollar as a key source of national power, instead of what it really is: a cancer on national power industry competitiveness.

Third, because the techno-economic power imbalance between the United States and the Soviets was so large, there was no need for a strategic industry policy. The Soviets might have had a peer-competitor military, but they by no means had a peer-competitor set of national power industries. And one reason was that Soviet command economics, unlike Chinese state capitalism, was incredibly limiting. Soviet Gosplan was in fact a central planner and allocator of goods and services.

Fourth, science and technology proceeded from funding to scientists to pursue basic research in whatever areas they chose (what FDR science advisor Vannevar Bush laid out as the linear model of basic science to commercial production) and company-funded research based on market forces alone. This meant that just as "computer chips, potato chips what's the difference?" prevailed in economic thinking, "astrophysics, quantum physics what's the difference?" prevailed in science funding. In other words, the United States was so far ahead of other nations in science that it had the luxury of funding a large share of the world's basic, exploratory research that other nations used to build their advanced industry export economies.

As such, neoclassical, non-goal-oriented economic policy became accepted as all-time truth. It was true everywhere and always. Short-run efficiency generated from market actors operating in response to market-determined price signals was the lode star. Externalities, with perhaps the exception of pollution, were few and far between, and government's efforts to intervene in this natural, indeed beautiful, process were, by definition, welfare-reducing.

This truth still dominates U.S. expert, pundit, and policymaker thinking. An emblematic example is a *Washington Post* op-ed excoriating President Trump's conditioning CHIPS Act grant funding to Intel on the federal government getting an ownership share. Yes, this was a bad decision, but not because it violated free-market dogma, but because it ultimately weakened Intel, clearly a power industry company.[20] The *Post's* statement is a perfect reflection of what current U.S. consensus is regarding techno-economic and trade policy where power industry concerns are nonexistent:

> This deal is the culmination of America's resurgent interest in industrial policy, the same interest we always develop when we sense a challenge to our global economic dominance. Whenever we spot a new competitor on the horizon, we look wistfully at China — or Germany, or Japan — and wonder if it's a mistake to let the market decide what America produces. Maybe we should learn a lesson from the competition and let the government, with its deep pockets and longer time-horizons, take a bigger role in shaping the economy.
>
> This particular policy also risks distorting the free-market system that has delivered better results for America, and the world, than any state-managed competitor has ever achieved. And it is unlikely to fix the deep problems with Intel, which have been decades in the making.

> There is an argument for industrial policy in strategically vital products. The United States does not want to source critical defense inputs from geostrategic rivals. But that argument only works if you make three dubious assumptions: that the government can confine its efforts to strategically important industries (rather than, say, bailing out failing automakers with politically powerful unions); that it can spend the money wisely (rather than wasting huge sums on efforts that sounded better to planners than to buyers); and that the companies that find themselves showered with money will use it to turn themselves into globally competitive superstars, rather than to maintain a lackluster operation thanks to the subsidies.[21]

A few years ago, this op-ed would have been exactly the same, but without the reference to the need for "strategically vital products." At least now elite discourse has to include a passing reference to this, before it then breezes on praising the wonders of the free market.

There is one final component of the America's techno-economic and trade doctrine, one that did not emerge until the fall of the Soviet Union: American hubris.

In its close, the op-ed at least considers that it might be necessary for the United States to have strong national power industries, but the authors still couldn't help themselves and fall back into conventional thinking, claiming that the old model actually works when it comes to national power industries. Government, it claims:

> can also work harder on improving infrastructure and fixing government policies that drive up manufacturing costs, such as land-use regulations and taxes. But the United States should not try to beat China by becoming China. We should compete the way we always have: by relying on the free enterprise system that has served us so well for so long.[22]

If this is not a rejection of the need for a doctrinal shift in response to an historical turning point, I don't know what is.

There is one final component of the America's techno-economic and trade doctrine, one that did not emerge until the fall of the Soviet Union: American hubris. At least during the Cold War, leaders on both sides of the aisle were worried about the Soviet challenge, not just militarily but also technologically, especially in the 1950s and 1960s as Soviet space and nuclear technology advanced. In hindsight, the technology threat was overstated, but nonetheless, policymakers remained apprehensive, ever focused on maintaining our lead.

Now, absent that threat, America suffers from what Chinese political economist Heng-Fu Zou calls "status-quo-based optimism."[23] In other words, too many U.S. experts and policymakers still see the world as it was from 1990 to the mid-2000s when the belief was that United States was preeminent in virtually everything. Communism had been defeated and was consigned to the dustbin of history. China was a poor, developing market economy, not a development-oriented Marxist-Leninist dictatorship. And emerging signs that China might be becoming a peer competitor were almost completely ignored by the expert class, so much so that individuals and organizations that tried to issue warnings were dismissed as cranks. Case in point: the U.S.

China Economic and Security Review Commission, an entity created by Congress as a sop to those worried about the effects of letting China in the World Trade Organization (WTO). For years, the view in Washington was that these were a bunch of crazed China hawks and it was largely frowned upon for experts to testify in front of this commission.

Because the United States had vanquished its foes and stood tall and unopposed (except by jihadists that turned airplanes into missiles), that meant, by definition, that the current techno-economic and trade system was optimal. It had led to the prosperous and strong America. No one could touch us. So why challenge what had worked so well?

This is perhaps the driving factor in why so many in the expert and political classes are so closed to considering new techno-economic and trade frameworks. The old/current system worked great. Why fix it if it ain't broke?

Accepting realities would mean a weakening of the foundations of the tripartite American techno-economic and trade doctrine: free trade, free markets, and reserve currency. That doctrine, and the professional reputations built upon it, must, at all costs, be defended.

And it is also why so many in the expert and political classes are almost completely impervious to data suggesting that reality no longer exists, especially the increasingly obvious Chinese techno-economic rise and the concomitant American decline, as well as Xi's Marxist-Leninist global hegemonic aspirations. Reams of data showing China's techno-economic rise are ignored or denied, as is data showing U.S. decline. Well, the data must be wrong. Or China is different. Or the data doesn't apply to the United States. Besides, we all know that China has a host of short-term business cycle challenges (e.g., housing glut), so no need to consider structural change. A bit more science spending, some regulatory tweaks, and some more high-skilled immigration and all will be ship-shape.

Accepting these realities would mean a weakening of the foundations of the tripartite American techno-economic and trade doctrine: free trade, free markets, and reserve currency. That doctrine, and the professional reputations built upon it, must, at all costs, be defended.

In other words, the consensus among the elite class is that the current system suffices. However, what is striking about past fundamental pivots in American techno-economic and trade systems is that all were in response to war: the Revolutionary War and the War of 1812; the Civil War; and WWII and the Korean War. Before each of these conflicts, the consensus view was for the then current system. Few policymakers and elites had any real desire to change, and those that did were in the minority with no real power. It was the shock and destruction of war that made the rejection of the old system and the embrace of a new system a virtual requirement.

Today, without a great-power war to spur change, there is little that is doing so. The Chinese national power trade attacks are not major battles, but rather a constant drip-drip of allied and U.S. losses that are either overlooked or rationalized as inconsequential. Better to defend the tripartite system of free trade, free-market economics, and reserve dollar and attack or ignore anyone who has the temerity to challenge it. Better to attack Trump as a clueless protectionist rather than to acknowledge that his concerns, if not necessarily his policies, reflect a new reality.

It is possible that a People's Republic of China (PRC) invasion of Taiwan might produce such a motive force. But it might not because U.S. leaders and the public could just give up and either not intervene or intervene but quickly withdraw after casualty numbers go up and missile stocks go down. If the PRC were smart and understood America, it would bide its time (it can no longer hide its light) until its GDP and power industry and military capabilities significantly outweigh those of the United States and the West. If it invaded then, even if the shock of war and defeat were enough to highlight the defects of the current system and motivate the embrace of a new one, it would be too late to do anything meaningful. U.S. and allied techno-organizational capabilities for renewal, including an existing advanced industrial base, would be below what is needed. As discussed ahead, the barriers to entry in most of these complex and capital-intensive industries would be too high. Even if the American populace and the elite class came together with a massive Sputnik-like movement and responded, the amount of effort and money needed to rebuild would be enormous. And so the techno-economic war would be over, and the United States would have lost most of its national power industry capabilities with virtually no way to get them back, akin to the United Kingdom after WWII. All the United Kingdom can do now is show nostalgic TV shows on BBC about when Britannia ruled the world.

Box 1: Britain's Failure to Grasp Its Turning Point

Like America, Britain faced a turning point during and after WWII, but unlike the United States, it failed to successfully turn, resulting in the permanent (at least to today), long-term deindustrialization and decline of the United Kingdom.

In his masterful book *The Audit of War: The Illusion and Reality of Britain as a Great Nation,* British historian Correlli Barnett documented the failures and why.[24] Like noted industrial historian Alfred Chandler, Barnett argued that British industry did not succeed in emulating American mass production and the management that went along with it. As Elbaum and Lazonick wrote:

Successful capitalist development in twentieth century German, Japan and the United States demonstrates the ubiquitous importance of the visible hand of corporate bureaucratic management. To meet with international challenge, British industries required transformation of their strategies of industrial relations, industrial organization, and enterprise management. Vested interests in the old structures, however, proved formidable obstacles to the old transition from competitive to corporate modes of organization.[25]

The result was significant lags in productivity and quality of manufactured goods, especially compared with Germany and the United States. And in many areas, Britain was completely dependent on other nations. For example, during the war, Britain was totally reliant on the United States for over 20 kinds of machine tools it had never been able to make itself.[26]

Some of this was due to poor management; many firms were still family owned and modest in size. Much of it was due to strong labor unions and their utter opposition to the kinds of industrial organization and job change that would be required to boost efficiency to be able to compete internationally.

It would have been one thing if Britain were losing its old industries but at least gained the new ones, such as chemicals, electronics, and aerospace. But it failed there as well, in part because of the persistence of the craft industry, as opposed to mass production—and also because the government spent so little on R&D. At the same time, the schools and university system, unlike

that of Germany and the United States, focused on traditional education, especially learning the classics, and neglected both skilled-trades education and STEM education.

It wasn't that certain groups and individuals in government were not aware of these challenges. Some were and proposed fairly far-reaching industrial policy changes that, if implemented, would have certainly reduced the scope and scale of deindustrialization and lack of progress in emerging science-based industries.

But at a political economy level, there were three forces that meant failure. The first was the long-standing British free-market ideology, especially among economists that eschewed any more than minimal government role in restructuring industry. And the Conservative Party's top priority was on "sound finance" and free trade. And many economists opposed scrapping out-of-date industrial machinery until that had been completely depreciated and was no longer working.

The second was the rise of the Labour Party and its massive embrace of what Barnett has called "The New Jerusalem": the idea that the state would provide a new almost utopian life for British citizens through public spending. Based in part on the 1942 "Beverage Report," which called for "cradle to grave" public support, including national health insurance, massive housing spending, and more money on education, the new Labour government under Atlee saw this as its overwhelming task to implement these wartime proposals. Indeed, the view of many was that Britain deserved this after its all-out fight to defeat Hitler. As Barnett wrote, "New Jerusalem was their [British 'enlightened' establishment Party officials] high-minded gift which they proceeded successfully to press on the British people between 1940 and 1945, with far-reaching effects on the British people's postwar chances as an industrial power struggling for survival and prosperity."[27] This massive new social services spending campaign crowded up virtually all needed public investment to be able to compete. It was not that the officials didn't know that this would cost a lot of money. Rather, as Barnett wrote, they pursued this vision "on the best romantic principle that sense must bend to feeling, and facts to faith," much like American conservatives and liberals push for tax cuts and spending increases, respectively, even when the till is empty.[28]

And ironically, the factor that held both the Conservative and Labour views together was the still prevalent individualism over communitarianism. School reform was based on freedom for the individual, rather than on what would boost national power. Spending was based on satisfying immediate needs, rather than boosting national power in the medium term. As a result, national investment was minimal, just one-third of post-war Germany levels.

In summary, Barnett stated, "If Britain after the war was to earn the immense resources required to maintain her cherished traditional place as a great power and at the same time to pay for New Jerusalem at home, she had to achieve nothing short of an economic miracle. Such a miracle could only be wrought through the transformation, material and human, of her essentially obsolete industrial society into one capable of triumphing in the world markets of the future."[29] Had all the most powerful groups and institutions in that society enthusiastically been willing to throw themselves behind the process of transformation, it still would have been difficult enough to achieve, given the scale of inherited problems. But instead of such willingness, there existed massive inertial resistance to change, which was so manifest in the history of Briain as an industrial society; a resistance that not even the shock of war had proved strong enough to budge more than a little.[30]

What does this all mean then? First and foremost, it means that the core challenge for America is wholesale abandonment of the post-war free-trade comparative advantage, free-market, and reserve currency doctrines and practices, and their replacement with doctrines and practices fitted for U.S.-China power industry conflict, as discussed ahead.

But the reality is that the preservation of U.S. and allied techno-economic power needs to take center stage in American politics and government. As Chinese scholar Heng-Fu Zou wrote in an article modeling China-U.S. great power competition, "Power is not a neutral consequence of growth, but a strategic externality. As a result, national welfare depends negatively on rival strength, even absent direct miliary confrontation."[31] He went on to argue, "This provides formal justification for industrial policies aimed at limiting rival capacity … These policies are rational from a strategic welfare standpoint, even if they reduce short-run efficiency."[32]

His last point is one that simply cannot be understood by most America economists who see reducing short-run efficiency as the height of economic stupidity.

Compared with China, the Soviet Union was a pre-season warm-up game in the minor leagues. Sure, it had military strength, including a powerful nuclear arsenal. But it's ability to degrade America's techno-economic strength was minimal and its ability to generate its own strength was even less.

At the same time, proactive domestic policies are needed. As Zho has stated, "Without proactive [U.S.] efforts to rebuild internal economic structure—both material (capital, factories, supply chains) and immaterial (skills, institutional memory, R&D ecosystems)—the relative power dynamic will continue to tilt toward China."[33]

Given today's reality of China's rise and America's decline, this should be so obvious that it need not even be stated. But alas, it is not and so it needs to be asserted.

Zou summed it up:

> Strategic rivalry in the 21st century is driven not only by military buildup or ideological narratives, but by underlying economic flows, learning dynamics and structural investments. Geopolitical outcomes are endogenous to trade, production and policy strategy. For the United States, reversing strategic decline will require more than tactical trade defense [e.g., tariffs]; it will require a coordinated industrial renaissance.[34]

This reality should be extremely sobering. Compared with China, the Soviet Union was a pre-season warm-up game in the minor leagues. Sure, it had military strength, including a powerful nuclear arsenal. But it's ability to degrade America's techno-economic strength was minimal and its ability to generate its own strength was even less, even as it engaged in massive IP spying and buying capabilities from the Europeans, who like today, were always willing to make a euro, even if it meant enabling an adversary. Maybe Lenin was thinking of them when he said, "the capitalists will sell us the rope by which we will hang them."[35]

By the early 1980s, U.S. techno-economic dominance over the Soviet Union had become increasingly apparent to U.S. policymakers.[36] As such, that conflict was largely about military capability and convincing the rest of the world that the capitalist, democratic system was

superior to the socialist, authoritarian one. That was as easy as arguing that Micheal Jordan was better than an NBA player coming off the bench. China is the finals of the major league.

EXPLAINING CHINA

What is China? That is the key question to answer.

The Conventional View vs. Reality

Much of the need to adopt a new techno-economic and trade doctrine depends on a simple question of what China is and what it wants to accomplish. The conventional view among most U.S. foreign policy experts is that it is a normal capitalist nation (albeit an authoritarian one) that just wants to develop as other developing nations have; or as some will admit, it just wants to have strategic independence from the United States.

The reality is that view is deeply naïve. The Chinese government is not a "normal" developing nation seeking growth, or even a fifth "Asian Tiger" seeking to rapidly move up the value chain through exports. China is a Marxist-Leninist dictatorship seeking global techno-economic domination by growing its own firms in virtually all emerging and foundational advanced technology industries. The intended casualty is the global market share and even the survival of Western and U.S. firms and industries. China's arsenal includes an array of weapons, including massive subsidies, IP theft, standards manipulation, closed domestic markets, and the incorporation into the Chinese orbit of an array of developing economies.

China is not a free trader or a protectionist, the only categories available for Western discourse. Rather, drawing on historical parallels, namely Albert Hirschman's account of pre-war German economic policy, China's subsidies, market closing, intellectual-property coercion, and overcapacity dumping are neither accidental nor benign. They revive the notion that trade can be weaponized, a concept powerfully elaborated by Farrell and Newman in "Weaponized Interdependence."[37] China is a "power trader" rather than a mere beneficiary of globalization, and that means we need to realign the policy debate toward defense of critical industries that enable national power and away from simplistic free trade versus protectionism binaries.

China is a Marxist-Leninist dictatorship seeking global techno-economic domination by growing its own firms in virtually all emerging and foundational advanced technology industries. The intended casualty is the global market share and even the survival of Western and U.S. firms and industries.

A key CCP weapon is flooding foreign markets with lower-priced products in order to capture market share from foreign leaders. Many trade experts refer to this process as Chinese overcapacity, as if this is simply an unexpected effect of the various forces at work in the Chinese economy. In reality, product "dumping" is a conscious decision at the core of the Chinese strategy of capturing global market share. Chinese companies are able to price below costs because they are subsidized by the state (and enjoy other cost advantages). And they know that companies in capitalist economies will not have the patience to suffer losses for more than a short period, after which they will cede market share and reallocate their capital to higher profit activities, including going bankrupt and returning capital to shareholders, or if they could get USG approval, selling their assets to a Chinese company. The CCP also knows that, for the most

part, foreign governments have neither the fiscal capability nor the political will to subsidize their companies' losses. And so, the bulldozer of value destruction keeps coming.

We have already seen the results in an array of industries, including telecom equipment, commercial drones, solar panels, shipbuilding, bulk chemicals, LCD displays, and many others. And China is continuing to attack across a wide array of industries and technologies, including semiconductor memory and logic, biopharmaceuticals, fine chemicals, EVs and batteries, quantum computing, AI, aerospace, and others. If the United States, and the West more broadly, allows China to weaken and even destroy much of our advanced industry, America will look like the UK—largely an industrial and technology wasteland—and China will be the most powerful nation on earth, with attendant economic, military, and foreign policy consequences.

History has seen other campaigns such as this. From the late 1800s to World War II, Germany illustrated how trade could be weaponized into "an instrument of power, of pressure and even of conquest," wrote the development economist Albert O. Hirschman.[38] Like China, Germany mostly focused on importing goods needed for its war machine, redirected trade to friendly or subject nations and sought to control oceanic trade routes, all in an effort to limit development of its adversaries. Like China, the German government kept its currency undervalued (making its goods relatively cheaper for consumers in other countries), leveraged the use of tariffs and subsidized its exports to bolster its position in industry goods such as steel, chemicals and machinery.

If the United States, and the West more broadly, allows China to weaken and even destroy much of our advanced industry, America will look like the United Kingdom—largely an industrial and technology wasteland—and China will be the most powerful nation on earth, with attendant economic, military, and foreign policy consequences.

How China Is Different Than America

If China was a "normal" country, focused on democracy, free trade, and generally market-oriented policies, there would be no need for this conversation. But China is not a normal country in the context of most other nations. First, despite what its leaders might present to the West, it is a Marxist-Leninist state.[39] After Deng Xiaoping in the late 1970s, the CCP did not make the fatal mistakes the Soviets made of seeking a command economy where the state allocated resources. But it did not seek a market economy either. The CCP knew and knows what it wants the economy to evolve to—which, frankly, is not hard to know given a more than rudimentary understanding of industry and technology—and it sets directions. But, unlike the Soviets with their central planning from agencies such as Gosplan, the CCP lets companies do the rowing to get to the intended destination. The government's job is to provide companies with a massive amount of help, including weakening their foreign competitors.

Second, China has an overall power industry strategy, as well as scores if not hundreds of strategies for particular industries and technologies (e.g., medical devices). Because of that, most economic players row in the same direction. Local and provincial governments, financiers, companies, and entrepreneurs—they all are attuned to the direction CCP leadership wants them to go and, while there are certainly tensions and often massive waste (which Chinese citizens pay for with their underconsumption), there are also massive victories.

Third, unlike the West, and particularly the Anglo-American West, China's focus is not on the individual. Americans are bombarded on a daily basis with how this or that policy will affect their welfare as consumers ("Trump tariffs will raise prices!"), investors ("Trump tariffs will lower stock prices!"), workers ("AI will kill jobs!"), and residents ("These wind turbines will make noise!"). And the national interest is relegated to the bottom of the list, if it is even considered. Indeed, in this framing, there is no national interest, only the aggregate voices of individual interests as consumers, investors, workers and residents. As such, if something is good for the nation but raises prices, lowers stock values, eliminates jobs, or disrupts a neighborhood, it is, by definition, bad.

Just as the U.S. economics profession embraced Ricardian trade theory and free-market economics, the U.S. political science profession, especially after the 1950s, embraced the theory of pluralism that held that the public interests was just the amalgam of competing interests. Academics such as Charles Lindblom, David Truman, and Robert Dahl led that charge. When a nation has to operate with those constraints, it is amazing that anything gets done other than what the most powerful forces can force through.

On top of that, the overriding U.S. focus is on consumer orientation, what Keynes termed as "more jam today." Harvard's Bruce Scottt wrote in 1997 that "policies that favor consumption, consumer borrowing, and leisure are components of a consumer orientation. Public provision of enhanced economic security is also a consumer-oriented notion; it allows consumers to take less responsibility for themselves, and thus to leverage a given level of income with additional debt."[40] We have only doubled down on that since Scott wrote those words, cutting taxes, massively expanding entitlements, and slashing true public investments. Lots of jam!

America needs to stop focusing on "more jam today" and instead focus on "more jam tomorrow."

China doesn't worry about that. The CCP runs things—not investors, not consumers, not workers, and not residents. Chinese citizens can't vote and have almost no voice in whether the CCP immiserates them in order to win the bigger, longer-term techno-economic war. Take peasants' land to build a port? No problem. Keep the value of the RMB currency low so consumers pay more for imports? No problem. Put the pedal to the metal with robotic and other forms of automation, even if workers lose their jobs? No problem. The CCP doesn't privilege self-interested individuals or organizations over the country as a whole, and as a result, it has much more smooth sailing to boost its national power industries. China has a producer orientation. As Scott wrote about Asian nations such as South Korea:

> [They are]built on the notion of increased resource mobilization so as to have … "more jam tomorrow." Producer-oriented nations favor saving and investment, technology acquisition, and skills upgrading through education and training, all of which imply less jam today as well as more tomorrow. In addition to increased resource mobilization, producer-oriented societies are characterized by market structures—capital, product, and labor—that permit producer institutions, firms, and associations to hold a great deal of power, while restricting that allowed to labor as well as to consumers.[41]

To be clear, the United States should not adopt a repressive government. But Americans need to dial back selfishness and embrace more civic virtue, ending the focus on "more jam today" and replacing it with "more jam tomorrow."

Fourth, while America prioritizes allocation efficiency, the CCP prioritizes effectiveness of actions leading to increased industrial power. American elites see markets as an end because markets optimize efficiency. The CCP sees markets as just one of many tools to achieve its goal: global dominance in national power industries. That orientation is better for winning great power competition because markets are largely indifferent to winning or losing that competition. Markets are not indifferent to maximizing wealth, at least in the short run. But power and wealth are quite different things. And an economy that boasts the world's most efficient personal services, utilities, hotel and lodging, and FIRE (finance, insurance, and real estate) sectors might be the richest. But an economy that can boast the largest national power industries will be the most powerful.

Fifth, a key difference between China and the United States is an obvious one: China is not a democracy. The lack of democratic constraints on government means that the CCP can afford to spend enormous sums (direct and indirect tax expenditures) on supporting Chinese national power industries. Chinese citizens surely have some pain point over taxes, but it is clearly considerably lower than Americans' pain point, as U.S. voters will go the ramparts if the gas tax is even indexed to inflation or if a politician even says they have considered a minor reduction in entitlements.

Sixth, like the Asian tigers (e.g., Hong Kong, South Korea, Singapore, Taiwan) Chinese officials are steeped in the discipline of industrial and technology policy. Yes, there is scholarly industrial policy discipline to study, and it is largely ignored in the Anglo-Saxon and most European nations. However, Chinese officials study it intently. Most have read the "Adam Smith" of national developmentalism, Friedrich List, even if few American economists even know who he is.[42] In contrast, the level of education and knowledge of national developmentalism in the United States is minimal, with national policymakers usually having backgrounds in law. And economics does not involve the study of industry or technology, but rather how price-mediated markets work. And elite economists and policymakers look with disdain at the field of industrial policy and national developmentalism, if they even deign themselves to notice it at all.

Seventh, Chinese governments support industrial policy research and analysis. The USG does not, and its economic statistics and technology system is designed to support market analysis and business cycle management, not power industry policy. And of course, every year, this system gets weaker with budget cuts.

China also has a multitude of different agencies and bureaus to implement power industry policies. And we see that with the range of sophisticated techno-industrial policies, including China's large and well-funded network of manufacturing innovation centers.[43] The United States has barely a few, some at the National Institute of Standards and Technology (NIST) and DOD, but that is about it.

Eighth, China sees itself in great power industry competition. Party congresses focus on this. Party newspapers constantly discuss it. Chinese leaders constantly discuss it. The United States largely does not. Most of the U.S. trade experts see trade as Ricardian win-win with countries not

competing with each other. Trade policy is to reduce barriers to let markets become more efficient. To the extent elites consider U.S. competitiveness, most believe that we are far ahead of the Chinese and always will be because market economies produce superior outcomes compared with state-directed economies. Or, like Paul Krugman and so many other conventional economists, they deny that the United States competes at all with other economies. Hot-button issues of abortion, immigration, culture wars, health care, and the like, as well as inflation and stock prices, take up the attention of most U.S. policymakers.

Ninth, Chinese officials are pragmatic. If letting companies have more leeway achieves CCP goals, they are for it. If winning requires more state involvement or even control, they are for that. In contrast, it is U.S. officials who are the ideologues. The CHIPS Act is opposed by the Right because it is too much government involvement. The Left opposes it because it commits the sin of helping corporations. Trump's efforts to take equity share in companies are opposed, not because it might not lead to increased national power, but because it violates free-market principles.

If national power industries are important and if China is outperforming the United States, that poses a direct challenge to current trade and economic ideologies.

This ideological nature of U.S. thinking is why so many U.S. experts disparage China, as well as the very need for national power industries. If national power industries are important and if China is outperforming the United States, that poses a direct challenge to current trade and economic ideologies. This is why so many pundits have been arguing that we have seen "Peak China." That way "nothing to see here, move on." No need to do the painful examination of whether our current system works or needs a historic transformation.

But Peak China is a fantasy; nothing could be farther than the truth. The demographic challenge they point to won't really kick in for another decade or so as smaller, younger cohorts move into mid-career roles. Besides, there is every reason to expect that Chinese productivity growth will continue to outpace population decline, as well as U.S. growth rates. The same with the housing bubble-induced fiscal crisis. That is a business cycle challenge, not a growth challenge. Brooks and Vagle dismiss China's techno-economic challenge because U.S. companies account for a larger share of global profits than Chinese firms.[44] But that is misleading for two reasons. U.S. profits overseas, especially in China, provide little in the way of national power. Second, low profits are a CCP tactic that lets Chinese firms gain global market share. Indeed, as a McKinsey Global Institute report points out, "Simply put, US manufacturing companies are expected to produce higher returns on capital than their competitors in the OECD and China."[45]

Some rightly point out that CCP has its own innovation bottlenecks—constraints in extreme-ultraviolet lithography, gallium nitride substrates, or advanced gene-therapy commercialization—that could limit Beijing's ability to sustain techno-war pressures. There is no question that this is true. China is not all-powerful. But the CCP is making massive efforts to either replace Western capabilities or innovate around them with fundamentally new-to-the-world capabilities.

Tenth and finally, China's rulers are much more unified on national goals. While there are divides within the CCP, although they are likely fewer after Xi's purges, the divides are not really about overarching goal. That remains, as China scholar Orville Schell wrote, wealth and power. In this

case, the power of being a rich global hegemon dominating advanced industries.[46] Any differences are about how to achieve that goal, with XI and his faction focused more on techno-economic aggression while any reformers still left focused on using slightly less aggressive policies so as to reduce Western pushback.

National Goals

There used to be more unanimity around U.S. national goals, which changed and emerged after each major historical pivot. In his book *Doing Capitalism in the Innovation Economy*, Bill Janeway discussed how America had national missions from its founding: the Hamiltonian mission of building the country to be independent of England, the mission from Lincoln to FDR to become a great world industrial power and tying the country together, and the post-World War II Soviet containment mission through military offset technology.[47] During the Cold War, there was broad-based bipartisan consensus about not letting the Soviets win, with some seeking a Kenan-like containment and others seeking a Reagan-like victory. But the goal was the same.

Today, America no longer has a unifying national mission or interests to rally around other than, for the Right, freedom, and for the Left (along with many on the "New Right," such as American Compass), equity and redistribution. And for many, the dominant mission now is fighting climate change. For others, it is fighting against the takeover of the world by super AI. And overall, self-interest not only runs amok, but also has become the new civic religion. China doesn't care about any of these matters. It is time for another historical pivot point when America's new national mission becomes not losing the national power industry war to China.

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As discussed in the next section, there is considerable difference of opinion among U.S. foreign policy experts regarding China's goals, and even fundamental nature, and as such a variety of strategic directions for the United States are offered. To the extent experts acknowledge China's power industry actions, the consensus view is that the CCP is focusing on advanced industries either because they simply want to catch up to the West as any developing nation wants to do or they are reacting to Trump's trade aggression and therefore are seeking to legitimately derisk from the United States. Likewise, the consensus view is that the CCP is seeking a seat at the global table in order to influence global issues. Finally, many experts see the CCP as being more capitalist than communist, and that, as such, it is more of a "normal" country than a Marxist-Leninist one.

There are two principal problems with the consensus view. First, the view is likely wrong, stemming from a combination of wishful thinking and long-term intellectual commitments to positions held years if not decades ago but are now outdated. The view that the CCP is truly a Marxist-Leninist regime seeking to be the global hegemon and impose its governance structure on the world is actually likely to be the more accurate one. Second, even if the odds are that the consensus view is the correct one, especially that China is not seeking power industry dominance, it leads to a set of policies that, if right, can lead to an adequate outcome, but if wrong, to U.S. decline and subservience. If this is the case, it makes the struggle for global advanced industry leadership not only more important, but also central to the outcome.

Finally, some believe that China has no desire or interest in having its power industry firms replace U.S. (and allied) power industry firms because then the CCP would have no leverage over our firms because there would be vastly fewer firms that buy from China. But this misses the point. The point is CCP leverage over the nation as a whole, and if it controls power industries, it has enormous power over Western nations.

To better understand the CCP, we can look both at what the CCP says, especially domestically, and what the CCP does in terms of its national power industries' policies.

What the CCP Says

Ultimately, only time will tell which view is correct. But one insight into which is correct—China as a normal developing country or China as a hegemonic Marxist-Leninist regime set on global dominance of national power industries—is to review CCP writings and speeches. As Charles Parton wrote for the U.K. Council on Geostrategy:

> The CCP puts out two types of narrative. The first it terms 'foreign propaganda' [外宣], the language of 'win-win', 'community of shared destiny for mankind', and the Global Development, Global Security, and Global Civilisation initiatives. The second narrative is what it puts out to party members for guidance and reassurance. It is this which better represents its true intentions and therefore to which foreign governments should pay attention.[48]

Perhaps the best analysis of these documents and statements comes from Daniel Tobin, professor of Practice at the U.S. National Intelligence University. In a May 7, 2025, article entitled "The Persistent, Soaring Ambitions of Xi Jinping's 'New Era' for China, Socialism, and the Globe," Tobin analyzed party documents, including Xi Jinping speeches and statements.[49]

He wrote:

> In recent years, a growing number of external observers have rediscovered the value of CCP leadership speeches and policy documents as a vehicle for understanding the PRC's intentions and actions. This is indeed the correct starting place. Owing to the CCP's Leninist heritage, it uses ideology expressed in these venues as its instrument to depict, modify, and mobilize around its long-term goals, view of the external environment, and the policies designed to navigate toward its objectives.[50]

His analysis suggests that the U.S. consensus view of China is wrong, and that indeed the CCP is a Marxist-Leninist party intent on advancing socialism globally against Western capitalism and democracy. He quoted Chinese Leader Xi: "The very purpose of the Party in leading the Chinese people in revolution, development, and reform is to make the people prosperous and the country strong, and rejuvenate the Chinese nation." Parton added:

> Since 1992, the CCP's constitution has maintained that: "The general starting point and criteria for judging each item of the Party's work are that it must benefit the development of the socialist productive forces, be conducive to increasing socialist China's comprehensive national power, and help to improve the people's living standards."

> Comprehensive national power, then, is both an end and a means to achieving the PRC's overall goal of "national rejuvenation" become "a country with leading comprehensive national power and international influence."
>
> In other words, the goal is not just to become a developed, modern strong country in absolute terms, but also a leading country in comparison with others.[51]

But the consensus view is that China just wants to be strong, just as any large developing country wants to be. But Tobin disagreed:

> Indeed, while some external observers have rushed to point out that the official translation says a global leader not the global leader, it strains credibility that, already seeing itself as the number two power in the world as measured in computations of comprehensive national power, Beijing's goal could be to work hard for several decades only to remain number two. In specific areas of international competition including economics, science and technology, innovation, and military capabilities, Xi repeatedly talks about "seizing the initiative," and for and the need for China not to miss another historical opportunity to assume leadership. Indeed, a 2021 *People's Daily* editorial under the pseudonym "Manifesto" (□ □), which Beijing has used several times to express the ambitions of the new era, maintains that "Gaining the upper hand in the competition of comprehensive national power is the key to national rejuvenation."[52]

He then wrote:

> Yet from Washington's standpoint it ought to matter that Xi has been relentlessly consistent in framing the PRC as engaged in a systems contest with capitalism, where the CCP's ability to navigate China to the status of the leading country in the world has implications for the rivalry between socialism and capitalism.[53]

In his 19th Party Congress speech, Xi famously declared about the new era:

> It means that scientific socialism is full of vitality in 21st century China, and that the banner of socialism with Chinese characteristics is now flying high and proud for all to see. It means the path, the theory, the system, and the culture of socialism with Chinese characteristics have kept developing, blazing a new trail for other developing countries to achieve modernization. It offers a new option for other countries and nations who want to speed up their development while preserving their independence: and it offers Chinese wisdom and a Chinese approach to solving the problems facing humanity.[54]

Tobin went on to argue that "Xi Jinping, from his first days in office, has continued to underline these arguments for remaining committed to socialism; yet he also returned to the arguments about socialism's inevitable international triumph that had not been emphasized since the Mao era."[55]

What is troubling is that most U.S. foreign policy experts don't seem to take Xi seriously, assuming that he is simply mouthing Marxist-Leninist platitudes for the party faithful and doesn't

really mean it. This may be in part because they believe that only countries such as North Korea and the former Soviet Union are/were really Marxist. For them, "socialism with Chinese characteristics" is a slogan the CCP proselytizes to pacify the masses.

Most U.S. foreign policy experts don't seem to take Xi seriously, assuming that he is simply mouthing Marxist-Leninist platitudes for the party faithful and doesn't really mean it. For them, "socialism with Chinese characteristics" is a slogan the CCP proselytizes to pacify the masses.

Yet, as Tobin wrote, "In what would become a famous speech to party cadres at the provincial and ministerial level in early January 2013, underscoring the party's commitment to the socialist project, Xi frames the contest as one of systems rivalry with capitalism, a contest in which China is behind but will catch-up."[56]

Tobin recounts that Xi stated:

> Reality has proved again and again that Karl Marx and Frederick Engels' analysis of the fundamental contradiction in capitalist society is not obsolete, nor is the viewpoint of historical materialism that capitalism is doomed to failure and socialism will prevail. It is an irreversible trend of social development, but the process will be tortuous. It will be a long process that leads to the demise of capitalism and the victory of socialism. We must understand in depth the self-regulating capacity of capitalist society and fully recognize the objective reality that developed Western countries will dominate the economic, scientific, technological and military fields for a long time. We must prepare ourselves for long-term cooperation and rivalry between the two social systems.... The most important thing is that we focus on our development to increase our comprehensive national power, improve our people's lives, and develop socialism that has more strengths than capitalism, so as to lay a solid foundation for us to seize the initiative, win the competitive edge, and secure our future.
>
> Our continued success in adapting Marxism to the Chinese context and the needs of our times has enabled Marxism to take on a fresh face in the eyes of the world, and significantly shifted the worldwide historical evolution of the contest between the two different ideologies and social systems of socialism and capitalism in a way that favors socialism.

Tobin went on to note, "Further, Beijing maintained, owing to the PRC's success, Xi Jinping Thought is: 'the Marxism of contemporary China and of the 21st century'."[57] What could be clearer than this?

The key point of Tobin's argument is thus:

> The thumbnail depiction common among US based China specialists that describes Beijing's goals as 'regional dominance and global influence' undersells and does not comport with either Xi Jinping Thought or the PRC's actions. On the contrary, Beijing has made it clear under Xi Jinping that it seeks a place of global leadership where the PRC's proposed solutions to global problems and vision for the global order prevail.... Beijing makes clear that attaining the CCP's objectives

> for the Chinese nation requires the construction of the global order along the lines the CCP favors.[103]

It is risky to ignore the written words laying out the foreign policy goals of dictators, as Stalin learned to his dismay with Adolph Hitler, who in 1925 laid out in *Mein Kampf* (My Struggle) his goals of *Lebensraum* (living space) in the east and destroying Soviet communism.

This is not simple economic competition, the frame that U.S. analysts, including economists, embrace. This is conflict between adversaries.

As this all relates to national power industries, Tobin wrote, "The PRC further sees these technological frontiers as both an opportunity to seize the leading global position and shape how emerging norms and standards are set."[58] And this is not simple economic competition, the frame that U.S. analysts, including economists, embrace. This is conflict between adversaries. Tobin also wrote that Xi "talks about the "great struggle" (a CCP euphemism for the systems contest with Western capitalist democracy), and trumpets "We must maintain strategic confidence and strengthen our fighting spirit."[59]

In summary, Tobin wrote:

> We ought to be able to put to bed suggestions that Beijing's ambitions for its place in the world are regional (with merely "global influence" as the goal). Rather, the CCP's vision is that its ideas and solutions become the foundation for the future global order and underpin the future of a deeply interconnected world and the future development of humanity as a whole. If there remained any doubts about the scope of US-PRC strategic rivalry, the 20th Party Congress and its aftermath should have answered them.[60]

Charles Parton, a former British diplomat, made similar points. He wrote that, to replace the United States as the world's leading superpower:

> [T]he CCP under Xi sees itself engaged in a fierce 'struggle' against 'hostile foreign forces'. For all its accusations that 'certain countries' are guilty of a 'cold war mentality', the CCP itself is in no doubt that this is a cold war— and an ideological one. As Xi has said, 'competition between systems is an important aspect of competition for comprehensive national power', and the dominance of a system gives a country the dominant position in winning the 'strategic initiative.'[61]

He went on to quote one CCP official: "International struggles are becoming increasingly fierce, and system confrontation has become a prominent feature of the game between major powers. The US suppression [of us] is a major threat but [our struggle with the US] is both a skirmish and a protracted war."[62]

He cited another CCP official with a similar tone of belligerency: "The strategic contest between China and the United States is bound to last for a long period of time, for which we must be fully prepared ideologically and work."[63] He discussed how the minister of Science and Technology wrote in the *People's Daily*, the CCP's newspaper:

> [T]he scientific and technological revolution and the contest between major powers are intertwined; the high-tech field has become the forefront and main battlefield of international competition, profoundly influencing the global order and development pattern…the competition between countries is a competition of strength. What is crucial is the competition of scientific and technological innovation capabilities. The underlying contest is about whose system is superior.[64]

As such, the CCP sees technology as a core component of national power. Parton went on to discuss how:

> Influential commentaries and articles in party media at the time of the First Session of the 14th NPC in 2023 made that point clearly: To a certain extent, those who gain access to the internet will gain the world. Seizing the historical opportunity of the information revolution is a major strategic decision related to the construction of a strong country and national rejuvenation. Core technology is an important weapon for the country….Only by holding key core technologies in our own hands can we fundamentally guarantee national economic security, national defence security, and other security.[65]

In "A Vision of Success in the U.S.-China Rivalry: The Technological Competition," Michael J. Mazarr, senior political scientist at the RAND Corporation, wrote:

> There can be little doubt that Beijing aims to be the unquestioned global leader in a whole series of science- and technology-based industries, from 5G and renewable energy to electric vehicles and biotechnology. (In parallel, it is seeking dominance in less technologically cutting-edge industries such as shipbuilding.) How precisely China defines success in these terms is not clear, although in some cases, such as solar panels, it has achieved something close to a global monopoly position in manufacturing, and in 5G China was apparently seeking to position Huawei similarly as the overwhelmingly dominant global actor. This position of technological overmatch would consequently provide Beijing with tremendous leverage in its broader effort to achieve global leadership. China's favored end state in the technology competition therefore envisions overall supremacy in many critical fields, all of which can be employed for broader geostrategic effect.[66]

We see this focus on influence and struggle in terms of how the CCP conceives of industry. Whereas U.S. thinkers see economic policy as enabling allocation efficiency with no other industry more important than another, CCP officials have a different view. An interview with Lu Feng, a leading professor at Peking University's School of Government, specializing in industrial policy, technological innovation, and development, gives a sense of this difference.[67] In the interview, cross-posted in the Substacks *High Capacity* and *Sinification*, Feng argues that China needs even more industrial development because it is a "strategic asset."[68]

According to interviewers Kyle Chan and colleagues, "Lu Feng argues that China's industrial base is its 'greatest source of strength" and a "strategic asset" akin to U.S. dollar hegemony or Russian oil and gas."[69]

Professor Wang Yu of the Nanjing University Business School said the same in March:

> The essence of competition among major countries is scientific and technological competition … The strategic value of strategic emerging industries and future industries lies in their fundamental impact on the future industrial status of various countries, reshape the international division of labor, and enhance national discourse power.[70]

Whereas U.S. thinkers see economic policy as enabling allocation efficiency with no other industry more important than another, CCP officials have a different view.

The CCP laid out its game plan in China's Made in China: 2025 plan that calls for China to become a global advanced manufacturing "powerhouse."[71] The plan stated:

> Since the beginning of industrial civilization in the middle of the 18th century, the history of the rise and fall of world powers and the history of the struggle of the Chinese nation has repeatedly proved that without a strong manufacturing industry, there will be no country and no nation. Building an internationally competitive manufacturing industry is the only way China can enhance its comprehensive national strength, ensure national security, and build itself into a world power.
>
> It must look to the world, step up strategic deployment, focus on building a manufacturing powerhouse, shore up its roots, and turn challenges into opportunities to seize the commanding heights of a new round of competition in the manufacturing industry.
>
> By the 100th anniversary of the founding of New China, the country's status as a manufacturing industry power must be consolidated, and its comprehensive strength must enter the forefront of the world's manufacturing powerhouses. The main areas of the manufacturing industry must be innovation-led with obvious competitive advantages, and we will build a world-leading technology system and industrial system.

China's National 13th Five-Year Plan for the Development of Strategic Emerging Industries also gives several indication of the CCP's intention dominate power industries, including:

> Industry innovation capabilities must rank first globally, forming first-mover advantages in several major sectors.
>
> By 2020, … the self-sufficiency rate for major key materials reaches over 70% to initially realize the strategic transformation of China from materials power to materials superpower.
>
> Promote domestic enterprises and Chinese-foreign enterprises in jointly developing international markets, support the "going global" of the supply chain to feed high-quality assets, technology, and management experience from "going global" back to China and form comprehensive competitive advantages.[72]

Chan wrote:

> The US-China rivalry ultimately as a contest between two systems: China's "industrial socialism" and America's "financial capitalism." The US was once an industrial powerhouse like China today with half of global production and an "arsenal of democracy" that changed the course of World War II. But, in a critique with strong political resonance within the US, Lu Feng says the US economy became increasingly "financialized," dominated by the short-term interests of Wall Street investors, causing America's industrial base to atrophy. In contrast, China's socialist system ensured that financial resources would be directed toward supporting the "real economy" and steer China away from the standard path of deindustrialization.[73]

China is working on a Made in China: 2035 plan that aims to surpass the United States in all advanced production industries. Lu Yongxiang, former vice-chairman of the National People's Congress, in a commentary published in 2024 in the "Chinese Journal of Mechanical Engineering" stated, "It is estimated that by 2035, 'Made in China' will surpass the United States and become the global leader."[74] He went on to note, "'Irreversible US production declines amid an expanding Chinese economy will thrust world into a new era." Note "U.S. declines" and "new era." The CCP knows that its effort to lead the world cannot come without absolute U.S. decline in advanced industries. And the new era refers to an era in which China is dominant.

And as Xi Jinping has stated, "Technological innovation has become the main battleground of the global playing field, and competition for tech dominance will grow unprecedentedly fierce."[75] Note the terms "battlefield" and "dominance." Likewise, as a CCP report titled "General Laws of the Rise of Great Powers" states, "Becoming a major manufacturing power provides crucial security for the goal of realizing the Great Rejuvenation of the Chinese Nation."[76]

In an article in state-run publication, the author wrote:

> 'Advancing Chinese-style Modernization Requires Handling Several Major Relationships Well,' General Secretary Xi Jinping pointed out the need to 'strengthen national strategic scientific and technological capabilities, guided by national strategic needs, focus on original and leading scientific and technological research, and resolutely win the battle to overcome key core technologies.[77]

Likewise, in the CCP-controlled publication *Peoples Forum*, Wei Ziping, a teacher at the School of Public Administration and Law, Anhui University of Technology, wrote in 2023 that China needs to "accelerate progress toward our goal of leading the world in key core technologies, build China into a global power in science and technology, expand the space for Chinese-style modernization through institutionalized, high-level openness and cooperation, and realize the Chinese Dream of the great rejuvenation of the Chinese nation."[78]

One leading Chinese scholar spoke at a major conference, "The competition for the Fourth Industrial Revolution will be held between China and the US. But America also suffers from the diseases of neoliberal politics. Its prospects are not bright. For China this once-in-a-century race is an opportunity."[79]

Former Deputy National Security Advisor Matt Pottinger describes a meeting during the first Trump administration with Chinese Premier Li Qiang in Beijing:

> Addressing Trump from across the table, Premier Li painted a menacing picture of the not-so-distant future. China, he said, would completely dominate this century's most important technologies, including artificial intelligence. The world would become more dependent on China than ever before. The United States, Li said, was destined to export little more to China than soybeans and corn. To add insult to injury, Li said Beijing would purchase substitutes for U.S. agriculture if the Communist regime was unhappy with Washington for one reason or another.[80]

Maybe this was bluster, or maybe he was turning over this cards to show the CCP's hand.

Either way, there is increasing evidence that China is preparing for a major external crisis; what Xi calls "extreme-case" situations, or "jiduan qingkuang." Whether that is war, we do not know.[81] What Rand Scholar Jimmy Goodrich calls China's "fortress economy" involves both defense and offense.[82] None of this is the language of nation seeking to just move up the development ladder; it is language of power and domination.[83]

The CCP knows that its effort to lead the world cannot come without absolute U.S. decline in advanced industries. And the new era refers to an era in which China is dominant.

CCP leaders are savvy enough to not explicitly show their hand, at least in venues that Westerners are likely to come across. After many nations expressed alarm, CCP officials understood that they were in error when they were so explicit about their goals for industrial power in Made in China: 2025. Shortly thereafter, Chinese leaders quietly dropped most if not all references to it, even as they doubled down on its implementation.[84]

But that does not mean that it is still not their strategy. The title of Rush Doshi's book, *The Long Game: China's Grand Strategy to Displace American Order*, says it all. This is not just about China rising, but also about China displacing the United States and other Western leaders, and the techno-economic battlefield is where much of the conflict will be fought. He writes that China's strategy is to displace the United States, including in the techno-economic sphere, and it uses predatory practices to accomplish that.[85]

U.S. Secretary of State Marco Rubio issued a report when he was the chair of the U.S. Senate Committee on Small Business and Entrepreneurship, concluding that China was doing more than "breaking the rules" to dominate high-value industrial sectors.[86] This helps explain why, despite a highly polarized political climate, Congress managed to pass the CHIPS and Science Act, which invests billions of dollars to support new semiconductor factories in the United States. Nothing promotes unity like a shared and frightening enemy.

In a report for the Hoover Institution—"Economic Statecraft: The Need For An Integrated Approach"—H.R. McMaster and Andrew Grotto discussed the need for the USG to "exercise broad discretion to intervene in the economy to address a threat emanating from overseas (e.g. China)."[87] It rightly argues:

> US administrations consistently undervalue the degree to which strategic application of economic power is essential for advancing US vital interests…The United States must act to counter Chinese economic aggression—nonmarket

> actions intended to harm American companies, impair US manufacturing, or coerce the United States and its allies.[88]

In *Getting China Wrong,* Princeton University scholar Aaron Friedberg argued that:

> Growth and development have not caused China's rulers to relax their grip on political power, abandon their mercantilist economic policies, or accept the rules and norms of the existing international system. To the contrary: China today is more repressive at home, more aggressive abroad, and more obviously intent on establishing itself as the world's preponderant power than at any time since the death of Chairman Mao.

Likewise, as Fredberg noted, "The key to understanding Xi's economic policies is to recognize that they are principally about power, not prosperity. He will almost certainly forge ahead toward concentrating the world's industrial power within China."[89] He went to write:

> Rather than letting the free play of market forces and the principle of comparative advantage determine the international distribution of industrial capacity, it seeks deliberately to build "national champions," helping them to acquire and "indigenize" critical technologies and supporting their efforts to dominate domestic and global markets for cutting-edge products.[90]

Finally, an anonymous author of an Atlantic Council report entitled "The Longer Telegram" warned that implementing an effective China strategy would "require a firm understanding of Xi's strategic objectives, which include the following: leapfrog the United States as a technological power and thereby displace it as the world's dominant economic power."[91]

What the CCP Does

Even with what should be compelling evidence of the CCP's intent, there will be those who say that these words are for internal consumption and don't reflect the CCP's external goals. Or that these translations make subtle but important mistakes that distort meaning. To those, I would argue, look at what the CCP has been doing.

China follows a predictable playbook for trying to dominate advanced industries. The first step is to attract foreign investment. In the early 1980s, when Deng Xiaoping opened up the Chinese economy to foreign investment, his main economic development strategy sought principally to induce foreign multinationals to shift relatively low- and moderate-value production to China.[92] China is still trying to do that today with emerging industries, seeking, for example, to attract global biopharmaceutical companies to build facilities in China.

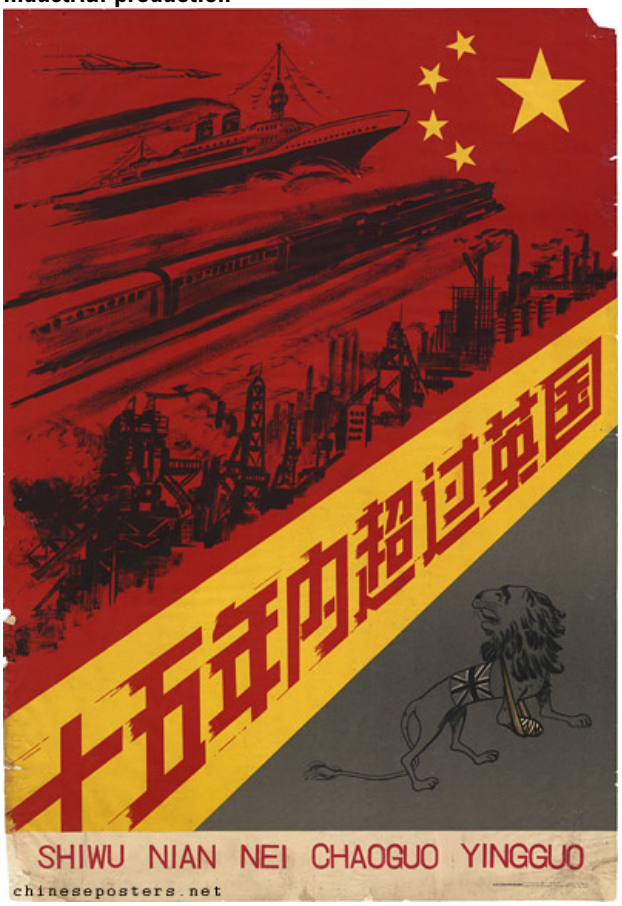
China follows a predictable playbook for trying to dominate advanced industries.

China's second step is to attempt to learn from foreign companies, in part by having them train Chinese executives, scientists, and engineers, and also by forced technology transfer, including through joint ventures. In 2015, 6,000 new international joint ventures, amounting to $27.8 billion in foreign direct investment (FDI) inflows, were established in China.[93] And the sophistication and value of the technology the Chinese government has demanded is high. As the United States Trade Representative's (USTR's) Office pointed out in its 2018 Special 301 report

on China, pressures on U.S. companies to form joint ventures and transfer technology "is particularly intense."[94]

The third step is to support Chinese companies in their efforts to copy and incorporate foreign technology while building up domestic capabilities. One important marker for the transition from stage two to stage three was the publication in 2006 of the "National Medium- and Long-term Program for Science and Technology Development (2006–2020)," which called on China to master 402 core technologies—everything from intelligent automobiles to integrated circuits and high-performance computers. China moved to a "China Inc." development model of indigenous innovation, which focused on helping Chinese firms, especially those in advanced, innovation-based industries, often at the expense of foreign firms.

Figure 1: 1958 CCP poster exhorting Chinese workers and companies to "surpass Britain in 15 years" in industrial production[95]



The fourth step is to enable Chinese firms to become independent innovators. China is attempting to do this through an array of plans and policies: "13th Five-Year Plan for Science and Technology," "13th Five-Year Plan for National Informatization," "The National Cybersecurity Strategy," and "Made in China 2025 Strategy," and most recently Xi Jinping's call at the 20th Party Congress for "invigorating China through science and education ... for the strategy of innovation-driven development."[96] A key part of this step is to squeeze out the foreign companies that they had initially invited in. The Chinese market essentially becomes dominated by Chinese-owned firms. We have seen this an array of industries, including chemicals, telecom equipment, heavy construction equipment, high-speed rail, and renewable energy.

The CCP then carves out and preserves the Chinese market for Chinese firms. For example, the Chinese government included 57 domestic auto battery makers in the catalog, meaning that foreign giants such as Samsung, LG, and Panasonic were excluded.[97] This demonstrates how China protects its domestic champions while they build capacity for international expansion.

The final step is to support these companies "going out" and taking market share in other parts of the world. Unfortunately, for gaining political support for a robust U.S. strategy to respond to China, the United States is among the last places Chinese firms will seek to enter. Rather, they are going after market share in places such as Latin America, Southeast Asia, Africa, and Eastern

Europe, the "soft underbelly" of global markets. As their firms gain market share, Western—including U.S.—firms, lose market share, and tipping points can happen quite quickly.

Chinese Subsidies

China backs this all up by massive subsidies to its industries. Firms often have to compete in "unfair" markets, if only because many factors affect the value of currency. Hence, firms can find themselves with an uncompetitive cost structure in global markets even though they are doing everything right. But leaving this aside, firm competition plays out through several key factors, with price and quality being the most important. If one firm is provided subsidies (including a devalued currency), it has—all else equal—a competitive advantage over its foreign competitors that receive limited subsidies. The firm can use that advantage to cut prices and gain market share. It can boost its scale and learning economies. Or it can invest those subsidies in R&D and other areas to boost quality and innovation, again taking market share from its competitors.

China's subsidies are on steroids because of the intense competition for industry between its cities and provinces, which shell out massive funds to support local champions. And it ignores the supposed WTO disciplines on subsidies.

While a number of nations have relied on many forms of subsidies (low corporate taxes, tax incentives, grants, subsidized costs of inputs such as energy, and a suppressed value of their currency), by and large, the scale of the subsidies is usually limited, often by domestic political pressures from voters demanding lower taxes or higher spending to directly benefit them. At the same time, many Western nations implement various subsidy-limitation measures because they want competition to be on a level playing field. But China is exempt from all of those limitations. China's subsidies are on steroids, in part because of the intense competition for industry between its cities and provinces, which shell out massive funds to support local champions. And China flouts the flaccid WTO disciplines on subsidies.

The magnitude and extent of Chinese subsidies have been widely documented. Though dated, Haley and Haley's book *Chinese Industrial Subsidies* documents just how sizeable these were and the role they played in enabling China to gain global market share in the 2000s. More recently, Center for Strategic and International Studies (CSIS) found, "Even using a conservative methodology, China's industrial policy spending is enormous, totaling at least 1.73 percent of GDP in 2019. This is equivalent to more than $248 billion at nominal exchange rates and $407 billion at purchasing power parity exchange rates."[98]

A new study from a German institute estimates, "Overall, industrial subsidies in China are several times higher than those in large EU and OECD countries. The size of the estimated difference ranges from a ratio of at least three to four in conservative estimates to a ratio of as high as nine in more encompassing studies."[99]

In 2022, 99 percent of listed firms in China received direct government subsidies. For example, the German study finds that Chinese EV maker BYD has received over $3.7 billion in subsidies. Overall, in 2019, Chinese industrial subsidies were 4.5 times greater than the United States as a share of GDP, and that is accounting for the U.S. subsidies related to national defense and government support for scientific research.[100]

Hand in hand with subsidies are market access restrictions. The first directly helps a domestic company gain market share; the second helps indirectly by reducing the market share of a foreign competitor and increasing that domestic firm's share. For example, when the Chinese government tells its state-owned telecom providers to stop using American computer chips in their systems, it weakens companies such as Intel and AMD while strengthening Chinese companies such as SMIC.

China's massive size means that it an and is seeking competitive advantage in every technology, current and emerging. In comparison, Japan in the 1980s and 1990s sought and gained advantage in significantly fewer sectors (e.g., consumer electronics, steel, autos, and chemicals). This size also means that because China manages its market and limits foreign sales once its firms get to a certain scale, Chinese firms are blessed with massive, largely secure market revenues, and this includes massive government subsidies.

In addition, the scope of state power to punish foreign firms and favor domestic ones is unprecedented. By cutting off foreign firms (or reducing their China revenue) while bestowing lavish benefits on its own firms, Chinese firms are able to sell below cost for many years, if not decades, all with the goal of taking market share away from global leaders. Japanese firms also did that, but to a much more limited extent.

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China's Wage Suppression and Productivity Promotion

One reason why international trade theory holds that low-wage countries won't dominate global trade because of their low costs is that they also have low productivity. Thus, when pundits warn that the United States can't compete with low-wage nations because of our higher labor costs, they are ignoring the fact that what matters is productivity-adjusted labor costs.

And it is a normal pattern of development that labor costs in virtually all countries tend to track labor productivity quite closely. According to Claude AI, there is a 0.88 correlation between labor costs and national labor productivity, just as we would expect. The average ratio of wages to productivity for 42 countries is 0.51, and in the United States it is 0.53, whereas in China it is just 0.24. In other words, if Chinese wages were half of Chinese productivity levels, as is the case in virtually all other nations, then wages in China would be twice as high, significantly reducing its competitive advantage in global markets.

One recent study examined five manufacturing industries, including electric vehicles, shipbuilding, and steel and argued that for a variety of reasons the Chinese government undercounts industry productivity.[101] The author found that physical output per worker averaged 2.4 times higher than U.S. output per worker, and value-added per worker was 20 percent higher, on average. Assuming that the value-added measure is a more accurate, apples-to-apples comparison, this means that China's cost-to-productivity ratio is between 6 and 12 times greater than the U.S. ratio, given that Chinese workers earn around 20 percent of U.S. workers' wages in dollar terms. This suggests that China is breaking the historical model for developing nations, where wages track productivity. The PRC is making sure that the benefits of productivity don't go

to Chinese workers but rather to foreign consumers who can buy cheaper products, with the goal of driving foreign producers out of business. This is consistent with a longstanding CCP pattern of giving short shrift to nonmanufacturing productivity growth and instead maintaining a laser-like focus on raising productivity in manufacturing.

While up-to-date quantitative data is not available, it is clear that China is doubling down on this approach in manufacturing. ITIF has calculated that, in 2021, China had 12 times more robots in use per manufacturing worker as did the United States when controlling for wage levels (higher-wage nations should have more robots than should low-wage nations).[102] In 2022, China had 59 percent more robots per manufacturing worker than did the United States.[103] And it installed more robots than the rest of the world combined did.[104] It is encouraging highly automated factories, including so-called "dark factories" with very few workers. This suppression of manufacturing labor costs coupled with acceleration of manufacturing productivity through automation appears to be gaining in focus in China, and is a powerful weapon for gaining global market share.

The PRC is making sure that the benefits of productivity don't go to Chinese workers but rather to foreign consumers who can buy cheaper products, with the goal of driving foreign producers out of business.

China's "Going Out" Strategy

As noted, the CCP knows that if it clearly articulates its techno-economic war strategy that it will mobilize both defensive and offensive reaction from the West. And so, of course, it does not. But one way we can get a sense of it is by examining China's global business expansion strategy. If China were only focused on gaining self-reliance from the United States it would be much less focused on gaining global market share.

China's "Going Out" (走出去) policy is a comprehensive government strategy launched in the early 2000s to encourage Chinese companies to expand internationally. The government encouraged companies to "go further outwards" (Jinyibu zouchuqu) in its 11th Five-Year Plan (2006–2010). Government policies encouraged Chinese state-owned enterprises (SOEs) and private enterprises to pursue investments in markets around the world, resulting in the internationalization of SOEs. The government specifically uses SOEs as vehicles for international expansion, providing them with preferential treatment and resources.

China's sovereign funds have also supported efforts to Go Out, including by helping Chinese enterprises finance mergers and acquisitions abroad. In 2015, for example, China Investment Corporation turned one of its divisions into the wholly owned subsidiary CIC Capital. This provided Chinese companies with massive capital backing for overseas acquisitions.

And of course, its Belt and Road Initiative (BRI) represents the most ambitious manifestation of the Going Out strategy. In the first 10 years of the initiative (2013–2023), China inked roughly $1 trillion worth of investment and construction deals with BRI countries[105] Between 2000 and 2022, Chinese financiers committed to lending or donating $1.34 trillion to low- and medium-income countries—nearly $800 billion of this was in the first decade of the BRI from 2013 to 2022.[106] The Chinese state is the underwriter for the initiative, via its four state-owned banks lending to SOEs.[107]

At the same time, PRC banks provide vastly more support for foreign investment than do USG institutions.[108]

Box 2: Chinese Competition and American Deindustrialization: A Financial Framework[109]

Different financial systems help determine the outcomes of the techno-economic war. China's system is designed to aggressively destroys Western company value. The U.S. system is designed to maximize short-term wealth creation and is agnostic toward national industrial power competition.

The U.S. Economic Model

Publicly traded corporations in capital-intensive sectors (e.g., industrials) optimize three key variables.

The first is economic value added (EVA). EVA equals return on invested capital (ROIC) minus the weighted Average Cost of Capital (WACC) (ROIC - WACC) times the amount of invested capital (IC). The weighted average cost of capital for U.S. firms is around 8–10 percent. ROIC equals net operating profit after tax NOPAT divided by invested capital.

Profit margins are calculated in various ways. Gross margin is sales minus the cost of goods and production labor. From an industrial standpoint, the most relevant profit margin is the gross margin. The others are influenced by a firm's overhead expenses and its tax, investment, and capital strategy.

The U.S. model is more financialized and focus on higher, short-term returns than other capitalist economies. But China is in a completely different model.

The Chinese Economic Model

Chinese firms systematically generate ROIC well below American WACC thresholds. The Chinese semiconductor firm SMIC, for example, posts approximately 4.5 percent ROIC versus around 12 to 16 percent global semiconductor industry WACC, creating negative EVA by American standards. Chinese EVA = (4.5% - 12%) × IC = -7.5% × IC.

In other words, Chinese firms can survive on ROIC that is less than the cost of capital in the United States. This economic value destruction manifests as the "China price"—aggressive pricing that destroys gross margins industry-wide. Chinese firms partially compensate through higher capital turns (sales/IC), enabled by rapid market expansion and debt-financed growth.

Chinese firms can do this because of overall financial repression in China. The PRC prevents savers from getting normal returns, and its capital controls on foreign investment preclude outside options. Both lower the cost of capital.[110] At the same time Chinese companies are pressured by the PRC to accept low returns and provided with low-cost capital from state-owned banks in order to gain market share.[111]

American Industrial Response

Faced with Chinese "scorched earth" competition, U.S. firms can generally only pursue two strategies that make up essentially the mirror image of Chinese value destruction:

Strategy 1: Asset-Light Retrenchment

Given this unbeatable competition, one strategy is for U.S. firms to reduce their IC base through outsourcing of production assets to someone else's balance sheet. At the same time, they focus on capital-light activities with higher margins, such as design, sales and market, and software. And they tend to limit expensive investments in capital equipment.

Strategy 2: Cost Reduction for Margin Protection

A second strategy is offshore supply chains and production of lower-cost inputs to preserve gross margins. At the same time, they are forced to press for lower prices from domestic suppliers and workers.

Capital Allocation Logic: Both of these strategies are additionally supported by a capital strategy that increases earnings per share. In particular, the companies use freed-up cash for share buybacks. Since earnings per share equals Net Income divided by the number of outstanding shares, so EPS can go up with stock buy backs.

With Chinese competitors destroying economic value while gaining market share, new productive investments cannot be justified. The rational response for these companies is returning cash to investors through share buybacks, inflating EPS even as the industrial base shrinks.

Deindustrialization Outcome

Both strategies hollow out domestic industrial capacity: Strategy 1 directly reduces the manufacturing base, while Strategy 2 degrades supplier ecosystems and workforce capabilities. The result is a self-reinforcing cycle wherein American firms lose the ability to scale innovation and compete in advanced manufacturing, validating Andy Grove's 2010 warning about the strategic risks of abandoning production competencies.

While some populists on the Right and the Left decry U.S. industrial corporations for taking these steps, accusing them of being profit hungry, this is too narrow a focus. The normal rate of capital returns in normal market economies is above 8 to 12 percent, given the cost of capital. No company can survive earning less than the cost of its capital. As such, if these companies tried to do that to meeting the China price, rational shareholders, including labor union pension funds, would invest in other sectors and companies that do not face this constraint, such as insurance and banking, logistics, and entertainment.

Rather than engage in emotionally satisfying and politically rewarding hectoring of selfish U.S. capitalists, a better strategy is to limit Chinese scorched earth competition while providing targeted incentives for national power industries to stay in the fight and keep investing.

THE NATURE AND IMPORTANCE OF NATIONAL POWER INDUSTRIES

Perhaps the fundamental flaw in the thinking of most in the U.S. foreign policy establishment, including the mass of pundits, journalists, think tank scholars, and academics is their dismissal of the importance of national power industries and lack of understanding of how these industries actually work. Most in the foreign policy establishment are educated in everything but how national power industries work. A random case in point: Johns Hopkins School of Advanced International Affairs Masters' Program curriculum. Students focus on international relations, regional studies, and language studies. But they also must take a set of courses on international economics. This sounds promising, until looking at the courses: "[T]he Economics I track covers topics in Microeconomics and International Trade Theory, and the Economics II track covers

topics in Macroeconomics and International Finance. The Essentials courses are more conceptual in nature and require only basic math skills."[112] As noted, these have almost nothing to do with business strategy, technology development, or industrial policy. Harvard's course list for its international relations master's program includes courses such as "Globalization and the Nation State" and "The Evolution of Deterrence Theory." Out of around 50 courses, there is just 1 that might bear on the U.S.-China tech war and that is "The Geopolitics of Technology," but like most of the limited focus in U.S. graduate school International relations, they are on the internet, exploring things like cybersecurity, ethical issues in AI, and cybersecurity."[113] Tuft's Flecther School of Global Affairs seems more promising, offering an entire program on "Technology and International Affairs" but it too is focused on the Internet and cyber.[114] It's International Economic Relations track seems promising, but it is neoclassical international economics, not power economics. Its International Security track is promising, but this is related to military issues, and of course, cyber conflict.

Perhaps the fundamental flaw in the thinking of most in the U.S. foreign policy establishment is their dismissal of the importance of national power industries and lack of understanding of how they work.

To be sure, these kinds of courses are quite important for being able to effectively study and participate in U.S. international relations, but they have little or nothing to do to prepare the student for understanding the importance of power trade, much less being able to understand what to do. As one distinguished U.S. foreign policy official said to me, "I wish we had learned technology in the foreign policy establishment, given how central it is now to the field." Well, they didn't and therefore they give technology and national power industries short shrift. And we see that in most foreign policy books on China, including the excellent new book by China foreign policy expert George Shambaugh, *Breaking the Engagement*, where technology is hardly mentioned. They stick with what they know best: diplomacy, foreign policy, great power, competition, human rights, etc.

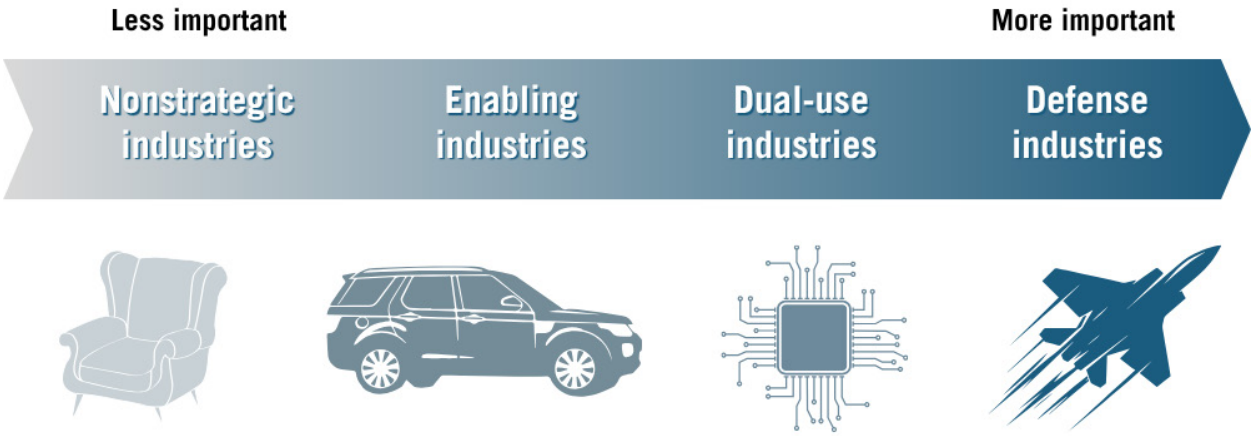
The U.S. foreign policy experts completely ignored the reality, possibility, and success of the Chinese techno-economic war in part because they denied the reality that certain industries provided power. They wanted a relationship that, as Shambaugh wrote, "would become more stable, productive and manageable. The more threads tying down the relationship like Gulliver, the more impediments there would be to systemic disruption."[115] But what disruption? For them, disruption meant not talking. They ignored the erosion eating into U.S. national power industry strengths. Pushing back against that would hurt the most important thing: dialogue.

If the lion's share of the U.S. foreign policy establishment ignore industry, perhaps with exception of defense contractors and large Internet platforms, the MAGA right loves all industry and wants to reindustrialize America, from baseball mitts to biotechnology.

What America needs is a "third way" for trade grounded in strategic industry trade policy based on the realization that some industries matter far more than others. The conventional view is that the only industries that matter to national power are defense industries. But that is now vastly too limiting. As Corelli Barnett, wrote, "For munitions production for modern war is not primarily a question of specialized armament industries, as some suppose, but of all those varied industrial and scientific resources that in peacetime make for a successful and expanding export

trade."[116] As such, ITIF has developed a classification of U.S. industries for their relevance to national power. This can be viewed as a continuum between defense industries on one side, nonstrategic industries on the other, and strategic industries and strategic enabling industries in the middle. See figure 2.

Figure 2: Industrial power scale



At one end of the continuum are defense industries. Clearly industries such as ammunition, guided missiles, military aircraft and ships, tanks, drones, defense satellites, and others are strategic. Not having world class innovation and production capabilities in these industries means a weakened military capability. Policymakers across the aisle generally (with the exception of the isolationist Right and the pacifist Left) agree that these industries are strategic and that market forces alone will not produce the needed results.

At the other end of the spectrum are industries in which the United States has no real strategic interests. These include furniture, coffee and tea manufacturing, bicycles, carpet and rug mills, window and door production, plastic bottle manufacturing, wind turbine production, lawn and garden equipment, sporting goods, jewelry, caskets, toys, toiletries, running shoes, etc. If worst came to worst and our adversaries (e.g., China) gained dominance in any of these industries and decided to cut America off, we'd survive—in part, because none of these are critical to the running of the U.S. economy, as many are final goods that might inconvenience consumers but wouldn't cripple any industries, and also because, in most cases, domestic production could be started or expanded relatively easily because none of these products are all that technological complex from either a product or process concern and the barriers to entry are relatively low.

Next to defense industries dual-use industries are critical to American strength. Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give our adversaries incredible leverage over America. Just the threat to cut these off (assuming that they have also deindustrialized our allies in these sectors) would immediately bring U.S. policymakers to the bargaining table. National power industries tend to also need global scale in order to complete. Moreover, many are intermediate goods such as semiconductors and chemicals, where a cutoff would cripple many other industries. Finally, these industries are hard to stand up once they're lost because of the complexity of the

production process, product knowledge, and the importance of the industrial commons that support them. In other words, barriers to entry are high and, if lost, would be very difficult and expensive to reconstitute.

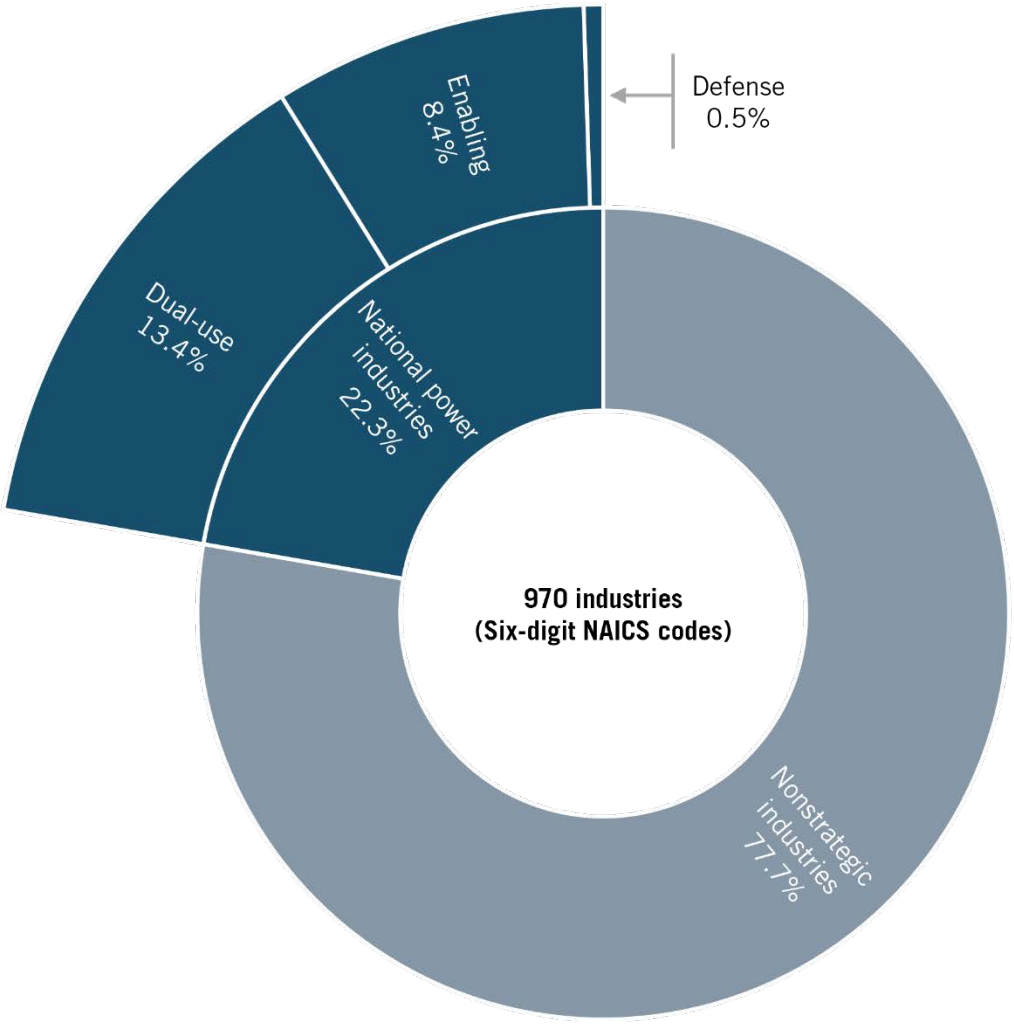
What America needs is a "third way" for trade grounded on strategic industry trade policy based on realization that some industries matter far more than others.

Finally, there are enabling industries. These are industries wherein, if the United States were cut off, the immediate effects on military readiness would be small. And the U.S. economy could survive for at least a while without production. America could survive for many years without an auto sector, as we would all just drive cars longer. But because of the nature of these industries—including technology development, process innovation, skills, and supporting institutions—their loss would harm both dual-use and defense industries. That is because enabling industries contribute to the industrial commons that support dual-use defense industries. A severely weakened motor vehicle sector would weaken the tank and military vehicle ecosystem. Similarly, a weakened commercial shipbuilding sector has weakened military shipbuilding. A weakened consumer electronics sector weakens military electronics.

We can see this in China, whereby the fact that it employs 213 million manufacturing workers, including engineers and technicians, gives it an enormous sophisticated and dynamic production system with synergies and spillovers between enabling industries, national power industries, and defense industries. Indeed, China does not and cannot draw firm lines between civil and military industries and technologies, and instead tries to fuse them.

In a companion report to this one, ITIF has put the 970 industries classified by the North American Industry Classification codes into the four categories.[117] Power industries account for 22.3 percent of the industries. (See figure 3 below and table 2 in the third appendix.) Most industries are not power industries, in large part because most are nontraded sectors such as law firms and barber shops. Of the 22.3 percent that are power industries, just 0.5 percent are defense industries, and 13.4 percent are dual use. The remaining 8.4 percent are enabling industries. In terms of employment, in 2022, just 9.5 percent of workers were employed in power industries. Of this, 6.4 percent worked in dual-use industries and 2.9 percent in enabling industries, and just 0.2 percent were employed in defense industries.

Figure 3: Breakdown of six-digit NAICS industries according to ITIF's national power industry typology



As such, trade policy should be focused first and foremost on defense, strategic, and enabling sectors and largely ignore nonstrategic. The problem is that Trumpian economic nationalism, at least as represented by some of his key officials, sees all four as equally worth of protection. Why else would Trump fight Canada so hard for dairy and wood products trade, clearly nonpower sectors. Likewise, why else would the administration push so hard for natural gas and farm product exports? Boosting exports of the former will reduce American fossil fuel resources, while boosting exports of the latter will do little to increase American food security.

At the same time, policymakers lack two key insights needed to respond in effective ways. The first is that some industries are strategic. Yet, both political parties have embraced a "potato chips, computer chips, what's the difference?" mentality. The head of one of the leading international economic policy think tanks in Washington said when asked how much manufacturing the United States could lose and still be okay, "All of it." Today, the Trump tariffs are anything but strategic, with the view that the chicken industry is as important as the chip

industry. The intent of this project is to change that so that there is a broader consensus around Washington on the criticality of strategic industries for the Republic's future.

1. Global trade is particularly important in most national power trade industries, particularly dual use. These industries are different in core ways from other industries. Given their high fixed costs relative to marginal costs and the fact that they must reinvest profits to produce the required next round of innovation, firms in these industries require access to global markets.

2. In addition, firms in these industries are much more susceptible to dying. If CCP competitors can gain enough global market share, they can enter into a virtuous cycle of more revenue, more profits, and more investment in the next round of innovation and so on. Conversely, firms that lose market share risk falling into a death spiral, where they invest less in R&D and new product development and process innovation, and therefore their next rounds of products/services fall behind their competitors, leading to another round of reversal.

3. Dual-use and defense industries also differ in that they are the engines of national power. To be sure, certain traditional industries, such as steel, are important to national security. However, many traditional industries are largely commodities produced in many countries and are largely available as inputs. Advanced industries are different. Production is concentrated in relatively few countries. Advanced innovation/production ecosystems contribute to and support defense industries. And these industries enable national power to be projected and to defend against adversaries attempting to project their power.

Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give America's adversaries incredible leverage.

We have seen the importance of national power industries in history. Case in point, the relative weakness of Great Britain against Germany in both WWI and WWII. The advancement of Germany's broad industrial base, and the atrophy of Britain's, resulted in the latter's relative military weakness, with only the entry of the United States in both wars enabling Britain to escape without military defeat. In his classic book *The Collapse of British Power*, Corelli Barnett wrote that:

> it was not the small size and partial decrepitude of Britain's specialized armaments in industry that were mainly responsible for throttling back British armament. For specialized armament firms constitute only a small part of the production of modern war equipment, which is a matter of general industrial resources and technology, especially in all kinds of advanced engineering. It was such general and varied resources that Germany had been able to swiftly convert to producing munitions after 1933 but it was such a resources that Great Britain terribly lacked just as in 1914-15 as the Defence Policy and Requirements Committee had warned in submitting its recommendations for a large scale rearmament in February 1936: "The most serious factor in the completion of the proposed program is the limited output of our existing industrial resources. The

> key to successful completion of the service programs lie in the solution of the industrial problem.[118]

Largely because of the dominant "liberal" "Adam Smithian" view of the role of government in industrial development, Britain never learned this lesson. After WWII, with the profligacy of the Beveridge-Attlee welfare state, the British once again "failed to retool the economy before European and Japanese competitors recovered from wartime devastation."[119] For the British, the sad and stark reality is that it was too late for them to do anything meaningful with regard to power industries, even if the British political economy could enable needed action, which it could not. America is not Britain today, but it is Britian in the early 1960s: still a chance to retool but with time slipping by quickly and few political economy resources to take the painful and needed steps.

Power Industry Dynamics and the Need for Production

Just as past wars provided the impetus for transformations in American techno-economic and trade regimes, it will be easier for American leaders and pundits to see that we are in a war after war starts. But if China bides its time for a least another decade or two, by then it will be too late, because the odds are Chinese firms will have begun to dominate most power industries. And importantly, once lost, it is virtually impossible to regain competitive position in most national power industries, especially ones that require global economies of scale.

America is not Britain today, but it is Britian in the early 1960s: still a chance to retool but with time slipping by quickly and few political economy resources to take the painful and needed steps.

The dominant view among most in Washington thinking about this challenge is to either 1) be largely unaware of barriers to entry, which would make it difficult if not virtually impossible in some industries for the United States to regain power industry capabilities once lost or 2) to believe that it doesn't matter because the United States will just continue to innovate.

Innovation Is Not Enough

The prevailing view about competitiveness in Washington is that innovation rains down from above for free, as MIT economist Robert Solow conceived of it, like manna from heaven.[120] It just is there for the taking. A slightly more sophisticated view is that it just requires a few favorable conditions such as risk-taking entrepreneurs, strong research universities, and venture capital. The fact that the United States is strong in innovation provides an ample intellectual crutch that prevents taking serious national power industry competition and loss. And so the thinking goes that, while it would be nice not to lose these old industries (old is usually defined as anything that was started 15 to 20 years ago), at the end of the day, America will prevail because we can play our innovation card.

The Obama administration 2010 National Innovation Strategy summed up the prevailing view from both the Left and the Right: "Innovation—the process by which individuals and organizations generate new ideas and put them into practice—is the foundation of American economic growth and national competitiveness."[121] And the key to that innovation is "Competitive markets provide strong incentives for private businesses to improve their products and operations and for capital and labor resources to be reinvested in our best ideas."[122] If that

is the case, we should welcome Chinese power industry predation because it ramps up the competitive pressures, providing even stronger pressures for U.S. companies to innovate.

A recent article in *Issues in Science and Technology*, a magazine of the National Academies of Science, agrees: "We believe that American competitiveness … can be maximized by fostering breakthrough innovations."[123] This is a bit like saying "small business drives growth": both are aphorisms. Who can disagree with either?

One appeal in the United States of an innovation strategy—or for some, an innovation culture—is that it avoids the dreaded "industrial policy" and picking winners. The market and plucky entrepreneurs in their garages will create the winners. The role of the government is to stay out of the way, provide them with foreign STEM workers, and keep capital gains taxes low. In an article by Tanner Greer, wherein he developed a typology of strategies on competing with China, he identified dynamists who focus on technology (rather than more broadly on industry) and who are skeptical or critical of state capacity:

> Dynamists are instead focused squarely on deregulating the American economy and reforming the American state. In their eyes, Chinese drone dominance is less a product of Chinese industrial policy than a result of the Federal Aviation Administration's "war on technology;" America's failure to match the stunning new infrastructure of China is best blamed on the National Environmental Policy Act regime; and cutting-edge developments in AI, crypto, and software engineering would have already transformed the American economy if not for the "regulatory capture, special interests, and perverse structural incentives" that have sheltered entrenched incumbents from real competition.[124]

Dynamists live in a narrow world, believing that Silicon Valley is the "be all and end all" of technological innovation and that the government has played only a minor role in the Valley's emergence as the world's top technology hub. And for them solving the problem is pretty easy: just get rid of government barriers, such as on immigration, building restrictions, and narrow-minded government management of science. Then our heroic entrepreneurs can ride to the rescue and save us. Eric Schmidt, former CEO of Google, wrote that the United States should spend less time focusing on limiting China. Instead, he wrote: "If the United States really wants to reindustrialize, it needs to double down on what it does best, including supporting scientific research, enacting immigration policies that welcome the best talent from abroad, and reducing regulatory hurdles."[125]

However, there are three key limitations to relying on innovation strategy, from more free market dynamists or more interventionist tech policy advocates, in ensuring U.S. national power industry strength. The first is, by definition, that an innovation strategy is agnostic with respect to power industries. We already see that where there is a growing concern that U.S. venture capital avoids so-called "deep tech," also called "hard tech." These are technologies that tend to be beyond software and the Internet, and require much more capital and engineering capabilities. Most power industries are hard tech. But they require more capital and have higher risks, so the market invests less than needed in them. Perhaps like rolling the dice, risk-taking entrepreneurs and profit-maximizing venture firms might invest in all the areas of power industries the nation needs, but the odds are a bit like rolling snake eyes six times in a row.

Second, innovation is only the first step. Power comes from being able to produce and sell the innovation around the world. History is full of examples wherein the United State led on innovation only to have production go overseas, often to foreign companies. These include VHS technology, TVs, LCD displays, solar panels, robotic vacuum cleaners, EV batteries, CNC machine tools, robotics, digital cameras, high-speed rail, digital telecom equipment, LED lighting, carbon fiber, 3D-printing materials, MRI machines, and more.[126] To be sure, innovation is important; without it, American power industries would ultimately lose market share. But more innovation without domestic production does not boost national power. If anything, it gives power to China when Chinese companies enter production based on U.S. discoveries, which they all too often steal or otherwise purloin.

Third, to the extent innovationists focus only on emerging tech, this misses the boat. Despite all the hype, America can't fight and win wars with only superior AI. Moreover, as noted, power comes also from independence from China in key industries and products. Many of these are not cutting-edge technologies.

History is full of examples wherein the United State led on innovation only to have production go overseas, often to foreign companies.

Fourth, the idea that deregulation and a more supportive culture are enough to restore U.S. techno-economic power is an ideological fantasy. As discussed ahead, not losing the war will require significant state action, just as not losing U.S. semiconductor capability required public investment (tax and direct), not just an R&D program.

Fifth, success relies in part on already having strong existing industries with an innovation ecosystem, which, if we lose, makes innovation harder. Innovation is not just something that happens. Put someone in the middle of nowhere and it's unlikely you will get much innovation. Innovation is enabled by a rich ecosystem that includes existing companies. Indeed, many innovators used to work at large established companies and gained knowledge and connections that enabled them to innovate. The list is endless: Reid Hoffman left PayPal to start LinkedIn, Marc Benioff left Oracle to start Salesforce, Scott McNealy left IBM to cofound Sun Microsystems, Gordon Moore and Jerry Sanders left Fairchild Semiconductor to found Intel and AMD, respectively, and Jensen Huang left AMD/LSI Logic to cofound NVIDIA.

It's not just that existing companies are incubators for entrepreneurial founders; they also support what Shih and Pisano call the "industrial commons." The industrial commons refers to the collective ecosystem of shared resources, infrastructure, specialized skills, and knowledge that enable a region's manufacturing competitiveness and resilience. It encompasses the interconnected network of suppliers, researchers, skilled workers, and development capabilities that, when nurtured together, foster innovation and economic growth within a particular geographic area. As one article asserts, "A country does not rise to the level of its innovation. It falls to the level of its industrial commons."[127] This is why former Intel CEO Andy Grove stated, perhaps in response to the preposterous claim by economist Alan Blinder that losing the U.S. television industry was a success:

> I disagree [that it's a success to lose the "commodity" television industry]. Not only did we lose an untold number of jobs, we broke the chain of experience that

is so important in technological evolution. As happened with batteries, abandoning today's "commodity" manufacturing can lock you out of tomorrow's emerging industry.[128]

In other words, innovation without an advanced industrial commons becomes much harder, and the ability to scale any innovations that occur, even harder.

Figure 4: Components of an industrial commons[129]



Why Once U.S. Firms in Power Industries Are Weakened, Comeback Is Unlikely: Barriers to Reentry

As noted, foreign policy thinking is largely devoid of sophisticated analysis of industries, much less power industries. Conventional economics is only a bit better, but generally assumes that barriers to entry—difficulties for entrepreneurs or existing businesses to enter a competitor's line of business—are generally small, and to the extent they are not, are a result of patents, government regulations, or unfair competition, the latter of which antitrust authorities must be ever vigilant against. Indeed, their ideal world is one of perfect competition, wherein entry barriers are zero. Prominent Austrian school (free market) economist Ludwig Von Mises spoke for many economists when he wrote, "The freedom to enter any business is essential to the preservation of the free enterprise."[130]

Milton Friedman agreed: "The greatest enemy of freedom has been concentrated power."[131] And the neo-Brandeisians have the same view but for different reasons. Where the free-market conservatives envision an economy with no entry barriers because it enables freedom and maximizes "market forces," the neo-Brandeisians want it because they hate capitalist profits.

This is wrong even without considering China. As Joseph Schumpeter rightly argued, the barriers to entry that innovative firms often create are always temporary. This is why Schumpeter wrote, "Profit … is the premium put upon successful innovation in capitalist society and is temporary

by nature: it will vanish in the subsequent process of competition and adaptation."[132] In other words, if the best an entrepreneur could hope for was making back the cost of capital, there would be little innovation.

The reality is that there are many interconnected factors that can create significant barriers for companies attempting to enter advanced industries.

After competitive failure of U.S. firms from Chinese aggression, the idea that the United States can easily get back in the market is fanciful.

But it is even more wrong when considering Chinese competition because it uses the massive power of the CCP to break down U.S. barriers of competition to not enable market forces to work, but rather to vanquish their business foes. For the purposes of the discussion here, that means that after competitive failure of U.S. firms from Chinese aggression, the idea that the United States can easily get back in the market is fanciful.

In other words, if more American companies in power industries fail or are seriously weakened to the point where they are much smaller, it is likely that those losses will be permanent. Even if the USG woke up and on a bipartisan basis realized that the United States must rebuild that lost capacity, it would be extremely difficult and enormously expensive. That is why, as discussed ahead, it is so critical to slow the relative loss of power industries to China.

Table 1, from a 1990 survey of U.S. firms, identifies multiple barriers to entry, with absolute cost advantages being the most important. Capital requirements are ranked second. In other words, some industries require large amounts of capital investment to enter. While economists may dismiss barriers to entry, firms take them deadly seriously because they are the core thing business leaders rightly work for.

Table 1: Barriers to market entry ranked by U.S. firms in 1990[133]

Barriers	Mean	Std. Dev.
Absolute cost advantages held by incumbent firms	4.13	0.90
Capital requirements to enter markets	4.11	0.98
Incumbents with superior production processes	3.91	0.94
Capital intensity of the market	3.84	0.91
Incumbents with proprietary product technology	3.81	1.02
Customer loyalty advantage held by incumbents	3.79	0.97
Incumbents with cost advantages due to economies of scale	3.71	0.85
Amount of sunk cost involved in entering a market	3.69	1.00
R&D expense involved in entering a market	3.63	1.02
Low prices charges by incumbents	3.61	0.81

Barriers	Mean	Std. Dev.
Access to distribution channels	3.53	1.10
Magnitude of market share held by incumbents	3.50	0.87
Number of firms in a market	3.49	0.94
Brand identification advantage held by incumbents	3.38	1.04
Incumbents with cost advantages due to learning curves	3.32	0.90
Amount of selling expense involved in marketing a product	3.22	0.98
Customers' costs associated with switching from one supplier to another	3.17	1.07
Expected post-entry reaction of incumbents	3.16	0.98
Trade secrets held by incumbent firms	3.15	1.11
Incumbents possessing strategic raw materials	3.09	1.17
Incumbents with relatively easy access to raw materials	2.78	0.96
Incumbents with government subsidies	2.76	1.38
High profit rates earned by incumbents	2.63	1.14
Heavy advertising by firms already in the market	2.54	0.92
Government licensing requirements	2.20	0.99

There are at least nine major kinds of barriers to reentry.

Technological and Knowledge Barriers

The most formidable obstacle is often the accelerated pace of technological advancement that occurs during a company's absence. In advanced industries, knowledge compounds rapidly, and the technological gap can become insurmountable. Companies lose access to cutting-edge research, miss critical patent opportunities, and lose design capabilities—and their technical workforce disperses to competitors or just atrophies. The tacit knowledge embedded in organizational routines, process technology and layout, and employee expertise is particularly difficult to reconstruct.

Capital and Investment Requirements

Reentry typically demands massive up-front investments in R&D, manufacturing capabilities, and infrastructure. Advanced industries often require specialized equipment, clean rooms, or complex supply chains that represent sunk costs with limited alternative uses. Financial markets may view reentry attempts skeptically, making capital more expensive or difficult to obtain. This is especially true in the United States where most markets want quick and certain returns. The company must also compete against established players with proven track records.

Market Structure and Competitive Dynamics

During a company's absence, market concentration may have increased, with remaining competitors strengthening their positions through consolidation, economies of scale, or network effects. This is particularly the case after Chinese firm market expansion. Established players often have preferential access to key suppliers, distribution channels, and talent pools. Moreover, customer relationships in B2B advanced industries are typically long term and trust based, making market penetration extremely challenging for returning entrants. In most cases, there are customer switching costs. Often the only way of entry is massive cost reductions or, if possible, a significant increase in the value proposition. Brand is another barrier to entry. If the competitor's brand is strong, it's hard to get into a market. To date, Chinese firms are generally not strong in brand, but that is changing.

Regulatory and Compliance Hurdles

Advanced industries frequently involve complex regulatory environments that evolve continuously. Companies lose institutional knowledge about compliance requirements, relationships with regulatory bodies, and understanding of approval processes. New regulations may have emerged that create additional barriers, and the cost of achieving compliance from scratch can be prohibitive. This is especially the case when American companies try to reenter overseas markets.

Human Capital and Organizational Capabilities

Specialized talent in advanced industries is often scarce and highly mobile. During the exit period, key personnel typically join competitors or leave the industry entirely. As we have seen with China, sometimes American talent actually goes and works for Chinese firms. If there are few firms in the United States with the demand for this specialized talent, the worker's skills atrophy and are not used. Rebuilding teams requires not only recruiting individual experts but also reconstructing the collaborative knowledge networks and organizational capabilities that enable innovation and execution.

Supply Chain and Ecosystem Dependencies

Advanced industries often rely on complex ecosystems of specialized suppliers, research institutions, complementary service providers, and training institutions. These relationships take years to develop and may have become exclusive or capacity-constrained during the company's absence. Reentry may require simultaneously rebuilding multiple interdependent relationships across the value chain.

Political Economy Factors

A factor that is given little attention, yet is important, is the barriers to entry when enough national power industries have lost market share or gone out of business, and therefore the pressure on government to adopt national power industry support policies. We can see that in a country such as Canada, which has deindustrialized so much and has so few advanced technology firms that the voices of high-end, knowledge-based firms that need strong government advanced industry policies are at best a whisper. Instead, companies that want cheap immigrant labor, banks and other financial services firms, and natural resource companies that want more rights to extract minerals and other materials dominate Canadian politics. To the extent advanced technology firms exist, they are dominated by small Canadian-owned firms that want handouts rather than a leg up. So, to the extent the Canadian government would put in place

advanced industry techno-economic strategy, it would have to have capabilities for independent action that it does not now possess. The lobbying forces of other firms are just too strong.

The United States is fortunate because it still has enough of a critical mass of large technology firms that press the USG to not put in place ill-advised anti-national power industry policies and to put in place favorable ones. But each weakening or death of an American national power industry firm with a Washington government-relations budget serves as one more barrier to reentry for the nation as whole.

The United States is fortunate because it still has enough of a critical mass of large technology firms that press the USG to not put in place ill-advised anti-national power industry policies and to put in place favorable ones.

Strategic Timing and Windows of Opportunity

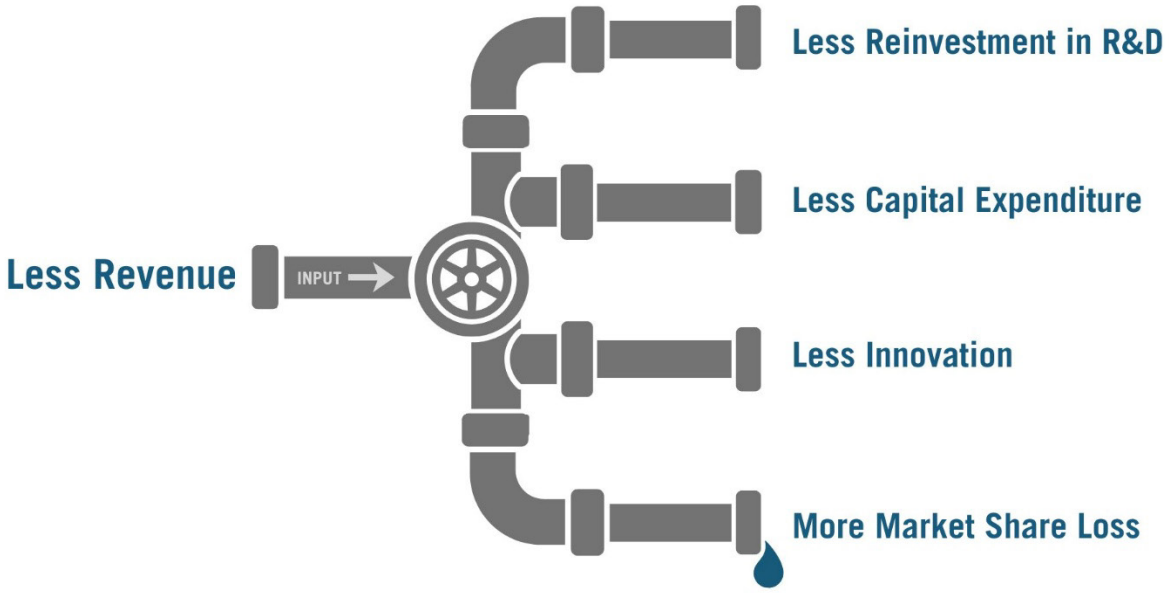
Industries evolve through cycles of technological paradigms, and companies that exit during one paradigm may find the next cycle dominated by different technologies or business models. The timing of reentry attempts relative to industry cycles, product life cycles, and competitive dynamics can determine success or failure.

The interaction between these factors creates what economists call "path dependency," wherein a company's current competitive position is heavily influenced by its historical choices and market evolution during its absence. This explains why even well-resourced companies with strong track records in other industries often struggle to successfully reenter advanced sectors in which they previously competed.

Downward Cumulative Causation

Consumer welfare economics assumes that factor price adjustments lead to equilibrium. If a company loses market share, it cuts prices and regain it. But the reality, especially in capital- and research-intensive industries, is that market share loss can trigger a downward cumulative causation cycle. As figure 5 shows, less revenue can lead to less reinvestment in R&D which means that next-generation products either are not as goods as the competitors' or enter the market late, in both cases reducing market share and sales even more. With fewer sales, capital investment budgets are cut, meaning that the company has a harder time investing in the most modern equipment, leading to slower productivity growth and reduced cost competitiveness, with other firms taking even more market share. And both factors lead to less innovation and less market share, with the downward cycle continuing to repeat unless the competitor firm makes a serious error or the core firm is able to discover a breakthrough innovation that lets it back in the game.

Figure 5: The downward process



Implications for Chinese Attackers

Unlike most U.S. policymakers who either ignore barriers to entry or do everything possible to lower them to boost competition, even if it means that Chinese firms enter the U.S. market, most Chinese policymakers deeply understand techno-economic and trade factors and dynamics, including barriers to entry and how to overcome foreign barriers and then maintain their own. And that is why they work so hard to erect them, including promoting mergers, limiting foreign company access to Chinese markets, and providing subsidies so Chinese companies can attack foreign company margins with deep discounts below cost.

At one level, it appears difficult for companies attempting to attack or disrupt established players in advanced industries. After all, these companies should have many of the barriers to entry previously described. But there are ways firms can successfully attack. And, as discussed, the CCP provides support for these attacks.

Exploit Windows of Vulnerability

Attacking companies should focus on periods when incumbents are most vulnerable, including during technological transitions, regulatory changes, and market disruptions. For example, when many U.S. companies were retrenching in the wake of the 2008 financial crisis, and again during the 2020 COVID crisis, Chinese companies, backed by the CCP, kept up, and even accelerated their rate of investment. When markets came back to "normal," they had gained market share at the expense of more prudent and market-driven Western companies. In the transition to 5G wireless, state-backed Huawei pushed hard to get into markets in developing nations, precluding Western companies from getting in, and thus setting themselves up for next generation sales.

Get to New Markets Early

In the United States, companies such as Tesla succeeded by timing their entry during the EV transition when traditional automakers were slow to adapt. The CCP understood where the global market was going and not only subsidized its EV providers but also spurred EV demand through government policies (reduced taxes on EVs, better access to roads, etc.) This enabled the Chinese EV makers to sell massive numbers of vehicles in China and, as a result, gain scale economies and learning by doing. Western vehicle makers are rightly focused on current limited consumer demand for EVs, but now have been seriously disadvantaged in their efforts to move into the new EV markets. Only the Biden EV tariffs have prevented significant damage. China has done this in a range of other industries, including solar panels and drones, and is seeking a similar victory in industries such as robots, including humanoid robots.

Most Chinese policymakers deeply understand techno-economic and trade factors and dynamics, including barriers to entry and how to overcome foreign barriers and then maintain their own.

Target Specific Market Segments

MIT business scholar Clay Christenssen argued that attackers seldom attack at the top, most profitable segments. Rather, they usually attack from the bottom on segments that are less profitable, less innovation based, and more likely to be given up by incumbents. Rather than launch frontal attacks on incumbents' core markets, which incumbents are more likely to fight to defend, successful attackers often focus on neglected segments, emerging applications, or underserved customer needs. This allows them to establish footholds without triggering immediate competitive responses, while building capabilities and market presence. They then use these gains, coupled with the erosion of sales and profits from the incumbents to steadily move up in their attacks. China has done this in many markets, focusing on more commodity-like products (e.g., bulk chemicals, legacy chips, lower-end mobile phones, LCD displays, etc.). This combination of "good enough" products at a much more competitive price point is often a winning combination, especially in the non-OECD world where price is a more important factor. That not only weakens the rich country incumbents who sell in those markets, but also gives the Chinese firms revenues to move up the value chain. Huawei's rise to global dominance in telecom equipment is a case study in that strategy.

Weakened Defensive Responses

Companies competing against other companies in normal countries have more ability to attack than Western companies do against Chinese attackers. Most importantly is IP. Often, an attacker will use IP from the defender without their permission, and the attacker can win in court, thus significantly blunting the attack; and if they receive damages, weakening the attacker. But that is much more difficult against a Chinese attacker, at least in the Chinese market, because Chinese courts are an instrument of Chinese national power industry strategy and seldom side with the non-Chinese company. And even in the home U.S. market, that can be difficult, as winning a court case or obtaining a Section 337 exclusion order from the U.S. International Trade Commission against an unfair competing Chinese firm can be costly and difficult, especially as the law requires a showing of immediate market share loss.

Defenders often can successfully defend against attacks through exclusive supplier agreements or strategic partnerships. But these are not possible in China. In fact, the CCP will weaponize

them against foreign companies to limit their access to Chinese suppliers in order to favor their CCP champion attacker.

The most important weapons CCP-backed attackers have are a protected market (in China and Belt and Road nations) and massive subsidies. Take CCP company COMAC, which is competing with Boeing and Airbus in the commercial aircraft market. There is a reason why, before COMAC, there were only two companies. The entry barriers were extremely high given the knowledge and capital requirements. But despite being a duopoly, the competition between Boeing and Airbus was intense, with each fighting intensively for big orders with airlines around the world. This was a market that, absent state intervention or some completely disruptive innovation (e.g., a hypersonic space plane), was going to stay a duopoly for the foreseeable future. No sane commercial company would seek to enter the market, because it would mean losing billions of dollars for at least a decade or more. But that did not stop China. China vaulted over those barriers by providing massive subsidies, enticing and threatening foreign parts and systems providers to sell COMAC what it needed, and then reserving the Chinese market for COMAC and subsidizing entry in Belt and Road countries. That is how a Chinese company overcomes big barriers to entry.

If the United States and the West are to avoid losing the national power industry war, they will need to adopt the correct overall strategy. That will likely prove daunting, at least for now, because the vast majority of expert voices on foreign and economics relations with China support the wrong strategies.

China overcomes barriers to market entry by subsidizing state-backed industrial champions such as COMAC



If this dynamic plays out as it has in some other industries, the result will be a cumulative causation decline of Boeing and Airbus. They are likely to lose massive sales revenue in China and many of the less developed nations that China seeks to sell to with extremely generous export financing. And that means they will have less money to invest in next-generation aircraft. That in turn will reduce future sales, and the cycle will continue until perhaps only one of the two companies is left.

We could see the same dynamic playing out in EVs, and even advanced industries such as memory chips and biopharmaceuticals. Given that China is not a normal competitor, the only away of defending against this kind of attack is with a trade wall in OECD nations against these attacks. Ideally, as we will discuss next year in a report on policy recommendations, this would mean long-term exclusion orders against the sales in OECD nations of unfairly competing Chinese companies.

But import bans are only one tool. If the United States and the West overall are to avoid losing the national power industry war, they will need to adopt the correct overall strategy. That will likely prove daunting, at least for now, because the vast majority of expert voices on foreign and economic relations with China support the wrong strategies.

AMERICA'S POWER INDUSTRY CHINA STRATEGY CHOICES

America needs a coherent strategy to shape, guide, and implement policy choices. Victory in a kinetic war often goes to the side with the best overall strategy. Strategic choices need to be made. When and where to attack? When to retreat? When to outflank versus when to conduct a frontal assault? How to best combine and coordinate forces? And even when to leave the battlefield and form a redoubt?

The techno-economic and trade war with China is no different. First and foremost, it requires an acknowledgment of the reality of the war and hence the need for a strategy. Some simply refuse to see that America (and its allies) are being attacked, denying the existence of national power industries, ignoring the CCP's stated intentions and long litany of aggression, and turning a blind eye to U.S. power industry injury and even death. Others say "war" is an incendiary and provocative term and that the United States and China are only in competition or, at worst, perhaps in a narrow "trade war" over a few industries. Many even assert that we are allies in addressing global challenges. Some even say that it doesn't matter. After all, countries don't compete. Or China is just trying to catch up. Or we benefit from trading with China. Or we need to engage with China. Etc.

But we are in a techno-economic and trade war, and it does matter. Indeed, there is a potential tidal wave of value destruction headed at U.S. national power industries, as better funded and more financially patient Chinese competitors keep up their relentless global expansion. PRC champions are coming after Western firms in national power industries, and they will not stop. Indeed, the PRC's is a scorched earth campaign, leaving no survivors, always maintaining the assault. And firms in U.S. and allied national power industries (including Europe) have nowhere to hide from this techno-economic blitzkrieg unless governments take action based on a coherent strategy.

Overall, the issue of China is largely framed by international relations scholars and experts, not business and industrial strategy experts. The former are aware of such competition, but they largely see it as subservient to overall foreign policy considerations and goals. Moreover, few understand the operation of advanced industries, the nature of the competition and the importance of barriers to entry and reentry. As such, the prevailing narratives largely ignore the strategic threats that techno-economic and trade wars pose for U.S. power.

When it comes to China, U.S. experts and pundits advance a number of strategic choices. Some put good relations with China above all other considerations. Some are based on a denial of the conflict. Others accept the conflict, but don't see the need for a new strategy. Others are guided by Ricardian free trade theory with its overarching belief in trade as always being win-win. Many, including trade and foreign policy experts, are globalists in the sense that the world should be one with few or no trade barriers and open and sustained cooperation between nations—and if the allies continue to work with China, that world will emerge.

There is a potential tidal wave of value destruction headed at U.S. national power industries, as better funded and more financially patient Chinese competitors keep up their relentless global expansion.

Others hold an explicit or implicit derision of the United States, seeing it as a white, imperial nation, motivated by capitalist greed. Therefore, the United States should be dethroned as the global hegemon. And many who specialize in studying China get "captured" by China, seeing the world, at least partially, through its eyes. And due to the fact that the CCP rewards and punishes U.S. Chinese studies scholars based on whether it likes their views, many U.S. scholars trim their sails.

Yet, collectively, these experts articulate a range of views and opinions that influence preferred strategic choice. As such, these choices need to be analyzed and assessed. For the sake of clarity, I provide analogies and titles reflective of strategic choices made in past wars, including WWII and in the conflict with the Soviet Union and how current strategic choices mirror those.

The Engagers: Let's Not Rock the CCP Boat

Many of these proposed strategic approaches are offered by engagers, those policy experts and scholars who put engagement with China above all else. For them, nothing should get in the way of engagement. As such, they exaggerate and stress the supposed panoply of benefits from being solicitous to the CCP, and dismiss and downplay the actions the CCP takes that are against U.S. interests.

The problem is that the days of engagement are, if they were ever legitimate to begin with, gone. Yet, engagers persist in out-of-date, flawed strategic framing. China scholar David Schambaugh has said about the engagers that "these were individuals who had spent their entire professional careers working to engage China. Now their life's work was under attack, and many individuals were naturally defensive."[134]

There are several flavors of engagement.

Let's Help the Soviets: A Strong China Is Good for Us

There is no question that the United State gave too much aid to the Soviet Union during WWII, enabling them to gain more ground in the West and emerge stronger after the war with Germany to become a global adversary with America. FDR was oblivious to the threat from Stalin and even saw "Uncle Joe" as someone he could work it.

Today, one China strategy is to simply assume that there is no conflict, and that the opposite is even true: a strong China is good for the world. One article lists the cases for de-escalation and engagement:

> China accounts for global GDP growth. China drives global economic growth, so a sound bilateral relationship is important to American consumers and workers, as well as to families who are counting on stock market returns to pay for their retirement. In the 10 years through 2019, China, on average, accounted for about one third of global economic growth, larger than the combined share.[135]

Likewise, the U.S. China Business Council) has written, "Today, the US-China trade relationship actually supports roughly 2.6 million jobs in the United States across a range of industries."[136]

Parroting the standard fare, an article in *Foreign Affairs* entitled "The Overreach of the China Hawks: Aggression Is the Wrong Response to Beijing" argues, "Closer ties with Beijing have led to Chinese acceptance of international rules in areas such as nonproliferation of weapons of mass destruction, arms control, and some aspects of global trade and finance. Engagement also brought China into the global economy and fueled economic growth worldwide."[137]

These comments about China fueling growth demonstrates the engagers' ignorance of both domestic and international economics. They assume China boosted global growth because China imported some goods. But China consistently ran a trade surplus. The net effect on GDP in the rest of the world was negative, not positive, as GDP is lowered when X-M (exports minus imports) is negative. So yes, exports to China supports jobs in the United States, but imports to the United States from China take away jobs from the United States, and since the United States runs a massive trade deficit with China, the U.S. production economy has been weakened, even though consumers save a few bucks.

Moreover, this framing reflects stale Keynesian demand-side thinking, suggesting that demand from China, rather than lower interest rates from the Fed, keeps the U.S. economy at full employment. U.S. full employment is not dependent in any way shape or form on what China does. Domestic demand should always equal domestic supply, and when it doesn't, domestic monetary and fiscal policy help restore the balance.

The reality is rather than the CCP helping global growth, it weakened it. The CCP's price suppression of wages and other business costs at home led to reduced productivity worldwide, as rather than invest in automation at home, companies in high-wage economies moved production to low-wage, less automated China, lowering global growth. And as China unfairly dominated manufacturing, the opportunities to move up the value chain for developing economies shrank to nothing. And finally, as ITIF has shown, China's unfair "innovation mercantilist strategies have lowered global innovation as less innovative Chinese firms unfairly took market share from more innovative Western firms.[138]

The reality is that U.S. growth does not depend on Chinese growth or any other foreign economy growth; in the moderate term, it depends on U.S. domestic productivity growth and nothing else.

Related to this is the foreign policy and international economy consensus that praises China for raising tens of millions out of poverty. An article by leading China experts in *Foreign Affairs* entitled "The Overreach of the China Hawks: Aggression Is the Wrong Response to Beijing" argues, "It is true, as [Aaron] Friedberg asserts, that China's leaders seek to harness economic growth to boost the nation's international stature and power. But Friedberg insists that this goal overrides all other purposes, ignoring the very real ways in which growth has benefited huge numbers of Chinese citizens."[139]

This is truly a striking statement, echoing fellow traveler statements in the 1930s and 1940s, arguing that sure, while Stalin had show trials, purges, and gulags, at least he boosted growth. Since when does the welfare of an adversary's citizens become of paramount concern for U.S. foreign policy?[140]

What is even more striking is that if there is one thing China's techno-economic strategy has not done is benefit huge numbers of Chinese citizens. The CCP's entire strategy has been to immiserate the proletariat to invest in weapons—a massive military and massively subsidized national power industries. If you want to look at a Chinese territory that benefited its citizens over the same period of time, look at Taiwan. After the revolutionary overthrow of the legitimate Kuomintang government by the CCP in 1949, China and Taiwan had about the same GDP per capita. Today, Taiwan's is almost three times greater.[141]

The Stalin-Hitler Pact: United States and China Are Actually Allies

One way to avoid having to deal with adversaries is to define them as allies, either by formal agreements, informal collaboration, or simply assuming a lack of adversariness. Stalin was so desperate to avoid war with Hitler that he blindly signed the Molotov/Ribbentrop Pact, hoping that Hitler would turn west instead of east and the capitalist powers would exhaust themselves, allowing Stalin to move in and conquer Western territory. But if Stalin had only read *Mein Kampf*, he would have realized that Hitler's overarching goal was not to fight the West but to stamp out communism.

Today, many U.S. foreign policy experts believe that the United States and China are allies in ensuring a safe and secure world. Indeed, this has been the default view of the U.S. foreign policy establishment for decades. A 1994 report by the Trilateral Commission argued that "China should be regarded more as an opportunity than a threat" and that the United States should seek to "incorporate China in the emerging world order."[142]

This view has changed little over time, as we see in a 2019 in an open letter in *The Washington Post* complaining about Trump's more assertive policy toward China. Among seven key points made by over 100 prominent U.S. foreign policy scholars, including friends of China Stapleton Roy and Susan Thorton, was, "We do not believe Beijing is an economic enemy or an existential national security threat that must be confronted in every sphere."[143] It goes on to state, "The fear that Beijing will replace the United States as the global leader is exaggerated." I wonder if six years later any of the 100 signers would like to take back this last statement.

Along a similar vein, leading China scholars Jude Blanchette and Ryan Hass have written:

> Instead of these two great nations pooling their considerable economic resources and human talent to jointly address the world's many growing challenges, they lock horns in a multifaceted strategic competition. The blunt reality is that because of these deep divisions, there will be diseases that will not be cured, there will be children who will unnecessarily suffer, and our climate will continue to degrade as opportunities for global cooperation slip through humanity's fingers. The mutual mistrust and strategic rivalry between the United States and China create barriers to innovation, collaboration, and the bold, unified action needed to tackle existential threats. In this fractured global landscape, the pursuit of dominance and security overshadows the shared responsibility to steward a livable future for all, leaving the world worse off.[144]

They continued:

> Collaboration with China is essential to addressing climate change. And even amid trade wars and derisking, China remains an important economic and trading partner with the United States. Scientists of the two countries have collaborated with each other on important and meaningful basic research projects that benefit not only the two countries but all of humankind. One area of fruitful research is in agriculture… The common view is that the United States and China need to cooperate to address climate change, global terrorism, infectious diseases, and other global challenges.[145]

Today, many U.S. foreign policy experts believe that the United States and China are allies in ensuring a safe and secure world.

Those who assert that the United States and China are adversaries or even in competition with China are routinely excoriated by the cooperation camp. We see this in a vitriolic attack on a leading scholar in the China competition camp, Princeton University scholar Aaron Freidberg. A group of engagers wrote in *Foreign Affairs*—the journal of the engagers—that "Friedberg calls not for mere competition but for an antagonistic rivalry that minimizes any attempt at cooperation."[146] They even wrote, "A pragmatic policy would recognize the value of economic ties with China and encourage continued Sino-U.S. cooperation in many critical areas, including technology."[147] How exactly do they explain how Chinese technology and trade policy has helped the United States on net? They simply waive their hands and assert it.

In other words, for this still powerful camp, cooperation is the paramount goal, and responding to Chinese aggression gets in the way by irritating our interlocutors. They are certainly right about the last part: yes, if the USG presses China on issues of true national concern and even survival, cooperation will be much harder. But if the USG does not, U.S. global leadership will be threatened.

There are at least two major problems with the engagement camp. First, they are so focused on engagement for engagement's sake that they come up with a seemingly endless litany of things we must engage on. Anything to keep engagement going. But presumably these issues are important to both the United States and China. In this case, why is the CCP not the supplicant to the USG, coming to Washington to ask the United States if it will cooperate with China and

giving the United States concessions for doing so. Because only U.S. experts and pundits are this naïve. There is little evidence that the CCP sees things this way. It is happy to talk about win-win relations, but we should not take them at their word. The CCP uses the desire for cooperation to advance its own specific techno-economic predatory practices. CCP officials are happy to say they will cooperate on climate change as long as the United States does not press China on an issues such as IP theft. And in the past, the United States has naïvely taken that deal, believing it has gotten the best of it.

Second, reflecting Stalin's naïveté and desperation with Hitler, many U.S. officials and pundits assume that China will help America shoulder the heavy responsibility for global order, including open and fair trade. Nothing is further from the truth. The CCP does not want co-responsibility for global order; it wants sole responsibility so it can impose its version of global order. And when it comes to trade, China's vision harkens back to British trade policy in the 1700s and 1800s, wherein Britain exported manufacturing goods to its empire and imported underpriced commodities. Given China's history and current practice of massive mercantilism, the idea that anyone could actually respond to these claims with a straight face is truly astounding.

Most importantly, engagement always comes at a price. The CCP and its leadership are realists, caring only about the CCP's Marxist-Leninist interests. When CCP officials see the USG asking it for help for addressing a global problem, they always exact a price.

If this litany of cooperation is of no real interest to China, then why are we pushing for them, when most of the issues are either related to global concerns (and why are these our concerns if addressing them comes at a cost to America?) or can be dealt with by the United States alone? A core reason, of course, is because so much of the U.S. foreign policy community puts governing the world ahead of advancing U.S. interests, especially techno-economic capabilities and strengths, something the engagers show absolutely no interest in.

Most importantly, engagement always comes at a price. The CCP and its leadership are realists, caring only about the CCP's Marxist-Leninist interests. When CCP officials see the USG asking it for help for addressing a global problem, they always exact a price. Sure, we will help you, but only if you have to back off key issues, especially our predatory trade, tech, and economic actions that are hurting your national power industry firms.

It would be one thing if the factors the USG were being supplicants for truly mattered and could be addressed by "cooperation." But the issues either don't or can't. Just look at the list of issues the USG constantly trots out as important to cooperate on. After the San Francisco summit of 2023 with Biden and Xi, the USG statement said that:

> the deliverables included more cooperation on artificial intelligence, a working group to promote tourism, cooperation in counter-narcotics, and combatting fentanyl trafficking, enhanced cooperation on climate change, an increase in airline flights, and people to people exchanges.[148]

Later, National Security Council head Jake Sullivan said, "We are ready to coordinate on climate, health security, macroeconomic stability, and … risks posed by AI."[149] Given that the Chinese cannot be negotiated with on issues of real concern, especially techno-economic and trade ones,

rather than walk away and say that nothing was accomplished, the administration put on a happy face with these "important" issues of cooperation.

No one ever asks, "Why do we need to cooperate on these?" They are seen as self-obvious. But they should be questioned, as they are either not needed, not important, or something countries can do on their own. Let's look at each one:

- **Artificial Intelligence.** What for? The United States does not need to worry about any AI use in our country because Congress could enact a regulatory regime to govern AI if needed. We don't worry about unsafe drugs from other nations because we have Federal Drug Administration drug approvals. AI is no different. Ahh, but what about the killer Terminator AI? What about it? It is science fiction, not reality. Even if it were reality, it's in the CCP's interest not to get terminated by AI too. We don't need to cooperate. What about AI weapons? Does anyone really believe that America should limit its battlefield use on the basis of an agreement signed with the CCP? If you do, I have a bridge to sell you.
- **Tourism promotion.** Surely, they must be kidding. Who cares? And why would the United States want more Chinese tourists, and why do we need to cooperate with the CCP on it in anyway?
- **Airline flights.** Again, what? If we want more airline flights from China, the Federal Aviation Administration and U.S. airports can make that happen. And if the CCP wants more U.S. flights, it can do the same.
- **People-to-people exchanges.** See above re: airline flights.
- **Cooperation in counter-narcotics.** Is this not something the CCP is very interested in? If so, they can ask us for help.
- **Combatting fentanyl trafficking.** Okay, this is another one of "you must be kidding." The CCP could stop the flow of fentanyl and precursors to the United States next week, but it chooses not to because they know it weakens America and strengthens China.
- **Health security.** Let me get this right. It is likely that a CCP lab created (with financial help from America's National Institutes of Health) and inadvertently let loose the COVID-19 virus on the world and then proceeded to cover it up and manipulated the World Health Organization to do its bidding. We should cooperate with a government that did that?[150] This is something out of Orwell.
- **Macroeconomic stability.** With China having a long-running a massive trade surplus with the world while intentionally trying to deindustrialize the world, we should ask their help with macroeconomic stability? Wow. And again, presumably China has an interest in macroeconomic stability in the face of a global financial collapse or massive recession. So why are we the ones asking for it?
- **And of course, wait for it… climate change.** The big kahuna. But isn't China concerned about climate change too? It is more vulnerable to climate change than the United States is given the larger share of its population at sea level and its lower per capita income. Why does the CCP not beg the United States to do more? Why should we implore them? And the reality is that climate change will never be solved until we get clean energy technology that costs the same or less as dirty. No amount of "cooperation" will help. The

> reality is that the CCP will keep increasing its emissions of greenhouse gases until it makes economic sense for it to stop.

To be sure, it is important not to unilaterally cut off diplomatic ties with China. But the idea that we need China to help us on certain matters and that this means not pressing them harder for their techno-economic aggression against U.S. (and allied) companies and the U.S. economy is just the ultimate in naïveté.

The reality is that we are long past the time when the USG could influence China policy in any meaningful way. The first Obama administration was the last time that was possible. Their power is just too great now. Let's top being a supplicant and get on with defending our economy from Chinese techno-economic aggression.

A good example of this view is from the Peterson Institute for International Relations. Ha Jiming (a scholar in China) and Adam Posen wrote:

> We all believe that China-U.S. trade has been clearly win-win, and will continue to be so if it is conducted by the rules of that order, and if those rules are consensually adapted to economic change. In fact, given the degree to which China has developed, the two economies have more fundamental economic interests in common now than before, including in safeguarding and abiding by that system.[151]

They view the competition as normal and healthy, writing, "Chinese companies have a right to compete with U.S. companies and succeed in any sector, including in high-tech."[152] They went on to state:

> While much has been made of Made in China 2025 and the earlier "indigenous innovation" programs, the Chinese government's aspirations to make China a technological leader in some fields should not be considered a threat to the United States. Even some government subsidization of relevant R&D or technical education in this pursuit should not be inherently contentious.[153]

In other words, in this view, global trade is always win-win, value maximizing, and pointing out that China is not a Ricardian trader but a power trader intent on dominance is simply "not cricket." Peterson's commitment to global integration and free trade is so blinding and all-encompassing that it simply cannot admit that China is not playing by global welfare-maximizing rules. No worry, it will all work out; the natural global division of labor will prevail.

Likewise, Ryan Hass at the Brookings Institution wants the United States not to be overly harsh with China, including on techno-economic issues, so that we can work cooperatively on global challenges such as global warming.[154]

The Marshall Plan: Give China Aid So It Will Have Goodwill Toward Us

As part of his naïveté toward communist regimes, including the CCP, George Marshall proposed the "Marshall Plan: to extend aid to the Soviets in part to bring them closer to the United States."[155] Stalin clearly had no interest in taking our money or becoming closer.

Likewise, the United States has long supported aid to China to keep them engaged. As Shambaugh wrote, the Carter administration saw that "science and tech was the perfect medium

to keep the Chinese engaged given Beijing's own prioritization on modernization."[156] Carter's agreement stated, "Affirming that such cooperation can strengthen friendly relations between both countries."[157]

In 2006, the State Department wrote of the agreement, "The S&T Agreement has withstood the test of political turmoil and has provided a stabilizing influence on U.S.— Sino relations."[158]

According to the Congressional Research Service, U.S. AID and the State Department provided over $417 million in aid to China between 2001 and 2017.[159] The U.S.-supported World Bank still provides funding to China.[160] Even the Department of War provides funding to Chinese research universities.[161] In other words, helping China grow its national power industries by sharing U.S. science and technology is good because it keeps the CCP favorable toward America. Clearly, this did not stop China from engaging in massive IP theft and forced technology transfer against U.S. companies.

Truman Caused the Cold War: Support China and It Won't Attack Us

The foreign policy Left loves to advance the narrative that it was Harry Truman's hawkishness, not FDR's coddling of "Uncle Joe" Stalin, that caused the Cold War. Stalin just wanted to be left alone. Of course, this framing is ideological nonsense. Stalin was always the aggressor, and all Truman did was help America wake up to it.

Today, this narrative is applied to the United States and China. If only the United States, and in particular China hawks, would just stop pressing China, CCP leaders would become more reasonable. As early as 1998, a review of Peter Rodman's book *Between Friendship and Rivalry: China and America in the 21st Century* (Rodman was deputy national security advisor in the Reagan administration) stated that there is a "drift toward strategic rivalry between China and the United States, but that it can be slowed or reversed if the two sides find common ground on such strategic issues as Korea, Pakistan, regional stability, and the Asian economic crisis."[162]

In other words, if we don't cooperate with China, they will try to become our rival.[163]

Foreign policy professor Charles Glaser agrees, writing that "China's Rise Can Be Peaceful If the U.S. Doesn't Provoke It."[164] As David Shambaugh wrote, this camp argues that "it was not China's fault or actions that had caused the relationship to deteriorate so precipitously, it was America's fault!"[165]

Some go even harder on this blame game. A report for the Quincy Institute, an organization that emphasizes military restraint and diplomatic engagement and cooperation, states:

> An alternative China policy would foreground internationalism, global cooperation, and multilateral efforts against climate change, public health dangers, and global inequality. Such an approach would not only reduce bilateral tensions, it would also confront the root causes of great power conflict and the rise of illiberal politics in China, the United States, and around the world.[166]

If we just got rid of capitalism, the CCP would like us more. I am sure it would.

Oswald Mosley: Let's Side With China

When Labour, Liberal, and Conservative parties in Britain in the 1930s started to wake up to the threat from German National Socialism, certain segments of British society were sympathetic to Hitler, especially Oswald Mosley's "black shirt" movement.

Today, while not as explicit or perhaps extreme, there are some whose strategy is that the United States should do everything possible to get close to China, downplaying its Marxist-Leninist nature and seeking friendship. The leading organization with this view is the National Committee on U.S. China Relations (NCUSR). It has written, worryingly, that "more than three-quarters of Americans hold an unfavorable view of China."[167] Rather than accept that Americans may be onto something (e.g., Uyghur oppression, lack of Chinese citizen freedom, closed U.S. factories, aggression toward Taiwan, etc.) NCUSR's "Public Intellectuals Program is trying to change that."[168] In other words, it would like to see these three-quarters of Americans hold a favorable view of China. And as such, its strategy is to do everything to keep relations strong.

NCUSR tells us that China has a massive military not because of external aggression, but because it needs to control tensions at home.[169] It tells us that China is not the only one that sees U.S. global leadership as problematic, and China needs to have much greater say in shaping global affairs.[170]

The progressive Left, with its global-proletariat and anti-U.S. views, also embraces this perspective. For many of them, having China replace the United States as the global hegemon would be a welcome relief.

Another is "The Committee of 100," a group of Chinese Americans chaired by former ambassador to China Gary Locke. The group objects to policies limiting China. For example, it opposes legislation limiting Chinese nationals' ability to buy U.S. farmland.[171] It argues that investigations and prosecutions of Chinese spies and IP thieves were racial profiling, even though it is clear that the CCP is massively supportive of IP theft in the United States, and there were no investigations of other Asian nationalities.[172]

The progressive Left, with its global-proletariat and anti-U.S. views, also embraces this perspective. For many of them, having China replace the United States as the global hegemon would be a welcome relief. Even CCP fellow travelers such as Columbia's Jeffrey Sachs are in this camp.[173] Sachs, a "useful idiot" to the CCP, publishes articles in the state-run journal *China Daily* about U.S. decline and the problems with U.S. hegemony and how China needs to become a global leader.[174] Sachs actually appears on Chinese TV news shows urging China and other countries to cooperate to resist the United States.[175] His message: Trump is a bad nationalist; Xi is a wonderful globalist.[176] And he believes that China is the economic model for much of the rest of the world, especially developing nations, despite the fact that Chinese industrialization has meant the stagnation of industrial development in other developing nations.[177] He straight up argues that the U.S. should not be the leader of the world. And he has told the CCP's *Global Times* that he "regrets U.S. foreign policy toward China."[178] Jeff, perhaps you should instead teach in China?

Another flavor of this capitulation is that, in large part because of severe structural disfunctions in the United States, mostly due to Trump, China will overtake us as the global hegemon. But

that's okay because the world needs someone to lead. Better China than a post-hegemonic world of chaos.

C. Fred Bergsten, former head of the Peterson Institute, exemplified this view in his 2022 book *The United States vs. China: The Quest for Global Economic Leadership*.[179] Bergsten is the dean emeritus of the U.S. foreign economic policy community, especially when it comes to global economic issues. And this book reflects that community's bias. He wrote about China seeking global leadership, which he views as simply tough competition, not a zero-sum battle to win the war for national power industries. In fact, the book is largely sympathetic and optimistic toward China. In Bergsten's conception, someone needs to lead the world order, and if it can't be the United States, China should step up. He (wrongly) sees China as "the largest engine of growth for the world economy," (see above) and (wrongly) says that Chinese cooperation with the U.S. is critical to solving key global challenges (see above).[180] And rather than discuss China's predatory policies, he wrote (wrongly) that "China is now emphasizing domestic rather than international drivers of growth" (written just before China doubled its global trade surplus). In fact, the CCP has been trotting out the promise of rebalancing to domestic consumption for over 15 years and American policymakers still believe them—like Charlie Brown believes Lucy will really hold the football this time. And amazingly, he blames both China and the United States for the problems from COVID-19.

He then wrote that once China catches up to the United States, it will become a responsible stakeholder and stop "cheating." (This is remarkably similar to what the advocates of China's WTO accession said in the late 1990s). He touts China's global economic leadership record, admitting that, sure, they have a few problems with mercantilism, but he is convinced that they will outgrow them once they catch up. But of course, that is like saying that once Stalin conquered most of the world, he would give up on his military aggression. By the time China becomes "responsible," it will have won the war.

If the CCP truly wants to help with global governance, it can start by dismantling its mercantilist techno-economic war machine and compete on the same basis other nations do.

Bergsten then gets to the key point: the CCP's main and overarching priority is to stay in power, not to dominate the world. And of course, he reminds us, don't forget the power of the Western-oriented liberal reformers in the CCP. Thus, his conclusion is that the United States should assist China in elevating itself on the global stage and in more global institutions so that China can help us solve the world's problems.

The Carnegie Endowment agrees, writing in a volume on U.S.-China relations that "the United States and China have a joint interest in finding a modus vivendi that provides the context for continued peace, prosperity, and national flourishing."[181] If the CCP truly wants to help with global governance, it can start by dismantling its mercantilist techno-economic war machine and compete on the same basis other nations do.

The Deniers: Nothing to Worry About With China

Many of the preferred strategic choices come from those who are so convinced of America's superiority and China's structural flaws that there is nothing to worry about. These strategies council patience and no need for fundamental U.S. policy change.

Kenan Containment: Wait for China to Self-Destruct

After President Truman and others sounded the alarm on the Soviets' global ambitions, few if any could ignore the Soviet Challenge. George Kenan, the architect of Soviet containment, argued that the Soviet Union would naturally self-destruct and counseled containment. And he was right about the outcome. But it took more than 40 years for that to happen, and the United States emerged victorious and dominant.

Today, one thing both Xi and Trump have done is to make it harder to ignore that China is a pacing competitor to the United States. And so, some U.S. China scholars and pundits feel that they cannot ignore that China challenge. But for those who finally now, albeit grudgingly, see China as a competitor, the preferred strategy is to Kennan-like wait for China to naturally decline. The idea is that just as with the Soviet Union, eventually, because of a raft of internal contradictions, the Chinese economy, and perhaps even the CCP, will self-destruct, and then China will no longer be a threat. Let's just contain China and all will be well. The problem, as discussed ahead, is that even with the Soviet union's rampant spying and IP theft from the West, it has never had the capability to structurally weaken America's power industries. China does and will likely win well before it—if it even does—becomes a democracy.

In 1998, right before China's growth accelerated even more, economist Nick Lardy wrote a book about China's unfinished revolution and argued, "Those who magnify the 'China threat' by extrapolating from China's past growth rates are seriously mistaken."[182] Indeed, they were mistaken because, in contrast to Lardy's pessimism, China grew even faster in the 2000s. But for neoclassical trade economists, there is no way a state-controlled economy can grow consistently. Not only that, but Lardy argued that continued growth depends on the CCP to surrender a great deal of economic and political power because, as we all know, state-directed capitalism is a failure.

It is the strong desire to avoid facing the bracing reality that the United States has never in its history faced such a serious geopolitical threat that makes this kind of "wait for Chinese decline" so appealing.

He then advocated that the United States needed to assist in China's enterprise and bank restructuring program. Here he was right, because if China had followed Lardy's neoclassical advice and its banks had focused on only making money rather than on fueling China's national power industries, China would not be the techno-economic power it is today.

More recently, John Mueller, a Senior Fellow at the Cato Institute wrote, "The lesson of the Cold War is not about the value of persistent containment in breaking your adversary's will and sapping its power. It is about the wisdom of standing back, keeping your cool, and letting the contradictions in your opponent's system become apparent."[183]

In other words, for free-market ideologues, the Chinese economy must self-destruct because it violates the free-market creed.

In addition, it is the strong desire to avoid facing the bracing reality that the United States has never in its history faced such a serious geopolitical threat that makes this kind of "wait for Chinese decline" so appealing. No need for the intellectually and emotionally difficult desire to

reassess long held and deeply committed to ideas and doctrines. No need to question whether the current American techno-economic and trade system will suffice to respond effectively to the challenge. No need to retool one's intellectual framework to adjust to new realities.

This is why any and all bits of bad news out of China are leaped on by so many as evidence of China's impending doom. China has too much internal competition.[184] Chinese firms have low profits. China has a housing bubble. China has a demographic challenge.[185] Chinese millionaires are fleeing. In 2021, *The New York Times* published an opinion piece entitled "How Will We Win the Second Cold War?" arguing that we will win by doing nothing and letting China self-destruct.[186] The article pointed to "the inner weakness that the regime can't get rid of because it's part of its DNA." Ahh, that is comforting. We can continue our ways, and the problem will take care of itself. A *Project Syndicate* article agreed: "No matter what China does, its economy's momentum will be sapped by an aging, shrinking labor force, past overdrafts of public spending, and weak consumption. While the country is often now compared to Japan three decades ago, its outlook is actually much bleaker."[187]

But to blindly assert that China will collapse because it has a broken economic model (i.e., not America's) is the height of hubris and wish fulfillment. As the author of the Atlantic Council report "The Longer Telegram" wrote, China is:

> more dexterous in survival than its Soviet counterpart, aided by the fact that China has studied carefully, over more than a decade, "what went wrong" in the Soviet Union. It would therefore be extremely hazardous for US strategists to accept that an effective future US China strategy should rest on an assumption that the Chinese system is destined to inevitably collapse from within.[188]

A bit like die-hard Marxists in the 1980s and 1990s still holding onto the view that capitalism must collapse of its own weight and internal contradictions, these China critics just counsel patience. Don't worry, the collapse is coming.

There is little evidence that if the "reformers" gained power they would not continue their practice of power economics and goal of dominating national power industries.

Assassinate Hitler: Support Xi's Opponents

Some alternative history advocates have explored what would have happened if the United Kingdom had supported the assassination of Hitler, surmising that the Nazi replacement leader would not have been as militarily aggressive.

Today, related to the view that China is on autopilot to self-destruct is the view that it is Xi Jinping that is the problem and when he leaves power, China will go back to normal cooperation. They assert that things were workable before him and when he and those in his camp lose power, as they surely must, conflict will significantly lesson.

Perhaps the best example of this is from "The Longer Telegram" report, wherein the author wrote that:

> the central focus of an effective US and allied China strategy must be directed at the internal fault lines of domestic Chinese politics in general and concerning Xi's

> leadership in particular. A fundamental error of US strategy has been to attack China as a whole, thereby enabling Xi's leadership to circle the wagons within Chinese politics around the emotional pull of Chinese nationalism and civilizational pride. Just as significant an error has been to crudely attack the Chinese Communist Party itself. However, the political reality is that the party is divided on Xi's leadership where he threatens the lives, careers, and deeply held policy positions of many within its senior political echelons.[189]

He went on to write that "all US political and policy responses to China's current strategy should be focused through the single lens of Xi himself."[190]

The 2019 Open Letter authors agree, stating,: "Efforts to isolate China will simply weaken those Chinese intent on developing a more humane and tolerant society."[191] They went on to write, "The United States should encourage Chinese participation in new or modified global regimes in which rising powers have a greater voice."[192] In other words, let's not rock the boat and the "anti-Xi's" will emerge and we can get back to friendly, win-win relations.

Whether CCP reformers can gain power is beyond the scope of this report. Given Xi's Marxist-Leninist extremism, it certainly couldn't hurt. But to assume that the problem is Xi and not the inherent logic and goals of the CCP expressed since its very formation is to naïvely misinterpret China's long-term goals. Deng Xiaoping had the same goals as Xi; he just knew that he had to bide his time and hide his light. There is little evidence that if the "reformers" gained power they would not continue their practice of power economics and goal of dominating national power industries. They might do it in more subtle and less aggressive ways because they would believe that it was a better way to achieve their goal, but domination would still be their goal.

There is a related strategy that some hold on to and that is to wait until the CCP is finally replaced. Perhaps this is possible if enough Chinese become truly middle class and the then current generation can't remember China's abject poverty. However, unlike Japan, Taiwan, and South Korea, which shifted to democracy when they got to a certain level of development, the United States is not directly influencing and pressing China to open up and become democratic. And the CCP appears to want to hold on to power vastly more than Asian Tiger autocrats did.

More fundamentally, assuming that China eventually follows the democratic path of other Asian Tigers, by then the techno-economic war will long be over, with the United States and the West having lost much of their national power industry base. A vast techno-industrial destruction would be left in the wake. Unchecked, China could very well take over the global semiconductor industry, the chemical industry, AI, electronics, robotics, aerospace, biopharmaceuticals, precision instruments, and more.

Let Them Have the Sudetenland: It's Okay for China to Want Power Industry Self-Sufficiency

Chamberlin's deal with Hitler was premised on the notion that Hitler only wanted to reunite former German territory. That may have been right in the West; it definitely was not in the East, as anyone who had read *Mein Kampf* would have understood.

Today, there is a similar strategic response, especially from European policymakers. Many in the EU believe that the CCP has no desire for global strategic industry dominance; it simply wants its own strategic industries, just like Europe wants to not be dependent on Trump's America. The

EU Parliament has written that China's "drive for 'self-reliance' in strategic sectors aims to lessen dependence on foreign technology, bolstering resilience and reducing vulnerability."[193]

The problem with this view is twofold. First, China is achieving that by closing its markets to foreign companies, something Europe is not willing to do in response to China's mercantilism because it still believes in the vision of the WTO. Second, and more importantly, the CCP wants domination, not just self-reliance. Self-reliance lessens its dependency on adversaries. Domination gives it leverage over adversaries. The CCP's entire Belt and Road and "going out" strategies are premised on attack and conquer, not just industrial defense of its homeland.

Many in the EU believe that the CCP has no desire for global strategic industry dominance; it simply wants its own strategic industries, just like Europe wants to not be dependent on Trump's America.

The French Strategy: Assume That the U.S. Techno-Economy Is Superior to China's

Before World War II, the French military high command and political leadership assumed that its forces were superior to Germany's. It had more men under arms, its tanks were considered superior, and it had the Maginot Line. This led both the civilian and military leadership to become overconfident, failing to spend money to rearm. At the same time, it led the French military to become complacent in strategy, planning to fight a long, protracted war, not a response to Guderian's blitzkrieg tank pincer formations.[194]

Today's version of this is widely believed in U.S. foreign policy circles. It holds that China hawks overstate Chinese capabilities and that the United States has enormous strengths that will lead us to automatically prevail in techno-economic competition.

Jude Blanchette and Ryan Hass exemplify this view:

> Even with its many shortcomings and vulnerabilities, the United States continues to command a strategic depth that China fundamentally lacks: a unique combination of economic vitality, global military superiority, remarkable human capital, and a political system designed to promote the correction of errors. The resilient and adaptable U.S. economy has the world's deepest and most liquid capital markets and unparalleled influence over the global financial system. The United States continues to attract top global talent, including many Chinese nationals now fleeing their country's autocratic political environment. Put plainly, the United States still has a vital edge over China in terms of economic dynamism, global influence, and technological innovation.[195]

They wrote in answer to the question, "Is China destined to be an economic superpower?":

> No. China has made huge, genuine strides in the past four decades, becoming dominant in manufacturing, prominent in many supply chains, and a leader in several high-tech sectors. However, China's economy has major structural challenges that will constrain growth, and its current economic strategy, which is rooted in pursuing technology leadership, is depressing growth due to industrial-policy waste and growing tensions with trading partners. Going forward, China could encounter a crisis, muddle through with low growth, or revive growth with a more market-oriented strategy.

> As reports in this series have definitely shown that is simply wishful thinking that relies on ideological platitudes and not on careful analysis of firms, industries and innovation systems. The preponderance of evidence suggests that China has vastly more manufacturing capabilities than America, including and especially in national power industries, and is making much faster progress in innovation.[196]

It is common for supporters of the view of U.S. superiority to point to U.S. universities, venture capital, high-skill immigration, and entrepreneurial culture as inherent sources of superiority. Many even still cling to the notion that U.S. manufacturing is strong. Professor and commentator Jerry Harr reflected this view when he wrote, "Examining U.S. manufacturing competitiveness today, one finds that the United States maintains a formidable position in global manufacturing despite facing intensifying international competition."[197] Yet, comparing U.S. advanced industry output with China's shows how far behind the United States is.[198]

A related view comes from CSIS. Its lead China analyst informed, "The United States needs to remember that it has not fallen behind China."[199] But nowhere on the CSIS China Power project website is any analysis of China's attempts to master advanced technology industries or any assessment of its progress and success. And to the extent it discusses China's actions in this realm, it largely suggests that it will fail, presumably just as it has done in steel, EVs, batteries, drones, telecom equipment, solar panels, and high-speed rail.[200]

Most U.S. holders of free-market doctrine dismiss the China threat because they believe that free-market economies are inherently superior to more planned economies. As such, there is no way we can lose, unless we become more like China. John Tamny, editor of *RealClearMarkets*, wrote, "The overblown China panic serves as a reminder of why the U.S. must maintain the market-friendly norms that have long made it the envy of the world."[201]

Box 3: U.S. Optimism: *Command of Commerce: America's Enduring Power Advantage Over China*

One of the more important questions to get right is whether the United States or China has more techno-economic and trade leverage over the other and what the trend in that dynamic is going.

A new book, *Command of Commerce*, addresses this issue.[202] As the title suggests, it's not an even, close contest: America dominates.

But the authors' methods and analysis are fundamentally flawed.

First, their key claim for U.S. superiority is that U.S. multinationals have a much larger share of profits than Chinese do. But as noted, that's largely because Chinese firms are willing to accept lower profits (in part because of government subsidies) in order to capture global market share. U.S. firms are not. Moreover, a higher share of Chinese firms are in more competitive segments where profits are low. For example, the profitability of electronics assembly firms is quite low compared with software firms. Does that not mean that being able to make things is not important to national power?

They also see profits from sales and marketing as key indicators of national strength. For them, an American firm that outsources low-margin production overseas but makes high profits because of sales and marketing boosts U.S. power. No, it weakens it, even if they argue that

higher profits help a nation. They do, but profits are a small share of national income, around 14 percent in the United States.[203]

Second, like so many U.S. foreign policy and economic experts, the authors focus on firm nationality and not production location. In the authors' analysis, a firm such as Boeing or Intel could offshore all its production to China and U.S. power would not diminish because these are U.S. firms. In fact, they argued, power would increase because the USG could order these U.S. firms to stop production in China at any time. But in a war, what matters is not production in other nations, especially your adversaries; it's production at home.

They wrote, "For a nation to be able to transform its manufacturing output into geopolitical leverage it needs to have significant influence over the more complicated manufacturing and design activities that feed into most products, and it needs to have control over where those products are sold."[204]

In other words, they asserted that a U.S. company that designs a product but has it made in Chinese factories, and then sold through the U.S. company's distribution channel has geopolitical leverage. At one level, it does. The USG can tell it to stop producing in China, although that would mean major job loss and possible bankruptcy of the U.S. company, as sales would crater before it could establish new production facilities somewhere else.

But it also means that the U.S. does not have this production domestically. To the extent the industry is dual use, or even enabling, that absence weakens U.S. defense production. And to the extent the United States relies on the products made by a U.S. company in China, it would be cutting off its nose to spite its face.

Third, the authors did rightly point to a key metric as allied production strength (even if profits are their key measure). But it's not at all clear that our allies are really our allies when it comes to China. South Korea and Japan are increasingly split in their loyalties, while the EU, in the face of Trump's tariffs, is tilting East, not West. Indeed, the EU has still not cut off sales of Huawei 5G equipment within Europe because some EU nations want to save a few euros by buying Chinese. And overall, EU leaders are loathe to give up Chinese markets, which explains why they do so little to embrace U.S. export controls on China.[205]

Fourth, the authors ignored important measures. They failed to mention that in 2024 the United States ran a $1.3 trillion trade deficit, with $300 billion of that with China. China ran a $900 billion merchandise trade surplus.[206] Over the last decade, U.S. manufacturing value-added output has grown more slowly than GDP and 14 of 19 major industries saw absolute decline.[207] Moreover, U.S. manufacturing productivity has been stagnant since the early 2010s.[208] While there does not appear to be easily accessible data on Chinese labor productivity growth, overall Chinese productivity growth has been significantly higher than that of the United States.[209] The fact that China now has installed 74 percent more industrial robots per manufacturing worker than the United States has, and installed 7.3 times more in 2013—an even more impressive feat given that Chinese manufacturing wages are significantly lower, which reduces the ROI of robotics installation—suggests strong competitive advantage.[210]

Fifth, the authors finally got to the real measures of power when they looked at OECD's value-added output in various industries. The problem is that they considered only high-tech industries as important—not motor vehicles, where tank production is classified; or shipbuilding, where aircraft carriers are classified; not steel, which weapons systems use; etc.

And even more, they included telecommunications services and professional services sectors that have no bearing on national power and leverage. If the Chinese were to cut off all exports to us, we'd still have these two perfectly functioning sectors, because they are not traded, they are domestic.

When looking at traded high-tech sectors, as the authors defined them, the OECD data shows that in 2022 (they used 2020 data), the U.S. share was 29.5 percent, with China's 18.5 percent, a significant U.S. lead.[211] But leaving out the two nontraded sectors, and the nongoods sector of IT and information services, China's share jumps to 27.7% while the U.S. share falls to 20.7 percent.[212]

Moreover, a core mistake the authors made is that they presented a static snapshot of China. They were absolutely correct that in certain sectors such as aerospace, drugs, semiconductors, and equipment that China lags behind the United States. And that does give the United States some breathing room. But in all these industries and more, China's progress is rapid. For example, from 2016 to 2022, China's output in other transportation, which includes aerospace, increased four times faster than U.S. value-added output, while its computer and semiconductor output increase twice as fast. And while the United States government is cutting federal R&D, the Chinese government is expanding it.

They also argued that Chinese GDP is exaggerated in official CCP figures. This may very well be the case, but it is not the key point if one is considering the global war for advanced industries. If China's personal services, retail, and legal services market is not expanding, that means lower GDP, but it has no effect on national power industries.

Sixth, the book goes all out to make its case. Case in point, the authors reported that because of the U.S. export sanctions, Huawei's global phone share fell from 11 percent in 2000 to 3.5 percent in 2024. They were either not aware of, or ignored the fact, that about 4 percentage points of that drop was due to Huawei spinning off its lower-end phone business to a new company, Honor. And they overlooked that Huawei is not the world's largest telecom equipment manufacturer, and its global market share for telecom equipment increased from 29 percent in early 2018 to 31 percent by 2024.[213]

Finally, the authors pointed to the fact that the United Staes has used export controls to supposedly hobble China (which they did not in the case of Huawei) while China has refrained from trying to do the same to the United States as evidence that it is weaker technologically and has little leverage. Because of this, the authors amazingly argued for even more export controls against China to weaken it.

This betrays a fundamental reading of China. China has no interest in cutting off sales of its products to the United States, because unlike the USG, it realizes that more Chinese sales strengthen its companies and weaken America's. Moreover, China still benefits from U.S. investment in China, and the technology transfer it gets. It doesn't close its markets to foreign investment until the industry in question is dominant. It is biding its time to gain even more from foreign firms.

"Peace in Our Time": There's Nothing the United States Can Do, So Do Nothing

Chamberlain probably rightly believed that there was little that France and the United Kingdom could do to deter or weaken Hitler, so he engaged in appeasement. Today, that is a common strategy toward China proposed by many in the foreign policy establishment. The 2019 Open Letter advocates this: "U.S. opposition will not prevent the continued expansion of the Chinese economy, a greater global market share for Chinese companies and an increase in China's role in world affairs."[214]

On what basis do they make this assertion, other than they value engagement above all else? Why wouldn't a strategy of limiting Chinese exports and working with our allies to do the same result in China having less global market share instead of more?

However, for them, even if we could do something to limit China's rise, we shouldn't because it would hurt ourselves. The authors went on to write that "the United States cannot significantly slow China's rise without damaging itself."[215]

China scholar Susan Shirk agreed, stating that "there is no objective measure to suggest that a dramatic reduction in the extent or quality of China's participation in global commerce and finance would do anything except harm economic growth in the United States."[216]

A Brookings report in 2022 expressed the same sentiment that the fight will be costly, so it will hurt us. It states that:

> Fully extracting Chinese firms from Department of Defense supply chains, including those that produce rare earth minerals for example, would likely be infeasible, and may discourage innovation by imposing costs that would likely be insurmountable for start-up companies.[217]

It goes on the criticize the idea that the United States should produce more key goods that we compete for with China, presumably because it would entail the dreaded "industrial policy" and because it would cost money:

> While it is reasonable to geographically diversify this particular portfolio, the imperative should not be applied more broadly to the high-tech industry overall. The goal of subsidies, tax breaks, and loan guarantee programs should be to incentivize greater supply chain resilience in sectors that are vital for the provision of necessary public goods; it should not be to strengthen the balance sheet of domestic firms or increase domestic production of high-tech goods and services per se.[218]

And above all, the authors worry that tariffs "increase the costs of goods for consumers."[219]

Why not eliminate the U.S. defense budget because it raises costs for taxpayers? We would be much better off spending money on consumer goods than defense goods if we didn't have to worry about national defense. And besides, this broad assertion of self-damage, made with no real logic, is certainly true with some actions, but not with others. Limiting the imports of national power industry goods or services produced unfairly helps, not hurts the United States.

We Wanted to Fight in Europe, While Stalin Had Other Ideas: Fighting Only Battles of Your Own Choosing—Derisking

After WWII, the entire U.S. defense and foreign policy establishment focused on Europe, largely ignoring Asia. The belief was that if Stalin attacked, he would go West, not Southeast. But Stalin, and Mao, had other ideas, giving the green light to North Korea's Marxist-Leninist dictator Kim Il-Sung to invade South Korea.

The analogy to today is the notion of derisking: a denial of the China threat and capabilities. Popular in the EU—which abhors having to take a stand against China and can't dare to consider that the old vision of globalization (a world where no nation other than America needs to spend money on defense) is dead, and wants to sell as much to China as it can—the idea is that it's only a few industries that we have to fight for to "derisk" from China.[220]

In a recent EU report on derisking, the EU Parliament wrote:

> According to Ursula von der Leyen, de-risking is not exclusively vis-à-vis China, as it is about 'managing the risks we see, addressing excessive dependencies through diversification of our supply chains. This is a positive communication move, as it has the potential to be better perceived in China than the triptych (China as a cooperation partner-economic competitor, systemic rival.[221]

Jake Sullivan also supported this strategy when he proposed, "De-risking and diversifying, not decoupling."[222]

In other words, the EU above all does not want to make the CCP mad by calling it a systematic rival. The term derisking allows, the EU believes, the limiting of some dependencies on China while not making it so angry that it limits EU sales to China, something the EU puts at the top of its agenda with China. The EU report goes on to state, "Trade and openness are deeply engrained within the European project, and the more moderate de-risking concept is meant as a way to find a better equilibrium between seizing opportunities and managing risks."[223]

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"Seizing opportunities" is a euphemism for selling more to China, especially if it comes at the expense of U.S. exports, while welcoming Chinese factories to be built in the EU.[224]

The report goes on to narrow the scope for derisking, even embracing more dependency on China:

> In many fields, European firms also look to the Chinese market and Chinese partners not only for research and development opportunities, but also as a source of technology. Ultimately, the de-risking approach proposed by the Commission may be considered one of risk mitigation or management, rather than a cleansing exercise. Indeed, many companies, Member States and even the Commission seek generally to maintain avenues of economic and technological cooperation,

> ensuring that China remains a partner for Europe in areas that do not constitute a palpable risk for Europe's security.[225]

The EU also defines derisking not as only with China, but amazingly also with the United States: "De-risking is strongly tied to the EU Economic Security Strategy that goes beyond China."[226] And the EU seeks to derisk from the United States, as the recent "Draghi report" suggests.[227] When it talks about strategic dependencies in the IT hardware sector, it talks more about the United States than it does about China. In the fact, the report is only partially focused on China, with much of the discussion on the United States' techno-economic capabilities.

Worry About the United States, Not China

Finally, there are a range of strategic approaches that largely ignore either attacking Chinese capabilities or defending against its techno-economic aggression, and instead focus only on ways the United States can improve.

Another French Strategy: Don't Attack China, Only Boost Our Own Force

France relied on defense against Hitler. It failed.

A similar approach is in vogue in the United States today. In a report for the Carnegie Endowment for International Peace Jon Bateman argued that "the primary effort should be 'offensive': new investments and incentives to bolster and diversify innovation pathways, supply chains, talent pipelines, and revenue models in strategic technology areas."[228]

In a 2018 article in *Foreign Affairs*, Kurt Campbell and Ely Ratner, former members of the Biden administration. argued:

> The starting point for a better approach is a new degree of humility about the United States' ability to change China. Neither seeking to isolate and weaken it nor trying to transform it for the better should be the lodestar of U.S. strategy in Asia. Washington should instead focus more on its own power and behavior, and the power and behavior of its allies and partners.[229]

Even if the United States had the political will to come together to fight the war and the willingness to commit the significant resources to spur domestic competitiveness, that would still not be enough.

A Biden interim national security guideline issued in March 2021 echoes this: "[O]ur enduring advantages will allow us to prevail in strategic competition with China or any other nation."[230] It went on to note, "The most effective way for America to out-compete a more assertive and authoritarian China over the long-term is to invest in our people, our economy, and our democracy."[231]

Even if the United States had the political will to come together to fight the war and the willingness to commit the significant resources to boost domestic competitiveness, that would still not be enough. The CCP's pockets and tools will always be deeper and sharper than America's.

Escape to Higher Ground: Support AI and Other Frontier Technologies

In the U.S. Civil War, General McLellan let Robert E. Lee intimidate him and set the stage for where to fight. McLelland reacted and retreated. But Ulysses S. Grant did not, famously stating, "I propose to fight it out on this line if it takes all summer."[232]

McLellan's thinking is what passes for much of U.S. competitiveness and tech policy thinking today. Well, we can't compete with China in "x" (e.g., drones, telecom equipment, chemicals, and even manufacturing generally), so we will retreat to higher ground of "x." Usually, "x" is AI. Well, China is good at manufacturing, but we are good at AI, so we can let them have manufacturing; we will win in AI. Some justify this by hyping AI as the secret weapon in the techno-economic war—akin to Hitler's jet fighters and V-2 rockets. Once the United States gets to artificial general intelligence (AGI) or even artificial superintelligence (ASI), the war is over, and the United States has won. AGI will give us utmost power to outcompete China everywhere.

As one study puts it:

> The contest between China and the United States to harness the potential of artificial intelligence (AI) has become this generation's defining technological rivalry. The report concludes that America's ability to shape AI's trajectory depends on extending its technological advantage over China as much as possible. Rather than focusing on unlikely cooperation, the United States must pursue decisive technical superiority fueled by a vision for American AI that advances democratic values and global development. Effectively managing the fraught issues on AI's horizon can strengthen the United States' soft power and technological advantage; failing to do so risks derailing American AI progress and ceding ground to Beijing.[233]

It is a seductive notion, but likely as wrong as Hitler's betting the war on *Wunderwaffen* (wonder weapons) rather than more tanks. First, China is making rapid progress in AI. It's not like the 1990s with "Wintelism" (Windows and Intel) and U.S. dominance in personal computing and then the Internet. China is in the game.

Second, it is a bet-the-farm risk that AI is the superweapon of the techno-economic war. What if AI is just another normal, albeit important technology? A technology that improves production in many sectors, but does not transform the world like never before. In that case, AI will not be able to preserve our national power industries such as drugs, aerospace, chips, machine tools, chemicals, etc. That, rather than sci-fi stories about ASI is the much more likely outcome, at least in the next quarter century when this conflict really matters.

A related story is that it's not just AI, but rather a host of emerging technologies that will save us. Through the magic of Silicon Valley, America will lead in the industries of the future: blockchain, humanoid robots, quantum, synthetic biology, 3D printing, and of course AI. Biden's Secretary of State Antony Blinken agreed, identifying six technologies as core to the U.S. competitive strategy: "microelectronics, advanced computing and quantum technologies, artificial intelligence, biotechnology and biomanufacturing, advanced telecommunications, and clean energy technologies."[234] (Although the administration never bothered to explain why clean energy is strategic when we have lots of dirty energy.) It seems like advocates of this view get their

understanding of technology from *Wired Magazine*, focused on the cool, cutting-edge stuff, much of what they experience in their own lives.

No need to fight to win the silicon chip wars; just develop the next generation of processors such as neuromorphic computing and the like.[235] No need to win the compute wars; just jump ahead to quantum. Don't worry about the chemical sector; embrace "synthetic biology."[236]

And don't forget, we have Silicon Valley; we can afford to cede the rest of the territory as long as we have the commanding heights of the Valley. This wrongly implies that atom-based industries—or "deep tech"—such as aerospace, vehicles, machine tools, and chemicals are not strategic. Moreover, for all the wonder of Silicon Valley, it's just not that big, accounting for just 1.5 percent of U.S. GDP.[237]

The problems with this approach are similar to those of AI. First, capacity in breakthrough technologies often comes from leadership in prior technologies. Biotech breakthroughs depend on strong, large U.S. biopharmaceutical companies. 6G might come from startups, but more likely it will come from incumbents such as Qualcomm and Ericsson. Quantum could come from new entrants, but existing IT and computer companies are more likely to develop it.

Second, the United States has a long history of leading in innovative breakthroughs only to lose production to other nations. Why would this time be any different if the fundamental U.S. strategy and policy remain the same? In fact, with China poised to hoover up U.S. breakthrough knowledge and commercialize it in China, one would expect even more of the same pattern. China is fighting hard in all of them, and some of these industries have a very similar dynamic to ones that the United States has already lost to China.

The United States has a long history of leading in innovative breakthroughs only to lose production to other nations. Why would this time be any different if the fundamental U.S. strategy and policy remain the same?

Third, there is no reason to expect that the United States will win all these sectors, especially with the deep cuts in federal funding for research. It was much easier for the United States to win past tech breakthroughs when the federal government funded such a massive amount of research. It no longer does.

Finally, there are many sectors, such as machine tools, basic chemicals, and others that are strategic but not cutting-edge, cool, high-tech. These and others are less likely to experience breakthrough innovations that could launch new companies in the United States.

Higher Ground II: Develop Science and Hope for the Best

Another strategy, related to the AI and emerging technologies ones, is to rely on some kind of vague, promised scientific innovations. Presumably, this pays off in commercial success in the United States and in strategic industries and technologies.

In a report for CSIS, Rand's Mike Mazzar wrote, "The domestic foundation for success in turn has three major components: nurturing a supportive ecosystem for science and technology, promoting diffusion, and managing the wider social effects of technology for competitive advantage."[238]

His first component for U.S. success is, "The domestic U.S. foundations of scientific and technological innovation, including the supporting science and technology ecosystem, must remain at a world-class level."[239]

This is a widely held view that a better science system will go a long way toward saving us. In a 2022 speech, National Security Advisor Jake Sullivan stated, "Advancements in science and technology are poised to define the geopolitical landscape of the 21st century. They will generate game-changers in health and medicine, food security, and clean energy. We'll see leap-ahead breakthroughs and new industries that drive our prosperity."[240]

In his otherwise excellent book, David Shambaugh reflected this conventional wisdom when he wrote, "We also need to invest considerable sums into basic scientific research in order to maintain all American comparative advantage in innovation."[241]

This is an appealing and safe framing because it doesn't require a dreaded strategic industry strategy that involves picking winners. It doesn't even involve the painful task of telling U.S. scientists that they have to do more work related to the national interest. Rather, it's grounded in the more widely accepted view that government can play the key role in innovation by funding scientific research that U.S. scientists choose to focus on.

But it also reflects a shallow and misguided view of how innovation takes place and even what it is. Innovation is not scientific discovery, something that is now available widely around the globe. Innovation is the successful bringing to the market of a new product, process, or service, and beating the competition while doing it. Innovation doesn't come from STEM workers or science funding. It comes from organizations with embedded knowledge. That requires a deep understanding of organizational production and corporate strategy. And sophisticated organizations anywhere on the planet can absorb a significant portion of the science breakthroughs funded by the USG.

Exactly how does the U.S. military fight wars with the best lawyers, consultants, accountants, and universities?

Higher Ground III: Our Post-Industrial Future

The ultimate retreat is to say that no particular part of land is strategic enough to defend. This is the view of the "potato chips, computers chips, what's the difference?" group. In this view, all industries are the same. Who cares if America manufactures anything; it's dirty and dull anyway? We will take the commanding heights of global finance, business consulting, content, and higher education. A report from CSIS summarizes the view: "What is missing from both strategies for competing with China is a focus on what is too often the unsung driver of U.S. competitiveness: services."[242] Exactly how does the U.S. military fight wars with the best lawyers, consultants, accountants, and universities? But these are soothing visions. No need to fight. You walk away from the aggressor. You do better things than the aggressor.

The Ultimate Higher Ground: Fix Capitalism and Praise Chinese Capitalism

Still another distraction from the war is the view by elites, especially global business elites and fellow travelers in the academic and punditry, which is that the problem is with the West and that only a new kind of capitalism will save it. Besides implying a self-loathing of Western

capitalism, this view is a major distraction from the task at hand of not letting the West lose in national power industry war.

One example is the famous (or infamous) Trilateral Commission, whose "Task Force on Global Capitalism in Transition" argued that it is Western capitalism that is inherently problematic, something that is remarkably similar to what Xi Jinping says.[243] The Task Force has argued, "There are growing concerns about whether market-based economies will be able to adequately address climate change, the disruptions triggered by the digital revolution, and rising inequalities. Moving toward a more sustainable and inclusive capitalism is thus a defining challenge of our age."[244]

In other words, climate and inequality demand a new kind of capitalism. Maybe even capitalism with Chinese characteristics? In fact, the Task Force has lauded the CCP's efforts as fellow reform travelers: "Even China—the largest beneficiary of global capitalism over the past 40 years—launched a campaign in 2021 to curb 'the disorderly expansion of capital.'"[245] It appears that they did not know that the disorder the CCP was trying to put in order was from companies not investing in ensuring Chinese global dominance in national power industries. The Task Force has even stated that the Chinese economy arguably meets the criteria for a capitalist system. Hence, China is in the club with America seeking "the transition in global capitalism" to a happy, clean, more equal sixth phase.

And of course, the World Economic Forum (WEF) is at the forefront of this kind of self-flagellation. Former director Klaus Schwab recently stated, "We now have a window of opportunity to create this Global Reset which we all need. This Global Reset is necessary because we have seen how our policies which we pursued before the coronavirus struck us because those policies do not create the necessary inclusion of society necessary for harmonious societal development."[246]

Was he not aware that the term "harmonious societal development" is a CCP global talking point to attack the Western model of development?[247] It's worth adding that this was from a person who told a Chinese forum, "We are coming out, thanks also to the leadership of China in terms of fighting the pandemic."[248] And he was "happy to see China putting high priorities on developing its 'fourth industrial revolution' capabilities."[249]

Sounding like *China Daily,* WEF touts that China is "driving global growth," "reshaping food systems," and powering a "remarkable green transition." It is even helping the world with its rare earth minerals policies.

WEF sees China as no different than any other nation, except it's bigger, provides more benefits, and is more committed to free trade than America is. One WEF article about China at Davos 2025 states, "China showcased its transition from traditional growth drivers to a new model centered on domestic consumption, advanced manufacturing, and green transformation, while emphasizing continued commitment to opening up amid geopolitical tensions."[250]

Yes, that would be the "new" model on domestic consumption the CCP has been promising without delivering for the last 15 years. Yes, if you consider green transition to be China' coal-fired power plant construction hitting a 10-year high.[251] And yes, if it's possible to commit to

opening up while simultaneously shutting out more and more foreign companies from its markets.

And the writer went on to castigate America for being closed:

> The recent US Department of Defense designation of CATL as a "Chinese military company" highlighted the challenges ahead for Chinese companies operating globally. While Chinese officials and business leaders consistently emphasized openness and collaboration, there was clear recognition of the need to navigate an increasingly complex international environment.[252]

Sounding like *China Daily,* WEF touts that China is "driving global growth," "reshaping food systems," and powering a "remarkable green transition." It is even helping the world with its rare earth minerals policies.[253] (True, if helping means putting the rest of the world's rare earth miners and processors out of business.) And the author, a professor educated in China and now teaching in Australia, has argued, "A more balanced narrative is the first step towards a coherent, globally coordinated policy response."[254] That is CCP speak for, "Stop criticizing us."

The pacifist Quincy Institute agrees, blaming capitalism for U.S.-China competition:

> The United States and China are trapped in zero-sum economic competition today because neoliberal globalization consistently failed to create the broad growth that would allow prosperity in all countries… The U.S. and China are thus locked in a zero-sum struggle that is distracting both sides from the root causes of the conflict and strengthening the forces of authoritarianism and nationalism in both countries.[255]

Ahh, if only the United States abandoned "neoliberalism," the CCP could get back to what it really wants to do: boost the Chinese proletariat.

Just Rely on Krupp: Defense Procurement Is Enough

In WWII, Krupp was the major defense contractor in Germany, and Hitler relied on it for building superweapons to win the war. Today, there is a similar myopic focus of just reforming defense procurement in order to address the China threat.

U.S. industrial policy for defense goods was seen as necessary because markets would fail. But an industrial policy for dual-use and enabling industries? That's a whole other matter. Much of the discussion of national power industry competition with China focuses narrowly on the defense industrial base and the myriad of reforms offered to improve it. These range from more competition, more procurement from the civilian sector, multi-year procurement, more foreign military sales, more allied cooperation and specialization, and of course, more flexible contracting and funding mechanisms.[256] It's not that these proposals are not useful, they very well may be. But the belief that we cannot lose the power industry war with China by only improving how DOD spends its procurement and R&D budgets is wishful thinking.

Redoubt: Let the China Take Over Everywhere But America

In the first half of the 20th century, the Swiss had a great strategy: let the rest of Europe destroy itself by making sure that the costs of invading mountainous Switzerland were very high and that

Switzerland would stay neutral. The problem with this strategy was that it could have let either the Nazis or the Soviets control Europe.

But still, the redoubt strategy is attractive and seductive. Many neo-protectionist Republicans want to erect high mountains from tariffs and therefore couldn't care less about what other nations, including China, do. Tariffs will ensure that the American economy will be self-sufficient and that China can do it little harm, at least economically. In this view, while a country such as Canada or the United Kingdom couldn't do that because their GDP is too small, the U.S. market is big enough to let every industry comfortably produce and thrive, as long as they are protected by high enough tariff walls.

The problems with this strategy are many. Most importantly, it ensures that China wins the global war. It may not "occupy our land" (e.g., hollow out our strategic industries), but it is likely to occupy the rest of the world. The United States would find itself living in a world where our influence would be minimal: no country would want to risk alienating the hegemon of Beijing. Just look at Europe now, tiptoeing around in fear of aggravating the CCP (or India, going to Beijing to get closer). Imagine how obsequious Europe would be without the United States to protect it.

A protectionist redoubt is a prescription for U.S. national power industry decline.

Second, most strategic industries that are technologically advanced, such as semiconductors, pharmaceuticals, aerospace, fine chemicals, and more, require global market share to survive. The fixed cost is too high to hope to recover them in a market even as large as the United States'. A protectionist redoubt is a prescription for U.S. national power industry decline.

The Right Strategy: FDR and Churchill—Enlist Allies and Fight the War for Chinese Power Industry Containment and Domestic Development

Just as in World WWII and the Cold War with the Soviet Union and the Eastern bloc, the only effective strategy is to stand and fight collectively. We have to take a stand. Like General Grant in the battle of the Wilderness: no more retreat. not one step back, only attacking the next day. Or like in World War II, when the Nazis were relentless in their advance and the Soviets had their backs to the wall, Stalin issued his famous not one step back order. While it meant hundreds of thousands of Soviet military deaths, it also meant that the back of the Wehrmacht would be broken.

Accepting that this is the only acceptable high-level strategy means a fundamental reexamination and reformulation of past institutional arrangements and policies. This means disruption and rethinking past assumptions about globalization, financial capitalism, the role of government, and the regulatory state. And it means embracing the development and implementation of a strategy to not lose the war.

In this sense, the Kennan concept of containment is the right one. Kennan understood the threat to the West from Soviet communist expansionism. And he knew that the ability of the West to defeat the Soviets, especially militarily, was minimal—at least until the Soviet Union began to fall significantly far behind the United States as they started doing in the 1970s. As such, the strategy was to limit the ability of the Soviet bloc to develop (through export controls and limited

trade) while limiting its ability to expand into allied nations, and finally working to gain the hearts and minds of the unaligned world.

Today, the United States does not have the capability to defeat China from a techno-economic perspective. We might have been 20 years ago, when the techno-economic capabilities ratio was much more in our favor, but it no longer is. While various export controls and other means might throw a wrench into Chinese progress (delaying them and raising costs), there is no evidence or reason to believe that it can keep the CCP from its ultimate goal of techno-economic domination.

The goal has to be, first and foremost, not letting the CCP win the battles for strategic industries in allied nations. The reason is simple: more sales for its strategic industry firms means more innovation and lower costs for China. Fewer sales for our strategic industry firms mean less innovation and higher costs for us. An overarching strategy for how to do that is laid out ahead, but for now, suffice to say it involves offense (supporting domestic companies in their battles) and defense (limiting Chinese companies' access to our markets).

Unless the United States rejects both free-market-based consumer welfare economics and progressive, quasi-socialist worker economics and instead adopts a national power economics doctrine and framework, it will lose the war.

Taking this seriously and to heart has major implications for the nation. First, it means that we have to give less attention to many of the political hot-button issues that the Right and the Left are willing to go the ramparts for. And it means, just as in the Cold War, that the American people and our leaders need to admit and bear the very serious costs that engaging in this war will cost. JFK said that "we shall pay any price, bear any burden, meet any hardship, support any friend, oppose any foe to assure the survival and the success of liberty."[257] Few Americans likely believe that today; in fact, many are ambivalent about the very value of liberty.

As such, setting that as the core strategy is paramount. But unless the United States rejects both free-market-based consumer welfare economics and progressive, quasi-socialist worker economics and instead adopts a national power economics doctrine and framework, it will lose the war.

CONSUMER WELFARE AND PROGRESSIVE ECONOMICS VS. NATIONAL POWER ECONOMICS

Two economic doctrines compete for U.S. dominance: free-market, consumer welfare economics and neo-New Deal worker-oriented progressivism.

Consumer Welfare Economics

Most economic policy, including trade, technology, tax and budget, and regulatory policy is grounded in the discipline of economics. In America's case, this is neo-classical economics. Another term for it is consumer welfare-focused economics because the goal is maximizing consumer welfare, ideally by allowing the free reign of market forces enabling the efficient allocation of resources.

In this frame, policies are usually judged by their effects on consumers and free markets. The free trade, free-market think tank The Peterson Institute reflects that view when it argued that:

> the United States cannot and should not have as its policy goal greater self-sufficiency across a wide range of activities. The nation—and the manufacturing sector in particular—is too deeply engaged in international trade to make that advisable. Furthermore, the efficiency gains from this diversification of supply are substantial.[258]

And in this view, efficiency is maximized when prices are set by natural supply and demand forces in markets. A minimum wage: bad because it substitutes government dictate for market forces and hurts consumers. Tariffs: bad because they substitute government dictate for market forces and hurt consumers. Industry subsidies: bad because they substitute government dictate for market forces and hurt consumers in their role as taxpayers. Company market power: bad because it gives them the ability to limit supply or raise prices in ways that true free markets would not.

In conventional economics, consumption is paramount. Trade deficits are actually good because they enable more consumption. No industry is more important than any other because consumer spending determines which industries are important. And foreign subsidization of export industries are good for the United States because they lead to lower prices. If these countries are dumb enough to give us "discounts" on their exports, we'd be dumb to say no. As such, this doctrine sees limiting Chinese auto imports to the United States as bad economic policy because consumers lose. Ignore the fact that much of China's cost advantage comes from government subsidies and a suppressed currency and that open imports would likely significantly harm U.S. auto producers.

And because companies make profits by most efficiently serving consumer needs, strong profits are a reflection of a strong economy. In this theory, the fact that U.S. firms are vastly more profitable than Chinese firms means not only that the U.S. system is better than the Chinese system, but also that the United States is stronger. Indeed, the United States has evolved into a society where it seems that stock prices are the paramount concern. Stocks up, economy strong. Stocks down, economy weak.

A Council of Foreign Relations article on China reflects this consensus consumer welfare view:

> U.S. trade with China has grown enormously in recent decades and is crucial for both countries. Today, China is one of the largest export markets for U.S. goods and services (second to Mexico), and the United States is the top export market for China. This trade—much of which grew after China joined the World Trade Organization (WTO) in 2001—has brought lower prices to U.S. consumers and higher profits for U.S. corporations.[259]

Andy Rothman, an American financial advisor in China, argued:

> China drives global economic growth, so a sound bilateral relationship is important to American consumers and workers, as well as to families who are counting on stock market returns to pay for their retirement. In the 10 years through 2019, China, on average, accounted for about one third of global economic growth.[260]

In this system, if U.S. companies offshore manufacturing or exit from manufacturing altogether, this is optimal, for two reasons. First, by definition, whatever market forces lead to is optimal, as it reflects the most efficient allocation of resources. Second, offshoring must lead to higher profits for firms exiting low-margin industries or business segments. And as we have seen, higher profits are seen as synonymous with a strong economy. If investing in software and information services firms generated higher profits than investing in factories did, then it is American firms that are the smart ones and the American economy that is the strong one.

Box 4: Adam Smith: Wrong and Misinterpreted

It's striking that few people seem to think it strange that the core economic thinkers for both today's Left and Right—Karl Marx and Adam Smith, respectively—put pen to paper more than 150 years ago. Maybe antiquity is why their works are treated as scripture.

But Marx is far worse than Smith, in retrospect. Most of what he wrote is completely wrong, including his claim that capitalism repeals the laws of competition such that all the fruits of technological progress go to the capitalists.[261] And of course, his followers were responsible for unspeakable crimes against humanity.

While Adam Smith is not as wrong as Marx was, at times, it's a close call. Why does this matter? Because the principle intellectual grounding today, at least among the Right and Center, in America against a national power industry strategy finds it succor in Smith's 1976 *Wealth of Nations.*

Smith's famous line, "By pursuing his own interest [an individual] frequently promotes that of society the more effectually than when he really intends to promote it," has morphed into biblical certainty.[262] To be sure, the pursuit of individual profit can and often does lead to societal benefit.

But this is such a simplistic framing, it's blatant in its obviousness. What about the cases where self-interest is not enough? This gets to Smith's core error: his disregard of production externalities.

Economists define an externalitiy as a side effect or consequence of an industrial or commercial activity that affects other parties without being reflected in the cost of the goods or services involved. If these are minimal, than a Smithian world does produce optimally. But even in Smith's time, they were not minimal—and in a world driven by advanced tehcnology, they are even more ubiquitous and important.

The reality is that the success of any one venture depends on the success of many others, both public and private. If an individual in Smith's time wanted to open a pin-making factory, he would have had a hard time if there had had also not been companies making steel and tools to cut the steel. In other words, success of companies depends in part not just on entrepreneurial will and vigor, especially in technologically complex industries, but also on the overall industrial ecosystem. And because companies are indifferent to externalities, by definition—they are external to the firm—relying on firms alone can lead to underperformance. Markets seldom solve externalities on their own. Governments do though.

Smtih was also wrong when it came to domestic vs. foreign production. While Smith was accurately describing his times, he did not worry about the negative effect of offshoring production because doing so was quite difficult. Indeed, he wrote that "every individual endeavors to employ his capital as near home as he can, and consequently as much as he can in

the support of domestic industry."[263] But what happens to his laissez-faire model if moving production to Shanghai is as easy as moving it to Sheffield?

In other cases, Smith qualified his statements with important caveats, but these are largely ignored by die-hard free-market, consumer-welfare economists. Even before David Ricardo, Smith argued that it made no sense to produce something domestically when it could be purchased more cheaply from abroad. This obvious insight is treated as Nobel Prize-winning genius and used to inform all of U.S. trade policy. Sure, it makes no sense for the United States to grow coffee, but what about other things such as cars and semiconductors?

It seems as if free-market Smithians never bothered to read: "There seem, however, to be two cases, in which it will generally be advantage to lay some burden upon foreign, for the encouragement of domestic industry."[264] In other words, Smith did not rule out government action for trade competitiveness, and in fact, downright encouraged it.

The first is for defense industry. He wrote, "The first is when some particular sort of industry is necessary for the defense of the country." Given the criticality of the British navy at the time, he used the case of shipbuilding. If he had been writing in the 1920s, he would have mentioned airplanes.

As Barnett Corelli wrote regarding *The Wealth of Nations*, "This vital distinction was totally lost by nineteenth-century apostles of Free Trade."[265] And, it could be added, by 21st century apostles of free trade in the United States. For Smithians, free markets and free trade, by definition, maximize what Smith termed "opulence."

Smith went on to note a second key caveat to free markets and trade:

The second case, in which it will generally be advantageous to lay some burden upon foreign countries for the encouragement of domestic industry, is when some tax is imposed at home upon the produce of the latter. In this case, it seems reasonable that an equal tax should be imposed on the like produce of the former.[266]

He wrote that when a foreign nation limits imports of goods, the home nation has an advantage if the other nation should impose some "duties or prohibitions upon the importation of some or all of their manufacturers into ours."[267] But to be fair, he only proposed that as a tactic to get the foreign nation to reduce its distortions. If they would not, then the home nation should do nothing. Except if the industry were important to national defense.

This all gets to the fundamental flaw of Adam Smith's doctrine, which Barnett rightly calls "(classical) liberalism." In his book *The Decline of British Power*, he wrote, "This swift decline in British vigor at home and the failure to exploit the empire were not owing to some inevitable senescent process of history. They shared a specific cause. That cause was political doctrine; a doctrine blindly believed in long after it had ceased to correspond with reality."[268]

He went on to say:

The doctrine was liberalism, which criticized and finally demolished the traditional conception of the nation-state as a collective organism, a community; and asserted the primacy of the individual. According to liberal thinking, a nation was no more than so many human atoms who happened to live under the same set of laws. From such belief it followed that the State, instead of being the embodiment of a national community as it had been under the Tudors and the Commonwealth, was required to dwindle into a kind of policeman, standing apart from the

national life, and with the merely negative task of keeping the free-for-all of individual competition with the bounds of decorum.[269]

He noted that as Adam Smith brought this doctrine to the fore, when it came to the national production system, the doctrine held, "What was socially necessary could be safely untrusted to spontaneous creation by private initiative."[270]

The problem then for Britain was when advanced economies evolved from small production shops with limited technological sophistication to mass production factories of increasing scientific and technological sophistication, Britain was completely unprepared. As Barnett wrote, "The English therefore entered the industrial era—the era of organization—with a deep-seated horror or organization, the larger the organization the greater the horror."[271] Spoken as a true neo-Brandeisian of the Left or Right would today.

We see that in the United States after the rise of traditional liberalism and libertarian, free-market economics in the 1970s. Free-market scholars such as Oliver Williamson dealt with the horror of organization by simply assuming it away, seeing large corporations merely as a way to reduce transaction costs among self-interested individuals.[272]

As a result, with the exception of wartime, the role of the British state was limited to writing reports about how backward British business was and how that threatened national security. As Barnett wrote, "To suggest in Britain in the late nineteenth century that the government should guide the industrial and commercial life of the nation was like suggesting medical treatment to a Jehovah's Witness."[273]

This was a doctrinal spell that was cast over the British leaders. Again, Barnett: "Like an enchantment, liberal doctrine seemed to blind British eyes and paralysis British willpower."[274] This was, to say the least, a crisis of utmost proportions as Germany, Japan, and the United States were racing ahead, all three with at least some, if not strong, support from government.[275] Barnett continued, "Thus after 1870 liberal economic doctrine itself was the most catastrophically inappropriate of all the outdated components of British economic development."[276] And as it became clearer and clearer on just how far Britain was falling behind, even as many continued to keep their head in the sands of denial (as in the United States today), he wrote, "No evidence of foreign success therefore shook the general British faith in British industry."[277]

While the parallels of British history then are certainly not exact with the American situation today, there are striking similarities. Liberalism dominates U.S. political economy thinking, and with it the belief that no industry is more important than others, that trade is largely welfare-maximizing, and that state policy is not needed, other than in the form of limited regulations and taxes and perhaps science spending and immigration, to ensure national power industry capabilities. To use Smith's terms, it is time to give more priority to "power" and less to "opulence."

There are two key problems with this conceptualization that consumer and investor welfare is synonymous with national welfare. First, this might be true, or at least truer, if we were talking about net-present value welfare. But all too often stock prices go up when companies take steps that weaken their long-term position but strengthen their quarterly or yearly financials. When CEO Mark Hurd was cutting Hewlett Packard's long-term investments, including in R&D, he helped drive HP stock prices through the roof. Yet, the real net present value of the firm was

declining, as was made clear when this "rob the future to pay the present" strategy was made clear to shareholders.

Second, even consumer-welfare economists recognize the existence of externalities wherein the costs or benefits from an individual actor's decision (including a firm) are not the same as the costs or benefits to society. But despite their incorporation of externalities in economic theory, for the most part, they ignore them, especially when advising on policy. Their view is that externalities are too messy, too uncertain, and too open to manipulation by politics. Let's pretend they don't exist, and that market forces alone produce optimality.

But, by definition, national power is an externality. From a consumer-welfare perspective, defense spending is a complete waste—as are, for the conventional economists, national power industry policies. But clearly defending the nation from aggression is an important benefit, even if individual consumers or firms taxed to pay for it don't benefit. At the end of the day, national power industries have much in common with pure defense industries, and their strength provides important national benefits.

By definition, national power is an externality. From a consumer-welfare perspective, defense spending is a waste—as are, for the conventional economists, national power industry policies.

It is inappropriate to blame conventional economists for the paucity of their theory and concepts. Consumer welfare economics is what it is, and it certainly has its uses. But its uses are close to zero when it comes to shaping and guiding national industry power strategy. Where mainstream economists deserve blame is veering from their lane to negatively pontificate against a national power industry strategy. They should stick to their knitting: issues such as interest rates, the problems with housing price controls, and the like. Leave national power industry strategy to the experts.

This means that conventional economics as practiced in the United States and Commonwealth nations, and to somewhat lesser extent in Europe, can no longer by the lodestar guide shaping national economic policy. It was not designed to operate in a national power trade world, and it was not designed to generate national power industry strength. As such, it is now fundamentally harmful to the nation, and if it continues to be the policy bible, it will lead to the decline of the United States.

The reality of this techno-economic and trade attack fundamentally undercuts the foundation of consumer welfare economics, and exposes its inability to address the current challenge. If national power, not consumer welfare, is the ultimate goal, this doctrine fails, at least for guiding the share of the economy composed of national economic power industries. If a nation's industrial mix is critical, then this doctrine of "potato chips, computer chips, what's the difference?" fails.

Neo-New Dealism Progressivism

While there has been growing criticism of consumer welfare economics—what its critics call "neoliberalism"—the replacement that most on the Left have adopted is no better in dealing with the China threat; in fact, it is likely worse. A broad-strokes consensus has gelled around the contours of a neo-New Deal economic agenda marked by redistribution, global economic autarky,

and worker-centric animus toward large corporations and markets. If implemented, neo-New Dealism might generate a one-time reduction in inequality, but it would come at the longer-term cost of economic stagnation, fiscal crisis, and greatly diminished U.S. national power industry capabilities. In its worst form, neo-New Dealism would severely erode the meritocratic, individualist capitalist system as America has known it.

Progressive journalist Michael Tomasky perhaps defined neo-New Dealism best. He calls it "middle-out economics" which "is the belief that prosperity comes from a thriving middle class, and therefore government plays a role in supporting families and communities. This version of capitalism—more just, more equal, and in which prosperity is shared—could be the American future."[278]

Many of those who have turned toward neo-New Dealism hold a deep skepticism toward corporations, markets, and American global power.

Consumer welfare economics is what it is, and it certainly has its uses. But its uses are close to zero when it comes to shaping and guiding national industry power strategy.

Proponents of neo-New Dealism, a faction that now includes much more than just the Bernie Sanders and "Squad" wing of the Democratic Party, insist that they are just providing a needed alternative to neoliberalism, filling a gap that needed filling. But with its animus toward large companies; its deep suspicion of markets, globalization, and capitalism; its focus on short-term worker welfare; and its overriding goal of redistributing rather than growing the pie, neo-New Dealism would mean losing the national power industry war with China.

Neo-New Dealism is about redistribution that ignores, and often rejects, growth (e.g., it's bad for the planet, it only helps the rich get richer, it creates too much disruption, etc.). Its "middle out" agenda—including eliminating college debt; free health care, elder care, college tuition, and childcare; weakened IP protection; drug price controls; mandates on companies, such as forcing Internet service providers (ISPs) to sell broadband at a loss; breaking up big companies and limiting productivity-enhancing mergers; subsidizing more expensive clean energy; and even a universal basic income more is a way to divide a fixed pie, not grow it. Its proposed massive spending on social policy goals and redistribution would leave little to invest in national power industries.

To be fair, neo-New Dealers are not averse to "industrial policy." But most of their "investments" would be to advance their "green equity" agenda of clean energy, human service industries such as childcare and eldercare, subsidized housing, and mass transit. In a report for the Brookings Institution, Harvard professor Dani Rodrik has advocated for "good jobs," including more jobs in nursing homes.[279] And of course, its anticorporate, neo-Brandeisian antitrust agenda would mean constant attacks on large corporations doing battle with CCP-backed national champions. And its pro-worker fixation would mean an anti-automation agenda, something that is critical to not losing to China that has the opposite effect: automation full steam ahead.

Sadly, some Republicans have begun to embrace some of these progressive views, especially the animus toward large corporations, the focus on redistribution (in this case, to working-class

families rather than on race, as the Democrats focus more on), and their putting worker interests ahead of national interests, especially related to automation and technology.[280]

Emulating the progressives' neo-New Dealism "middle-out" framing, Oren Cass, the founder and president of American Compass, a conservative reform organization, has written:

> This response emerges from an insight that I like to call the working hypothesis: that a labor market in which workers can support strong families and communities is the central determinant of long-term prosperity and should be the central focus of public policy. Genuine prosperity depends upon people working as productive contributors to their society, through which they can achieve self-sufficiency, support their families, participate in their communities, and raise children prepared to do the same.[281]

Sadly, some Republicans have begun to embrace progressive views, especially the animus toward large corporations, the focus on redistribution, and their putting worker interests ahead of national interests, especially related to automation and technology.

The reality of the CCP's techno-economic and trade war on the West undercuts the foundations of neo-New Deal progressivism. If the United States is in an existential contest for global power, then boosting taxing and regulations on business is especially ill-advised, as is the neo-Brandeisian campaign to destroy large corporations. As are unrestrained demands from organized labor. Progressive advocates know this quite well, which is why they go to any end to deny that China even is a competitor.[282]

AN OPERATIONAL STRATEGY FOR "STAND AND FIGHT"

The grand strategy of stand and fight, ideally with the support of U.S. allies who hopefully don't cave and strike their own separate Quisling deals, requires a coherent national power industry strategy. Free-market policy, and even a manufacturing policy, competitiveness policy, and innovation policy—none will get the United States where it needs to be, because, by definition, they are all agnostic to strategic industry capabilities.

The problem is that Washington has virtually no experience with a national power industry strategy. There is neither the conceptual framework for how to craft a strategy, the institutional and legal frameworks to enact it, nor the skills in the federal workforce to manage it. The last time Washington tried do something like this was in WWII when the Roosevelt administration, under the leadership of "Big Bill" Knudsen and Henry Kaiser, organized industry into the arsenal of democracy.[283] Knudsen, then the CEO of General Motors, was put in charge of the Office of Production Management. His task was not to spur innovation or even generate more manufacturing, but rather to help American industry transition to build mass amounts of weapons to defeat our enemies. Kaiser, CEO of Kaiser Steel, was tasked with building a flotilla of "liberty ships." At the same time, the Office of Scientific Research and Development was created to drive scientific and engineering research for military purposes.[284]

That task, while daunting, was in many ways easier and more straightforward than today's. The United States already had the world's largest and most technologically sophisticated manufacturing sector. And the transition from trucks to tanks and passenger planes to bomber

planes was not as complicated as it would be today, given the advanced technology involved in today's weapons systems. And the focus was somewhat narrow: produce a massive amount of a relatively small variety of weapons.

Today's task is much harder. The United States has already lost significant manufacturing capabilities, and its "industrial commons" is hollower than it should be. And the focus must be much broader than just weapons systems, to include dual-use industries. That suggests that any effort needs to be guided by strategic analysis, not just throwing a jumble of disconnected policies and programs at the problem.

Where to start? Fortunately, the concept and theory of strategy have been formulated in business. Business schools have long had courses in strategy, and the number of books and articles published on the topic are legion. Business strategy is a much more valuable intellectual vein to mine compared with economics because, in contrast to the latter, which sees transactions as utility maximizing for both parties, business strategy sees competition as win-lose, exactly the dynamics between the United States and China.

The problem is that Washington has virtually no experience with a national power industry strategy. There is neither the conceptual framework for how to craft a strategy, the institutional and legal frameworks to enact it, nor the skills in the federal workforce to manage it.

In addition, economics is largely based on theories, models, and equations and assumes that the real world fits the models—and when it doesn't, economists complain about the world, not the models. And at the same time, the field of international affairs largely overlooks business competition, industry structure, and technology innovation. For both fields, the concept of technology is limited to things that are broadly familiar, such as AI and cybersecurity. Neither consider things such as catalysis, computer numerical control processes (CNC), or combustion engineering. And both assume, as Robert Solow did, that technology emerges out of nowhere, like manna from heaven. So, they don't even contemplate the possibility of defeat. Rather, they assume there might be shocks that harm some blue collar workers, which is to be lamented and addressed with career training and free bus tickets to help them move out of their loser communities to the coasts, where they can aspire to become two-earner professional couples in more lucrative service industries.

Business strategy can't afford this luxury. It has to be based on ground truth reality, or as close as strategists can get to, because the costs of being wrong are usually obvious, immediate, and painful. A business strategy consultant, or a firm implementing business strategy that has the wrong strategic formulation, will soon be out of business. In contrast, economists are seldom if ever punished for being wrong. Just think that, in 2007, most economists, including Alan Greenspan, Ben Bernanke, and economists at the NY and Boston Fed and International Monetary Fund, said a nationwide housing price collapse was virtually impossible. It is hard to think of a single one that suffered professionally from this flawed ideologically based advice.

Finally, good business strategy is based on a deep understanding of competitors, one's own organizational capabilities, and threats and opportunities in the current and emergent environment. This kind of thinking is completely absent in economics, but it is central to national power industry competition.

As such, it's worth reviewing corporate strategy literature and then discussing how it can be applied to national power industry strategy. The godfather of corporate strategy, Harvard Business School's Michael Porter, wrote:

> The essence of strategy formulation is coping with competition... Whatever their collective strength, the corporate strategists' goal is to find position in the industry where his or her company can best defend itself against those forces or can influence them in its favor... Rivalry among existing competitors takes the familiar form of jockeying for position, product introduction, and advertising slugfests.[285]

He went on to note, "Once the corporate strategist has assessed the forces affecting competition in his industry and their underlying causes, he can identify his company's strengths and weaknesses."[286]

Strategy is always in the service of goals. And organizations and nations can have strategies or not. But what often passes for strategy in government is policy. Policy for nations is an amalgam of different government actions (e.g., different tax provisions, spending on a particular area, a specific regulation). If these are oriented toward a common goal, they can be described as a comprehensive policy for "x" (climate, innovation, equity, etc.). But policy is not strategy. Strategy is the use of policies to achieve particular outcomes that take into account the overall internal and external environment.

What should be the goal of national economic strategy? That is the single most important question and the one that must be answered first and gotten right. Organizations have an easier time agreeing on a goal. For most companies, the goal is maximizing profits—ideally net present value profits. Not only do nations seek to achieve many goals, but also the process of deciding on these goals, at least in democracies, is messy to say the least.

Policy is not strategy. Strategy is the use of policies to achieve particular outcomes that take into account the overall internal and external environment.

When it comes to economic goals, for the last half century or so, the United States has not been able to come close to agreeing on an overarching one. Some on the Right put freedom from government as the paramount goal, with the belief that this will solve any and all economic problems. But as noted previously, there is no logical reason why a laissez-faire policy would lead to a strong competitive position in national power industries that the United States must be strong at to compete with China. Free-market advocates either deny that the U.S. needs industrial capabilities in key industries or simply assert that this is the role for defense spending.

The problem with the latter approach is twofold. First, defense capabilities increasingly rely on commercial capabilities, and what use to be mostly spin-off (defense innovations being used by the commercial sector) are now more spin-on (commercial innovations being used by defense).[287] This is one reason for the creation of organizations such as In-Qtel, the Defense Innovation Unit, and DOD's Office of Strategic Capital. Second, even if DOD could create its own self-sufficient and technologically advanced ecosystem, with rest of the economy being law firms, personal service firms, and retail, the costs would be enormous. For example, commercial semiconductor

manufacturing relies on mass production to achieve economies of scale and drive down costs. A defense-only model would forego these benefits, leading to vastly higher prices per chip. Moreover, with no commercial partner to share the cost, DOD would have to bear the full expense of developing custom technologies for its unique security, performance, and radiation-hardening needs.

While the free-market hold on Washington thinking has lessened in the last decade especially, it's possible that replacement doctrines, while better, all suffer from systematic limitations for being guides to a national power industry strategy. This is true even for the new manufacturing reshoring doctrine, that many on the Right and the Left have embraced. In this doctrine, restoring manufacturing is the overarching economic goal. In this narrative, the goal should be to restore the working class to its prior position and advocates to see the way to do this by boosting manufacturing, regardless of sector. But even if the United States grew manufacturing so much that it eliminated its manufacturing trade deficit, the number of blue-collar jobs that would be created would be modest at best, less than 2 percent of the U.S. workforce.[288] And like the free-market doctrine, there is no logical reason why a manufacturing doctrine would lead to a strong competitive position in the national power industries the United States must be strong in to not lose to China. It might very well grow consumer sectors such as furniture and plastics, but not power sectors such as aerospace and biotech.

The same problems exist with those that embrace the competitiveness and innovation policy doctrines. These doctrines rightly want government to do more to spur competitiveness, especially of advanced sectors and technological innovation broadly. And certainly, more of both would be better and would contribute to boosting U.S. power. But again, there is no reason why generic competitiveness and innovation strategies (e.g., more STEM immigration, a stronger R&D tax credit, more federal support for science) would necessarily preserve critically needed national power industries.

Competitiveness policy is indifferent to particular industries and therefore there is no need to conduct strategic industry strategy.

The same is true for the new fashionable "Abundance" and "Progress" movements.[289] These movements rightly argue that America needs to once again embrace progress and risk taking, and that we need to significantly reduce the barriers to building things. They want to "shape the progress movement into a cultural force."[290] But while certainly useful and needed, to think that fewer regulations, a bit more policy risk taking, and more general optimism of the future is enough to not lose the national power industry war is to not understand the nature of the challenge. [291]

Finally, there are those who are indifferent to industrial development and have an anticapitalist, neo-New Deal doctrine. The Democratic Left is increasingly focused on economic, social, and demographic equity and the fight against the privileged classes. To the extent it has an industrial strategy, it is for human services industries such as day care and elder care.

In addition, much of the Left's support for industrial policy is actually climate policy, such as supporting the Inflation Reduction Act to spur the building of factories producing renewable energy technologies. But for the most part, with the exception of motor vehicles, these sectors

are not strategic in relation to China. For example, if China cut off exports of solar panels, the effect would not be felt immediately and other electricity generation technologies, such as natural gas turbines, could be used.

That leaves national power industry strategy.[292] It is a subset of competitiveness policy, but differs in one critical way. Competitiveness policy is indifferent to particular industries and therefore there is no need to conduct strategic industry strategy. But before delving into national power industry strategy, it's worth examining competitiveness strategy and its limitations.

Figure 6: Relationship between competitiveness strategy and national power industry strategy



The Limits of Competitiveness Strategy and the Michael Porter Framework

It would seem that competitiveness policy should be the replacement doctrine to neoclassical consumer welfare-focused economics. But while it is closer to the solution we need than consumer-welfare economics or neo-New Deal economics is, it cannot be the guide for the simple reason that it does not prioritize defending key industries. Competitiveness policy is much broader, relating to a more robust competitive trade position for U.S. companies—like how manufacturing policy is indifferent to strategic sectors, competitiveness policy is even more indifferent, as it is agnostic whether the United States is competitive in goods or services.

When it comes to national competitiveness strategy the bible remains Michael Porter's *The Competitive Advantage of Nations*, published in 1990. The book was a major contribution to the debate at the time, and it remains highly influential for how competitiveness experts and politicians think about the issue. Because of that, it is worth examining what Porter got right and what he got wrong, especially for today's China era.

What Porter Got Right

Porter got much right. First, he rightly pointed out that national prosperity is created, not inherited, a direct challenge to much of international trade theory at the time, which still believed in comparative, rather than competitive advantage.

Second, Porter pointed out that competitive advantage is something governments should strive for—yet is something most U.S. economists still question.

Third, he stressed the importance of innovation in creating competitive advantage.

Fourth, he built theories of competitive advantage up from the experience of industries, not down from broad macro conditions. This is critical because almost all that passes for competitiveness or industrial policy today ignores industry analytics. As Porter wrote, "The particular industry—passenger cars, facsimile machines, accounting services, ball bearings—is where competitive advantage of firms is either won or lost."[293] He went on to note that "firms play a central role in the process of creating competitive advantage."[294] This is why he wrote that his theory drew on several fields, including of course the business literature of competitive strategy, but also fields of "technological innovation, industrial economics, economic development, economic geography, international trade, political science, and industrial sociology."[295] Note that he did not include macro- and micro-economics, the disciplines that dominate economic policy thinking in the United States. The fields Porter drew from are largely ignored in Washington in favor a sterile and model-based abstract economics.

Fifth, he brought in the critical field of strategy, writing that "a new theory must reflect a rich conception of competition that includes segmented markets, differentiated products, technological differences and economies of scale … and process innovation."[296] Despite Porter's contribution, these insights have had virtually no impact in Washington, where sectoral level analysis and strategy largely do not exist and where macro-economists and finance experts run economic policy.

Sixth, Porter demonstrated the importance of dynamic, not static, competition—something that today's economic theory, including antitrust, too often misses. As he wrote, "In actual competition, the essential character is innovation and change. Instead of being limited to passively shifting resources to where the returns are the greatest, the real issue is how firms increase the returns available through new products and processes."[297]

Seventh, he recognized a role for government, something most economists deny or minimize. But as discussed ahead, Porter significantly underestimated that role, as almost all corporate strategists still do.

Porter's Key Flaw: Competitiveness Is Not National Productivity

Much of what Porter wrote represents an important contribution to the understanding of national competitiveness. But Porter's thinking, and the thinking of other experts and organizations who have adopted the conventional Porter-inspired competitiveness framework, contains fatal flaws that make policy recommendations stemming from it be inadequate at best, and harmful at worst.

His cardinal intellectual sin was that he wrongly argued that "the only meaningful concept of competitiveness at the national level is national productivity." [298] At one level, it's surprising that

someone of his stature could make such a fundamental error of logic as this, but few scholars can escape their intellectual background when delving into adjacent fields, and his background was in how firms boost their profits (e.g., productivity). Others have followed his framing. WEF's *Global Competitiveness Report* defines competitiveness as "the set of institutions, policies, and factors that determine the level of productivity of a country."[299] And IMD's *World Competitiveness Yearbook* defines competitiveness similarly, but more broadly, as how an "economy manages the totality of its resources and competencies to increase the prosperity of its population."[300]

But while these two terms are related, competitiveness should not be equated with productivity or GDP growth. To see why, it's important to differentiate between traded and nontraded industries. A traded industry is one in which the firms sell a significant share of their output outside a particular geographical area. For example, a printing firm in Michigan that sells printed material to customers across the United States would be a traded firm from the perspective of the Michigan economy, but a nontraded firm from the perspective of the U.S. economy. In contrast, a software firm in Washington that sells software throughout the world would be a traded firm from the state and national perspective.

Porter's thinking contains fatal flaws that make policy recommendations stemming from it be inadequate at best, and harmful at worst.

Thus, competitiveness relates only to the economic health of a region's or nation's traded sectors. (For the purpose of this memo, the term "region" shall refer to both national and subnational economies) But how do we define health? One definition is jobs. But this can't be right, because if one region's traded sector is highly productive, it will have fewer jobs than another region's traded sector that is less productive, yet it may be more competitive. Another definition is value added—the amount of value that traded sector firms add to the inputs of production that they purchase. This is closer to the right definition, but it fails to control for the extent to which a region's economy is traded. One region's economy might be more traded than another's and therefore its traded sector is larger, but it might have vastly more imports, meaning that its traded sector is not holding its own when it comes to competitiveness. But even this is not quite precise enough, for one region might run a trade surplus but do so by subsidizing its exporters (e.g., by manipulating its currency) or erecting barriers to importers (e.g., tariffs). In this case, the trade surplus may not be a reflection of the true competitiveness of the region's traded sector firms, but rather a reflection of the extent of mercantilist aid the traded sector firms receive.

This sets up the true definition: competitiveness is the ability of an economy to export more in value-added terms than it imports, while accounting for the "terms of trade" to reflect all government "discounts" (including an artificially low currency, suppressed wages in export sectors, artificially low taxes on traded sector firms, and direct subsidies to exports), as well as foreign barriers to its exports (both tariff and nontariff). Under this definition, a nation may run a large trade surplus (one component of competitiveness), but if it does so by providing large "discounts" to its exporters or by blocking imports, it would not be truly competitive, for such policies would reduce its terms of trade by requiring its residents to give up some of their income to foreign consumers, pay higher prices for foreign goods and services, or both.

We can see this by looking at past trends in the U.S. trade deficit. When the rise in the relative price of imports brought about through the lower value of the dollar in the last half of the 1980s helped reduce the U.S. trade deficit, it also reduced the U.S. terms of trade (the United States could buy fewer imports for the same quantity of exports). Therefore, U.S. competitiveness was unchanged even as the trade deficit declined. Likewise, the fact that the United States runs a massive trade deficit today but many of its trading partners run surpluses by means of massive "discounting" (including currency manipulation) and import blocking means that we cannot determine with certainty that the U.S. economy is uncompetitive.

In fact, despite numerous studies claiming to compare national competitiveness, no study to date has actually done this because none has fully accounted for the magnitude of export discounting and import blocking, in part because the data is extremely difficult to collect. While data exists on trade balances for virtually all nations, data on the extent of export discounts and import blocking (especially through nontariff barriers) is difficult to obtain. Despite this, at a cursory level, it would appear that nations such as Austria, Germany, and Sweden would be on a list of competitive economies (they run trade surpluses while also having relatively high wages and limited other discounts). In contrast, nations such as China (too much discounting) and the United States (too large a trade deficit even when accounting for foreign subsidies) would likely not make the list of competitive economies.

How does productivity fit into competitiveness? Productivity can enable competitiveness, especially if it is concentrated in traded sectors, which lowers costs and enables firms to sell more in global markets without relying on government-provided discounts. But productivity growth can also be relatively unrelated to competitiveness if it is concentrated in nontraded sectors. Imagine a nation with strong productivity growth but almost all of it in nontraded sectors such as grocery stores, electric utilities, and nursing homes. Certainly, incomes would go up as relative prices in these sectors fell, but firms in traded sectors would only see modest reductions in their costs based on the extent of purchased inputs from nontraded firms.

The United States could very well be much stronger internationally with no trade deficit and no diminution of the value of the dollar and still see key industries beaten and destroyed by China.

Porter recognized that "to firms, competitiveness meant the ability to compete in world markets."[301] Although he should have added the caveat that this only matters for firms in traded industries, not domestic serving industries. But he can't go to the next logical step of saying that to nations, competitiveness meant the ability to compete in world markets. Presumably, this is because he worried that it would empower protectionists who cared about deindustrialization. But in fact, countries do compete, as we will see ahead regarding China.

But even this true definition of competitiveness still does not address the core existential challenge facing the United States: predation by China for strategic industries. The United States could very well be much stronger internationally with no trade deficit and no diminution of the value of the dollar and still see key industries beaten and destroyed by China. It could boost exports in tourism, banking, consulting, higher education, natural resources, food products, plastics, and furniture but lose is aerospace, machinery, biotech, semiconductors, and other advanced industries to China.

Porter's Other Flaws and Gaps

Before discussing the concept and importance of strategic national power industries, it's important to consider the other major problems in Porter's work, because so many people continue to rely on the Porter framework even though it no longer applies to the world the United States finds itself in today.

A Focus on Democratic Nations: First, Porter analyzed democratic, capitalist nations; not China. As such, he made two key assumptions. One was that other countries would generally play by the rules. And two was that it was okay if U.S. firms disinvested in certain industries. It didn't matter if other nations won in certain industries, as long as the United States' firms generally invested in areas they had competitive advantage in. In fact, Porter did not even mention China in his book.

The assumptions he made about the competitive environment of firms in the United States or any of the countries he advised simply do not hold when it comes to China. Porter was writing about capitalism, not state capitalism. And state capitalism changes everything. Among other items, he assumed that 1) foreign firms would not engage in systematic dumping; 2) nations would not be able to afford massive subsidies to targeted industries; 3) to the extent they did dump or subsidize, national trade policies would effectively respond to such policies; and 4) foreign markets would generally be open to imports, and if they were not, negotiations would pry them open. Of course, none of that applies to Chinese state capitalism.

Porter went on to claim that "subsidies of any kind will have little leverage when competition is based on quality, rapid product development, and advanced features."[302] But what about when the competitor has pretty good quality, fairly rapid product development, and many advanced features but on top of that has massive subsidies from the government? This describes many Chinese firms. Then those subsidies provide massive leverage. Moreover, in many markets, particularly middle-income countries, price matters more and buyers are willing to buy Chinese goods that are not quite as good as American because of the strong price advantage. Porter ignores this because he couldn't conceive of what China became and didn't anticipate the strong growth of global GDP in developing markets.

Porter was writing about capitalism, not state capitalism. And state capitalism changes everything.

To the extent Porter envisioned tough price competition, his advice was that firms downsize and even exit, because competing on price is a fool's errand. And he applied this advice to governments to give up on industries that they couldn't easily compete in because of price, even if most of the price differential was due to unfair government practices.

Porter also wrote that companies, and nations by extension, should give short shrift to unfair foreign trade practices. For Porter, this just opened up rent seeking that ultimately kept firms from evolving. In fact, he noted unfair trade practices with italics ("unfair") to suggest that they really are not unfair. He argued that firms and governments pushing pack against foreign unfair trade practices "postpone change, dampen innovation … and work in exactly the wrong direction from those necessary for competitive advantage."[303] This is clearly wrong. If it's true, why not encourage other nations to ramp up unfair advantages, as doing so would really motivate U.S.

firms to compete. But if the unfairness is actually a Colt 45 to the head, as it is with China, it won't motivate, it will decimate.

Porter also applied the same corollary to domestic policy, when he wrote, "Direct government 'assistance' [again note the quotation marks to imply that it is not actually assisting] in one firm or industry also has a strong tendency to create forces that cause it to spread and multiply."[304] He was writing as if assistance were highly contagious and a deadly communicable disease and not a key factor to respond to Chinese power industry predation.

Related to this, and reflecting his firm orientation, Porter repeatedly rejected the idea that nations should seek to address systematic cost disadvantages, in fact, bizarrely saying that these are good, as they spur firms to compete and innovate more. Perhaps, but not when the cost differentials are large and persistent as they are vis-à-vis the United States and China. Perhaps betraying his lack of understanding of international economics Porter did not appear to ever consider that currency is the natural market adjustment mechanism in international trade except that it doesn't work for the United States because the dollar is the reserve currency.

A Limited Role for Government: Second, Porter only saw a limited role for government in boosting firm or industry competitiveness. The role of government "is inevitably partial."[305] When a nation's companies are competing against companies from other nations that generally play by the rules, perhaps this framing is correct. Although Porter largely ignored the key role the USG played in the development of many industries, including shipbuilding, aerospace, semiconductors, and interchangeable parts. But again, in a world where China practices techno-economic predation, such a limited role is by definition a death sentence for domestic industry that China targets.

He applied his famous Porter diamond of five forces that affect firm competitiveness to national policy. These were threat of new entrants, bargaining power of suppliers, bargaining power of buyers, threat of substitute products or services, and in the middle, rivalry among existing competitors. For countries, he listed four: national factor conditions, firm strategy, structure and rivalry, related and supporting industries, and demand conditions.

But this reflects his overarching ideology of limited government, a blind spot most business strategists suffer from. Sure, government can build some roads and fund some R&D and put in place some regulations. But under no circumstances should it be involved in industry strategy.

Porter's theory allowed firm exit from markets, and in fact actively supported it. But countries cannot allow power industry exit unless they want less power.

He made assumptions that at least in the case of China are not true as when he said that "even when staffed with the most elite civil servants, governments make erratic decisions about the industry to develop, the technologies to invest in, and the competitive advantages that will be the most appropriate and achievable."[306] Yet, he assumed that leaving these choices to a nation's firms would maximize competitiveness: which Porter meant as productivity.

Porter opposed governments targeting particular industries because "targeting distorts market signals by altering the incentives of private firms to compete in an industry."[307] He wrote that when government distorts market signals, especially through direct targeting, it cannot rely on

firms to invest only in fundamentally sound industries. It places the burden on government planners to understand the subtle conditions for national advantage."[308]

He went on to complain that "one nation after another crowds into the same industries," creating overcapacity.[309] Perhaps in a pre-China world this might have some basis, but not now. When China targets U.S. firms with attacks, fundamentally distorting market forces, not responding distorts market forces.

Nations Can Choose Any Industry: Porter's third error was that he treated industry choice the way companies treated it. Profit-making companies are indifferent about the industry they are in, as long as they maximize profits. So should nations be, said Porter, writing, "Manufacturing is not 'better' than services … because many services involve sophisticated technology and high levels of productivity."[310] If the goal is productivity, Porter was correct. Whatever set of industries maximize productivity are the best ones. But if the goal is competitiveness, and in particular power industry competitiveness, then nations cannot be indifferent about which industries they are strong in. Porter's theory allowed firm exit from markets, and in fact actively supported it. But countries cannot allow power industry exit unless they want less power.

Cost Competition Is Not Key: Fourth, Porter rejected cost competition. Like almost all strategy gurus, he advised firms to not engage in slugging it out in price competition because doing so eroded margins. Better to find ways to move up the value chain or seek niches that maintain margins. If that doesn't work, then shrink. But that clearly cannot be the answer for strategic industries. The United States does not have the luxury of getting out of industries such as semiconductors and aerospace even if China attacks the margins. He wrote that a "10 percent cost saving through economies of scale … is nullified quickly by rapid product and process improvement."[311] But in a hyper-competitive environment with China, where it will have the former and the latter, not pursuing the former is a recipe for market share loss.

Porter's third error was that he treated industry choice the way companies treated it. Profit-making companies are indifferent about the industry they are in, as long as they maximize profits. So should nations be.

Top-Line Growth Is Key: Fifth, Porter reflected the common view in the business strategy literature that the best strategy is to go for top-line growth in new markets, rather than slugging it out with other firms in existing markets. He wrote, "The most sustainable strategies are those that widen and upgrade the market rather than simply taking business away from foreign firms."[312] That might be a good strategy for firms that have no fundamental responsibility for maintaining production of power goods. But it is a defeating strategy for nations.

Firms Must Choose Between Cost and Differentiation: His sixth error was in assuming that firms had a fundamental choice in industry positioning between lower cost and differentiation. This was common business strategy advice at the time. As David Moshella argued:

> In 1995, Michael Treacy and Fred Wiersema argued that companies could excel in one of three areas—*product leadership (PL), operational efficiency (OE),* or *customer intimacy (CI)*7 *.* Strategically, they needed to choose which discipline to focus on, and then be competitive in the other two. This thinking made great

> sense in the pre-digital age—with Sony (PL), McDonald's (OE), and the Ritz-Carlton (CI) serving as iconic examples of each approach. But the digital leaders shown in the figure typically excel in all three dimensions. For example, Amazon and Netflix have the widest product selection, the most efficient operations, and the most personalized customer experience in their respective markets.[313]

That was certainly true when he wrote the book *Seeing Digital: A Visual Guide to the Industries, Organizations, and Careers of the 2020s*.[314] But the emergence of digital technologies has made that much less true. Digital-first companies can now achieve low costs, high quality, and differentiation. That means the safety niche of moving upscale to differentiation is less safe from attack.

Porter's Concept of "Bad Competitors" and Its Application to China

One key aspect of Porter's work (and others in the field) is the idea of bad competitors. For anyone who plays poker, a bad player is someone who is so bad they don't know when the opponent is making a great bluff and hence stay in and win. In the case of bad competitors, Porter argues they have several characteristics. First, they are aggressive price cutters even if doing so hurts their long-term profitability and overall industry profitability. Second, they are low-differentiation players that offer similar products with little or no differentiation, making it difficult for any firm to establish a sustainable competitive advantage. Third, they are unstable participants that enter an industry with aggressive tactics and limited resources, potentially destabilizing the market. And finally, they are high-stakes competitors that are heavily invested in an industry and will fight aggressively to maintain their position, even during downturns.

These factors largely describe Chinese competitors that, for the most part, are bad competitors employing almost militaristic, scorched-earth policies. They aggressively cut prices, not worrying about year after year of losses, usually backed up by Chinese government deep pockets. This China price—aggressive pricing—destroys gross margins industry-wide.

Second, they specialize in copycat products. Third, they aggressively enter new industries such as biotech, aerospace, and high-speed rail where they have little experience and ultimately completely destabilizing markets, in part because they end up closing their own markets to competition. And finally, they don't blink in either economy- or industry-wide downturns; they keep investing and expanding, leading to global overcapacity.

U.S. and allied nations must prepare for a decades-long siege wherein a share of national income will have to be devoted to shoring up power industries in order to endure grueling trench warfare.

When it comes to dealing with such competitors in normal countries, Porter proposed three possible strategies.

First, abandon the industry. If the industry is structurally unattractive due to bad competitors and offers limited profit potential, a company might choose to exit the market and pursue opportunities elsewhere. Or it might abandon the United States and seek to match the artificial China price by moving production to China, or more recently, to even lower-cost locations such as India. Or it might go "asset-light" and outsource capital-intensive, lower-margin shares of the business to other companies, including companies outside the United States. In these

situations, it makes little economic sense to invest, which is why so many companies return free cash to shareholders through stock buybacks. But this is temporary strategy at best. Moreover, both strategies hollow out domestic industrial capacity: strategy 1 directly reduces the manufacturing base, while Strategy 2 degrades supplier ecosystems and workforce capabilities. The result is a self-reinforcing cycle wherein American firms lose the ability to scale innovation and compete in advanced manufacturing, validating Andy Grove's 2010 warning about the strategic risks of abandoning production competencies.[315]

While this might be useful for the company in the short run, eventually, the company will have few places to run. And more importantly, abandonment is not a choice that countries seeking to maintain national techno-economic power can make.

Second, convert bad competitors. Porter says that a company might try to influence or educate bad competitors to adopt more sustainable competitive practices, such as focusing on differentiation or value-added services. Perhaps this might work with a normal company in a normal government, but it absolutely will not work with China. For at least two decades, U.S. policymakers thought that if they just engaged in enough dialogue, they could show the CCP the error of its ways and that it would start to compete fairly. Needless to say, that proved to be false.

If neither of these two steps is possible, Porter advised preparing for a siege. In this case, the company needs to adopt a long-term strategy focused on cost leadership or differentiation while enduring intense competition and potentially lower profits. That is what U.S. and allied nations must do: prepare for a decades-long siege wherein a share of national income will have to be devoted to shoring up power industries in order to endure grueling trench warfare.

Applying Business Strategy to National Power Industry Strategy

America needs a national power industry strategy. Conventional consumer-welfare economics won't cut it, nor will progressive neo-New Dealism. Competitiveness, innovation, and manufacturing policy, while closer, all fall short of the mark. While there was considerable excellent work done on competitiveness policy, including by scholars such as John Zysman, Laura Tyson, Robert Hayes, Lester Thurow, Michael Piorre, James Womack, Annalee Saxenian, Ira Magaziner, and others in the 1980s and 1990s, that work did not have to focus on national power industries because our core competitors—particularly Japan and Germany—were allies.[316] Finally, new concepts such as the "abundance movement," at best address only small parts of the challenge.

For a national power industry strategy, the first issue is to identify which industries (products in business strategy terms) to compete for. And the second is development of an action plan based on an amalgam of deep industry analyses.

What to do? Unfortunately, in part because the United States has never faced this kind of challenge before, there is little intellectual work on which to build. As discussed, the closest is the field of business strategy. We need to look at this field, not for cookie cutter answers, but rather for inspiration and ideas that can be built upon to construct a national power industry strategy framework.

What is business strategy? It is not culture. It is not operational excellence. It is not planning and policy. Rather, strategy is about positioning and reacting. As strategy guru Roger Martin has written:

> Planning and strategy are two fundamentally different actions—and conflating them undermines performance. Planning is about allocating resources and setting out actions within a company's control, like opening a new plant or hiring staff. Strategy, on the other hand, is about making a coherent set of choices that position an organization to win in a specific market.[317]

One business strategy article argues that a business strategy has two core elements:

> The first is the product-market investment decision which includes the product-market scope of the business strategy, its investment intensity and the resource allocation in a multiple business context. The alternatives range from a withdrawal from a business area to a milking strategy to various growth strategies such as market share growth, or expansion of the product line or served market. The second core element is the development of a sustainable competitive advantage which encompasses underlying distinctive competences or assets, appropriate objectives, functional area policies, and the creation of synergy. A sustainable competitive advantage is usually based upon a strong point of differentiation such as product quality, a sustainable cost advantage, or a focus upon one or more market segments.[318]

In other words, for a national power industry strategy, the first issue is to identify which industries (products in business strategy terms) to compete for. And the second is development of an action plan based on an amalgam of deep industry analyses.

The Advantages of Business Strategy as an Intellectual Base

Business strategy is a much more effective source of information for a national power industry strategy than conventional dominant consumer welfare economics.

First, unlike consumer welfare economics, which assumes in the Ricardian framework that trade is win-win, business strategy sees competition as mostly win-lose, with market share gains of one company coming at the expense of a competitor. And that is exactly what the U.S.-China techno-economic and trade relationship is. The PricewaterhouseCoopers journal *Strategy and Business* wrote:

> The concept of strategy originates in war, where the objective is to destroy the enemy. In business, if the enemy is your competitor, then the objective of strategy must be to crush the competition. Michael Porter gave academic standing to this way of thinking when he made popular the idea of "competitive advantage" with his best-selling textbook, *Competitive Strategy*, published in 1980.[319]

One leading strategy book from 1986, *Marketing Warfare,* notes that it:

> applies military strategic principles to business competition, outlining four primary competitive strategies: defensive warfare (for market leaders), offensive warfare (for strong challengers), flanking attacks (for smaller players finding

> undefended market segments), and guerrilla warfare (for small companies using focused, limited attacks).[320]

Second, unlike consumer welfare economics, which assumes that all industries are similar (they all compete on demand and supply), business strategy also is grounded in recognition that industries (and technologies) are fundamentally different, and require different strategies. And that matters when competing with China because winning in biopharmaceuticals requires a very different kind of strategy than competing in quantum computing.

Third, unlike consumer welfare economics, business strategy largely sees firm inputs as undifferentiated commodities firms can buy in markets. Business strategy recognizes the many different factors that go into a firm being able to win competitive challenges, including taxes. This is key because winning (or at least not losing) in various national power industries requires understanding that each requires unique inputs and policies.

The concepts in business strategy are vastly richer than economics, wherein everything boils down to supply and demand, profit and loss, and allocation efficiency.

Finally, unlike consumer welfare economics, which assumes that national economies tend toward a state of equilibrium, business strategy, especially work after the late 1990s, assumes a constant dynamic process. And also unlike consumer welfare economics, which assumes that innovation is constant, essentially "manna from heaven," business strategy sees it as intentional. UC Berkely professor David Teece wrote:

> Dynamic capability is "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." Dynamic capabilities can be distinguished from operational or "ordinary" capabilities, which pertain to the current operations of an organization. Dynamic capabilities, by contrast, refer to "the capacity of an organization to purposefully create, extend, or modify its resource base."[321]

As one article notes, "Competitive dynamics refer to a series of attacks and counterattacks launched by companies operating in a particular market to strengthen their competitive positions, where strategic actions by one firm often trigger reactions from rival firms."[322]

The concepts in business strategy are vastly richer than economics, wherein everything boils down to supply and demand, profit and loss, and allocation efficiency. In other words, if you would have one discipline to shape national techno-economic and trade policy, economists or business scholars we would be better off with the latter.

While certain sub-disciplines of economics such as industrial organization and regional economics address some of these concepts, by and large, consumer welfare economics glosses over them. These concepts include the following:

- Choices of technology leapfrogging
- Overcoming latecomer disadvantages
- Role of market share building

- Fixed costs and variable costs and impacts on marginal costs
- Economies of scope and scale
- Importance of execution vs. strategy
- Sources of competitive advantage (price, quality, customization, innovation)
- Incremental vs. disruptive innovation
- Organizational culture and resistance to disruptive innovation
- Turnaround strategies vs. sustaining
- Experience curve and learning curve[323]
- Growth-share matrix[324]
- Cost advantage vs. differentiation
- Barriers to entry
- Product life cycle and commodification
- Market growth rates
- Sustaining vs. disruptive innovation
- Industry positioning
- Market scope (local, national, global)
- Kinds of innovation (product, process, business model)
- Kinds of competition (dynamic vs. static)
- Industry externalities
- Network effects
- Agglomeration (localization and urbanization)
- First mover vs. latecomer advantages[325]
- Threat of entry and barriers to entry
- Expected retaliation from incumbent
- Substitutability
- Modularity

These and other business strategy concepts can be incorporated into the shaping of a national power industry strategy and the multitude of sub-industry strategies that must be developed.

Where Business Strategy Does Not Effectively Translate for a National Power Industry Strategy

While the business strategy frame offers a much more promising foundation to build on, there are important ways it does not fully translate for the establishment of a national power industry strategy.

First, business strategy is based on indifference to strategic sectors. If Intel can make more money by becoming a fabless chip designer than it can competing with the likes of TSMC to produce chips, by all means it should do this. But that cannot be an acceptable outcome from a power industry strategy because the nation needs leading chipmakers that are headquartered in the United States.

Second, business strategy advises firms to not slug it out in markets based on cost competition. Pretty much every business strategy tells business executives to retreat to higher-margin parts of the business. This may or may not be good business advice, but it also might be bad in that it assumes that the cost challenger is consigned to cost competition, not other forms of higher-margin competition such as quality, customization, or brand. But either way, it is poor strategy for a nation seeking to not lose in cost competition because China always starts industry competition with a cost assault—and if U.S. firms fold and run at the first whiff of gunpowder, America will lose power industry capabilities. Besides, Chinese firms have shown that they always intend to move up the value chain and attack the high-margin segments.

Going asset-light is usually counter to the goals of a national power industry strategy, which is based on boosting capital assets in country.

Third, some of the business strategy literature, and most of the equity market advice, is for firms to maximize return on net assets. A key way to do boost this ratio is to reduce net assets. Companies do this by going asset-light and outsourcing more capital-intensive work to other companies that presumably don't listen to business consultants. This way, capital can be freed up for other uses, such as stock buybacks. This may or may not be a good strategy to maximize long-term profitability and net-present value returns. But going asset-light is usually counter to the goals of a national power industry strategy, which is based on boosting capital assets in country. As one article notes, "The tension is often between financial goals, such as cash flow and profit, and strategic goals, such as market position and growth."[326] For a corporation, the former dominate. For a country, the latter must dominate.

Fourth, of course, is that the fundamental goals and operations of an economy are different than that of a firm, and the business strategy literature largely ignores the role of the state. It is instructive that chapter 12 of Porter's book *Competitive Advantage of Nations* is not "government strategy" but "government policy." This is key. The competitiveness community eschews strategy, but without it, we can't solve for China strategic industry aggression.

Box 5: Shih-Paisano Industry Classification Model

At the same time, calls for massive reshoring ignore the fact that it makes sense to rely on global supply chains for at least some manufacturing production. One useful framework for thinking about this comes from Harvard Business School professors Gary Pisano and Willy Shih.[327] They have argued that the degree to which it makes sense to offshore production or keep it at home depends on two factors: process maturity (the extent to which the technologies used to produce a product are mature or continuing to evolve) and modularity (the degree to which information about product design can be separated from the manufacturing industry).

Their argument is that in industries with high modularity and mature production processes, offshoring in order to lower costs makes good business sense and does not come at the cost of

product or process innovation. They put the production of active pharmaceutical ingredients (APIs) in this category; the production process is relatively mature and product innovation (the development of new drugs) is not dependent on close linkages to the production process. This is why a significant share of API production has moved offshore. In contrast, they've argued that biotechnology production (the production of large-molecule, living compounds) is not a mature production process and there are closer links between drug development and drug production. This is why a much larger share of biotechnology production is still in the United States. There are at least five main policy implications from this. The first is that, to the extent that policy can spur more drug innovation, especially in large-molecule, biotech drugs, it is more likely that production will be located in the United States. The converse is also true: the more there is a push to replace novel drugs with generics, the more likely that supply will be filled through offshore production. As Shih and Pisano wrote, in sectors developing breakthrough products at the frontiers of science, the major process innovations are evolving rapidly and are critical to product innovation.

A NATIONAL POWER INDUSTRY STRATEGY FRAMEWORK

Later reports in this series will lay out in greater detail a national power industry strategy, including a comprehensive list of actionable policy steps America needs to take. For now, a broad framework follows.

As in any conflict, there are two main tactics: strengthening one's own forces and slowing the advance of the adversary's forces or even degrading them. The former tactic requires a coherent national strategy to bolster domestic economic power. The latter requires steps to limit the PRC's advances in national power industries. Both are required to succeed. The PRC's subsidies and other weapons are so powerful that responding by simply boosting America's domestic capabilities will not be enough, because for a variety of reasons the United States and core allies will never be able to do enough to counter PRC advantage.

To slow Chinese gains, the United States and its core allies need to take actions in four areas: 1) limiting Chinese knowledge acquisition; 2) limiting Chinese imports and investment in U.S. and key allied markets; 3) reducing allied firms' production in China; and 4) contesting Chinese firms in non-allied markets. Doing all of this will require a host of detailed legislative actions, plus administrative follow-up and enforcement.

The PRC's subsidies and other weapons are so powerful that responding by simply boosting America's domestic capabilities will not be enough.

Meanwhile, spurring U.S. and allied gains also will require action in four main areas. First, allied nations need to invest much more in the foundations of technology-based competitiveness, including R&D and skills development in science, technology, and engineering. And these initiatives will need to be structured and targeted in new ways for national power industries, working closely with industry leaders and experts. At the same time, a wide range of federal policies and programs need to be scrapped or modernized for the new era—especially environmental regulations, immigration policy, antitrust policy, tax policy, and economic policies pertaining to small businesses and industrial support.

Second, it's time to jettison the entire idea of free trade agreements. The very concept is based on the quasi-utopian idea that all nations are allies and inherently free traders. Alas, the last 15 years have proved that vision is deficient. Rather than free trade agreements, the United States needs to take the lead in forming strategic national power industry partnerships with allies that are willing to stand up against the CCP's techno-economic aggression. These partnerships would require not only eliminating virtually all trade and investment barriers, but also requiring that each nation commits to limiting Chinese investment in their domestic markets, adopts a robust export-control and outward bound investment-review regime when it comes to China, agrees to share commercial counterintelligence, and engages in close techno-industrial partnerships.

The U.S. government needs to craft industry-specific strategies as part of an overarching national power industry strategy.

Third, as American capitalism and corporate financing have evolved into a finance-driven system that presses companies to be asset-light and to prioritize short-term returns, U.S. firms' ability to robustly fight this techno-economic war has declined. They are competing with Chinese firms that are willing to accept zero or negative returns; that receive massive subsidies for capital investment; and that are prepared to slug it out in market competition until capitalist adversaries throw in the towel. While specific techno-industrial development policies are needed, as long as those incentives are in place for Chinese firms, it will be critical for the United States to provide incentives for even the most patriotically minded CEO not to act in ways that will lose the war. That will likely entail thoroughly overhauling the corporate tax code to reduce or eliminate incentives for short-termism, while at the same time putting in place positive incentives for long-term investment, such as a stronger R&D tax credit and an investment tax credit.

Fouth, the U.S. government needs to craft industry-specific strategies as part of an overarching national power industry strategy. Industries are all different in terms of their structures, competitive forces, technology needs, and other factors. While generic support policies like the R&D credit, infrastructure, and science investment can help the overall innovation and competitiveness environment, they lack the specificity needed to help firms in the United States compete effectively in global markets. So, we need a national semiconductor strategy, a national biopharma strategy, a national machine tool and robotics strategy, a national aerospace strategy, and more. These strategies would assess industries' strengths, weaknesses, opportunities, and threats in a classic "SWOT" analysis, and examine how a wide array of federal, state, and local policies impact their power and competitiveness.

Box 6: National Power Industry Policy vs. Industrial Policy

At first glance, it would appear that national power industry strategy and traditional industrial policy (industrial policy designed around U.S. competitiveness, as opposed to industrial policy for social goals such as climate change or social welfare) would be quite similar. They are at the same level, as they both reject consumer-welfare, free-market economics and envision an active role for government in boosting value added output in certain industries.

But there is where their similarity ends. Traditional industrial policy advocates stress its benefits for productivity. Oren Cass has stated that industrial policy is needed because the industries it grows "are actually the place where we get a lot of our productivity growth over time."[328] But

that's no longer true, as manufacturing productivity growth has lagged behind overall economy productivity growth over the last 15 years or so. The pro-industrial policy group Prosperous America has written that industrial policy is "essential to rebuilding U.S. industry and prosperity."[329]

The logic is that industrial policy will boost output in industries with high value added per worker and by definition will reduce output in industries with lower value added per worker (this is an identity because the models and theory have to assume full employment). When a country is early in its development phase, as South Korea was in the 1950s, this moving-up-the-value-chain model can be quite effective. Workers move from lower productivity sectors such as agriculture and textiles to higher productivity sectors such as steel and then semiconductors.

But once an economy becomes fully industrialized, the potential gains from such a strategy are quite limited. For example, the Bureau of Economic Analysis ranks the 19 major manufacturing industries by value added per worker, with petroleum and coal products at $836,600 per worker and furniture and related products at just $69,000. Assume that industrial policy boosts the higher value-added sector output and jobs by an average of 30 percent and reduces the lower value-added sector output and jobs by the same (so the economy has the same number of manufacturing jobs), GDP would experience a one-time increase of $230 billion, or about 1 percent of GDP.[330] Even if we assume that the losses are in even lower value-added nonmanufacturing sectors such as retail trade and personal services, the gains would still be quite small, perhaps 2 to 3 percent of GDP.

Second, traditional industrial policy is indifferent to industries in terms of their importance to national power. If an industry has high value added (such as tobacco products), it's a valuable industry, even if it has no impact on national power.

In contrast, the goal of national power industry strategy is not to boost national income; it's to preserve national power, even if that means a lower standard of living because consumers are paying more for products than they would in a world where more of these products were imported. In addition, national power industry strategy is not agnostic toward industry type.

These distinctions may seem esoteric—after all, both approaches embrace industrial policy. But in fact, they are key. Adopting the former strategy will have some positive effects on national power industries, but much of those effects may be irrelevant. The latter strategy will focus on national power industries, even if consumers and taxpayers pay a price.

THE POLITICAL ECONOMY OF NATIONAL POWER INDUSTRY STRATEGY

Political economy is almost everything. To be sure, articulating the right strategic framing for a national power industry strategy is key. But at the end of the day, what matters is executing and implementing that strategy. For the most part, the USG is lacking implementation capabilities. There are too few people in government with deep understanding of technology, industry, and national industry strategy. And too many government programs are bogged down with too many rules and restrictions to make them fully effective.

The characteristics of the U.S. political economy will have a major influence on the extent to which the United States can put in place an effective national power industry strategy. Even if, by miracle, a president were elected who placed the U.S.-China techno-economic war as their top priority and were fully committed to formulating and carrying out a national power industry

strategy, the odds of its success would be limited unless there were broad political support for it, or at least the absence of vociferous opposition.

With regard to the political economy of a national power industry strategy, the single biggest factor is that the United States no longer has a developmental state. A developmental state works to prioritize industrial and economic development, along with technological innovation, to strengthen a nation's competitive standing and geopolitical power. In this model, the state plays an active role in fostering specific sectors and capabilities, in contrast to the more hands-off approach of neoliberalism or the more antibusiness, redistribution of neo-New Deal liberalism. We have a developmental state for defense, but nothing else.

With regard to the political economy of a national power industry strategy, the single biggest factor is that the United States no longer has a developmental state.

What we have is a fight between a capitalist class that wants nothing more than to be left alone and a Left that wants to limit them and redistribute wealth and power.

The U.S. political economy is made up of at least five key players: business, labor unions, civil society, universities, and government. And within each group, there are key subgroups. Unfortunately, none of the five groups fully supports a national power industry strategy.

Business

Arguably the most incisive analysis of the role of corporations in U.S. economic policy is from U.C. Berkely political science professor David Vogel in his 1979 article "Why Businessmen Distrust Their State: The Political Consciousness of American Corporate Executives."[331] While Vogel wrote this almost 50 years ago, little has changed. Vogel tried to answer why such a large share of U.S. corporate leaders looked askance at the state and wanted little to do with it, unlike corporate leaders in Europe and rising Asian nations. He wrote:

> The business community has been remarkably consistent in its opposition to the enactment of any government policies that would centralize economic decision making or strengthen the authority of government over the direction of the business system as a whole. It is only with respect to policies that have their impact on particular firm or industry that its much heralded pragmatism at times comes into play. The criterion by which business evaluates government policy has remained quite firm: does the proposed intervention strengthen or weaken the autonomy of management?[332]

This was not, in Vogel's view just some recent development; it was baked into the evolution of the U.S. economy. He wrote that this:

> was an element in conservative doctrine throughout the first seventy-five years of the Republic. After the Civil War, however, it became clear that capitalism was now strong enough to get along without more active assistance from government than it already enjoyed. Equally important, it began to appear that in a partnership between government and business the danger of gratuitous political interference was becoming too serious to justify the risk. The idea of a positive

> relationship between government and economic life thus fell out of favor among those who underwrote the conservative program.[333]

It wasn't that the state per se would be inept of anticorporate, it was that democratic forces, albeit stronger in the United States than in any other nation, would capture the state in ways that would harm business and overall economic development. Again, Vogel wrote, "Indeed, it was the fact that the state was not required to overthrow anticapitalist forces in the United States that leads to the unique view among U.S. business leaders." Vogel went on:

> The critical key to understanding why businessmen are more anti-statist than virtually any other major interest in American society lies in the unique role of the state at their institution's birth. Business—both large and small—developed during a period when the state was relatively weak and small: in the case of virtually all other major national institutions, the state and the political process played a critical role in their formation… Accepting their nation's most powerful legitimating ideology, they remain concerned that governmental policy will indeed come to reflect popular preferences. Their hostility to both the ideal and the idea of government involvement in the economy is significantly due to their lack of confidence in their ability to dominate the political process. Unlike France, Germany and Japan, we have no tradition of a strong and autocratic state or of a bureaucracy independent of popular pressures.[334]

He added:

> This historical development pattern, doesn't just shape business leaders' views toward business, it shapes their self-identity. For despite what Marxists might say, the United States does not have a unified, self-aware capitalist class, it has individual business leaders who see themselves as such for most interactions, every once in a while seeing them as part of a narrow industry, but almost never once as capitalists.[335]

Vogel then wrote:

> The extent to which capitalism has been ideologically unchanged in America—either by an aristocracy or by a socialist working movement—has also inhibited American businessmen from developing a stronger sense of internal unity. A sense of classlessness that pervades American society, cited so frequently by both defenders and critics of America's unique political tradition, not only made American unions relatively indifferent to socialist ideology; the individualistic ethic that is so critical a component of the liberal tradition also inhibits a sense of solidarity within the bourgeoisie. Nearly one hundred and fifty years ago, de Tocqueville remarked: To tell the truth, though there are rich men, the class of rich men does not exist; for these individuals have no feelings or purposes, no traditions or hopes, in common; there are individuals, therefore, but no definitive class… The rich are not compactly united among themselves.… In their intense and exclusive anxiety to make a fortune, they lose sight of the close connection which exists between the private fortune of each of them and the prosperity of all… The discharge of political duties appears to them to be a troublesome

> annoyance, which diverts them from their occupations and business ... These people think that they are following the principle of self-interest, but the idea they entertain of that principle is a very rude one; and the better to look after what they call their business, they neglect their chief business, which is to remain their own masters.[336]

He quoted one business executive: "We don't have a business community. Just a bunch of self-interested people."[53] He further wrote, "American businessmen appear to behave quite rationally toward government when the interests of their firm or industry are at stake, yet their understanding of the American business system remains remarkably shortsighted and provincial: they confuse their role as businessmen with their interests as capitalists."[337]

This unfortunately has gotten worse, not better, since 1979. As Vogel pointed out, because of the nature of capitalist development in the United States, where the state did not have to play a strong role to overthrow feudal interests, U.S. business leaders never adopted a very strong role as "capitalists." But even so, their understanding of that role and the key importance of it declined significantly after the late 1970s. Before then, many corporate leaders saw themselves as not only as business leaders but also as corporate statesmen. CEOs such as Reg Jones of General Electric, Irving Shapiro of Dupont, Thomas Watson of IBM, David Packard of HP, George Romney of American Motors, and even John Young of HP in the 1980s spent considerable time advancing the interests of the nation, not just their own firms. And unless you are a diehard anticorporate advocate, there is no doubt that this advocacy strengthened America.

But that started to die in the late 1970s and 1980s, prompted by the shareholder value movement and the libertarian notions of popular economic figures such as Milton Friedman, who proclaimed that the only purpose of business is to maximize profits. At one level, this is, of course, true. Companies have to make profits, or they cannot stay in business. But if support for the capitalist system and the policies that support it are weakened, then the ability to earn individual profits is lessened.

As Wall Street shifted from providing long-term capital for productive investment to a short-term extraction game—led by raiders such as Mike Miliken, Carl Icahn, Nelson Peltz, T. Boone Pickens, and others—CEOs could no longer afford anything but a focus on short-term profits. The capitalist system would have to take care of itself. And it has not.

At the same time, corporate norms shifted and so what was once a system that enabled and largely required statesmanship was now one that penalized it. And the rise of intense global competition only contributed to that short-termism and selfish focus. Doug Henwood wrote that "the transaction replaced the relationship—not just on Wall Street but in American business generally."[338] And it turns out that relationships are critical to the effective functioning and strength of the U.S. economy.

At the same time, the decline of the traditional American WASP ruling class, with all its flaws, had the singular advantage of promoting leaders who were civic minded and not only self-interested, and played a key role. Say what you will about this class, it at least had an ethos of service to the nation. We saw this in the motto of private boarding school Groton, the lead training ground for American leadership class before the 1950s: "Cui servire est regnare," which is conventionally translated as "To serve is to rule." In other words, service was key. This didn't

mean that these leaders were always right or altruistic. It did mean that there was an expectation to serve and preserve the Republic. Today, WASPs are a timid minority that recognizes itself at its private clubs, but not much more.

It's not just the change in the system, it's that the U.S. business community has not been able to generate its own leadership. Who are the top few business leaders who represent American business. Elon Musk? Tim Cook? Jamie Diamond? Not really. Even in 1979, Vogel dismissed the effectiveness of leading "peak associations" such as the Business Roundtable and the Council of Foreign Relations. He argued that the closest the capitalist class came to this was from the 1890s to 1920s, particularly with the leadership of Rockefeller and J.P. Morgan. Morgan was said to have told President Theordore Roosvelt during the Northern Securities antitrust case, "If we have done anything wrong, send your man to my man and they can fix it up" reflecting his centrality to U.S. business.[339]

Vogel wrote that four factors weakened that:

> Since the 1920S four developments have markedly reduced the ability of corporate executives to generate their own political leadership: the decline of the dominance of the Morgan financial interests; the reduction in market control of many of the turn-of-the-century monopolies, e.g., Standard Oil, U.S. Steel, International Harvester; the displacement of entrepreneurs by professional managers; and the internationalization of U.S. corporations. The impact of the first two developments is obvious: they significantly decentralized authority within the corporate system, making it less likely that the position of any one firm could provide a point of departure for understanding the needs of business as a whole. Most of the voluminous literature on the separation of ownership and control is concerned with its impact on corporate economic behavior; what has been overlooked is its impact on corporate political consciousness. This is serious: the managerial revolution severely undermined the formation of corporate class consciousness and business solidarity.[340]

Their class consciousness and solidarity are now almost completely gone.

The state itself will have to have stronger capabilities, of course, deeply informed by industry, but willing to act for U.S. national power, even when business support might be lacking.

At the same time, in part because of the overreach of the neoliberal vision (e.g., tax cuts for upper-income Americans and excessive globalization, reduced public investment, and an acceptance of what was once seen as a fringe ideology, libertarianism) what was once a Left that supported the American capitalist system but wanted it tamed and regulated to reduce excesses, is now largely antagonistic to the system. As an example, while Senator Elizabeth Warren (D-MA) will proclaim that she's pro capitalist, this appears to be mostly a smoke screen to defend her anticorporate positions.

All this has two major implications for the development of a national power industry strategy. First, it means that companies, even if they realize the nature of the China challenge, will be hesitant about asking for state help because they do not trust the ability of the state to either not

get captured by nonbusiness interests or to effectively implement a developmental program. Such concerns are not unwarranted, as we saw with the politicization of the CHIPS program by the Biden administration and now the Trump administration. But there are policies and program designs that can limit such flaws, such as tax incentives and industry-led programs.

Second, it means that there are few voices advancing the overall U.S. business interests, especially as they align with state interests. Few companies have the leeway to think much beyond their own firm's interests—especially their near-term interests. This is not because the leadership is populated with selfish individuals. It is because they are operating in a financialized capitalist system wherein any behavior other than that will be punished by markets.

As such, it means that the state itself will have to have stronger capabilities, of course deeply informed by industry, but willing to act for U.S. national power, even when business support might be lacking.

Box 7: From Shareholder Value Capitalism to National Power Capitalism

The emergence of the shareholder value movement—the notion that the sole purpose of capitalist enterprises is to maximize profits—is often attributed to a 1970 *New York Times Magazine* article by economist Milton Friedman, who wrote that the purpose of a business "is to increase its profits."[341] Radical libertarian Friedman saw anything other than extreme selfishness as socialism:

This is the basic reason why the doctrine of "social responsibility" involves the acceptance of the socialist view that political mechanisms, not market mechanisms, are the appropriate way to determine the allocation of scarce resources to alternative uses.[342]

Today, the shareholder value movement tolerates no other corporate purpose than producing short-term profits.

Yet, from the early 1900s until the 1970s, there was a general view held by corporations that their mission was not just to increase stock price but also to serve other constituencies, including the national interests (something libertarians such as Friedman do not believe exists). Eminent business scholar Peter F. Drucker represented this view in 1952, writing:

We believe today, both inside and outside the business world, that the business enterprise, especially the large business enterprise, exists for the sake of the contribution which it makes to the welfare of society as a whole. Our economic-policy discussions are all about what this responsibility involves and how best it can be discharged. There is, in fact, no disagreement, except on the lunatic fringes of the Right and on the Left, that business enterprise is responsible for the optimum utilization of that part of society's always-limited productive resources which are under the control of the enterprise.[343]

But beginning in the 1980s, changes in the institutional system of U.S. investing and management, under the rubric of the "shareholder value movement," changed all that. How investment funds were structured and their managers were rewarded meant that funds moved money around in search of the quickest return, regardless of where long-term value might be found. How managers were compensated—increasingly with stock options that were not always related to actual managerial performance—reflected this new view that a manager's job was to maximize value for the shareholders. And because managers themselves became key short-term stockholders (through the significant growth of stock options), they made even more effort to

enhance the welfare of short-term stockholders, including by boosting dividends and through stock buybacks.

Now stock price was all that mattered, and the best way to get that price up was to engage in frenetic bidding wars to get the best CEO and top-level management team, which meant a massive increase in executive compensation. The rise of the shareholder value movement and its later evolution into corporate short-termism, or what some call "quarterly capitalism," meant that CEOs were rewarded for downsizing firms, limiting investment in capital stock (in order to maximize return on net assets), and paying attention solely to the bottom line.

This focus on short-term returns was not rational in the sense of maximizing returns for society, or even for companies (if returns are defined as maximizing the net present value of all future profits). The shareholder value revolution hurt national economic power. Indeed, as companies began paying out more in dividends and engaging in stock buybacks as a way to boost stock prices for short-term investors, relatively less was available for investing in activities that would boost national economic power.

With the rise of the shareholder value movement came a shift in the political role and orientation of the corporate community. Prior to the mid-1980s, many CEOs, such as GM's Charlie Wilson, GE's Reginald Jones, HP's John Young, DuPont's Irving Shapiro, and Loral's Bernard Schwartz, saw their role not just as CEO but as corporate statesman. But around that time, the role of "business statesman" began to fade. Executives came under increasing pressure to focus ruthlessly on boosting profits and share prices. Those who didn't risked losing their jobs or seeing their companies swallowed up in hostile takeovers. This is not to say that some of today's CEOs don't try to play some broader role, but overall, U.S. corporate leaders have abdicated their roles as statesmen for roles as CEOs alone. In his book, *The Fracturing of the Corporate Elite*, Mark Mizruchi observed:

[After] World War II, American business leaders hewed to an ethic of civic responsibility and enlightened self-interest.... In the 1970s, however, faced with inflation, foreign competition, and growing public criticism, corporate leaders became increasingly confrontational with labor and government. As they succeeded in taming their opponents, business leaders paradoxically undermined their ability to act collectively.[344]

A survey by the corporate organization Committee for Economic Development supports this observation, finding that the three biggest barriers to business leaders taking a more active role in public issues were "concern about criticism others have experienced; shareholder pressure for short-term results; and belief that a CEO should focus on his/her company."[345] For the CEOs, it became a collective action problem. Why step up and fight for big business and the U.S. economy generally when it only means taking valuable time away from your company? As a thought experiment, try to name a current CEO who is seen as a leader for good policy for the American economy.

Today, the lunatic fringes of the Right and Left are no longer fringes. The Right embraces Friedman's shareholder value movement. Today's Left, at best, talks about stakeholder capitalism (e.g., helping workers, the environment, and other interests). Some, such as radical globalist Klaus Scwab, even argue that the key stakeholder should be the entire global proletariat and environment.[346] Others, including many on the progressive Left, would have companies completely do away with a focus on profits, while others would wrap corporations up in a Gulliver-like straitjacket.[347]

But even mainstream thinking has missed the point. The Business Roundtable says that the best companies "put the customer first and invest in their employees and communities" and supporting their suppliers.[348] For many, shareholder capitalism is following an alphabet soup of ESG (environment, social, and governance) goals. Absent is any discussion of the needs of the nation as a whole.

What is needed is an alternative to shareholder capitalism that is not stakeholder capitalism. We need national power capitalism. In this framework, companies don't ignore profit, but they work wherever possible to align that with U.S. and allied techno-economic and trade power. And they certainly do not oppose, and ideally support, national government policies to encourage the alignment of companies and the national interest.

Labor Unions

Just as corporations used to think of themselves as defenders of the system, so did organized labor. Of course, this was before labor unions were significantly weakened and now largely represent government workers, some low-pay service workers, and certain construction trades. Like corporations, unions focus largely on their own interests, in this case, demanding higher wages and benefits and resisting automation.

A 2023 United Auto Workers strike led the Big Three U.S. automakers to grant workers at least 27 percent wage increases.[349] The Writers Guild strike resulted in studios agreeing to limit the use of AI to automate creative work. The International Association of Machinists and Aerospace struck for a 40 percent wage increase and a restoration of defined-benefit retirement plans.

The question few are asking is what the effect will be on the global competitiveness of these companies, and by extension the U.S. economy. It's one thing for a teachers' union to demand higher wages; the only result would be higher taxes. But in industries that are globally traded, overly aggressive union demands often put firms at a competitive disadvantage—helping current union members in the short term, but hurting the firms, future workers, and the national economy in the long term as the firms become less competitive in global markets.

We have the role of unions in leading to industrial decline in the United Kingdom, as all their incentives have been to maximize short-term gains at the expense of long-term stability. Even if unions realized the harm they were doing to their firms, all too often, they haven't been able to stop themselves. As one scholar wrote with regard to U.K. unions:

> What occurred in industry after industry in the U.K. was a Greek tragedy.... Somehow workers in some sectors have found themselves destroying their firm, fully aware of what they were doing, yet unable to stop. They found themselves answering strike calls ... in the full awareness that ... the result could only be ruin for all concerned.[350]

That description bears a striking resemblance to what has also occurred in many unionized U.S. industries. Around 2015, I asked a former UAW leader whether, if the UAW had known in the 1970s and 1980s what it knows now about the decline of the Big Three, it would have done things differently. His response was, "No." While he acknowledged that UAW actions hurt the Big Three's global market share, he believed that union leadership could have acted no differently. If it had, he said, workers would have voted UAW leadership out and installed leaders who would stand up for the interests of workers now.

Moreover, while some in the AFL-CIO have called for more industrial policy support, the lion's share of its efforts to go boosting wages and expanding members.[351] On its web page "What We Care About," the Federation lists better pay and benefits, civil rights, corporate greed, gender equality, global worker rights, immigration, infrastructure, and workplace health and safety.[352] Lower on the page, on a list of other issues, it does list manufacturing.

Civil Society

As Vogel has rightly pointed out, institutionalized civil society after the New Deal accepted and even supported the corporate capitalist system. They just wanted to ensure that broader societal interests were adequately represented, and their concerns addressed.

That is no longer the case. Most of these groups, largely funded by major left-wing foundations, now reject the U.S. capitalist system, seeing it as inherently evil and harmful. It is racist, sexist, imperialist, and every other "ist." Hundreds of these often-well-funded groups push for ever stronger land use and environmental regulations, stronger privacy rules, stronger antitrust prosecution, higher business taxes, and technology bans. The philanthropy consultancy, Blue Tent, has identified over 200 left-leaning foundations in America.[353] These include groups that reject copyright enforcement, seek to hold tech firms "accountable," promote technology justice, protect individual privacy, oppose new technologies such as facial recognition and AI, highlight "power imbalances," and want to break-up large firms and regulate large telecom providers to bridge various digital divides. The Ford Foundation alone has funded nearly 100 nonprofit advocacy groups focused on "public interest technology."[354] Not one comes close to supporting a national power industry strategy.

Most of these groups, largely funded by major left-wing foundations, now reject the U.S. capitalist system, seeing it as inherently evil and harmful.

At the same time, most free-market foundations fund organizations that are diametrically opposed to the government development of a national power industry strategy because their task is less government. While that can be an important component of a national power industry strategy, if it focuses on eliminating or streamlining regulations inimical to national power industry competitiveness, overall, they oppose the areas where government needs to be more active and strategic.

In addition, a variety of nonprofits now mobilize political interests to not only prevent any reforms needed to better compete with China, but also to rachet up new regulatory restrictions. We see this with the pressure environmental organizations exert any time Congress attempts even the most common-sense reform of environmental laws.

Universities

A national power industry strategy would entail a very different role for U.S. research universities. They would, among other things, need to focus more on STEM education, especially for Americans; on research areas critical to success in national power industries; and on working more closely with industry to ensure that more of the benefits of that research flow to firms in America, rather than China.

But the problem is that U.S. universities resist the imposition of even guidance from the federal government. As Vogel argued that U.S. business executives value autonomy from government above all else, the same is true with faculty, who ultimately call the shots at universities. We have seen this with the reaction to President Trump's "Compact for Academic Excellence in Higher Education," which would provide universities with a set of benefits if they adopt the measures in the Compact. The point here is not whether the Compact is good, or if the president has the authority to implement it; it's to show the utter focus on autonomy by higher education.

For example, in rejecting the invitation to join, Brown University's president, Christina Paxson, said that the compact "by its nature and by various provisions would restrict academic freedom and undermine the autonomy of Brown's governance."[355] Todd Wolfson, president of the American Association of University Professors (AAUP), stated:

> By declining to compromise its core mission, Brown University has affirmed that no amount of federal inducement is worth surrendering the freedom to question, explore and dissent. In rejecting the compact, Brown stands as a bulwark for higher education's sacred commitment to academic freedom and institutional self-governance.[356]

To be sure, they would be mostly correct if they were not receiving funding from taxpayers through federal grants. If they want to give up that, then have at it. But the acceptance of federal funding should come with it an expectation to act in the national interest, not just the university's own interest, however it defines it. Academic freedom is a code word for being able to say and do whatever they want with virtually no constraints.

But with the national industry power war, it is in the national interest for universities to operate differently. This means boosting the quality of undergraduate education from its fairly mediocre levels. Keeping tuition increases reasonable so students can afford education without federal subsidies. Focusing more on STEM education, especially for American students. And focusing on research critical to the success of national power industries.

With the national industry power war, it is in the national interest for universities to operate differently.

However, as we saw with the vociferous resistance by higher education to the provisions in the Endless Frontier Act (which was incorporated with the CHIPS Act to become the Chips and Science Act) that would have given most of the increase in National Science Foundation funding to the Technology Innovation Partnerships program rather than to traditional programs, we can expect most higher education institutions to actively resist ensuring that higher ed policy be guided by a national advanced industry strategy. They will continue to trot out stale bromides such as academic freedom and Vannevar Bush's linear model of science that lets researchers study whatever they want and only focus on research publications. Universities that agree to support U.S. national power industries would likely be attacked by their fellow universities and academics.

Government

Finally, government. The state itself is an actor advancing interests: something the MAGA right calls the "deep state," implying that government interests are not national interests.

Notwithstanding this radical view, the U.S. state itself is actually weak. Vogel nailed it when he wrote, "The American state still lacks essential information about the basic functioning of the economy and even if that information were available the fragmentation of authority and power within the federal bureaucracy would make any coordinated government policy extremely problematic."[357]

Given the hollowing out of the federal government since he wrote this in 1979, including the recent calamity of the Department of Government Efficiency (DOGE) haphazardly slashing and burning bureaucracy, this is even more true now.[358] To the extent that the state has real capacity, it is largely limited to DOD, and as discussed in later work on policy steps, the problem is that DOD (or now called the Department of War) has become another interest group, focusing on advancing its own narrow military interests rather than national power writ large, especially through a national power industry strategy.

In writing about how corporations have to succeed, Gary Hamel and Prahalad stated:

> To create the future, an entire company, not just a few isolated boffins or "research fellows" must possess industry foresight. Top management cannot abdicate its responsibility for developing, articulating and sharing a point of view about the future. What is needed are not just skunk works and intrapreneurs, but senior managers who can escape the orthodoxies of the corporation's current "concept of self."[359]

DOD has become another interest group, focusing on advancing its own narrow military interests rather than national power writ large, especially through a national power industry strategy.

They went on to write:

> Making industry and company conventions explicit, understanding how these conventions could imperil the firm's success in the future, delving deeply into industry discontinuities, establishing a process for extending industry foresight and working collectively to craft a strategic architecture are the means for genetic reengineering on a large scale.[360]

That is all the more true for the USG. But today's few SES (Senior Executive Service) or political appointees have those capabilities, and as discussed later, there are few easy ways by which they can attain them.

Today's Limitations

When David Vogel wrote his book, majorities in both parties accepted both government and corporate capitalism. The Republicans were always a bit more on the side of corporations. The Democrats were on the side of civil society and used the state to advanced broader public interests and concerns, especially workers' and consumers'. Now most of the Right wants significantly limited government and some no longer trust corporate America. And much of the Left has rejected large corporations and the capitalist system itself.

Vogel noted how the U.S. democratic system, with its open democracy, was one of the few developed economies without a socialist opposition:

> Whatever may be inconveniences of a relatively open and responsive governmental system to the achievement of specific corporate objectives—and they are often considerable - they are clearly the price the American bourgeoisie pays for a luxury enjoyed by no other business community in the advanced capitalist nations—the absence of a socialist opposition. American executives continually complain about the large number of organizations and interest groups that routinely turn to the state to redress their grievances against the corporation, but this state of affairs certainly preferable to one in which these non or antibusiness factions did not use the political process because they perceived it as fixed against them. The latter would seriously undermine the political stability upon which a sound economic system depends.[361]

That is no longer the case. A large swath of progressives now embrace socialism, even if they do not call it that. And it is quite possible that America will become like Europe: a social welfare state wherein socialism represents the Left.

Given that any effective national power industry strategy has to be built around large corporations and a strong government role, all this bodes ill for the ability to take effective action.

For conservatives, it's just as bad, if not worse. For much of the post New-Deal through to the election of President Reagan, the business community, and more important conservative intellectuals accepted the New Deal. As Vogel wrote:

> At his presidential address delivered to the annual meeting of the American Economic Association in 1962, Edward S. Mason noted …the fact that the really revolutionary changes in the role of government and in the relation of various groups to government produced by the depression and the war have not yet been fully accepted in this country. Where counter-revolution is still considered to be a possibility no one is quite prepared to lay down his arms.[362]

Dwight Eisenhower warned that abolishing New Deal programs would undermine any political party's viability, and for decades, Republicans largely grudgingly heeded that caution. Even though many on the Right have long viewed Wilson's New Freedom, Roosevelt's New Deal, and Johnson's Great Society as fundamental deviations from America's founding principles, conservative politicians, like liberals, have dared not touch them. The policies and programs of those eras were assumed to be sacrosanct pillars of the post-World War II power and prosperity we have known as the American Century.

But the counterrevolution was always nascent, occasionally breaking out with someone like Goldwater or Gingrich. Now the counterrevolution has triumphed, working to restore the nation to the pre-New Deal, and even pre-Wilson era.[363] President Trump and the MAGA movement, buoyed by a perception of the Biden administration's overreach, are now actively revolting against all that was once held sacred. Many are doing so under the banner of "drain the swamp." More fundamentally, though, the animating desire is to return to the governance of more than a century ago—that of the Gilded Age, an era of small government, protective tariffs, limited immigration, and America as regional power—a period that reached its zenith during the Republican administration of President William McKinley.

Given that any effective national power industry strategy has to be built around large corporations and a strong government role, all this bodes ill for the ability to take effective action.

Ironically, the business community in the United States distrusts the state because it worries that it will be captured by populist forces that neither understand nor care about the economic system—and even more ominously, they will try to dismantle that system. With such a risk always in the background, U.S. corporate leaders have long preferred to be left alone, and to support a weak central government.

If America is to not lose the national power industry war to China, it needs a political economy that puts the restoration of U.S. power, especially from national power industries, at the center.

It is ironic that in a Marxist-Leninist China, the last thing the state wants is for democratic forces to derail capitalist progress. To be sure, the CCP inserts itself into capitalists' business, but it is only to 1) make sure that the capitalists do not challenge the Party and 2) to make sure that the companies advance CCP and Chinese power globally.

If America is to not lose the national power industry war to China, it needs a political economy that puts the restoration of U.S. power, especially from national power industries, at the center.

APPENDIX 1: SELECTED CHINESE ADVANCED INDUSTRY POLICIES

Until recently, China's playbook was to imitate the advances of industrialized countries, but since the 12th Five-Year Plan (2011–2015), the Chinese government has shifted its strategy toward incentivizing innovation. We see that in a variety of advanced sectors.

Biotech

China has named biotechnology as a strategic emerging industry and has set development priorities for drugs, biomedical engineering, agriculture, and biomanufacturing. It has developed a comprehensive national strategy to enhance the innovation capabilities of its domestic biotech industry. The strategy includes subsidies, financial incentives, national reimbursement for innovative therapies; the creation of high-tech science parks, start-up incubators, and public-private partnerships; talent recruitment initiatives; reforms to expedite drug review, especially for domestic products; and efforts to enhance IP protection to foster innovation. China has set several milestones and goals for the industry, including enhancing the originality of biotech through new technologies and products, creating a biotech innovation platform, and strengthening the industrialization of biotechnology.

To implement this strategy, China has increased R&D activity and built out its innovation infrastructure—science parks, incubators, and national gene and cell banks. The number of high-quality biotech publications and clinical trials in China has surged. Still, structural challenges remain, such as inconsistent hospital data systems and difficulty translating scientific research into market-ready products, with China lagging behind the United States in commercialization capabilities. However, it is expected that the Chinese share of the global biotech drug market will grow significantly, at the cost of Western leaders' market share.

Quantum Computing

China's quantum strategy reflects a clear belief that competing in this field requires central political control, not just industrial strength. Rather than backing a decentralized commercial ecosystem like in the United States, Beijing has placed universities and state-run labs at the center of its quantum push, with funding, talent, and political oversight all flowing through the Party apparatus. The focus is on the areas where state coordination can yield strategic wins—namely, quantum communications and sensing, which are easier to deploy and carry direct national security value.

To implement this strategy, the government has folded private industry into its preferred channels. High-profile exits, such as Alibaba and Baidu abandoning their quantum research divisions and transferring their assets to state-linked institutions, reflect a system wherein firms are discouraged from independent leadership and instead are expected to serve as suppliers or technical partners to state-led projects. Rather than bet on uncertain, long-term breakthroughs in quantum computing, China is locking in an early advantage in quantum key distribution (QKD) and quantum sensors, which are more mature fields that can scale faster and shape international norms.

For the United States, the impact is dual. First, China's rapid progress in quantum communications and sensing shortens the window for U.S. institutions to upgrade to post-quantum secure systems. That raises national security risks; if adversaries establish quantum-secure channels or advance quantum sensing before the United States adapts, it could

compromise intelligence, defense, and critical infrastructure. Second, China's early dominance in export-ready quantum systems, especially sensing technologies, threatens U.S. competitiveness in emerging markets. By offering heavily subsidized AI solutions through state-directed firms, China could lock in long-term customers and establish its standards as the default, making it harder for U.S. companies to enter or influence these strategic sectors later on.

AI

China is using state power to tilt the AI playing field. Rather than relying on market dynamics alone, China is using state-led tools—subsidies, open-source acceleration, massive data access, and political endorsement—to build national champions and crowd out foreign competitors. Tsinghua-affiliated start-ups such as Zhipu AI and Moonshot AI, backed by government-linked funding and supercomputing access, show how China incubates AI firms within a politically protected ecosystem. These firms now produce competitive large language models, and some, such as DeepSeek, outperform U.S. peers on key benchmarks.

China implements this strategy by tightly aligning AI firms' development with state priorities. The government funnels capital through targeted venture funding, particularly benefiting companies overlooked by private markets, and supports strategic partnerships that quickly scale AI platforms. Firms such as DeepSeek receive explicit political endorsement, securing privileged market positions and accelerating their ability to innovate and commercialize. Furthermore, China leverages its enormous population to generate extensive, unrestricted datasets, feeding AI models at a scale unattainable in democratic societies constrained by privacy rules. This creates a structural advantage, allowing Chinese firms to train advanced AI systems more cost-effectively and rapidly.

If China's model for AI becomes the reference point in fast-growing markets, U.S. firms may find themselves shut out of both standards-setting processes and adoption pathways. This doesn't mean replicating China's model, but it does mean recognizing the structural advantages it creates and rethinking the domestic policies that may be holding U.S. companies back.

Electric Vehicles

China has pursued an ambitious strategy to become the world's leading EV and battery manufacturer and, in so doing, displace "Western" (including Japan and South Korea) leadership in internal combustion engine (ICE) vehicles. The Chinese government began investing in EV-related technologies as early as 2001, when EV technology was introduced as a priority science research project in China's 10th Five-Year Plan.

Subsidies have proven indispensable in building Chinese EV competitiveness. From 2009 to 2023 alone, China channeled $230.9 billion in subsidies and other support to its domestic EV sector. From 2018 to 2023, the Chinese government extended $1.8 billion in subsidies to EV battery developer CATL (Contemporary Amperex Technology Co., Limited) alone.

Chinese policymakers have put their thumb on the scale for electric as opposed to ICE vehicle adoption, such as by giving EV owners license plates at no cost and not subjecting them to traffic control measures. China has established the world's largest public charging infrastructure network.

Growth in Chinese competitiveness in autos has been astounding. In 1985, Chinese enterprises manufactured a grand total of 5,200 passenger vehicles; by 2024, they produced 26.8 million vehicles (including 10 million EVs)—21 percent of global production—a share automotive analysts expect will reach one-third by 2030.

The Alliance for Automotive Manufacturing has referred to Chinese EV growth as a potential "extinction-level event." While Chinese EV makers have yet to make significant inroads in the U.S. market, they're capturing considerable market share in third-market countries. The United States has responded by offering 100 percent tariffs on Chinese EV imports.

Semiconductors

Ever since the 2013 Third Party Plenum, the Chinese government has made semiconductors the country's top industrial innovation priority. China's "2014 National Guidelines for Development and Promotion of the Integrated Circuit Industry" called for $150 billion in central government investments to establish a fully "closed-loop" semiconductor ecosystem in China. The plan called for eliminating China's trade deficit in ICs by 2030 and achieving 70 percent self-sufficiency in semiconductors by that year.

Chris Miller has suggested that adding up semiconductor-sector investments made by Chinese governments at all levels, China "has probably invested the equivalent of [America's] CHIPS Act virtually every year since 2014."[364] One OECD study of the global semiconductor industry from 2014–2018 found that China accounted for 86 percent of all below-market equity injections and that subsidies accounted for 40 percent of foundry SMIC's revenues. The Chinese government stood up NAND memory-maker YMTC from whole cloth by a $24 billion investment.

China added more chip-making capacity than the rest of the world combined in 2024, with most centered in the legacy (28 nm or greater) market, which is particularly concerning because Chinese companies are gaining a foothold there and selling products 20–30 percent less than Western competitors, disrupting the industry's innovation economics. Huawei Ascend AI and Kirin mobile chips are increasingly capable and pose market share threats to U.S. companies in China and third-party markets. Elsewhere, Document 79 articulates an import substitution approach that has directed Chinese EV and ICT firms to remove foreign semiconductors from their products.

APPENDIX 2: KEY TAKEAWAYS FOR MAJOR U.S. POLICY AREAS

The final report in this Chinese National Power Industry War series will be a comprehensive and detailed policy agenda. But as a way to frame that, based on the argument presented here, this appendix briefly describes major changes needed in various policy areas.

Antitrust

For the free-market Right, the goal of antitrust is short-term consumer welfare; and for the populist Left and Right, the goal is attacking and breaking up big companies. It is time to incorporate a national power industry "screen" in antitrust analysis and enforcement wherein national power industries would be treated differently. Merger review, as well as enforcement, would be viewed in equal part of how much the actions would hurt U.S. power industry capabilities.

Environmental Regulation

U.S. environmental regulation came of age in an era of supposed plenty with virtually no international industry competition. And over the years, it was largely a one-way ratchet, with more regulation added on. Some regulation makes sense. But much of it could be implemented in ways that are less damaging to competitiveness and with lower compliance costs. And some are just unnecessary. The poster child of this is the National Environmental Protection Act, which imposes massive costs and delays, or even bans, on needed development. Again, as with antitrust, environmental regulation needs to reformed and implemented through the "screen" of national power industry health.

Industry Regulation

Industry is regulated in a number of ways besides environmental regulation. This includes sector-specific regulation (e.g., freight rail, housing construction, etc.), data privacy regulation, worker safety, and others. Again, as with environmental regulation, these were put in place and enforced with little consideration for impact on national power industry competitiveness. That needs to change.

Business Tax Policy

For most Republicans (and neoclassical economists), the best business tax code is a broad base (few to no exemptions of incentives and a low rate). For most Democrats, the best business tax code is one that raises the effective tax rate of large corporations. A national power industry-based tax code reduces the effective rate on business, but especially on national power industries, by boosting specific incentives to align their interests with national interests for a strong national power industry sector.

Budget and Taxes

Both parties are afraid of the wrath of selfish American voters of raising taxes on anyone but the rich. And most Republicans favor cutting USG discretionary spending, including on activities that would support U.S. national power industry competitiveness. Most Democrats want to boost spending to help current consumers and workers, even if this means less public investment that would support power industries. And both parties are terrified of controlling entitlement spending, even though without that, there is almost no way to generate the fiscal headroom for the kinds of direct and indirect (tax) expenditures needed to win the national power industry war with China.

International Trade

Most in Washington are loathe to prioritize particular industries in trade policy—"agriculture is as important as aerospace." That needs to change, where the interests of U.S. national power industries are paramount on trade policy and negotiations may require comprising with other nations in ways that hurt nonpower industries while helping U.S. power industries. At the same time, traditional trade supporters see free trade with all nations as good, and populist trade advocates on both the Right and the Left now reject global trade and seek autocracy; sometimes euphemistically called a "trade agenda for the middle class." A national power industry trade agenda prioritizes China, including strengthening allied trade relations and allied efforts to restrict Chinese exports, especially of power industry goods and services.

Foreign Policy

U.S. foreign policy on the right prioritizes the United States being the policeman throughout the world. On the Left, it prioritizes pushing for human rights throughout the world, including in China. In addition, foreign policy has long been willing to spend "national power industry capital" to achieve these globalist foreign policy goals. We see this in how the United States has consistently engaged in export controls to punish nations for taking actions we didn't like, even though that came at the cost of U.S. power industry competitiveness. A national power industry foreign policy prioritizes China over all else, and seeks to advance U.S. national power interests throughout the world.

Small Business

Since the start of the first Cold War, U.S. policy has idolatrized small business, blessing it with a wide panoply of regulatory, tax, and spending protections and favors. The Left supports it because it believes that it can convince petit-bourgeois small business owners to think of themselves as part of the proletariat oppressed by large capitalist corporations. The Right supports them because they see them as being driven by Adam Smith-like competition, unlike large supposedly woke, crony capitalist large corporations. In a world of national power industry war with China, the nation can longer afford to do this. It costs too much money, and it weakens power industry firms. In a power industry world, all U.S. policy would become size neutral.

Banking and Investment Regulation

Banking and investment regulation has largely supported financial markets, even though many of them have become zero-sum casinos benefiting a small cadre of billionaire hedge fund managers, driving national power industry corporations toward short-term financial maximization at the cost of long-term competitiveness. Investment regulation needs to focus first on how to drastically reduce the size of the industry as it sucks off needed talent and GDP away from national power industries. Second, it needs to reform the industry away from its parasitic short-termism toward long-term national wealth and power creation.

Science Policy

Science policy still is under the post-WWII shadow of Vannevar Bush and the linear model of science focused on prioritizing early-stage basic science of whatever scientists want to study. Science policy should evolve to "science, technology, and engineering" policy and more money should go to targeted areas critical to advancing U.S. national power industries and in ways that involve industry more. Whether that can be done at the National Science Foundation with its

deep commitment to the desires of individual scientists and research universities, or whether it requires the creation of separate institution is an open question.

Overall Government Goal

There is a reason the United States has no real national power industry strategy and why so few policy areas are aligned to support that. And it is because there are few forces in American politics pushing for this. Most Republicans, including most "Trumpians," still are committed to small government and "freedom" from government. That is largely what the president wants. And most Democrats now are firmly redistributionists, wanting more now, especially for those "oppressed" by the U.S. capitalist system and big corporations. That is largely what President Biden pushed for. Not losing the national power industry war with China requires more state capacity and action, strong support for power industry corporations, and way more sacrifice of current consumption toward future investment.

As Robert Kagan of the Brookings Institution put it:

> If and when American power declines, the institutions and norms that American power has supported will decline, too. Or more likely, if history is a guide, they may collapse altogether as we make a transition to another kind of world order, or to disorder. We may discover then that the U.S. was essential to keeping the present world order together and that the alternative to American power was not peace and harmony but chaos and catastrophe—which is what the world looked like right before the American order came into being.[365]

APPENDIX 3: NATIONAL POWER INDUSTRY TYPOLOGY AND CATEGORIZATIONS

Figure 7: Breakdown of six-digit NAISC industries according to ITIF's typology

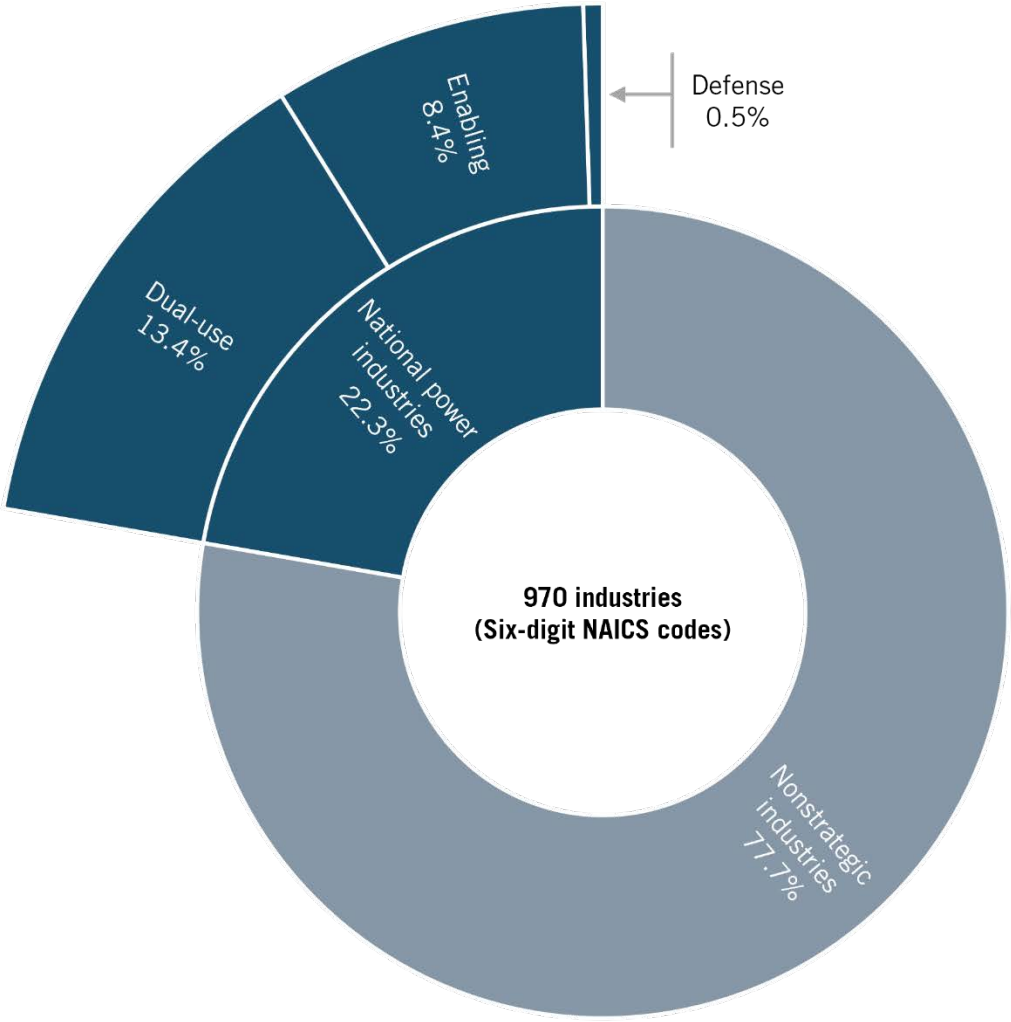


Table 2: National power industries in ITIF's typology—namely, defense, dual-use, and enabling industries—together account for 22.3 percent of NAICS six-digit industries (216 out of 970)

NAICS Code	NAICS Description	Power Category
336414	Guided Missile and Space Vehicle Manufacturing	Defense
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing	Defense
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing	Defense
336611	Ship Building and Repairing	Defense
332993	Ammunition (except Small Arms) Manufacturing	Defense

NAICS Code	NAICS Description	Power Category
334111	Electronic Computer Manufacturing	Dual-use
334210	Telephone Apparatus Manufacturing	Dual-use
334118	Computer Terminal and Other Computer Peripheral Equipment Manufacturing	Dual-use
331313	Alumina Refining and Primary Aluminum Production	Dual-use
334112	Computer Storage Device Manufacturing	Dual-use
334413	Semiconductor and Related Device Manufacturing	Dual-use
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Dual-use
334412	Bare Printed Circuit Board Manufacturing	Dual-use
332991	Ball and Roller Bearing Manufacturing	Dual-use
334310	Audio and Video Equipment Manufacturing	Dual-use
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	Dual-use
327910	Abrasive Product Manufacturing	Dual-use
336411	Aircraft Manufacturing	Dual-use
336510	Railroad Rolling Stock Manufacturing	Dual-use
327212	Other Pressed and Blown Glass and Glassware Manufacturing	Dual-use
333912	Air and Gas Compressor Manufacturing	Dual-use
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	Dual-use
334517	Irradiation Apparatus Manufacturing	Dual-use
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing	Dual-use
333515	Cutting Tool and Machine Tool Accessory Manufacturing	Dual-use
335312	Motor and Generator Manufacturing	Dual-use
333519	Rolling Mill and Other Metalworking Machinery Manufacturing	Dual-use
334290	Other Communications Equipment Manufacturing	Dual-use
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	Dual-use
339113	Surgical Appliance and Supplies Manufacturing	Dual-use

NAICS Code	NAICS Description	Power Category
325412	Pharmaceutical Preparation Manufacturing	Dual-use
333511	Industrial Mold Manufacturing	Dual-use
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	Dual-use
332410	Power Boiler and Heat Exchanger Manufacturing	Dual-use
332996	Fabricated Pipe and Pipe Fitting Manufacturing	Dual-use
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	Dual-use
326113	Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing	Dual-use
332510	Hardware Manufacturing	Dual-use
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	Dual-use
332420	Metal Tank (Heavy Gauge) Manufacturing	Dual-use
333613	Mechanical Power Transmission Equipment Manufacturing	Dual-use
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	Dual-use
336390	Other Motor Vehicle Parts Manufacturing	Dual-use
325411	Medicinal and Botanical Manufacturing	Dual-use
325212	Synthetic Rubber Manufacturing	Dual-use
333618	Other Engine Equipment Manufacturing	Dual-use
339112	Surgical and Medical Instrument Manufacturing	Dual-use
327993	Mineral Wool Manufacturing	Dual-use
334417	Electronic Connector Manufacturing	Dual-use
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	Dual-use
334419	Other Electronic Component Manufacturing	Dual-use
334519	Other Measuring and Controlling Device Manufacturing	Dual-use
325110	Petrochemical Manufacturing	Dual-use
327390	Other Concrete Product Manufacturing	Dual-use
331314	Secondary Smelting and Alloying of Aluminum	Dual-use
333914	Measuring, Dispensing, and Other Pumping Equipment Manufacturing	Dual-use

NAICS Code	NAICS Description	Power Category
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	Dual-use
333120	Construction Machinery Manufacturing	Dual-use
333994	Industrial Process Furnace and Oven Manufacturing	Dual-use
333517	Machine Tool Manufacturing	Dual-use
325180	Other Basic Inorganic Chemical Manufacturing	Dual-use
332117	Powder Metallurgy Part Manufacturing	Dual-use
335313	Switchgear and Switchboard Apparatus Manufacturing	Dual-use
336412	Aircraft Engine and Engine Parts Manufacturing	Dual-use
333314	Optical Instrument and Lens Manufacturing	Dual-use
335311	Power, Distribution, and Specialty Transformer Manufacturing	Dual-use
325320	Pesticide and Other Agricultural Chemical Manufacturing	Dual-use
335991	Carbon and Graphite Product Manufacturing	Dual-use
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	Dual-use
327999	All Other Miscellaneous Nonmetallic Mineral Product Manufacturing	Dual-use
327410	Lime Manufacturing	Dual-use
324191	Petroleum Lubricating Oil and Grease Manufacturing	Dual-use
325211	Plastics Material and Resin Manufacturing	Dual-use
336360	Motor Vehicle Seating and Interior Trim Manufacturing	Dual-use
334516	Analytical Laboratory Instrument Manufacturing	Dual-use
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	Dual-use
327211	Flat Glass Manufacturing	Dual-use
333611	Turbine and Turbine Generator Set Units Manufacturing	Dual-use
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	Dual-use
324199	All Other Petroleum and Coal Products Manufacturing	Dual-use
333111	Farm Machinery and Equipment Manufacturing	Dual-use

NAICS Code	NAICS Description	Power Category
336120	Heavy Duty Truck Manufacturing	Dual-use
325920	Explosives Manufacturing	Dual-use
333993	Packaging Machinery Manufacturing	Dual-use
325414	Biological Product (except Diagnostic) Manufacturing	Dual-use
327992	Ground or Treated Mineral and Earth Manufacturing	Dual-use
331210	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel	Dual-use
332992	Small Arms Ammunition Manufacturing	Dual-use
332994	Small Arms, Ordnance, and Ordnance Accessories Manufacturing	Dual-use
325311	Nitrogenous Fertilizer Manufacturing	Dual-use
336415	Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing	Dual-use
213112	Support Activities for Oil and Gas Operations	Dual-use
316998	All Other Leather Good and Allied Product Manufacturing	Dual-use
322220	Paper Bag and Coated and Treated Paper Manufacturing	Dual-use
325193	Ethyl Alcohol Manufacturing	Dual-use
325199	All Other Basic Organic Chemical Manufacturing	Dual-use
325992	Photographic Film, Paper, Plate, and Chemical Manufacturing	Dual-use
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	Dual-use
326211	Tire Manufacturing (except Retreading)	Dual-use
326291	Rubber Product Manufacturing for Mechanical Use	Dual-use
327332	Concrete Pipe Manufacturing	Dual-use
331110	Iron and Steel Mills and Ferroalloy Manufacturing	Dual-use
331221	Rolled Steel Shape Manufacturing	Dual-use
331315	Aluminum Sheet, Plate, and Foil Manufacturing	Dual-use
332439	Other Metal Container Manufacturing	Dual-use
332613	Spring Manufacturing	Dual-use
332618	Other Fabricated Wire Product Manufacturing	Dual-use

NAICS Code	NAICS Description	Power Category
332911	Industrial Valve Manufacturing	Dual-use
332919	Other Metal Valve and Pipe Fitting Manufacturing	Dual-use
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing	Dual-use
333131	Mining Machinery and Equipment Manufacturing	Dual-use
333241	Food Product Machinery Manufacturing	Dual-use
333242	Semiconductor Machinery Manufacturing	Dual-use
333249	Other Industrial Machinery Manufacturing	Dual-use
333316	Photographic and Photocopying Equipment Manufacturing	Dual-use
333318	Other Commercial and Service Industry Machinery Manufacturing	Dual-use
333413	Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing	Dual-use
333921	Elevator and Moving Stairway Manufacturing	Dual-use
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing	Dual-use
333992	Welding and Soldering Equipment Manufacturing	Dual-use
333996	Fluid Power Pump and Motor Manufacturing	Dual-use
333997	Scale and Balance Manufacturing	Dual-use
333999	All Other Miscellaneous General Purpose Machinery Manufacturing	Dual-use
335129	Other Lighting Equipment Manufacturing	Dual-use
335911	Storage Battery Manufacturing	Dual-use
335912	Primary Battery Manufacturing	Dual-use
335921	Fiber Optic Cable Manufacturing	Dual-use
335929	Other Communication and Energy Wire Manufacturing	Dual-use
335931	Current-Carrying Wiring Device Manufacturing	Dual-use
336310	Motor Vehicle Gasoline Engine and Engine Parts Manufacturing	Dual-use
336320	Motor Vehicle Electrical and Electronic Equipment Manufacturing	Dual-use
511210	Software Publishers	Dual-use
541360	Geophysical Surveying and Mapping Services	Dual-use

NAICS Code	NAICS Description	Power Category
541713	Research and Development in Nanotechnology	Dual-use
541714	Research and Development in Biotechnology (except Nanobiotechnology)	Dual-use
339999	All Other Miscellaneous Manufacturing	Enabling
335314	Relay and Industrial Control Manufacturing	Enabling
333991	Power-Driven Handtool Manufacturing	Enabling
336340	Motor Vehicle Brake System Manufacturing	Enabling
334416	Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing	Enabling
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing	Enabling
339991	Gasket, Packing, and Sealing Device Manufacturing	Enabling
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	Enabling
332710	Machine Shops	Enabling
326130	Laminated Plastics Plate, Sheet (except Packaging), and Shape Manufacturing	Enabling
334514	Totalizing Fluid Meter and Counting Device Manufacturing	Enabling
324121	Asphalt Paving Mixture and Block Manufacturing	Enabling
325510	Paint and Coating Manufacturing	Enabling
339114	Dental Equipment and Supplies Manufacturing	Enabling
325312	Phosphatic Fertilizer Manufacturing	Enabling
326140	Polystyrene Foam Product Manufacturing	Enabling
324110	Petroleum Refineries	Enabling
335220	Major Household Appliance Manufacturing	Enabling
325314	Fertilizer (Mixing Only) Manufacturing	Enabling
336999	All Other Transportation Equipment Manufacturing	Enabling
327215	Glass Product Manufacturing Made of Purchased Glass	Enabling
336612	Boat Building	Enabling
332721	Precision Turned Product Manufacturing	Enabling
326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing	Enabling

NAICS Code	NAICS Description	Power Category
325991	Custom Compounding of Purchased Resins	Enabling
326112	Plastics Packaging Film and Sheet (including Laminated) Manufacturing	Enabling
327991	Cut Stone and Stone Product Manufacturing	Enabling
326220	Rubber and Plastics Hoses and Belting Manufacturing	Enabling
336211	Motor Vehicle Body Manufacturing	Enabling
325413	In-Vitro Diagnostic Substance Manufacturing	Enabling
325520	Adhesive Manufacturing	Enabling
325120	Industrial Gas Manufacturing	Enabling
336212	Truck Trailer Manufacturing	Enabling
326121	Unlaminated Plastics Profile Shape Manufacturing	Enabling
324122	Asphalt Shingle and Coating Materials Manufacturing	Enabling
326122	Plastics Pipe and Pipe Fitting Manufacturing	Enabling
113310	Logging	Enabling
211120	Crude Petroleum Extraction	Enabling
325130	Synthetic Dye and Pigment Manufacturing	Enabling
325194	Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing	Enabling
325220	Artificial and Synthetic Fibers and Filaments Manufacturing	Enabling
325612	Polish and Other Sanitation Good Manufacturing	Enabling
325613	Surface Active Agent Manufacturing	Enabling
326199	All Other Plastics Product Manufacturing	Enabling
331410	Nonferrous Metal (except Aluminum) Smelting and Refining	Enabling
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding	Enabling
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)	Enabling
331511	Iron Foundries	Enabling
331513	Steel Foundries (except Investment)	Enabling
331524	Aluminum Foundries (except Die-Casting)	Enabling

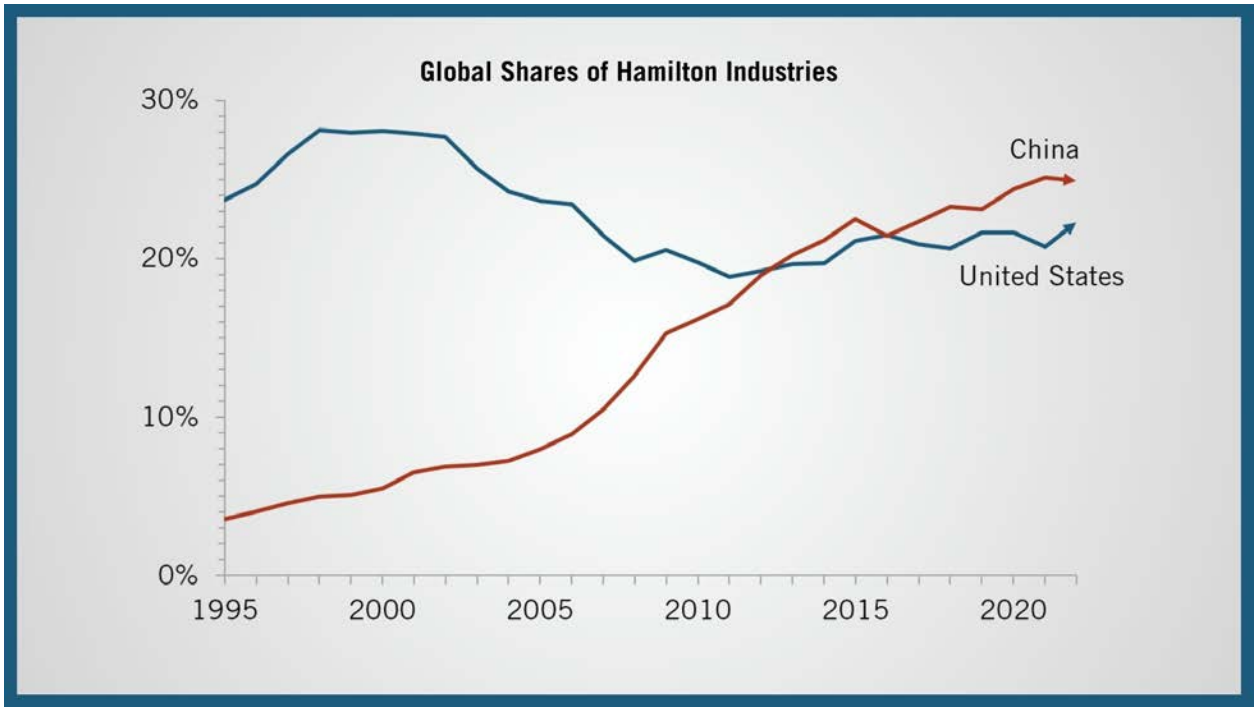
NAICS Code	NAICS Description	Power Category
332119	Metal Crown, Closure, and Other Metal Stamping (except Automotive)	Enabling
332215	Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing	Enabling
332311	Prefabricated Metal Building and Component Manufacturing	Enabling
332313	Plate Work Manufacturing	Enabling
332321	Metal Window and Door Manufacturing	Enabling
332431	Metal Can Manufacturing	Enabling
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	Enabling
332912	Fluid Power Valve and Hose Fitting Manufacturing	Enabling
333132	Oil and Gas Field Machinery and Equipment Manufacturing	Enabling
333243	Sawmill, Woodworking, and Paper Machinery Manufacturing	Enabling
333244	Printing Machinery and Equipment Manufacturing	Enabling
333922	Conveyor and Conveying Equipment Manufacturing	Enabling
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	Enabling
333995	Fluid Power Cylinder and Actuator Manufacturing	Enabling
334613	Blank Magnetic and Optical Recording Media Manufacturing	Enabling
335110	Electric Lamp Bulb and Part Manufacturing	Enabling
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	Enabling
335210	Small Electrical Appliance Manufacturing	Enabling
335932	Noncurrent-Carrying Wiring Device Manufacturing	Enabling
336111	Automobile Manufacturing	Enabling
336112	Light Truck and Utility Vehicle Manufacturing	Enabling
488999	All Other Support Activities for Transportation	Enabling
517410	Satellite Telecommunications	Enabling
518210	Data Processing, Hosting, and Related Services	Enabling
541330	Engineering Services	Enabling

NAICS Code	NAICS Description	Power Category
541380	Testing Laboratories	Enabling
541511	Custom Computer Programming Services	Enabling
541512	Computer Systems Design Services	Enabling
541513	Computer Facilities Management Services	Enabling
541519	Other Computer Related Services	Enabling
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	Enabling

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Section II.
Strategic Assessments of America's Position



US National Power Industries Are at Risk

MEGHAN OSTERTAG

Instead of treating manufacturing as a monolith to be revived, policymakers must focus on national power industries. These industries protect U.S. national defense and economic security, and are eroding at an alarming rate.

KEY TAKEAWAYS

- The strongest case for revitalizing U.S. manufacturing is national power.
- National power industries, which include enabling, dual-use, and defense industries, are those that enable a strong military and give the United States leverage over other nations. These industries are under threat.
- Enabling and dual-use industries experienced the steepest drops in employment, establishments, capital investment, and value added between 2007 and 2022, outpacing declines in nonstrategic and defense sectors.
- When adjusting for inflation, real value added fell across all manufacturing categories, with enabling industries declining by over 30 percent, the largest drop among power industries.
- Defense industries, protected from global competition by federal demand, saw capital expenditures, sales, and value-added grow more than other power industries had.
- While the United States struggles to revive its manufacturing sector, China is focused on achieving dominance in advanced industries, giving it leverage over the United States.
- Unchecked Chinese dominance in power industries will translate into sustained cost advantages, persistent price, profit, and employment losses for American advanced manufacturers at the hands of Chinese market manipulations.

INTRODUCTION

In recent years, there has been increasing concern about the health of U.S. manufacturing, with the voices that long argued that manufacturing doesn't matter finally becoming a minority.

But why does manufacturing matter? The answer to that question shapes the kind of manufacturing policy a nation has. The conventional view is that manufacturing matters because it provides good jobs, especially for non-college-educated workers; drives economic growth through higher productivity and a higher employment multiplier; supports innovation; and reduces the trade deficit. These are mostly not strong arguments.

Manufacturing jobs now pay, on average, slightly less than jobs in the overall economy do.[1] And manufacturing labor productivity has grown more slowly than overall economy productivity for over a decade.[2] With regard to the employment multiplier, this is largely irrelevant given that the U.S. economy is at or near full employment, except in economic downturns, and even then the Federal Reserve responds with monetary policy. As for innovation, there is no reason foreign manufacturers can't drive global innovation. However, a strong manufacturing sector does help reduce the U.S. trade deficit, but services and natural resources exports also play a big role in reducing the deficit.

National power industries drive growth and both national and economic security, and must be the focus of strategic industry trade policy.

The principal reason for concern with manufacturing should be national power. Certain industries enable a strong military or give the United States leverage over other nations, especially China. At the same time, Chinese dominance in other industries would give it enormous leverage over the United States. We see this already with rare earth minerals. We call these "national power industries."

Traditional measures of manufacturing health treat the sector as a monolith, but some industries are far more critical to U.S. power than others are. The United States is at risk of losing its national power industries, which are essential to the country's economic and national security. If these industries were to be lost, it will be difficult, if not impossible, to regain them.

In a novel framework, the Information Technology and Innovation Foundation (ITIF) has classified all 970 industries delineated by the North American Industry Classification System (NAICS) at the six-digit level on a continuum of defense, dual-use, enabling, and nonstrategic. The first three are power industries.

Most industries are not power industries because most firms primarily serve domestic demand and are not exposed to international competition or predation. Consider the neighborhood pizza shop or local bank. If these companies go out of business, some jobs and money will be lost, but American power will be unaffected. Other "local serving" businesses will emerge, or existing ones will gain market share.

Some traded industries are nonstrategic, meaning their loss would not weaken U.S. power or provide leverage to China. Case in point: wind turbines. If the Chinese dominated all wind turbine production and wanted to cut off exports to the United States to force U.S. government

policy change, the impact would be minimal. Utilities would simply utilize alternative energy-generation technologies, and if even temporary shortages occurred, America would just pay a bit more for energy and conserve energy for a few years.

Compare that to a dual-use industry such as semiconductors. If China dominated this industry—which it is seeking to do—the simple threat of cutting off access to semiconductors would lead policymakers to scramble to avoid that outcome. And of course, if the worst were to happen and the United States and China engaged in a kinetic war, China's ability to produce vastly more weapons than the United States could, combined with the fact that Chinese suppliers still play a key role in U.S. weapons systems supply chains, would introduce dangerous vulnerabilities and weaknesses.

The principal reason for concern with manufacturing should be national power.

In a utopian globalist world where no country uses trade for power and all are responsible stakeholders, countries can afford to be agnostic to their industrial composition. But in the real world, where the People's Republic of China seeks to become the global hegemon and the dominant producer of most, if not all, strategic industries, that long-dominant and comforting framework is as realistic as the Washington Naval Treaty of 1922, which attempted to prevent an arms race by limiting naval construction but was later renounced by key signatories.

As such, it is time for a U.S. and allied national industry power strategy. A companion ITIF report lays out the need for and framework of such a strategy.[3]

This report analyses the performance of U.S. national power industries between 2007 and 2022. It finds that U.S. dual-use and enabling manufacturing industries declined faster than non-power industries, with greater losses in employment, establishments, capital expenditures, and value added than in nonstrategic and defense sectors. We would expect defense industries to perform reasonably well because they face limited global competition, and the U.S. government is their principal end-use customer. But the finding that dual-use and enabling industries declined more than nonpower manufacturing industries have is troubling.

Should this continue, the United States will find itself in a position of even greater vulnerability to China, in which institutional knowledge is lost and economic independence is at risk, and the country is able to hold America hostage.

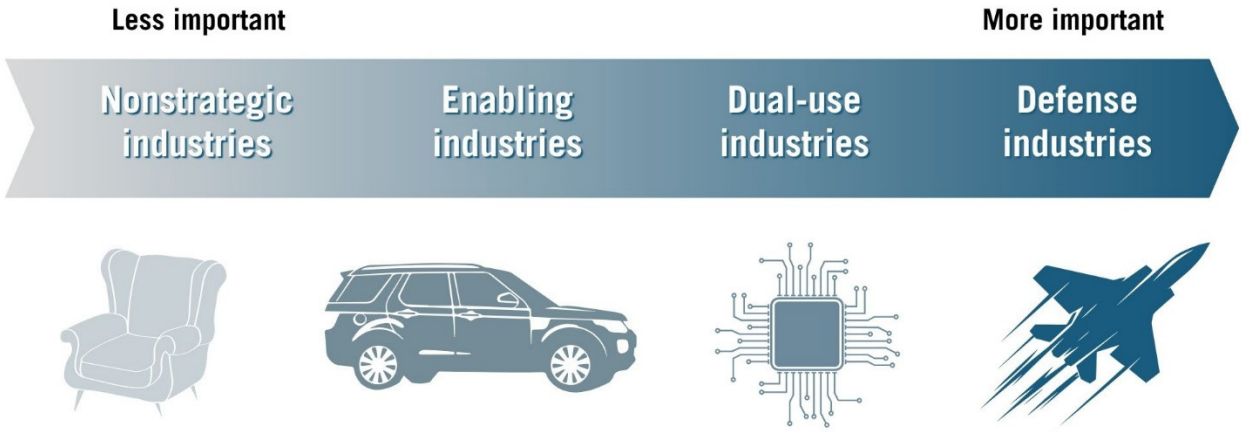
METHODOLOGY

The concept of categorizing industries isn't new, having been undertaken by both public and private institutions to rank industry importance and influence policy decisions. The Brookings Institution, Bureau of Labor Statistics (BLS), and the Organization for Economic Cooperation and Development (OECD) have each developed their own methodology for classifying advanced or high-tech industries, using criteria such as research and development (R&D) intensity, knowledge of STEM (science, technology, engineering, and mathematics), and capital intensity.[4] These industries are identified in relation to their capacity to generate innovation and growth. The Cybersecurity and Infrastructure Security Agency has taken a different approach, classifying critical infrastructure sectors essential for national security, the economy, and public health.

Many of these sectors are defense oriented, including nuclear materials and the defense industrial base.[5]

While these approaches shed light on innovation and infrastructure, none explicitly assess industries through the lens of national power. Our methodology does that, considering an industry's relevance to both U.S. national security and power. We use both quantitative and qualitative means to classify 970 six-digit NAICS codes into one of four classifications based on this grouping: nonstrategic, enabling, dual-use, and defense. (See appendix 1 for the full methodology.)

Figure 1: ITIF's industrial power scale

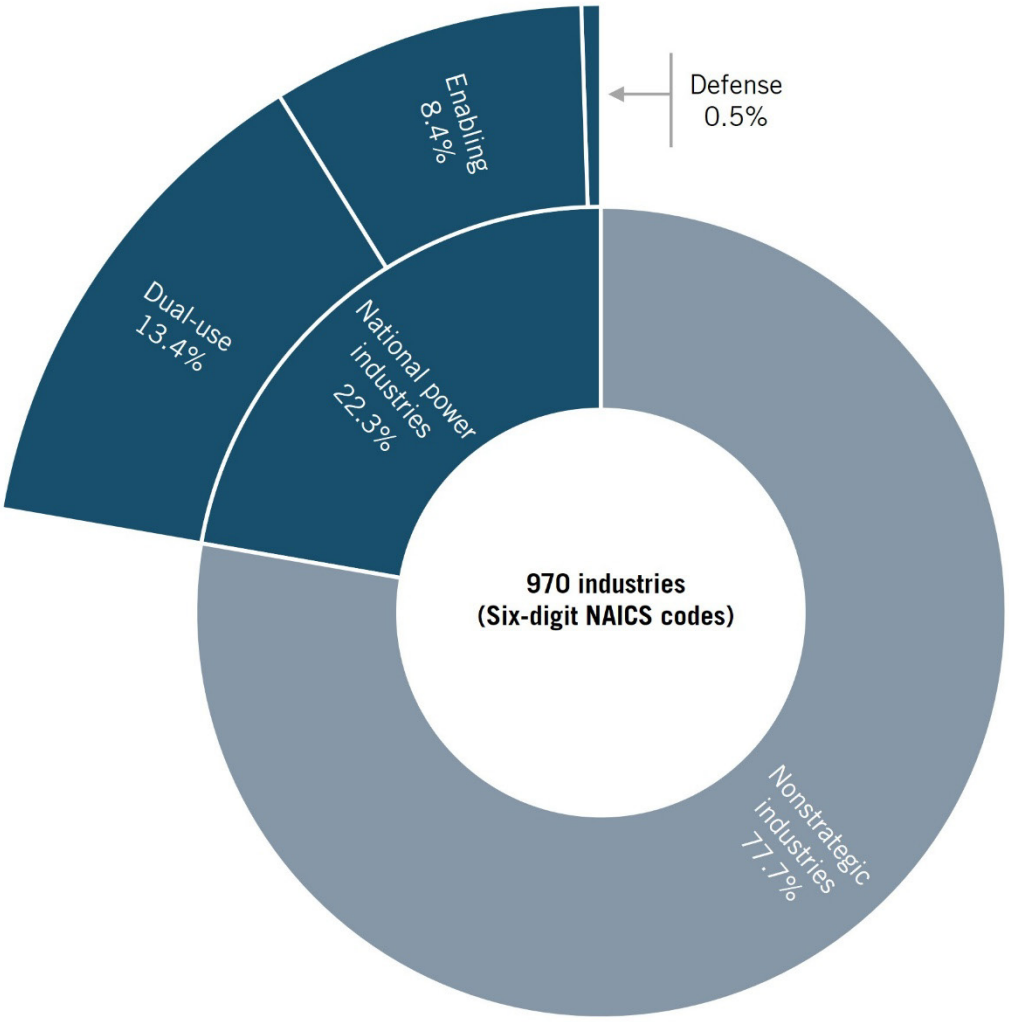


In our analysis, power industries account for 22.3 percent of the 970 industries. (See figure 2.) Most industries are not power industries, in large part because a number are nontraded sectors such as law firms and barber shops. Of the 22.3 percent that are power industries, just 0.5 percent are defense industries, and 13.4 percent are dual-use. The remaining 8.4 percent are enabling industries. In terms of employment, in 2022 for example, just 9.5 percent of workers were employed in power industries. Of this, 6.4 percent worked in dual-use industries and 2.9 percent in enabling industries, and just 0.2 percent were employed in defense industries.

To be clear, at one level, every industry could be considered strategic. For example, we classify the perfume industry (NAICS 325620) as nonstrategic. But firms in this industry employ chemists, and they may contribute innovations that spill over to more traditional chemical industries. Likewise, the tortilla industry (NAICS 311830 and nonstrategic) employs machine operators who, in case of war time, could work in defense factories.

But arguing that everything is strategic means that nothing is strategic. Not only does the U.S. government lack the resources to establish independence in all industries, but attempting to do so would take resources away from truly strategic industries. As such, we believe that such a typology provides a valuable framework for guiding strategic planning and resource allocation.

Figure 2: Six-digit NAICS industries by national power type



Nonstrategic industries, including nontraded sectors such as professional services and retail, as well as traded industries such as furniture, food, soda, paper, clothing, office equipment, and board game production, are largely irrelevant to national and economic security. These industries may have other values, such as enabling innovation or driving domestic productivity, but their health is not critical to national power. Seventy-eight percent of industries (including manufacturing and nonmanufacturing) fall into this first classification. The other three categories are national power industries.

Enabling industries produce goods in the industrial commons that, while not central to power, do strengthen the ecosystem for the production of dual-use and defense goods, and are necessary for economic well-being.[6] Many of these industries produce largely final consumer goods; therefore, losing these industries would not have an immediate effect on American security—the U.S. economy would perform fine, at least in the near and moderate term, if, for example, no new cars were available.

However, the loss of these industries would erode U.S. production and innovation in dual-use and defense industries, as the technological advances made in industries such as motor vehicles and appliances have downstream effects on the supply chains of dual-use and defense equipment. These industries contribute to the industrial commons that dual-use and defense industries live in, which include science and engineering knowledge, university and technical training programs, professional associations, standards bodies, research institutes, and more. These industries also often share suppliers with defense and dual-use industries.

The automotive sector is a perfect example. It employs 47,000 engineers and invests over $26 billion in R&D annually.[7] The industry plays a key role in metalworking, mechanical engineering, and machinery manufacturing ecosystems, participating in training and higher education programs and industrial standards groups. And it sources parts from over 5,600 specialized domestic suppliers, which provide essential components and capabilities, such as precision machining and casting, that are crucial for many dual-use and defense industries.[8]

U.S. dual-use and enabling industries are declining faster than non-power industries are, with greater losses in employment, capital expenditures, and value added than nonstrategic and defense sectors.

Dual-use industries produce goods with civilian as well as defense applications, including the production of chemicals, semiconductors, displays, aircraft, sensors, and telecommunications equipment. Many of the products produced by these industries are intermediate goods, meaning a shortage or loss of domestic production would have negative impacts on other sectors, including defense. Consider China invading Taiwan, which would cut the United States off from its largest semiconductor supplier. Without access to Taiwanese chips, all data center, machinery, and automobile construction would come to a halt. The loss of domestic production in these industries would give China even more leverage over the United States, where it could use export controls as a powerful weapon to compel behavior change and force U.S. subservience to the Chinese Communist Party. And of course, weakness in dual-use goods would be catastrophic if the United States and China were to engage in military conflict. Moreover, the production of these goods also involves substantial investment in R&D and tacit knowledge by workers. Meaning that once these industries are lost, it would prove difficult to resurrect them.

Defense industries produce goods predominantly for defense applications, such as shipbuilding and the production of missiles, large ammunition, military vehicles, and fighter jets. For obvious reasons, domestic production and innovation in these industries are essential to national security.

Using this classification, we used data from the Census Bureau's Annual Survey of Manufacturers (ASM) and Economic Census to identify trends in manufacturing activity over 16 years.[9] Although U.S. manufacturing began its steepest decline after China's accession to the World Trade Organization (WTO) in 2001, government data limitations restrict the time period that can be assessed.[10] To ensure data consistency across all variables, our assessment spans the period from 2007 to 2022, the latest year of available data.

It is important to note that data obtained from the Census Bureau differs slightly from data from other government institutions. Research by Andrew Reamer highlights the differences between Census Bureau data and data from the Bureau of Economic Analysis (BEA) and BLS in their

reporting of wages and employment. Differences in information access, specifically the Census Bureau's ability to access federal tax information that is limited or inaccessible to the BEA and BLS limit the agencies' ability to synchronize data, reducing consistency and quality.[11] In an effort to maintain consistency, all variables were sourced from the Census Bureau.

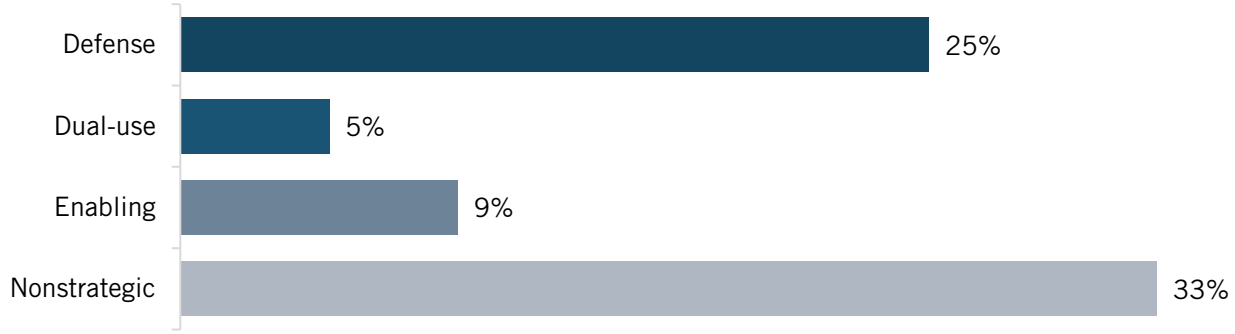
This analysis relies on nominal figures for all dollar amounts, including value added, as real or inflation-adjusted data was not available at the industry level and for the time series assessed. This is a significant drawback, as productivity growth rates, and hence nominal price and employment changes, can differ between industries that experience the same real value-added growth. But in the absence of inflation-adjusted value-added measures, this data provides the best available indicators. Also, it's not clear that productivity growth should be significantly different between the four industry groups. The fact that the averages for the industries are similar across all variables, including energy use, which is less likely to be affected by differential industry productivity, suggests that the findings are reasonably strong.

EMPIRICAL ANALYSIS

Evaluating the health of U.S. manufacturing requires an analysis of the key inputs and outputs of the industries, namely sales, capital, labor, energy, and value added.

The value of shipments in manufacturing industries is a proxy for sales, as it measures the net selling value of all products a firm ships.[12] Sales in nonstrategic and defense industries surged compared with enabling and dual-use industries, with growth ranging from 25 percent to 35 percent. In contrast, enabling and dual-use classifications experienced sales increases of less than 10 percent during those 16 years. However, as these values are in nominal dollars, when considering that inflation increased by 40 percent over this period, sales in all industries fell relative to overall price changes.[13]

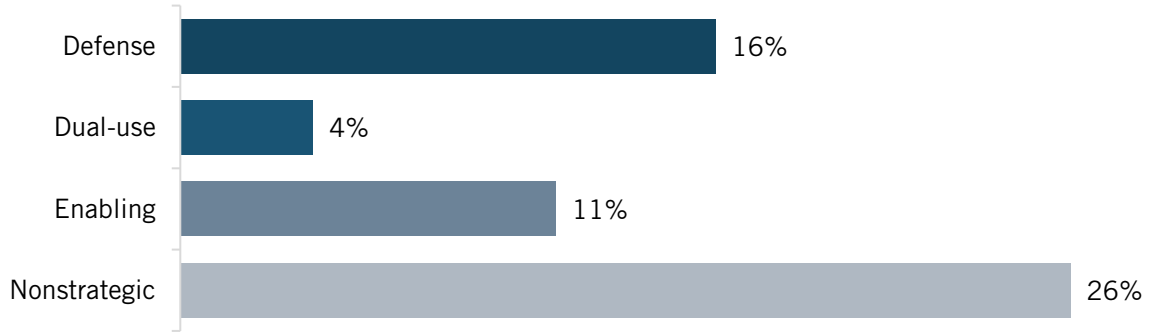
Figure 3: Change in value of manufacturing shipments (2007–2022)



Real value added is the best indicator of the performance of the manufacturing sector, which is measured by the output of an industry minus its inputs. But as noted, only nominal figures are available. Nominal value added grew across sectors, yet growth was weakest among the core manufacturing base of enabling and dual-use industries (see figure 4). Nonstrategic industries saw the highest increase in value added, and defense industries also saw substantial growth. As shown in figure 6, the fact that enabling and dual-use industries experienced less or even negative growth in capital equipment suggests that their nominal value-added growth was not

due to superior productivity and resultant price declines. Appendix 2 lists the industries that experienced the largest growth and greatest decline in value added in each classification.

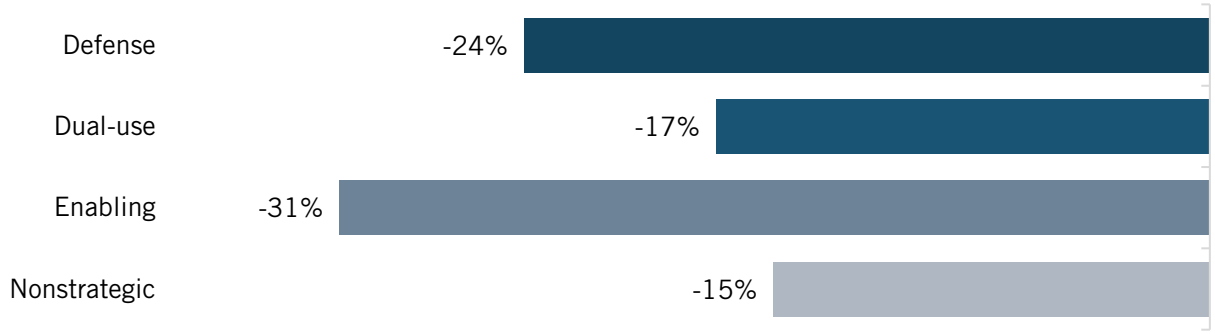
Figure 4: Change in U.S. manufacturing value-added (2007–2022)[14]



Change in value added was weakest among enabling and dual-use industries.

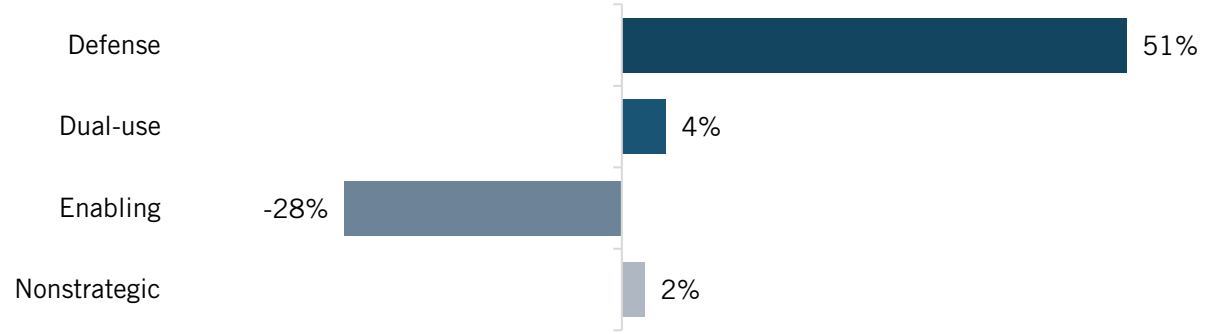
When controlling for producer price index (PPI), which shows the change in price levels for producers over a given period, it's evident that value added actually declined across all classifications, though worst of all in enabling industries, at approximately 31 percent.[15] A decline in value added has repercussions across the rest of a firm's operations, including capital investment, and employment. Figure 5 depicts change in value added relative to PPI.

Figure 5: Change in U.S. manufacturing value added, PPI adjusted (2007–2022)



One of the most critical drivers of productivity and competitiveness is better tools, or capital investment.[16] Capital expenditures include the purchase of a range of tools for business operations, including desks for offices, the construction of new buildings, and the purchase of new machinery and software. In power industries, changes in capital expenditures range widely, with a decline in enabling industries, while defense industries experienced an increase of over 50 percent (figure 6). Dual-use and nonstrategic industries saw minimal change. These differences may be the result of a changing number of firms in the various categories (fewer firms means less capital investment, all else equal) or existing firms simply cutting back on investment due to a weaker financial position or decline in sales.

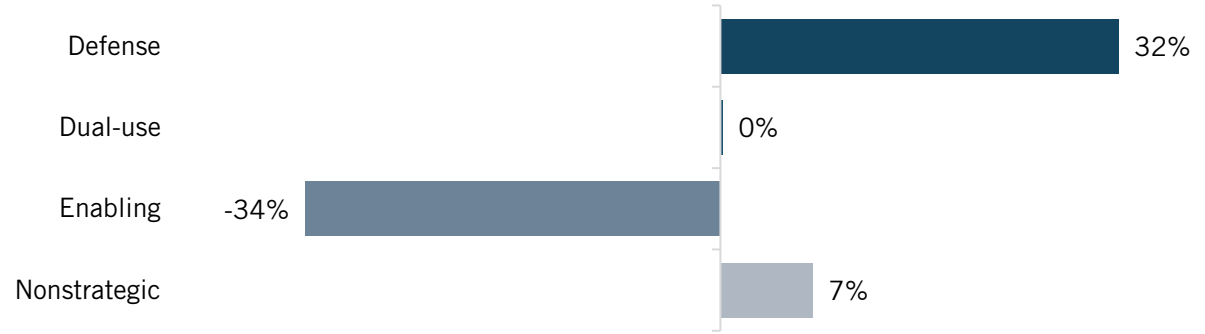
Figure 6: Change in U.S. manufacturing capital expenditures (2007–2022)



While capital expenditures broadly are an important indicator of performance, the type of capital purchased can have a significant impact on business operations and productivity. Productivity-enhancing equipment, such as machinery and equipment, has a more impactful effect on productivity and growth because, while a new machine in a factory will have a tangible impact on the number of motor vehicles a factory can produce, the construction of a new building or the purchase of a new office chair will not have that same productivity-enhancing effect. Figure 7 shows how investment in machinery and equipment changed between 2007 and 2022. Investment declined in enabling industries, while it rose slightly in nonstrategic and significantly in defense industries.

There is a very strong and positive correlation between capital investment generally and investment in machinery and equipment (correlation coefficient of 0.96), suggesting that there have been no broad initiatives to invest greater output into machinery and equipment over other forms of capital. Investment in machinery and equipment also has a slightly stronger correlation to value added than broad capital investment, with a coefficient of 0.32.

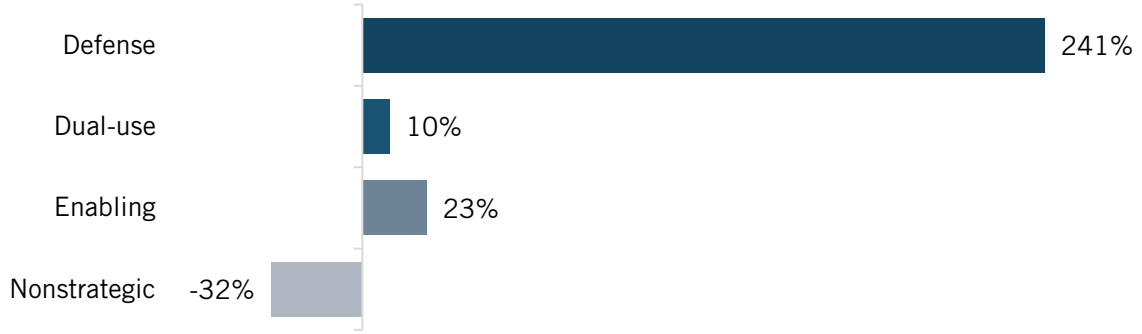
Figure 7: Change in U.S. manufacturing expenditures machinery and equipment (2007–2022)



Like machinery and equipment, data processing equipment and computers have a positive effect on productivity. Enabling and dual-use industries experienced relatively little growth in their expenditures on this equipment, especially considering the growing necessity for technological equipment in modern-day industry. Defense industries, on the other hand, exhibited a rapid boom in these types of capital expenditures, increasing by 241 percent.

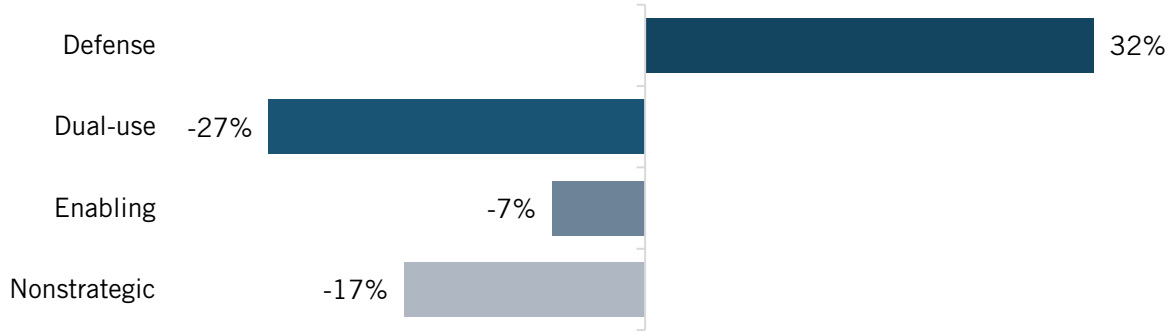
Investment in computers and data processing equipment is also highly correlated to overall capital investment, with a correlation coefficient of 0.82. In many ways, the defense spending figures indicate what U.S. manufacturing performance in the other three sectors would look like in the absence of stiff international competition.

Figure 8: Change in U.S. manufacturing expenditures on computers and data processing equipment (2007–2022)



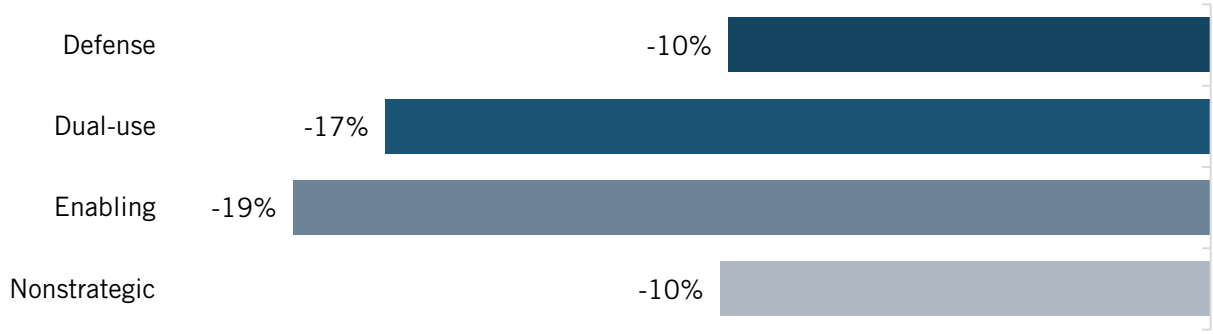
Following the trends seen in capital expenditures, electricity purchases in enabling and dual-use industries trail those of the defense sector, demonstrating a shrinking capacity to produce goods in these strategic sectors. In enabling and dual-use firms, a reduction in electricity purchases or consumption is likely related to a shutdown of factories and a decrease in output as firms move abroad to nations with lower costs or lose market share to imports. On the other hand, defense industries have seen a relatively significant increase in electricity production, a clear bifurcation in our manufacturing base. Defense industries face little to no international competition—the Pentagon will always purchase missiles and fighter jets from American manufacturers—and this insulation shields defense sectors from the cost pressures that have driven offshoring elsewhere, reinforcing their domestic concentration.

Figure 9: Change in U.S. manufacturing electricity purchases (2007–2022)



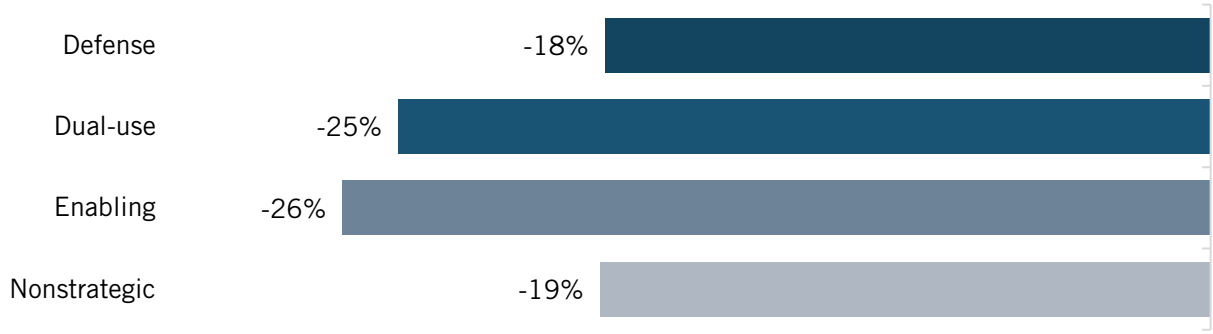
Employment in manufacturing industries experienced a broad decline in all industries, with the steepest decreases occurring in enabling and dual-use sectors (19 percent and 17 percent, respectively). The trends in these two industries follow those in capital investment, energy purchasing, and value added, reinforcing the conclusion that dual-use and enabling industries performed the weakest of the four groups.

Figure 10: Change in U.S. manufacturing employment (2007–2022)



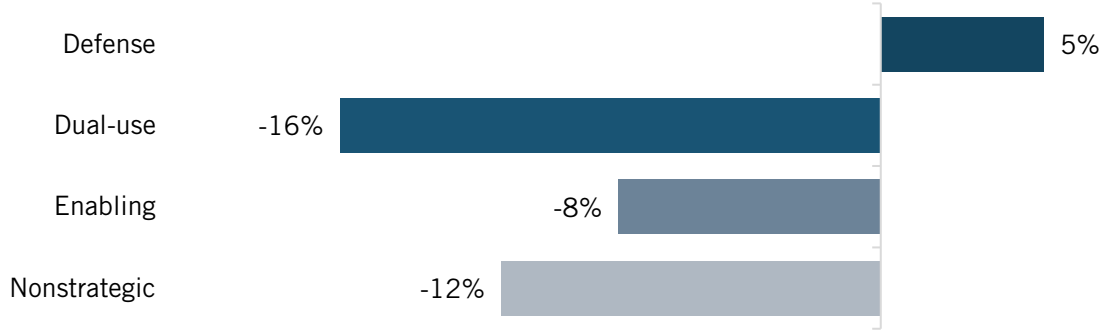
Considering overall employment in the United States rose by 11 percent between 2007 and 2022, this decline in the manufacturing workforce is even more troubling. Looking at manufacturing employment as a share of economy-wide employment across the four classifications, figure 11 shows that relative employment fell even more across all manufacturing classifications. Enabling and dual-use industries experienced the greatest decline, at 26 percent and 25 percent, respectively.

Figure 11: Change in U.S. manufacturing employment relative to the overall economy[17]



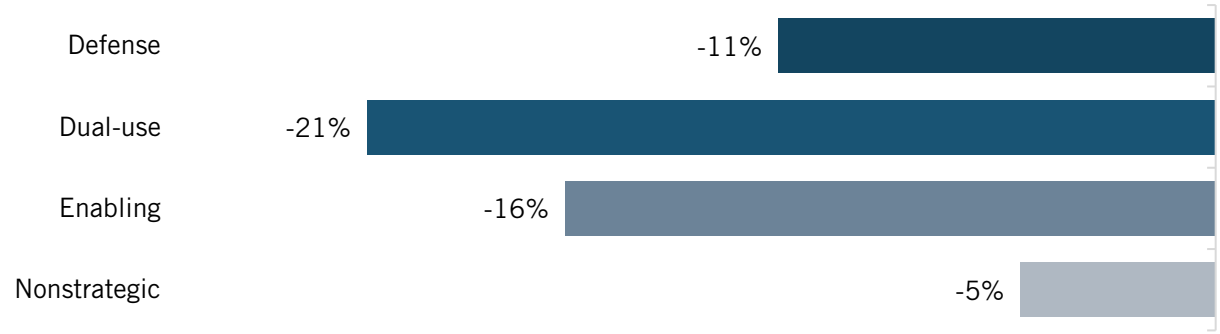
Taking a deeper look into the fall in employment, production manufacturing workers fell the most in dual-use industries, a 16 percent decline (figure 12). And again, defense industries performed the best, experiencing a growth in production workers by 5 percent.

Figure 12: Change in U.S. manufacturing production workers (2007–2021)[18]



Change in nonproduction workers was consistent with overall trends, with enabling and dual-use seeing the steepest declines. Non-production workers include managerial and R&D positions, among others.

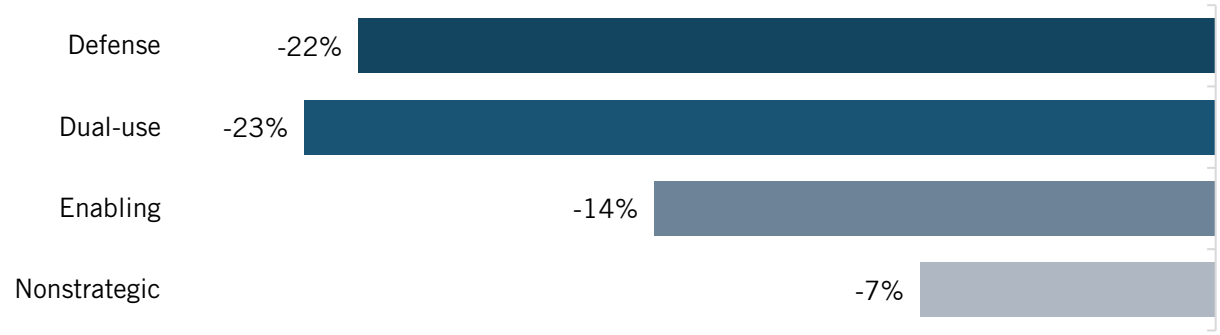
Figure 13: Change in U.S. manufacturing non-production workers (2007–2022)



A reduction in the manufacturing workforce has corresponded to a decrease in the number of establishments, or physical locations of a firm. A firm can have multiple establishments, so a decline in establishments does not necessarily mean that the number of firms in an industry has fallen, just that the number of factories or office buildings has been reduced.

Dual-use and defense industries saw the most significant reduction in the number of establishments, with each falling by over 20 percent between 2007 and 2022. Enabling industries experienced a relatively moderate decline of 14 percent.

Figure 14: Change in U.S. manufacturing establishments (2007–2022)



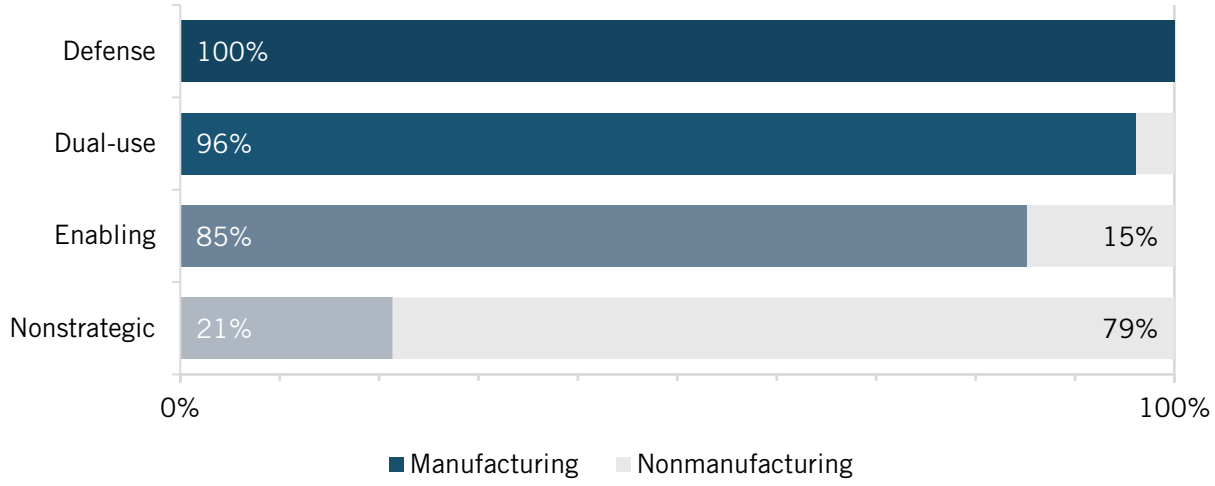
As employment has declined in manufacturing, so has the number of employees per establishment. Enabling industries experienced the greatest decline, with the number of employees in each enabling industry establishment falling by more than half. Dual-use industries saw the smallest decline of 12 percent. The larger decline in sales of dual-use industries likely reflects the greater loss of number of establishments.

Figure 15: Change in average employment per U.S. manufacturing establishment (2007–2022)



While most national power industries are in manufacturing, some are not. For example, biotechnology research (NAICS code 541714) is a dual-use industry, as its discoveries can be used to develop medicines or create and defend against biological weapons. Similarly, the satellite telecommunications industry (NAICS code 517410) is an enabling industry, as it deploys critical service for civilian and military usage and requires significant investment in R&D. But if the United States lost this industry, the country could function temporarily on the existing satellite and ground infrastructure. All defense industries in this analysis are manufacturing industries. See figure 16 for the share of each classification engaged in manufacturing versus nonmanufacturing activities.

Figure 16: Share of U.S. industries in manufacturing vs. nonmanufacturing



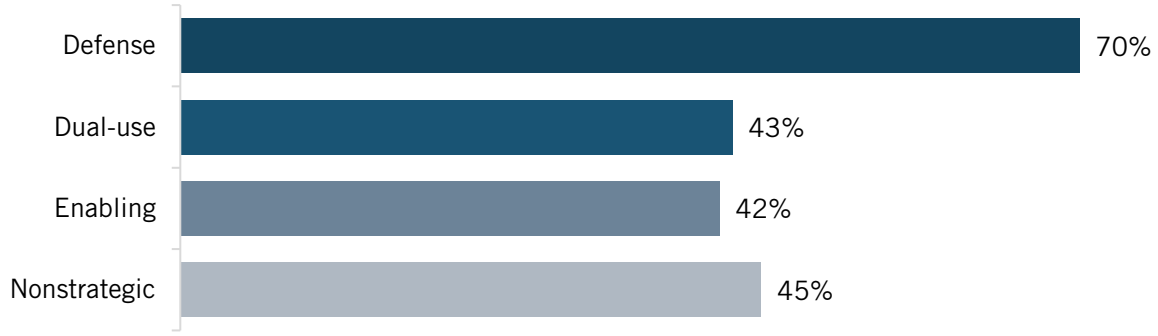
Expanding the analysis of employment beyond strictly manufacturing industries reveals a different set of trends. While employment in manufacturing power industries fell significantly, and much more than in nonstrategic industries (figure 10), the opposite is true for nonmanufacturing and services industries. Dual-use industries outside of manufacturing almost doubled in workforce size over between 2007 and 2022, driven largely by the rise in software publishers, which increased by 167 percent, while enabling industries grew by 60 percent.

Figure 17: Change in employment of nonmanufacturing industries (2007–2022)



Despite varying trends in every other indicator, median nominal wages increased at roughly similar rates across the nonstrategic, enabling, and dual-use industries, with growth ranging from 42 to 45 percent. Defense industries, however, saw significant growth over this timeframe, with the median wage increasing by 70 percent. Median wages in nonstrategic industries were the lowest, at about $58,000, while wages in defense industries were highest at $97,500.

Figure 18: Change in manufacturing median wages (2007–2022)



IMPLICATIONS FOR U.S. POWER

This data suggests that of the four industry groups, dual-use and enabling industries declined even more than nonstrategic and defense.

The hollowing out of the industrial commons of the United States is evident, and its consequences are severe. Enabling industries have experienced the steepest decline in capital expenditures and employment, and the loss of dual-use industries, as evidenced by the significant decrease in employment, energy purchases, sales, and almost stagnant value added, should serve as a warning for the United States. The sectors most critical to U.S. national security, those that support domestic supply chains and national power, are losing ground to international competitors.

Unchecked Chinese dominance in advanced industries will translate into sustained cost advantages; persistent price, profit, and employment losses for American advanced manufacturers; and vulnerabilities that will leave the United States subject to Chinese market manipulations.

China has demonstrated its ability and willingness to disrupt American supply chains. In 2025, China has implemented and continues to expand restrictions on the sale and export of rare earths to the United States, creating a chokepoint in the U.S. supply chains most critical for dual-use and defense industries. China processes more than 90 percent of global rare earths and extracts over 60 percent, giving it a practical monopoly and unimpeachable power over the industry.[19] Without access to China's supply of these minerals, U.S. firms in downstream industries face shortages, delays, and reduced competitiveness against Chinese firms with ample access to these resources. This pattern extends to batteries, basic metals, and advanced electronics—products in which China is consolidating global market share.[20] Unchecked Chinese dominance in advanced industries will translate into sustained cost advantages for its firms; persistent price, profit, and employment losses for American advanced manufacturers; and vulnerabilities that will leave the United States subject to Chinese market manipulations.

CONCLUSION

Current debates on the manufacturing industry focus on the state of manufacturing as a whole, encompassing everything from textiles to tortilla production, but these industries are not the point. While defense industries grew and strengthened between 2007 and 2022, the core of U.S. manufacturing—enabling and dual-use industries—eroded, weakening national power and leaving the country vulnerable to national and economic security concerns as China continues to consolidates its control over these same sectors. Allowing these industries to fail is not an option; doing so would weaken supply chain security, reduce innovation and R&D investment, and increase U.S. dependence on China. America's continued success and security will rely on defending and supporting these industries through targeted policies and a strategic and comprehensive industrial plan. If the United States fails to do this, it will lose not only factories, but also the foundation of its innovative and military strength.

APPENDIX 1: FULL METHODOLOGY

The methodology for categorizing industries as defense, dual-use, industrial commons, or nonstrategic is the following. Some industries are reclassified based on judgment:

1. If an industry's Defense Department contracts as a share of total receipts for fiscal year 2022 were above 50 percent, then the industry is automatically classified as a defense industry.[21]
2. Of the remaining industries, if the industry produces one of the Commerce Control List (CCL) products and the product is also traded, then the industry is a dual-use industry.[22]
3. Of the remaining industries, if the industry produces one of the CCL products but the product is not traded, then the industry is an enabling industry.
4. Of the remaining industries, if the industry does not produce a product on the CCL but produces intermediate or capital goods, then the industry is also an enabling industry.[23]
5. The remaining industries are classified as nonstrategic industries.

Table 1: Examples of national power industry categorizations based on ITIF's methodology

NAICS Code	NAICS Description	Power Category	Defense Obligations	CCL	Product Category
336414	Guided Missile and Space Vehicle Manufacturing	Defense	98.3%	Yes	Capital Goods
332993	Ammunition (except Small Arms) Manufacturing	Defense	96.7%	Yes	Capital Goods
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	Dual-use	42.8%	Yes	Intermediate Goods
336411	Aircraft Manufacturing	Dual-use	38.2%	Yes	Capital Goods
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	Enabling	2.8%	No	Capital Goods
336212	Truck Trailer Manufacturing	Enabling	2.7%	No	Capital Goods
481212	Nonscheduled Chartered Freight Air Transportation	Nonstrategic	29.2%	No	Services
561210	Facilities Support Services	Nonstrategic	27.1%	No	Services

APPENDIX 2: INDUSTRIES WITH THE GREATEST CHANGES IN VALUE ADDED

Table 2: Top industries with largest increase in nominal value added by classification

Category	NAICS Code	Description	Change in value added (2007–2022)
Dual-use	336415	Guided missile and space vehicle propulsion unit parts	374%
Dual-use	325311	Nitrogenous fertilizer	286%
Nonstrategic	312140	Distilleries	220%
Dual-use	332994	Small arms	214%
Defense	332993	Ammunition (except small arms)	201%
Dual-use	332992	Small arms ammunition	194%
Enabling	326122	Plastics pipe and pipe fitting	172%
Nonstrategic	336214	Travel trailer and campers	170%
Nonstrategic	321219	Reconstituted wood products	153%
Nonstrategic	311513	Cheese manufacturing	150%
Enabling	324122	Asphalt shingle and coating materials	123%
Enabling	326121	Unsupported plastics profile shapes	116%
Enabling	336212	Truck trailers	108%
Defense	336611	Ship building and repairing	67%
Defense	336419	Other guided missile and space vehicle parts	58%
Defense	336992	Military armored vehicle, tank, and tank components	-30%

Category	NAICS Code	Description	Change in value added (2007–2022)
Dual-use	334111	Electronic computers	-83%
Dual-use	334210	Telephone apparatuses	-76%
Nonstrategic	313210	Broadwoven fabric mills	-53%
Dual-use	334112	Computer storage devices	-51%
Defense	336414	Guided missile and space vehicles	-50%
Nonstrategic	337122	Nonupholstered wood household furniture	-46%
Nonstrategic	314110	Carpet and rug mills	-38%
Dual-use	334413	Semiconductor and related device	-35%
Nonstrategic	311230	Breakfast cereals	-30%
Enabling	339999	All other miscellaneous manufacturing	-17%
Enabling	335314	Relay and industrial controls	-9%
Enabling	333991	Power-driven hand tools	-5%
Enabling	336340	Motor vehicle brake systems	-4%

Tracking R&D Leadership: US Advantage Narrowing as China Gains Ground

TRELYSA LONG

Maintaining R&D leadership in advanced industries is critical to U.S. economic competitiveness and national power. But on a size- and wage-adjusted basis, China is rapidly gaining ground. Congress needs to boost corporate R&D incentives to prevent America from falling behind.

KEY TAKEAWAYS

- In 2024, U.S. firms in nine advanced sectors invested $675 billion in R&D, 52 percent of the global total. Chinese firms invested $165 billion, 13 percent of the global total.
- But China has been catching up rapidly over the last decade. On a size-adjusted basis, Chinese firms are already outpacing U.S. firms' R&D investments in four of the nine sectors ITIF has studied.
- Meanwhile, advanced industries' investment in R&D in the rest of the world appears to have largely stagnated. We appear to be moving to a bipolar world in which the United States and China are dominating corporate R&D investment.
- China has a distinct advantage in that research costs less there than it does in the United States. In fact, on a wage-adjusted basis, China's R&D investments in advanced industries are 20 percent below U.S. levels.
- Excluding software and biopharmaceuticals, Chinese firms' wage-adjusted R&D across seven advanced industries now exceeds U.S. firms' R&D by 6 percent.
- To avoid losing global market share in advanced industries critical to U.S. national power, Congress should expand programs that fund joint industry-university research and triple both the Alternative Simplified R&D Credit and regular R&D credit.

INTRODUCTION

Advanced, traded-sector industries power the U.S. economy's global competitiveness.[1] A key indicator of strength in these industries is the amount firms invest in research and development (R&D) to produce new innovations. As China vigorously challenges the United States for global leadership in the innovation economy, it is important to assess where the two countries stand in their advanced industries' private R&D investments.[2]

This report uses the EU R&D Industrial Scoreboard, which tracks the R&D investments (in euros) of the world's top R&D investors, covering about 90 percent of the world's private sector R&D investments, to compare U.S.- and Chinese-headquartered firms' R&D investments in nine advanced sectors.[3] These nine sectors are aerospace and defense, electronic and electrical equipment, general industrials, industrial engineering, pharmaceutical and biotechnology, software and computer services, technology and hardware equipment, alternative energy, and automobiles and parts. The Scoreboard covers 2,000 companies from 2024 and 2,500 from 2014 because it took 2,500 companies to cover 90 percent of the world's private sector R&D investments in 2014 but only 2,000 in 2024. Moreover, there are other caveats about this dataset. (See appendix for details.)

Each section of the report examines U.S. and Chinese private-sector R&D in those sectors on a size-adjusted basis—first relative to the size of their respective economies, then as proportions of global R&D in each sector or group of sectors, and finally using an industrial concentration ratio known as a location quotient (LQ), which is R&D as a share of a country's national economy versus the global average.

While U.S. firms' investment in R&D is growing, China is catching up. On a size-adjusted basis, U.S. firms' R&D investments in eight of nine advanced sectors in 2014 exceeded that of Chinese firms.

The data shows that while U.S. firms' investment in R&D is growing, China is catching up. On a size-adjusted basis, U.S. firms' R&D investments in eight of nine advanced sectors in 2014 exceeded that of Chinese firms.[4] But by 2024, U.S. firms had lost their lead in four of the nine sectors, while China had closed the gap in the rest.[5] The United States is likely to lose global R&D investment market shares in the other five sectors as Chinese companies expand R&D investment with government support. In addition, because they benefit from extensive intellectual property theft and forced technology transfers, Chinese firms do not have to invest as much in R&D as American firms do to get the same innovation results.[6] Think of China as a free rider, living on the R&D investments of U.S. and other foreign firms. But in addition to that free-riding strategy and the impact of having R&D workers with lower salaries, Chinese firms also are investing more in their own in-house capabilities. Indeed, when adjusting for R&D workers' wages, Chinese firms really accounted for 9 percent of advanced sector R&D investments in 2014 and 25 percent in 2024 (rather than 4 percent in 2014 and 13 percent in 2024). More concerningly, Chinese firms' LQ rose from 0.7 to 1.5 from 2014 to 2024 while U.S. firms' LQ declined from 1.8 to 1.7.

Meanwhile, the rest of the world's advanced-sector firms' R&D investments have been relatively stagnant, while U.S. and Chinese firms are becoming the main global R&D hubs. From 2014 to 2024, worldwide firm-level R&D investments increased by 102 percent, but this aggregate figure

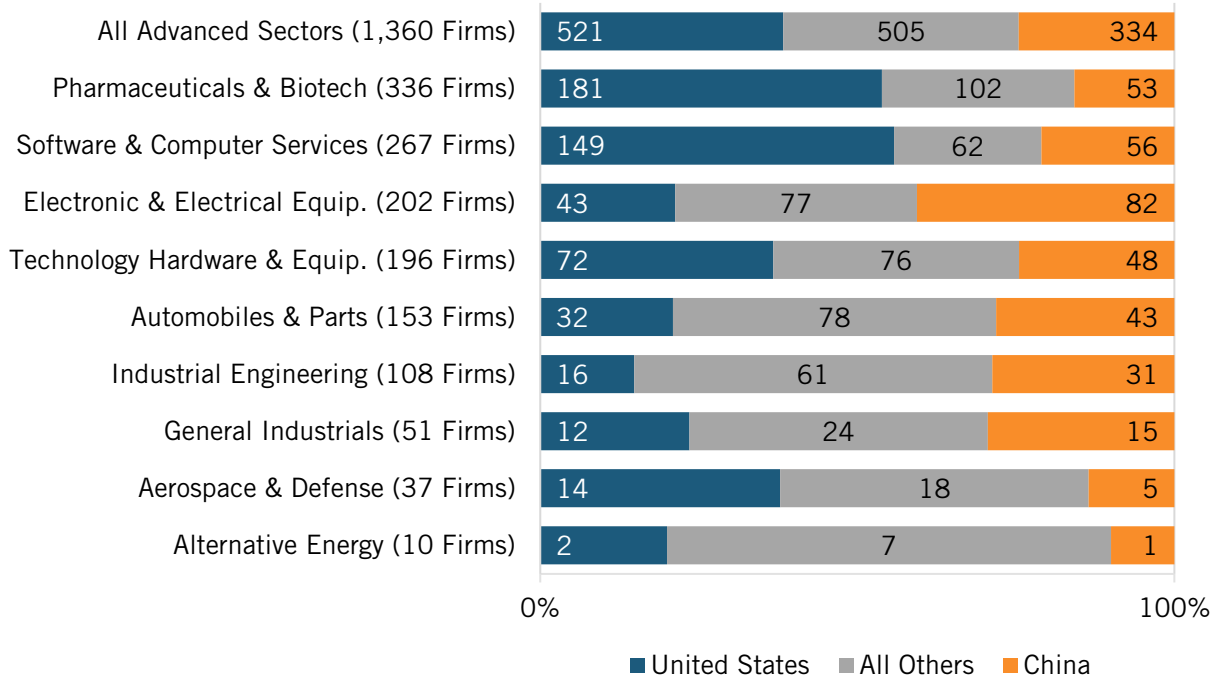
masks a sharp concentration of growth. U.S. firms expanded R&D investments by 150 percent over the period, while Chinese firms increased theirs by an extraordinary 537 percent. In contrast, firms in the rest of the world increased R&D investments by just 32 percent. These disparities indicate that global innovation capacity is increasingly consolidating around two dominant centers—the United States and China—leaving much of the rest of the world struggling to keep pace rather than shaping the technological frontier. This concentration is particularly concerning from a geopolitical perspective, as China is not a U.S. ally, raising risks of strategic vulnerability as the United States will have to turn to China for advanced technologies rather than to an ally.

In response, Washington needs to do a better job of incentivizing the private sector to expand R&D investment in the United States. This should include expanding programs that fund joint industry-university research, boosting the Alternative Simplified R&D Credit rate from 14 percent to at least 28 percent, and doubling the regular R&D tax credit from 20 to 40 percent. It's much easier to keep U.S. industries' global market shares through such policies than to lose them and later have to work much harder to win them back, often in vain.

ALL ADVANCED SECTORS

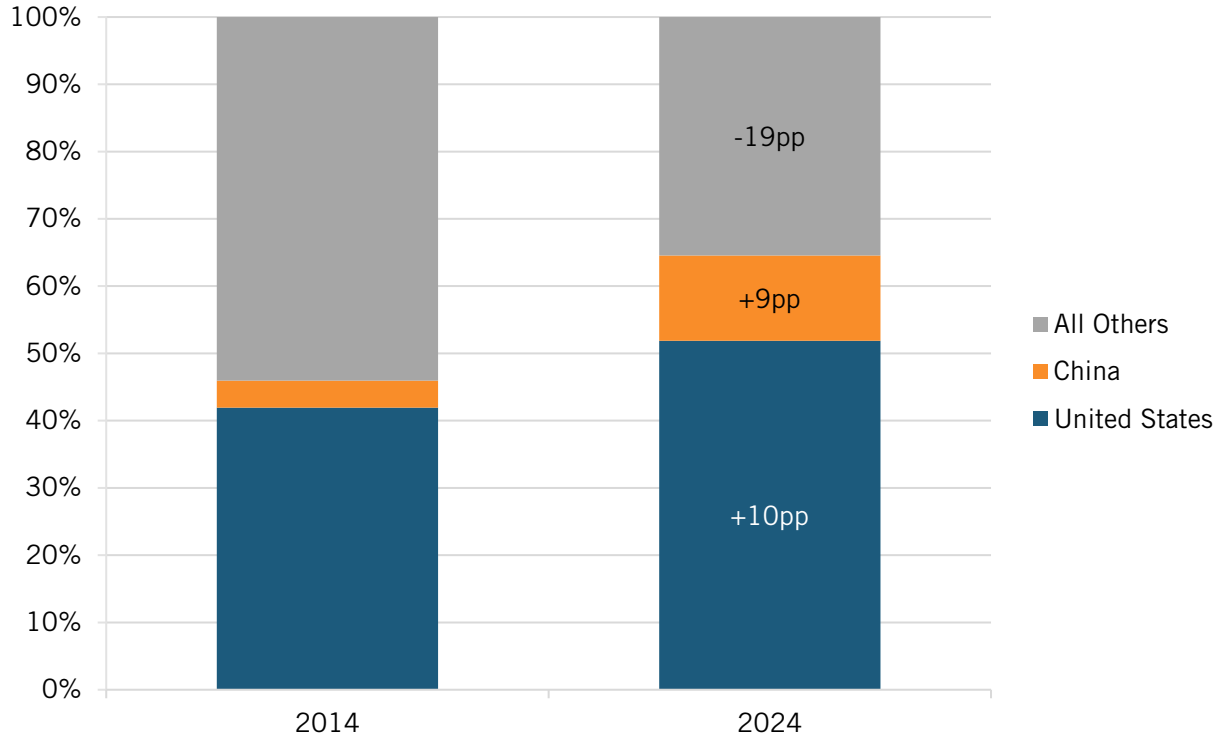
In 2024, the United States and China dominated business R&D investments, accounting for 63 percent of firms (521 U.S. firms, 334 Chinese, and 505 rest of world).[7] For the United States, pharmaceuticals and biotechnology led (181 firms), followed by software and computer services (149 firms) and then IT hardware.[8] China's top sector was in electronics and electrical equipment (82 firms) and software and computer services (56 firms).[9] (See figure 1.)

Figure 1: Number of U.S. and Chinese firms investing in R&D by industry, 2024 (global total in parentheses)



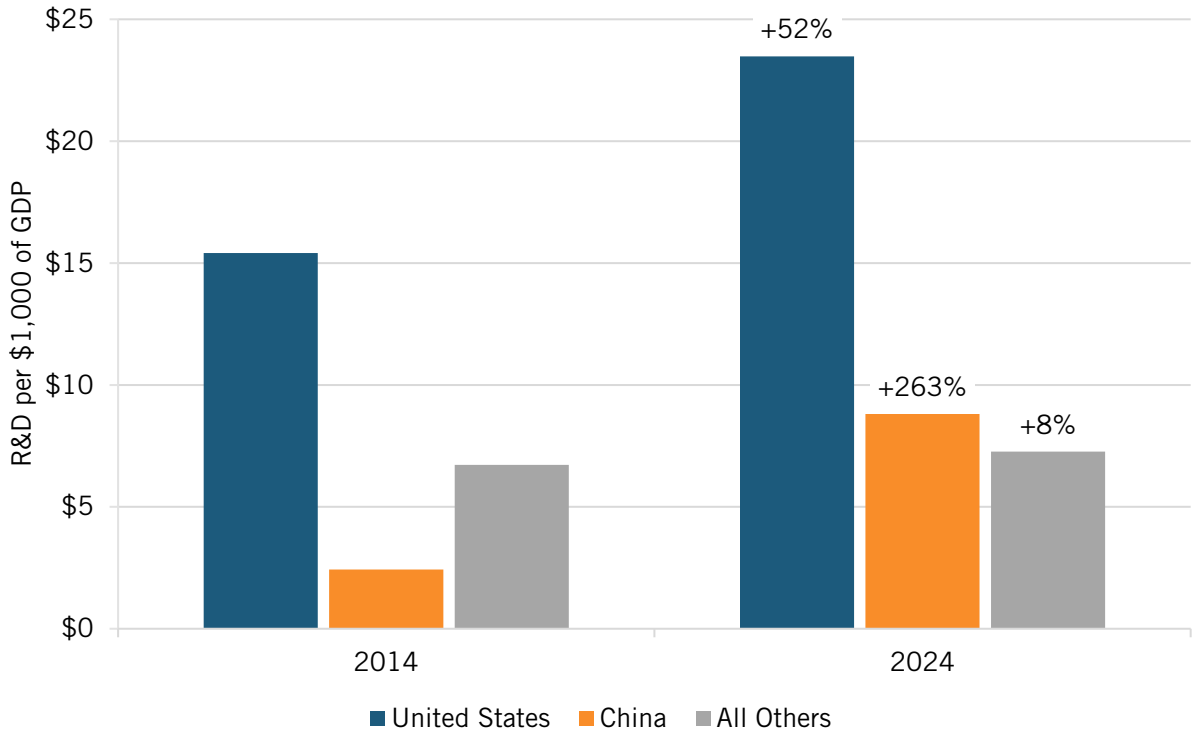
Despite U.S. firms investing more than Chinese firms in R&D, Chinese firms are catching up. From 2014 to 2024, U.S. firms' share of global R&D in advanced industries rose 10 percentage points from 42 percent to 52 percent—from $270 billion to $675 billion. In comparison, Chinese firms' rose almost as much as U.S. firms did at 9 percentage points from 4 to 13 percent—from $26 billion to $165 billion.[10] (See figure 2.)

Figure 2: 10-year change in U.S. and Chinese firms' global shares of R&D in advanced industries



When controlling for gross domestic product (GDP), U.S. firms invested $15.41 per $1,000 of GDP in 2014 and rose to $23.48 in 2024.[11] In comparison, Chinese firms' investment rose from $2.43 to $8.81 per $1,000 of GDP.[12] Interestingly, the rest of world largely stagnated, not increasing R&D as a share of their economies by much and falling in global share from 54 percent to 35 percent.[13] (See figure 3.)

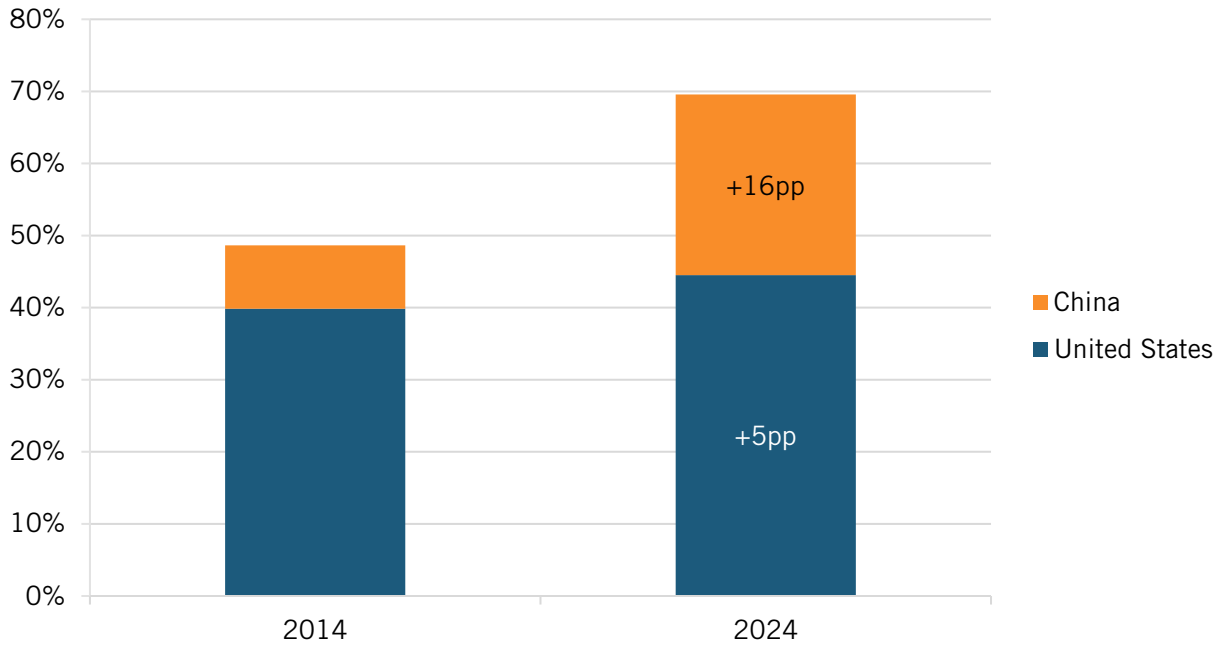
Figure 3: 10-year change in advanced industry R&D controlling for GDP



Because Chinese R&D is less expensive than U.S. R&D, Chinese firms' R&D is increasing and catching up to that of U.S. firms at a faster rate than suspected.

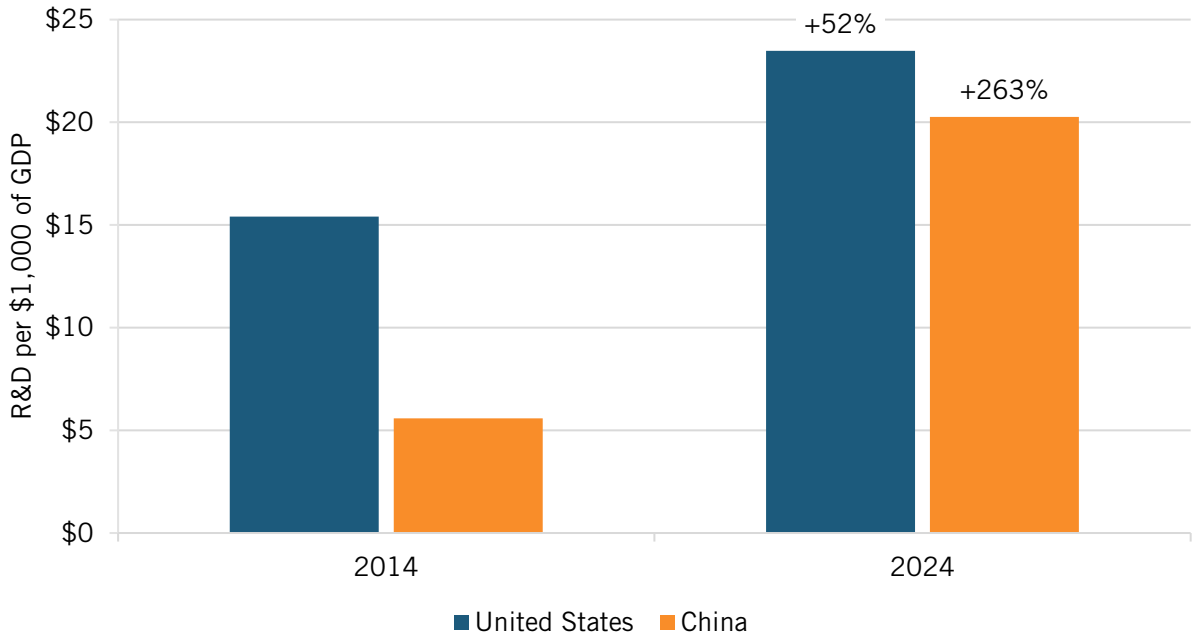
More concerningly, because Chinese R&D is less expensive than U.S. R&D, Chinese firms' R&D is increasing and catching up to that of U.S. firms at a faster rate than suspected. The Information Technology and Innovation Foundation (ITIF) has found that for every U.S. R&D worker supported by $100,000 of R&D spend, a Chinese firm spending $100,000 on R&D can throw 2.3 workers at the same problem.[14] Indeed, from 2014 to 2024, U.S. firms' share of the sectors' R&D investment rose only 5 percentage points from 40 to 45 percent while Chinese firms' rose 16 percentage points from 9 to 25 percent.[15] (See figure 4.) This is compared with the unadjusted figures wherein U.S. firms rose 10 percentage points and Chinese firms rose 9 percentage points.[16]

Figure 4: 10-year change in U.S. and Chinese firms' wage-adjusted shares of global R&D in advanced industries



When controlling for GDP, Chinese firms' investments are also quickly catching up to U.S. firms'. Indeed, while Chinese firms invested $5.59 per $1,000 of GDP in 2014, they had increased that amount to $20.26, just about $3 below U.S. investments of $23.48, by 2024.[17] (See figure 5.)

Figure 5: 10-year change in U.S. and Chinese firms' wage-adjusted R&D in advanced industries as a share of GDP



Despite investing more than Chinese firms, U.S. firms' R&D growth has relied heavily on two sectors: the pharmaceutical and biotechnology, and software and services sectors. Indeed, excluding these two sectors, U.S. firms' R&D investments rose from only $136 billion in 2014 to $220 billion in 2024, accounting for 33 to 34 percent of the sector.[18] (See figure 6.) When controlling for GDP, U.S. firms' R&D investments actually declined slightly from $7.78 to $7.66 per $1,000 of GDP, indicating that the biotechnology and software sector were key drivers of growth in R&D investments.[19] (See figure 7.) This is compared with the figures above wherein U.S. firms' R&D as a share of the sector and when controlling for GDP grew much more when these two sectors were included.

Despite investing more than Chinese firms, U.S. firms' R&D growth has relied heavily on two sectors: the pharmaceutical and biotechnology, and software and services sectors.

While the United States has relied on these two sectors, China has been less concentrated. When excluding these two sectors, Chinese firms' R&D grew substantially from $19.6 billion to $116 billion from 2014 to 2024, accounting for 5 percent at first before rising to 18 percent of the these sectors (figure 6).[20] More importantly, without these two sectors, Chinese firms' R&D investment rose from almost seven times less than U.S. firms to less than two times.[21] Moreover, when controlling for GDP, Chinese firms' R&D investment increased from $1.84 per $1,000 of GDP in 2014 to $6.21 in 2024 (figure 7).[22] The rest of the world's R&D investments grew from $252 billion to $306 billion during this period. When controlling for GDP, the rest of the world's R&D investment declined slightly from $4.85 to $4.82 per $1,000 of GDP.

Figure 6: 10-year change in U.S. and Chinese firms' global shares of R&D in advanced industries, excluding pharmaceuticals and biotech, and software and services

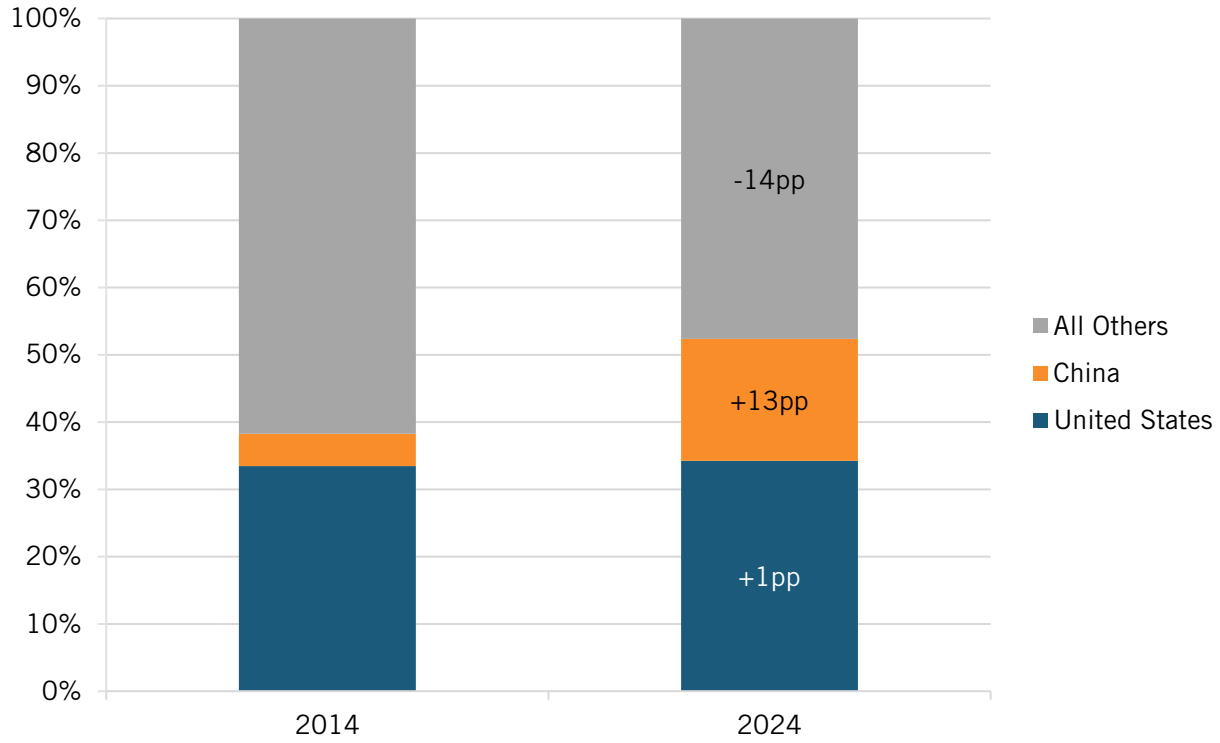
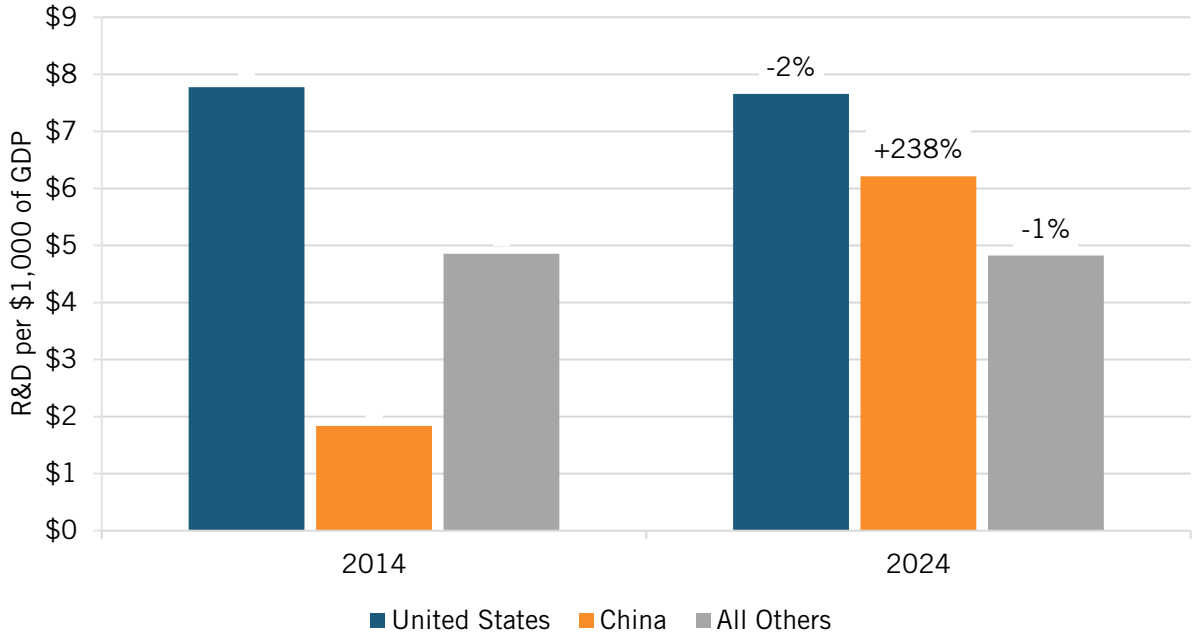
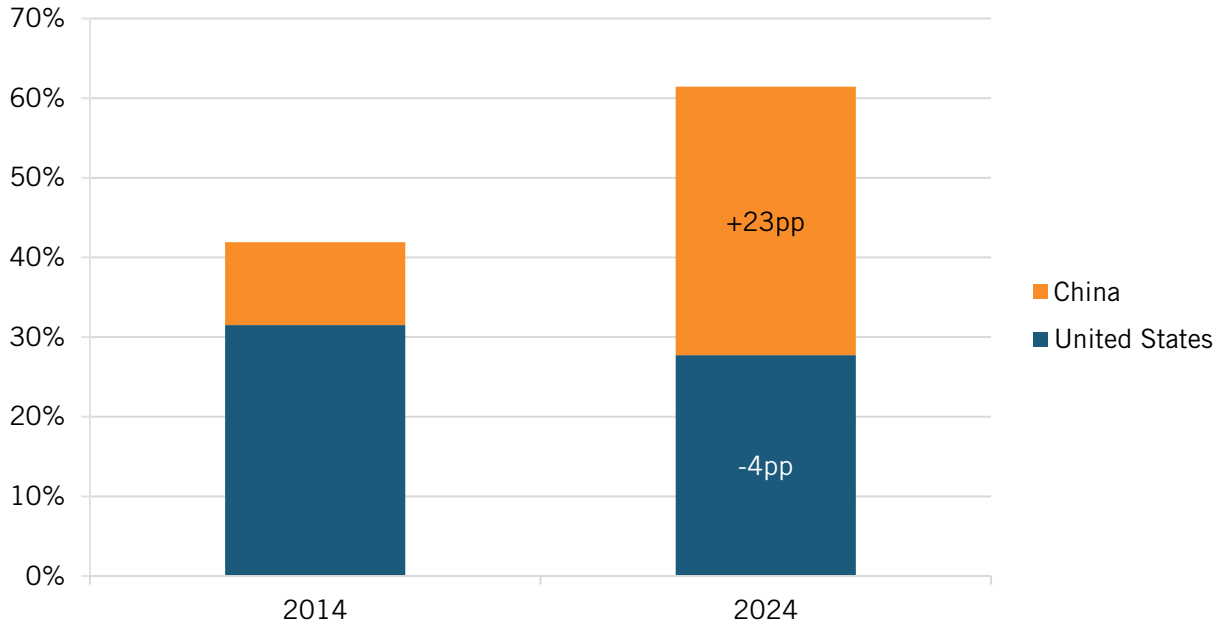


Figure 7: 10-year change in advanced industry R&D controlling for GDP, excluding pharmaceuticals and biotech, and software and services



Concerningly, when excluding the software and pharmaceutical sector and adjusting for wage differences, Chinese firms' R&D investments had surpassed U.S. firms by 2024. Indeed, from 2014 to 2024, U.S. firms' R&D investment as a share of sector R&D declined 4 percentage points, from 32 percent to 28 percent, while Chinese firms' rose from 10 percent to 34 percent. (See figure 8.) In raw values, U.S. firms' investment went from $136 billion to $220 billion while Chinese firms' went from $45 billion to $268 billion.

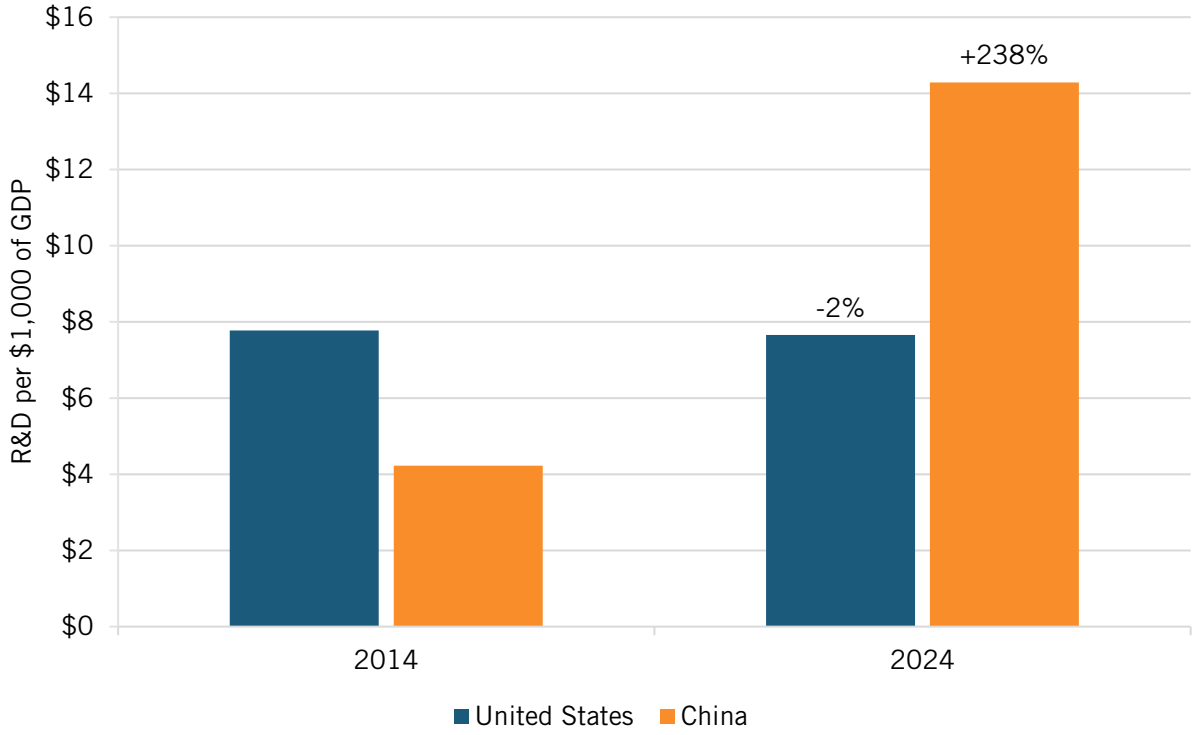
Figure 8: 10-year change in U.S. and Chinese firms' wage-adjusted shares of global R&D in advanced industries, excluding pharmaceuticals and biotech, and software and services



When controlling for GDP, U.S. firms invested $7.78 per $1,000 of GDP in 2014 but then reduced it to $7.66 per $1,000 of GDP by 2024. In comparison, Chinese firms invested $4.22 in 2014 and $14.29 by 2024, almost doubling U.S. firms' investment. (See figure 9.) Essentially, U.S. firms have fallen behind Chinese firms when key sectors are removed and wages are adjusted for.

U.S. firms' size-adjusted R&D investment was larger than Chinese firms' in 2024. The size-adjusted R&D investment compares U.S. and Chinese firms' R&D investment as a share of their respective country's GDP to the global average R&D investment as a share of the world's GDP. This results in an industry concentration ratio known as an LQ, which we express as a multiple. For example, if a country has twice the global average corporate R&D in a given sector, then its LQ in that sector is 2x. The LQ is important in this analysis because it compares the performance of firms in each country with the global average after adjusting for the size of each country's economy.

Figure 9: 10-year change in U.S. and Chinese firms' wage-adjusted R&D in advanced industries as a share of GDP, excluding pharmaceuticals and biotech, and software and services



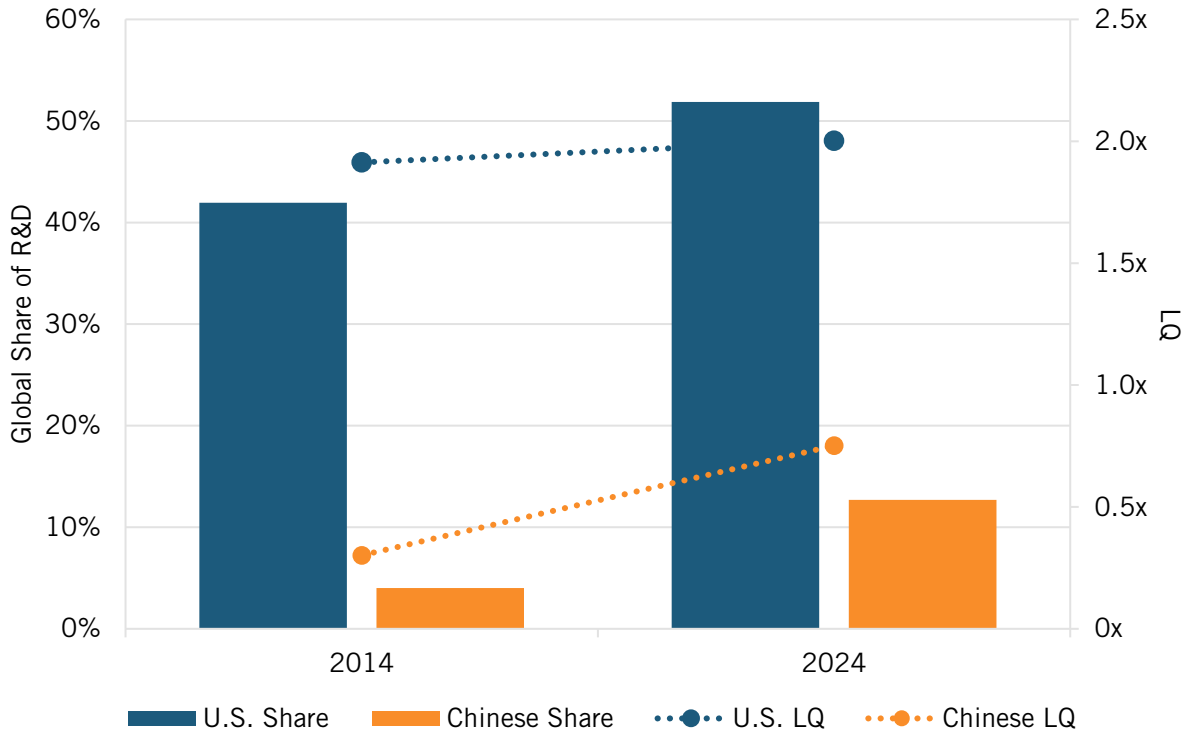
By that measure, U.S. firms' size-adjusted R&D investment was higher than China's in five of the nine sectors in 2024. These included software and computer services, technology hardware and equipment, pharmaceuticals and biotechnology, aerospace and defense, and alternative energy. However, in four sectors—general industrials, industrial engineering, automobiles and parts, and electronic and electrical equipment—U.S. firms were lower than Chinese firms in their size-adjusted R&D investment.

Moreover, Chinese firms are closing the size-adjusted R&D investment gap with U.S. firms in advanced sectors. In eight of nine sectors, U.S. firms' size-adjusted R&D investment have either

declined or remained stagnant while Chinese investment have risen since 2014. As a result, when controlling for GDP, U.S. firms' R&D investment rose from 90 percent to 100 percent more than the global average (1.9x to 2.0x).[23] In comparison, Chinese firms' rose from 70 percent below the global average (0.3x) to 25 percent below the global average (0.8x).[24] In addition, U.S. firms' have historically exceeded Chinese firms' R&D investments, but Chinese firms' investments are rapidly catching up. From 2014 to 2024, U.S. firms' R&D investments rose from 42 percent to 52 percent of the sector.[25] In comparison, Chinese firms' R&D investments rose from 4 percent to 13 percent of the sector.[26] (See figure 10.)

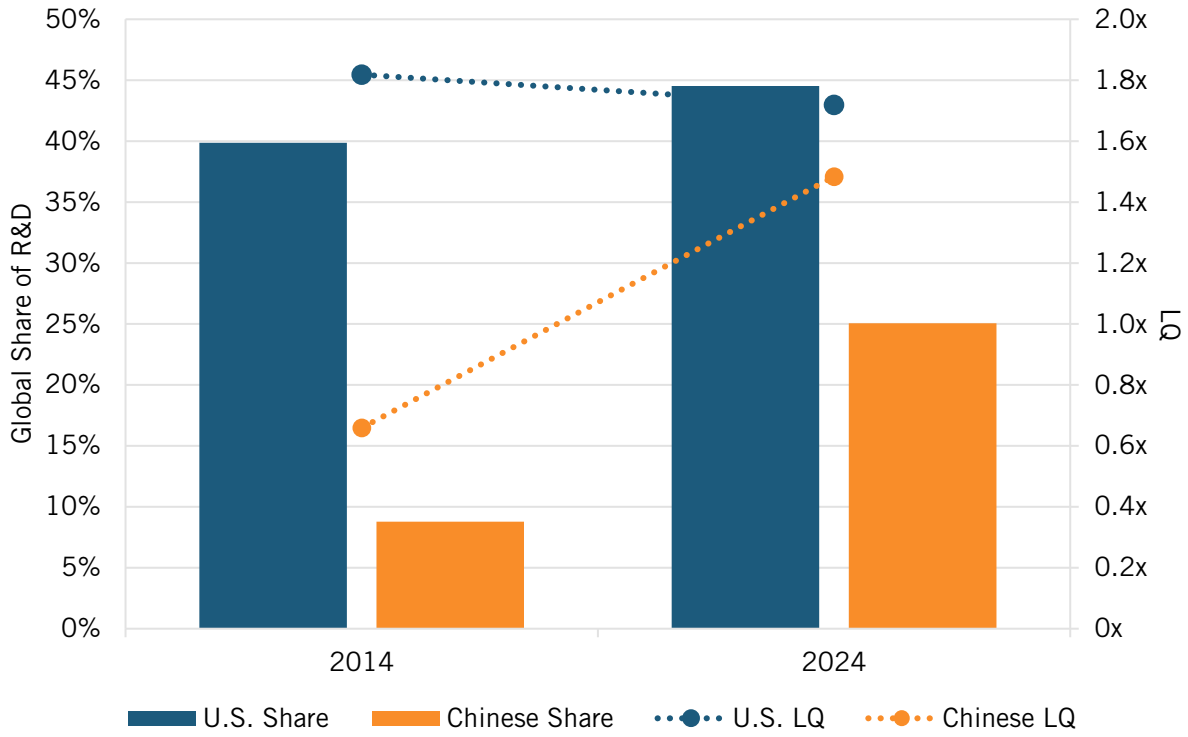
In eight of nine sectors, U.S. firms' size-adjusted R&D investment have either declined or remained stagnant while Chinese investment have risen since 2014.

Figure 10: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for all advanced sectors



When controlling for wages, Chinese firms really accounted for 9 percent of advanced sector R&D investments in 2014 and 25 percent in 2024 (rather than 4 percent in 2014 and 13 percent in 2024). More concerningly, Chinese firms' LQ rose from 0.7 to 1.5 from 2014 to 2024, while U.S. firms' LQ declined from 1.8 to 1.7. (See figure 11.) In other words, Chinese firms are not far from being on par with U.S. firms' size-adjusted R&D investment.

Figure 11: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for all advanced sectors with Chinese firms' R&D adjusted for wage

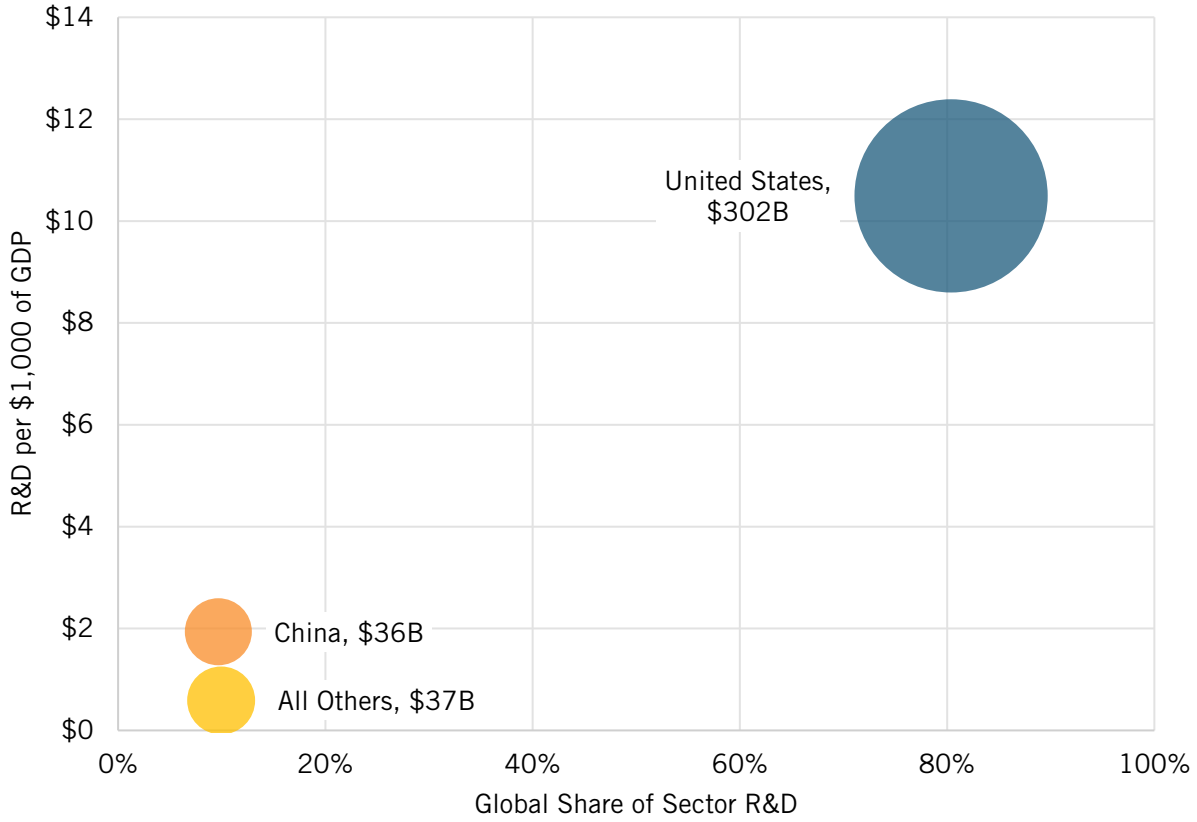


SOFTWARE AND COMPUTER SERVICES

The software and computer services sector includes companies that provide consulting or integration services to other businesses relating to information technology: computer-system designers, systems integrators, network and systems operations, cloud computing service providers, distributed ledger technology (DLT) consultants and integrators, data management and storage providers, and repair and technical support services.[27] The sector also includes publishers and distributors of computer software and companies that generate revenue from virtual products using digital platforms.[28]

U.S. firms dominate global R&D in this sector, investing $302 billion in R&D, making up 80 percent of the sector's global R&D investment. In comparison, Chinese firms invested $36.3 billion, making up 10 percent of the global R&D investment.[29] When controlling for GDP, U.S. firms invested about 5.4 times more than Chinese firms did.[30] For every $1,000 of GDP, U.S. firms invested $10.49, while Chinese firms invested only $1.94.[31] This is compared with the rest of the world's R&D share of 10 percent and investment of $0.59 for every $1,000.[32] (See figure 12.)

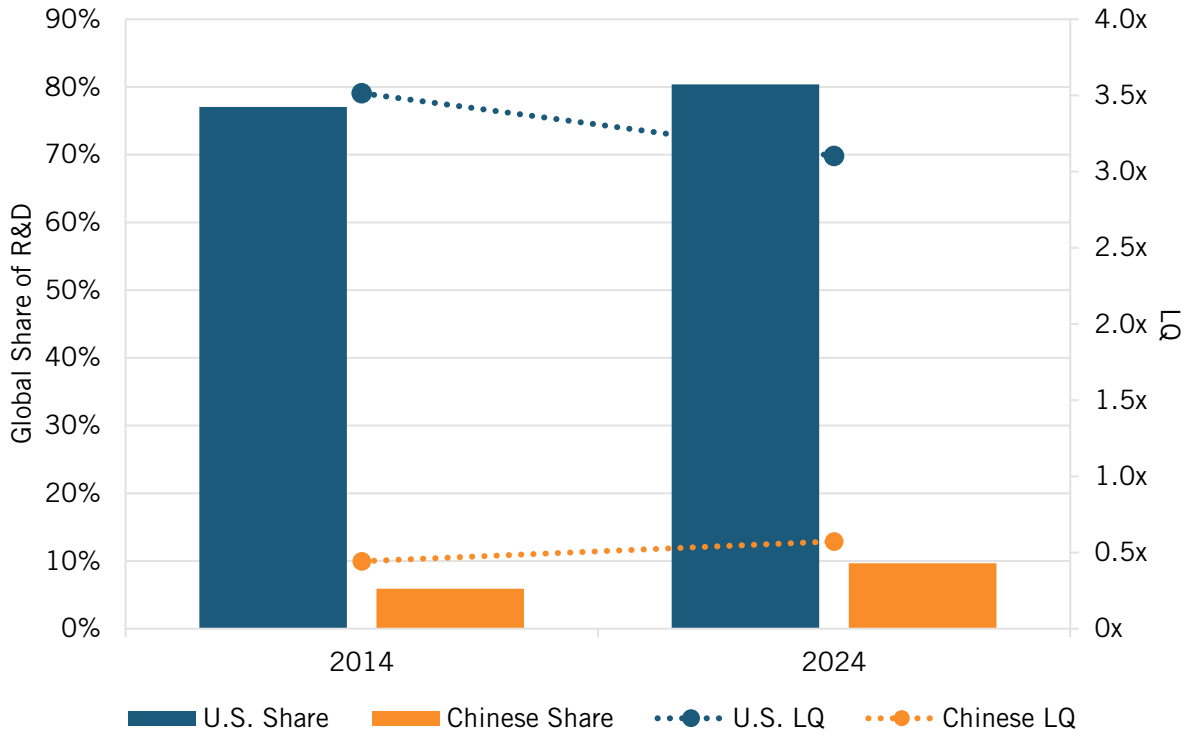
Figure 12: U.S. and Chinese firms' R&D investment in software and computer services, 2024



U.S. firms have consistently invested more than Chinese firms in R&D. In 2014, U.S. firms' R&D share of the global sector was 75 percent compared with Chinese firms' 6 percent.[33] And in 2024, U.S. firms' share grew to 80 percent but was still significantly higher than Chinese firms' 10 percent.[34] Although U.S. firms still invested considerably more than Chinese firms did, Chinese firms' R&D investments continue to grow. At the current pace of growth, Chinese firms should be investing more in R&D in this sector than is the rest of world combined minus the United States.

Despite U.S. firms dedicating more investments to R&D than did Chinese firms, U.S. firms' size-adjusted investments compared with the global sector's declined, while Chinese firms' was catching up. In 2014, U.S. firms' size-adjusted R&D investment was 350 percent of the average global (3.5x), while Chinese firms' was 44 percent (0.4x).[35] By 2024, U.S. firms' R&D investment had declined to 310 percent of the global average (3.1x), while Chinese firms' had risen to 60 percent (0.6x).[36] (See figure 13.)

Figure 13: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for software and computer services



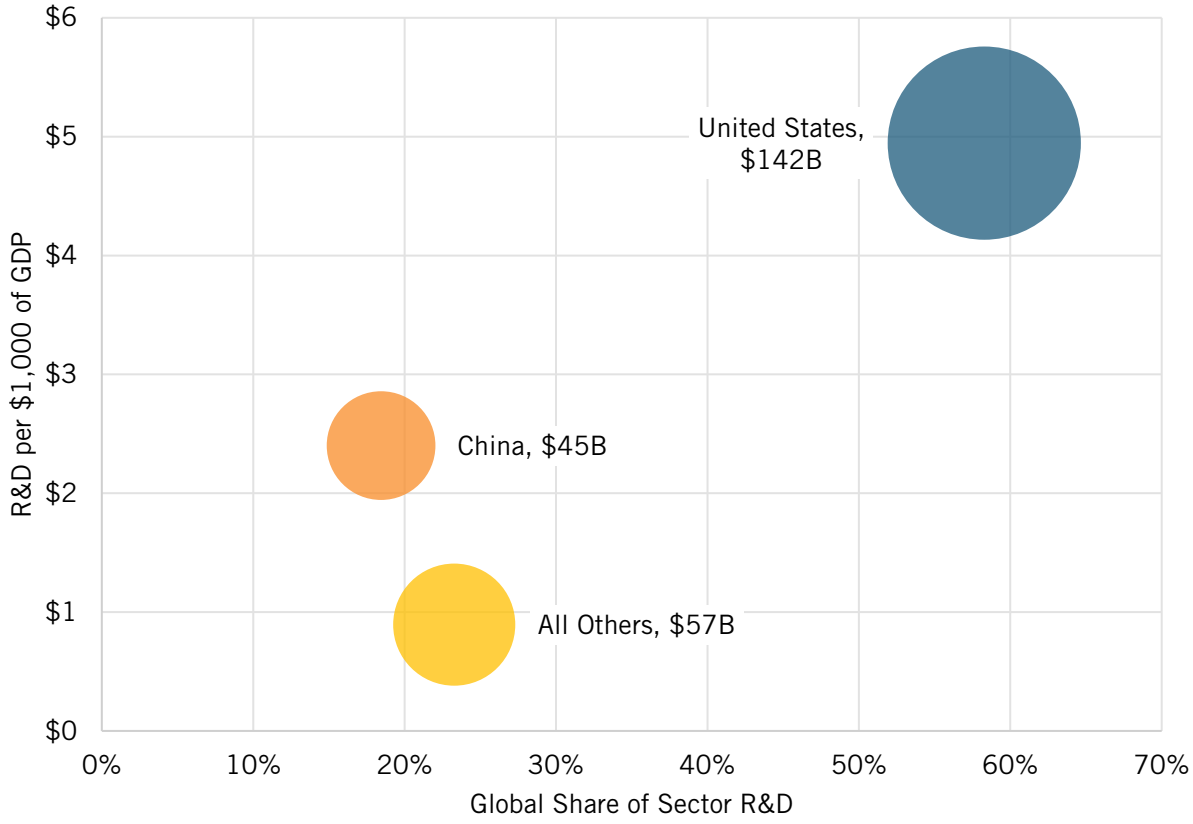
TECHNOLOGY HARDWARE AND EQUIPMENT

The technology and hardware equipment sector includes semiconductor and other chip producers and distributors; "companies involved in the application of high technology parts to finished products" (e.g., printed circuit boards); semiconductors, photonics, and wafers creation equipment manufacturers; computer, servers, and other computer hardware manufacturers and distributors; and electronic office equipment manufacturers and distributors.[37]

U.S. firms' R&D investment in the technology hardware and equipment sector also dominates. This is partly because U.S. semiconductor firms constitute over half the global semiconductor industry and invested nearly 20 percent of their revenue on R&D to develop the next generation of chips.[38]

In 2024, U.S. firms invested $142 billion in R&D, making up 58 percent of the sector's global R&D investment. In comparison, Chinese firms invested $45 billion, making up 18 percent of the global R&D investment.[39] When controlling for GDP, U.S. firms invested about 2.1 times more than Chinese firms.[40] For every $1,000 of GDP, U.S. firms invested $4.95, while Chinese firms invested only $2.40.[41] This is compared with the rest of the world's R&D share of 23 percent and investment of $0.89 for every $1,000.[42] (See figure 14.)

Figure 14: U.S. and Chinese firms' R&D investments in technology hardware and equipment, 2024

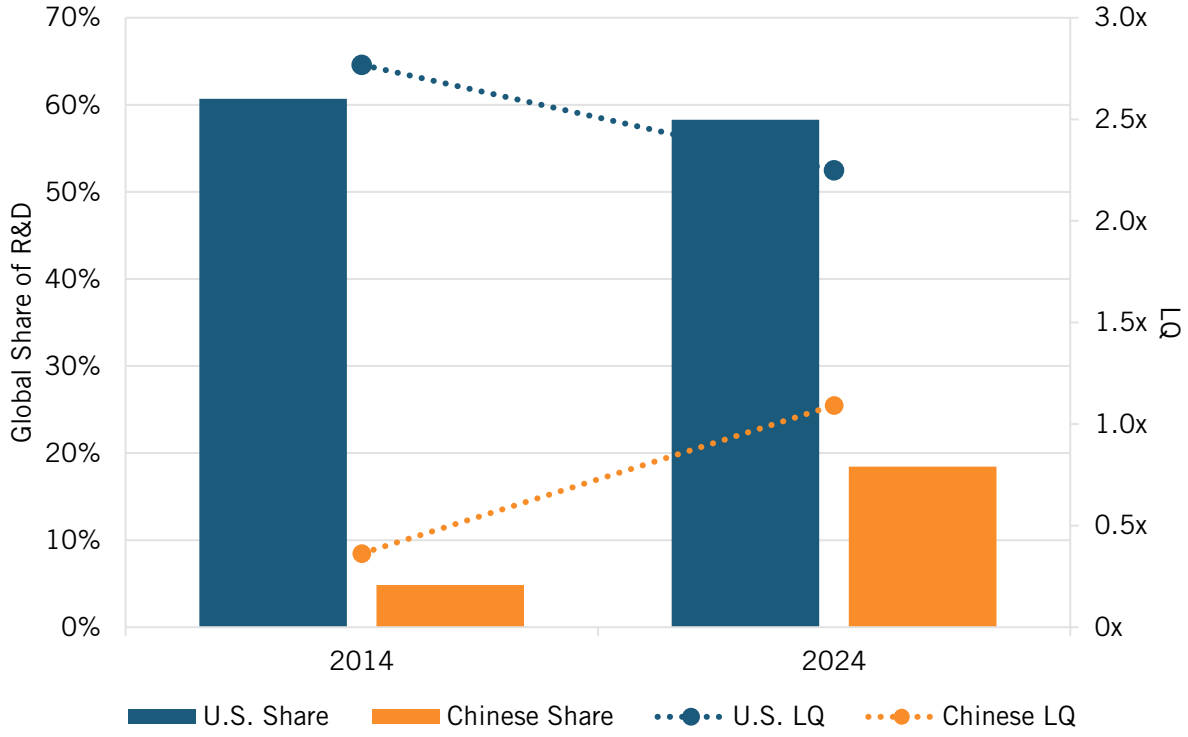


Despite U.S. firms consistently investing more than Chinese firms do in R&D, its share of the sector is declining compared with Chinese firms. In 2014, U.S. firms' R&D share of the global

sector was 61 percent compared with Chinese firms' 5 percent.[43] And in 2024, U.S. firms' share had declined to 58 percent. Meanwhile, Chinese firms' had grown to 18 percent.[44]

More concerningly, in the last decade, U.S. firms' size-adjusted investment compared with the global sector's declined, while Chinese firms' grew. In 2014, U.S. firms' size-adjusted R&D investment was 277 percent of the average global (2.7x), while Chinese firms' was 36 percent (0.4x).[45] By 2024, U.S. firms' R&D investment had declined to 225 percent of the global average (2.3x), while Chinese firms' rose to nearly 110 percent above average (1.1x).[46] (See figure 15.)

Figure 15: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for technology hardware and equipment



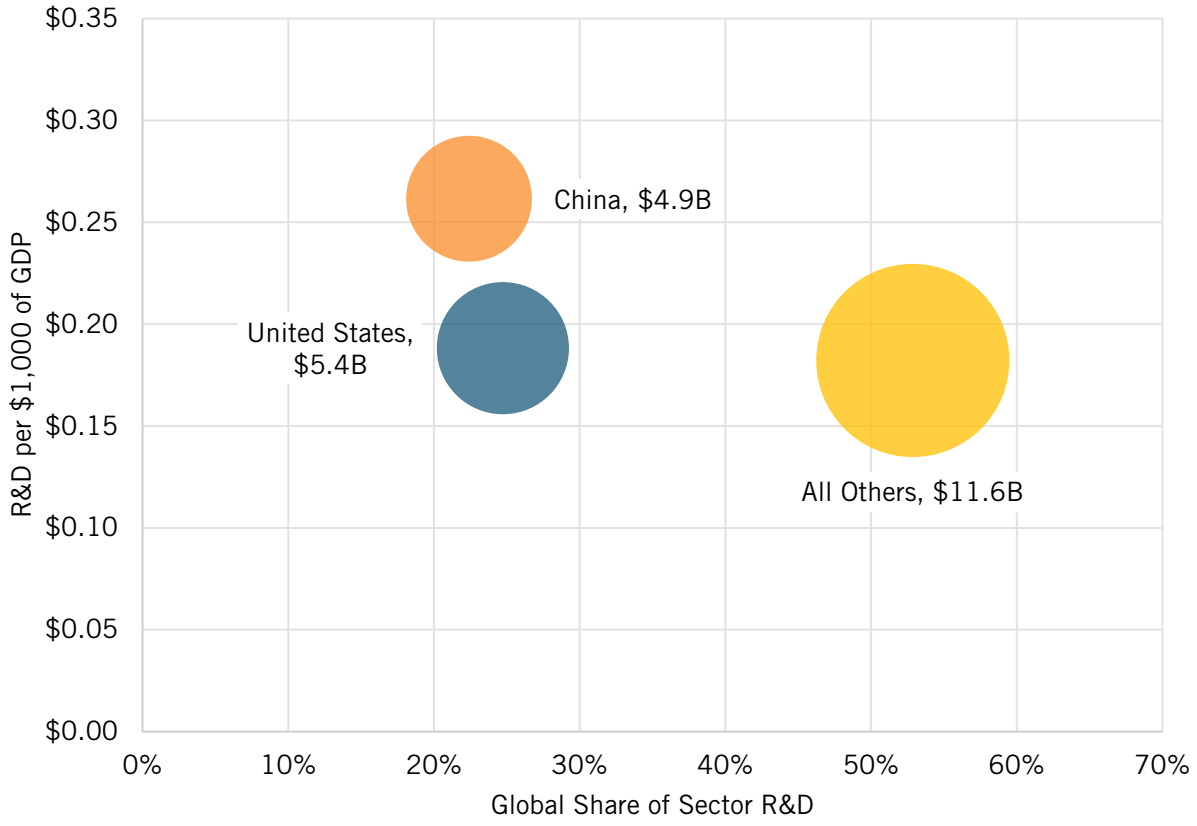
In the last decade, U.S. firms' size-adjusted investment compared with the global sector's declined, while Chinese firms' grew.

GENERAL INDUSTRIALS

The general industrials sector includes companies "engaged in three or more industrial business activities, none of which is the dominant business line."[47] Moreover, the sector also includes companies that manufacture, distribute, or produce paint, material coatings, resin, plastic products, chemicals used in plastic, structural glass and other glass products, and packaging products.[48]

U.S. firms have invested only slightly more than Chinese firms have in overall R&D but less than Chinese firms when accounting for GDP. In 2024, U.S. firms invested $5.4 billion in R&D, making up 25 percent of the sector's global R&D investments. In comparison, Chinese firms invested $4.9 billion, making up 22 percent of the global R&D investments.[49] However, when controlling for GDP, U.S. firms invested about 28 percent less than Chinese firms did.[50] For every $1,000 of GDP, U.S. firms invested $0.19, while Chinese firms invested only $0.26.[51] This is compared with the rest of the world's R&D share of 53 percent and investment of $0.18 for every $1,000.[52] (See figure 16.)

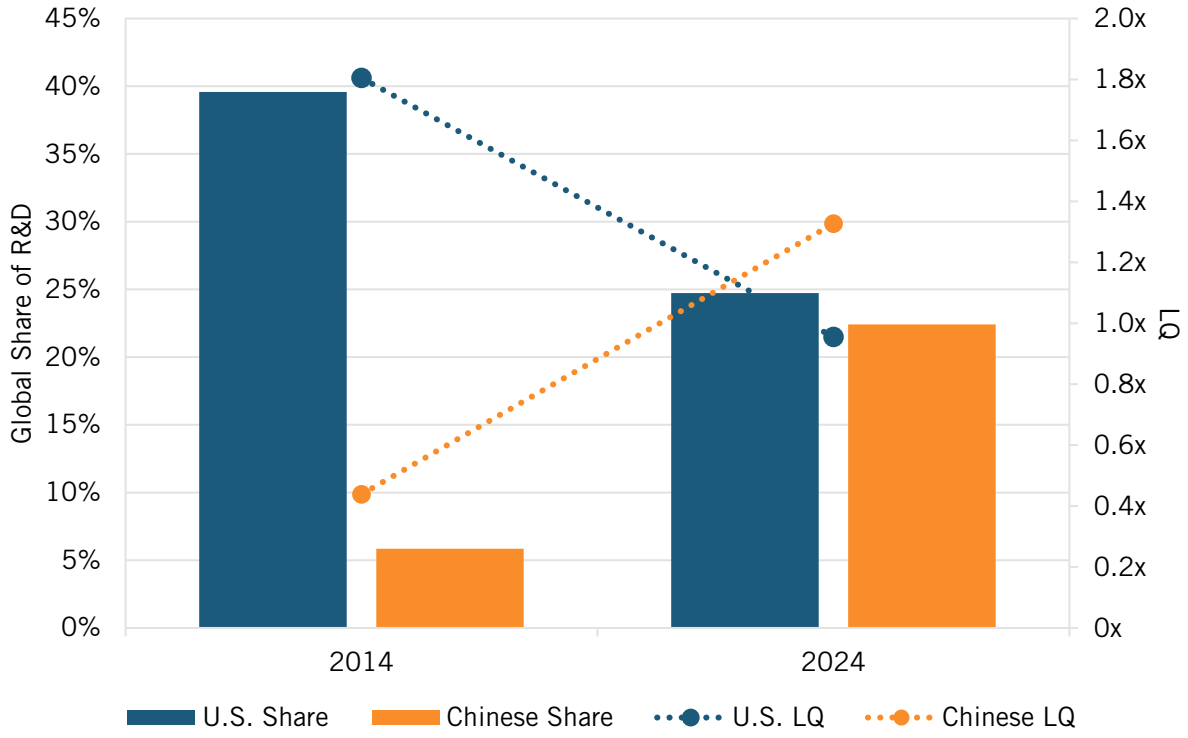
Figure 16: U.S. and Chinese firms' R&D investments in general industrials, 2024



U.S. firms have consistently invested more than Chinese firms have in R&D but their share of the sector has been declining while Chinese firms' has been rising. In 2014, U.S. firms' R&D share of the global sector was 40 percent compared with Chinese firms' 6 percent.[53] Yet, by 2024, U.S. firms' share had declined to 25 percent while Chinese firms' had grown to 22 percent, almost catching up to U.S. firms' 25 percent.[54]

More concerningly, in the last decade, U.S. firms' size-adjusted R&D investment fell from above the global average to below while Chinese firms' rose from below to above the global average, surpassing U.S. firms. Indeed, in 2014, U.S. firms' size-adjusted R&D investment was 181 percent of the average global (1.8x), while Chinese firms' was 44 percent (0.4x).[55] By 2024, U.S. firms' R&D investment had decreased to 95 percent of the global average (1.0x), while Chinese firms' had risen to 133 percent (1.3x).[56] (See figure 17.)

Figure 17: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for general industrials



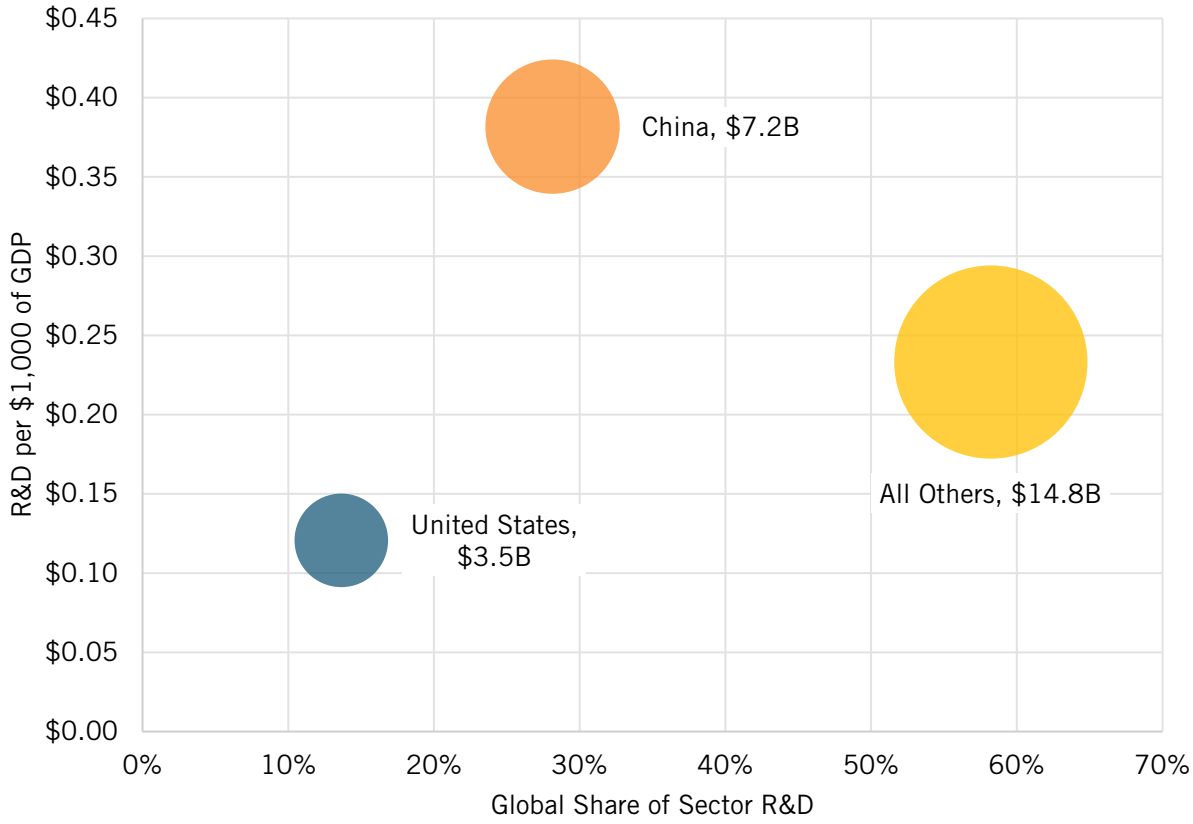
In the last decade, U.S. firms' size-adjusted R&D investment fell from above the global average to below while Chinese firms' rose from below to above the global average, surpassing U.S. firms.

INDUSTRIAL ENGINEERING

The industrial engineering sector includes "companies that design, develop, manufacture, sell, and support general industrial machines and parts;" manufacture farming equipment; manufacture large construction and port industrial equipment; manufacture and distribute energy output devices (e.g., diesel engines); manufacture equipment for heavy industries; and manufacture and market specific types or groups of industrial machines and parts.[57] The R&D invested in this sector is particularly important to a nation's competitiveness, as it goes to producing more efficient and innovative machinery for manufacturing. As ITIF has highlighted previously, machine tools production plays an essential role in a nation's manufacturing capabilities and efficiency because manufacturing industries require machine tools for efficient production, especially when it comes to durable goods.[58]

Despite the importance of this sector, U.S. firms have invested less than Chinese firms in R&D. In 2024, U.S. firms invested $3.5 billion in R&D, making up just 14 percent of the sector's global R&D investments. In comparison, Chinese firms invested $7.2 billion, making up 28 percent of the global R&D investments.[59] When controlling for GDP, U.S. firms also invested about 68 percent less than Chinese firms did.[60] For every $1,000 of GDP, U.S. firms invested $0.12, while Chinese firms invested only $0.38.[61] This is compared with the rest of the world's R&D share of 58 percent and investment of $0.23 for every $1,000.[62] (See figure 18.)

Figure 18: U.S. and Chinese firms' R&D investment in industrial engineering, 2024



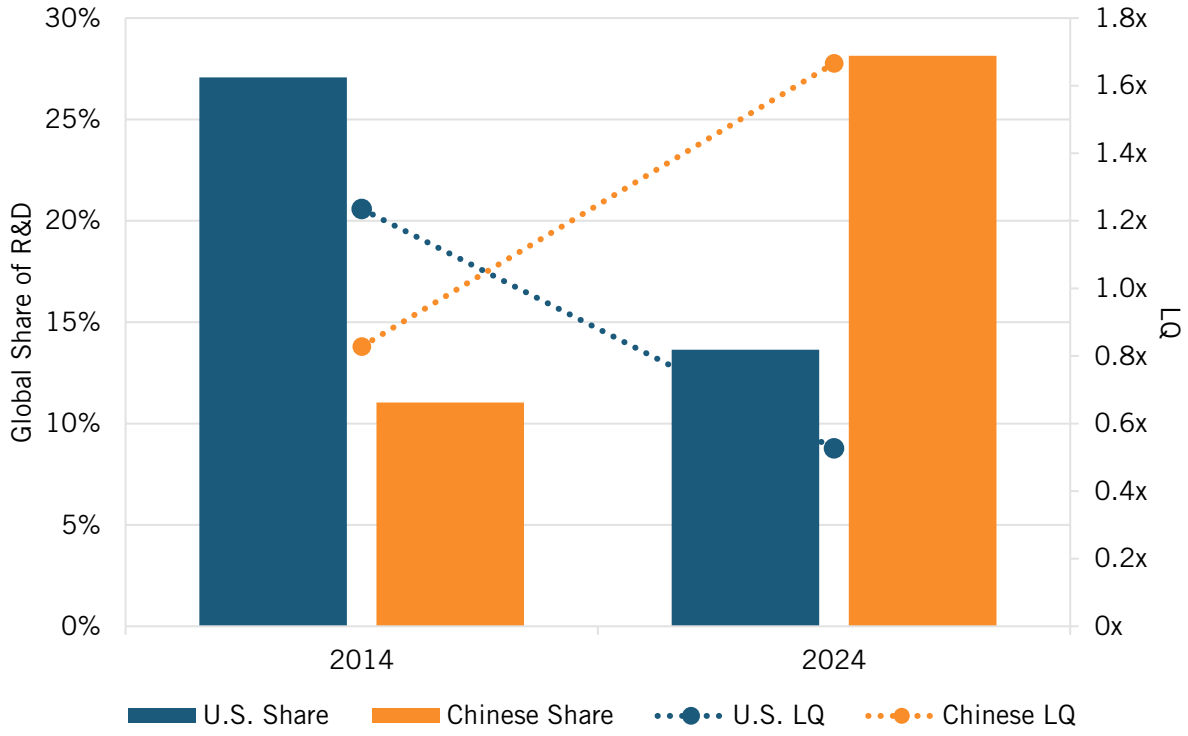
Partly due to this low investment, the United States has not regained its lost market shares in the machine tool industry, leading U.S. machine tool production LQ to be 70 percent below the

global average in 2022.[63] In comparison, Chinese machine tool production LQ is 80 percent above the global average.[64]

U.S. firms used to invest more than Chinese firms would, but Chinese firms have now surpassed U.S. firms' investments. In 2014, U.S. firms' R&D share of the global sector was 27 percent compared with Chinese firms' 11 percent.[65] Yet, by 2024, U.S. firms' share had declined to 14 percent while Chinese firms' share had risen to 28 percent.[66]

Moreover, U.S. firms' size-adjusted R&D investment have also declined from above to below the global average while Chinese firms' have increased from below to above the global average. In 2014, U.S. firms' size-adjusted R&D investment was 124 percent of the average global (1.2x), while Chinese firms' was 83 percent (0.8x).[67] By 2024, U.S. firms' R&D investments had decreased to 53 percent of the global average (0.5x), while Chinese firms' had risen to 167 percent (1.7x).[68] (See figure 19.)

Figure 19: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for industrial engineering



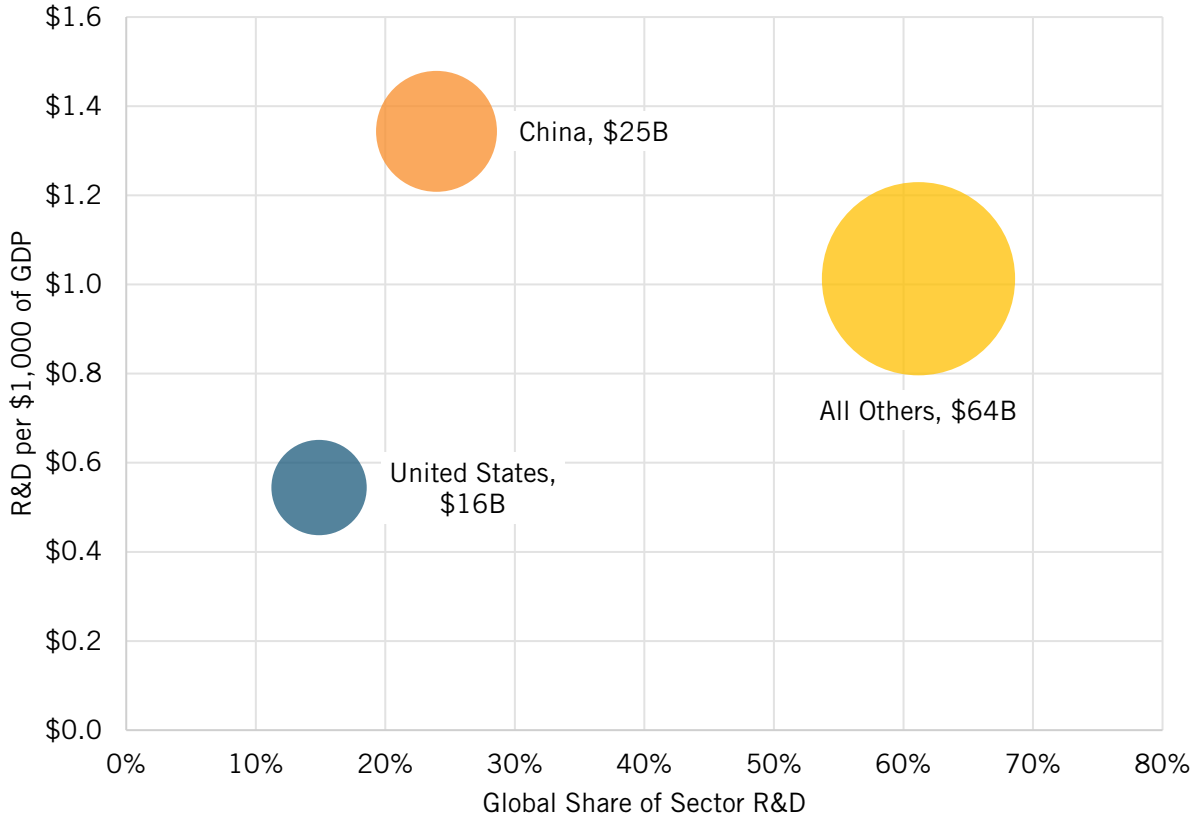
U.S. firms used to invest more in industrial engineering than Chinese firms would, but Chinese firms have now surpassed U.S. firms' investments.

ELECTRONICS AND ELECTRICAL EQUIPMENT

The electronic and electrical equipment sector includes makers and distributors of electrical parts for radios, including cables and transistors, and other consumer electronics.[69] The sector also includes companies providing mechanical and electronic security; filtration systems; products used in the measurement of electric, gas, and water; pollution control equipment; and electrical devices and components marked to businesses.[70]

Chinese firms have invested more than U.S. firms have in R&D. In 2024, U.S. firms invested $15.7 billion in R&D, making up 15 percent of the sector's global R&D investments. In comparison, Chinese firms invested $25 billion, making up 24 percent of the global R&D investments.[71] When controlling for GDP, U.S. firms also invested about 60 percent less than Chinese firms did.[72] For every $1,000 of GDP, U.S. firms invested $0.54 while Chinese firms invested only $1.34.[73] This is compared with the rest of the world's R&D share of 61 percent and investment of $1.01 for every $1,000.[74] (See figure 20.)

Figure 20: U.S. and Chinese firms' R&D investment in electronic and electrical equipment, 2024

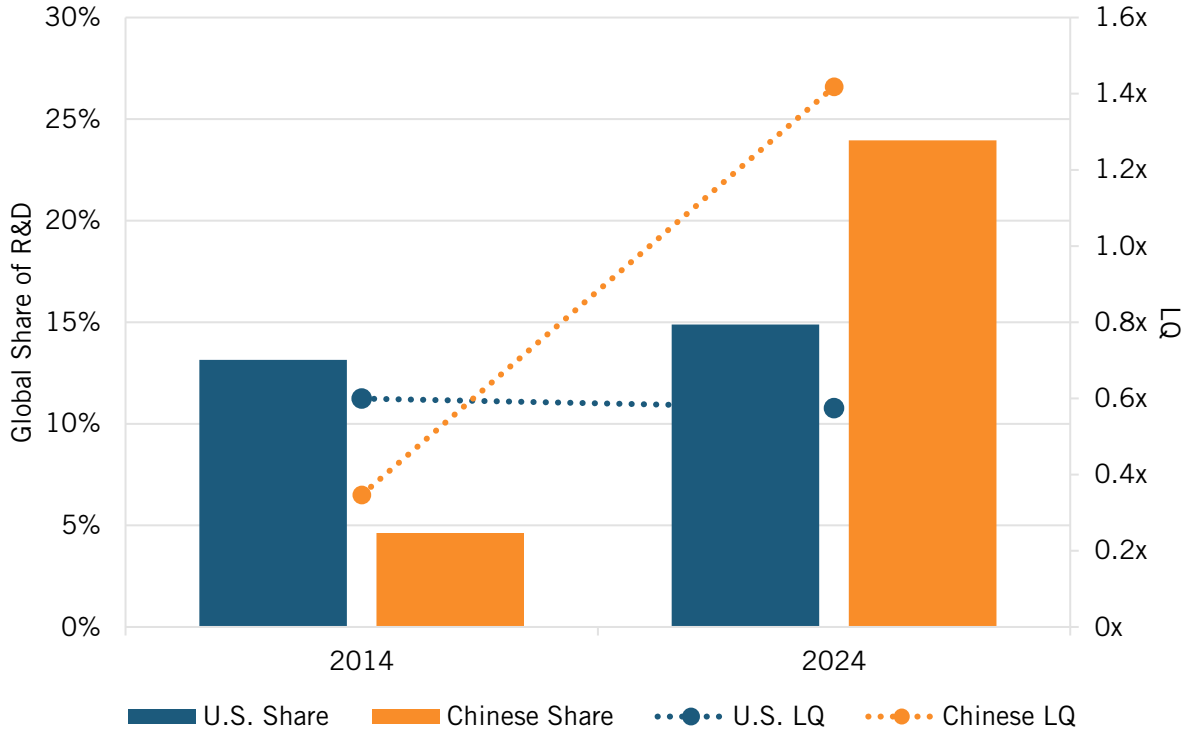


In the past, U.S. firms invested more than Chinese firms did, but Chinese firms' investment has now caught up and surpassed U.S. firms'. In 2014, U.S. firms' R&D share of the global sector was 13 percent compared with Chinese firms' 5 percent.[75] By 2024, U.S. firms' share had risen slightly to 15 percent but Chinese firms' share had surpassed that, rising to 24 percent.[76]

More concerningly, U.S. firms' size-adjusted R&D investment remains below the global average while Chinese firms' have risen to above the global average. In 2014, U.S. firms' size-adjusted

R&D investment was 60 percent of the average global (0.6x), while Chinese firms' was 35 percent (0.4x).[77] By 2024, U.S. firms' R&D investment had remained about the same at 57 percent of the global average (0.6x), while Chinese firms' had risen to 142 percent (1.4x).[78] (See figure 21.)

Figure 21: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for electronic and electrical equipment



In the past, U.S. firms invested more than Chinese firms in electronic and electrical equipment, but Chinese firms' investment has now caught up and surpassed U.S. firms'.

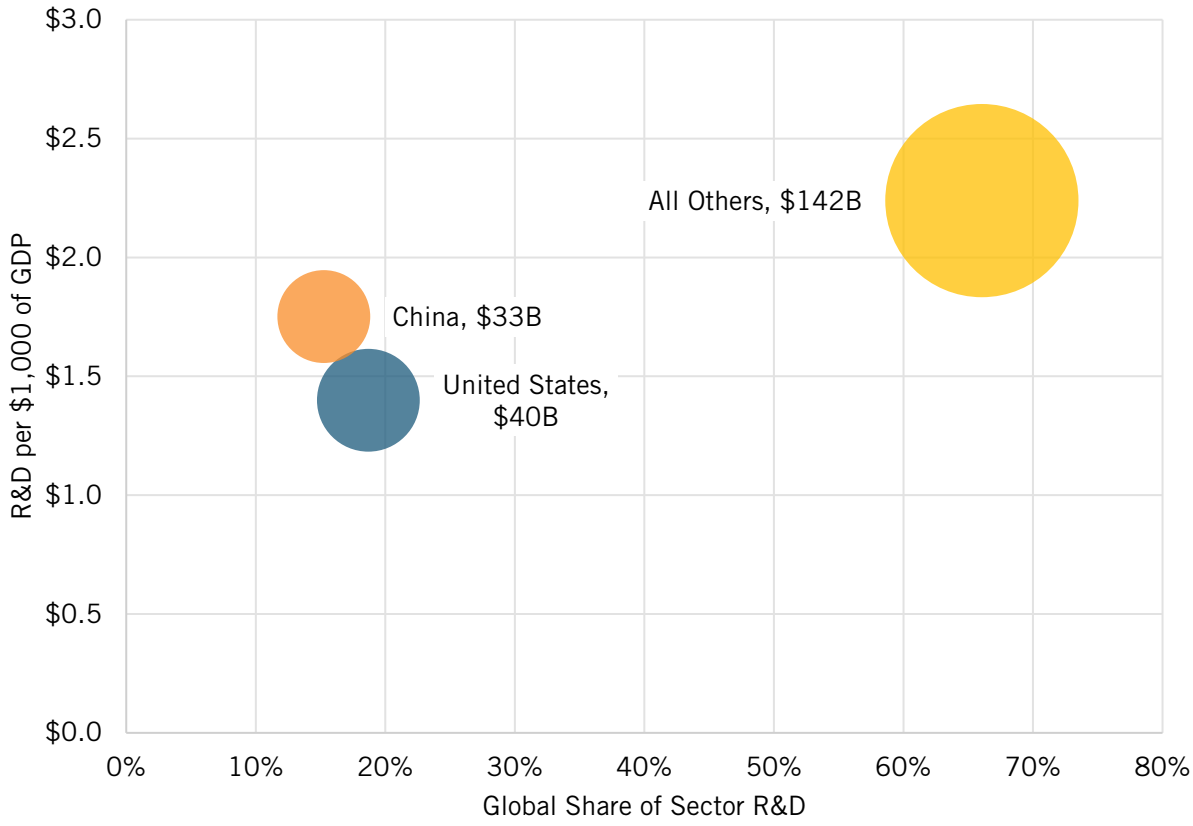
AUTOMOBILES AND PARTS

The automobiles and parts sector includes manufacturers and distributors of automobile, truck, and motorcycle tires; makers of cars, SUVs, and light trucks; and manufacturers and distributors of parts, such as engines, for motorcycles and other automobiles. The sector also includes "companies that provide assistance to individual vehicle owners."[79]

U.S. firms have invested slightly more than Chinese firms in R&D but when controlling for GDP, U.S. firms have invested less. In 2024, U.S. firms invested $40 billion in R&D, making up 19 percent of the sector's global R&D investments. In comparison, Chinese firms invested $33 billion, making up 15 percent of the global R&D investments.[80] However, when controlling for GDP, U.S. firms invested about 20 percent less than Chinese firms did.[81] For every $1,000 of GDP, U.S. firms invested $1.40, while Chinese firms invested $1.75.[82] This is compared with the rest of the world's R&D share of 66 percent and investment of $2.24 for every $1,000.[83] (See figure 22.)

Although the United States still retains advantages over China in the traditional auto industry, that lead is narrowing, especially in the area of electric vehicles (EVs). Indeed, ITIF research as found that Chinese automakers already account for 21 percent of global passenger vehicle production, a share projected to rise to 33 percent by 2030.[84] Moreover, as of 2022, Chinese automakers accounted for 62 percent of the world's EV production.[85] More concerningly, the report finds that "collectively, Chinese EV and EV battery enterprises have at least equaled—and in some cases surpassed—their Western peers in innovation capacity and product quality."[86]

Figure 22: U.S. and Chinese firms' R&D investments in automobiles and parts, 2024

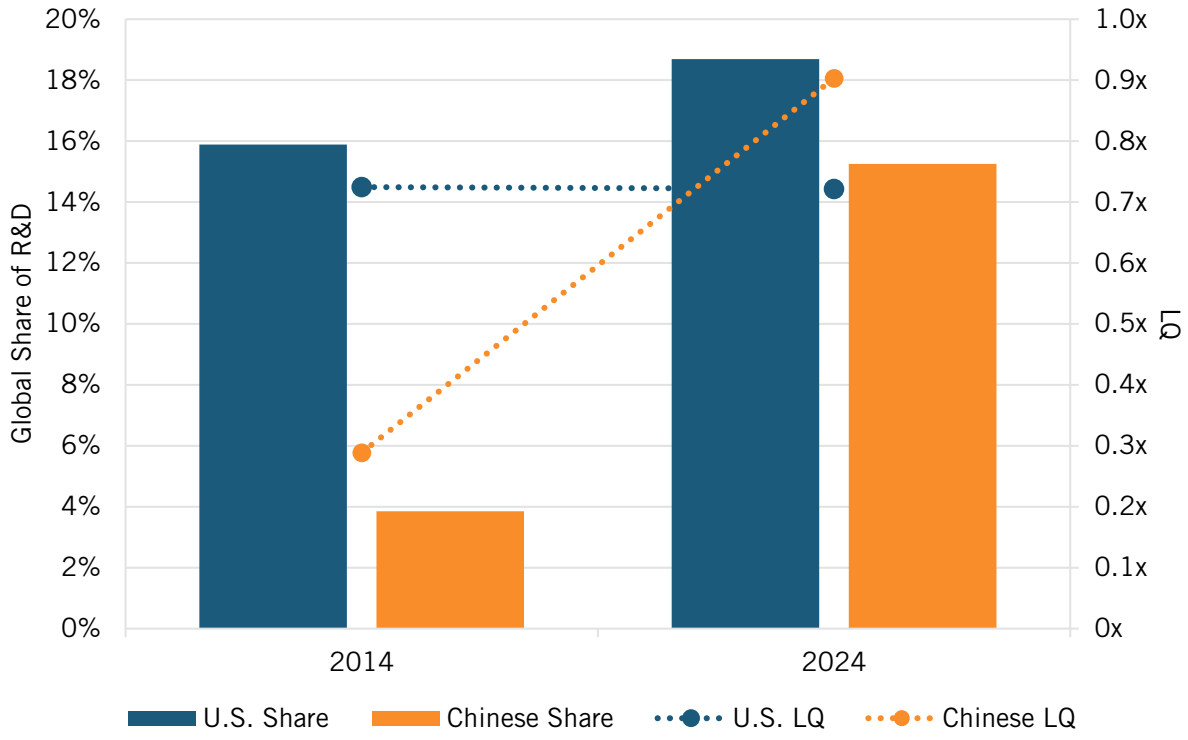


U.S. firms have historically invested more than Chinese firms have, but Chinese firms are quickly catching up. In 2014, U.S. firms' R&D share of the global sector was 16 percent compared with Chinese firms' 4 percent.[87] By 2024, U.S. firms' share had risen slightly to 19 percent while Chinese firms' share had risen to 15 percent and only 4 percent behind U.S. firms.[88]

Although the United States still retains advantages over China in the traditional auto industry, that lead is narrowing, especially in the area of electric vehicles (EVs).

In the last decade, U.S. firms' size-adjusted R&D investment has remained relatively the same while Chinese firms' has risen and surpassed U.S. firms. In 2014, U.S. firms' size-adjusted R&D investment was 72 percent of the average global (0.7x), while Chinese firms' was 29 percent (0.3x).[89] By 2024, U.S. firms' R&D investments had remained the same at 72 percent of the global average (0.7x), while Chinese firms' rose to 90 percent (0.9x).[90] (See figure 23.)

Figure 23: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for automobiles and parts

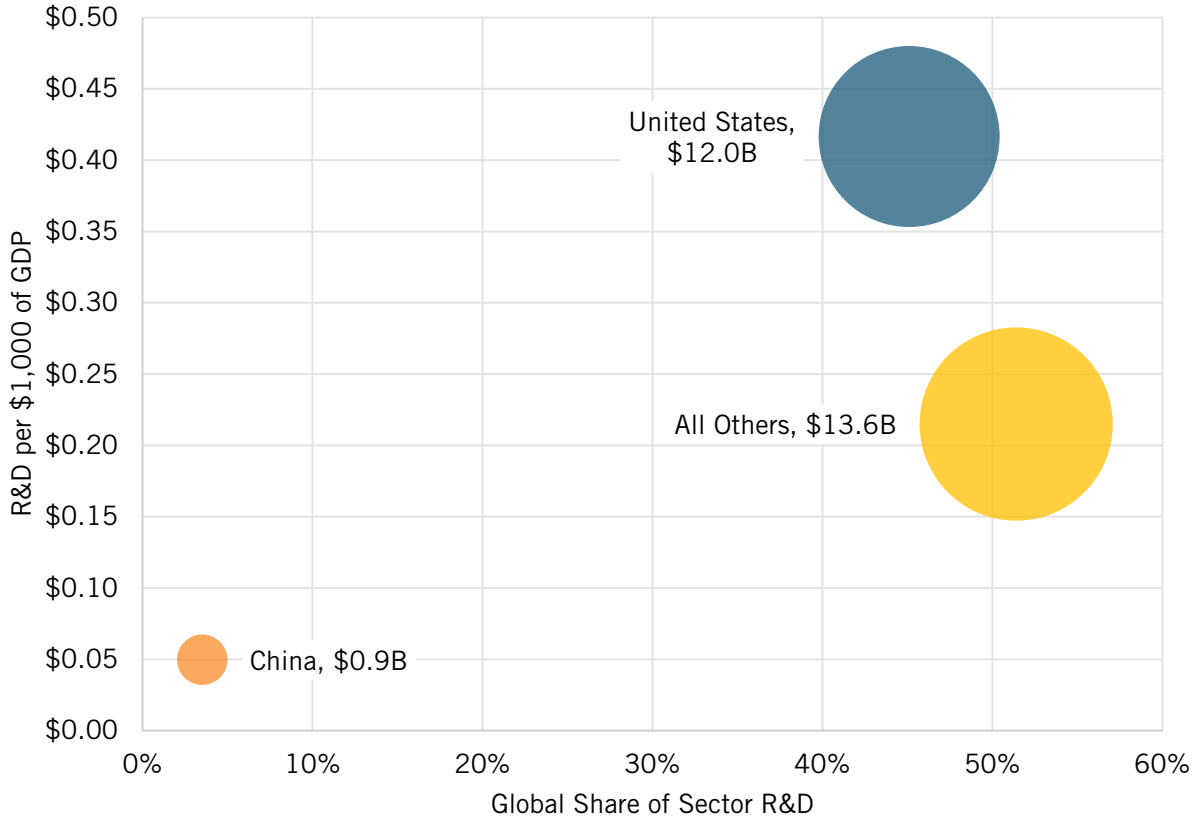


AEROSPACE AND DEFENSE

The aerospace and defense sector includes manufacturers, assemblers, and distributors of aircraft parts, aircrafts, and communication satellites used in both commercial and private air transport.[91] The sector also includes producers of military aircraft, radar equipment, and weapons used in the defense industry.[92]

U.S. firms' R&D investment dominates, especially when compared with Chinese firms' investments. In 2024, U.S. firms invested $12 billion in R&D, making up 45 percent of the sector's global R&D investment. In comparison, Chinese firms invested $933 million, making up 4 percent of the global R&D investment.[93] When controlling for GDP, U.S. firms invested about 8.4 times more than Chinese firms did.[94] For every $1,000 of GDP, U.S. firms invested $0.42 while Chinese firms invested only $0.05.[95] This is compared with the rest of the world's R&D share of 51 percent and investment of $0.21 for every $1,000.[96] (See figure 24.)

Figure 24: U.S. and Chinese firms' R&D investment in aerospace and defense, 2024



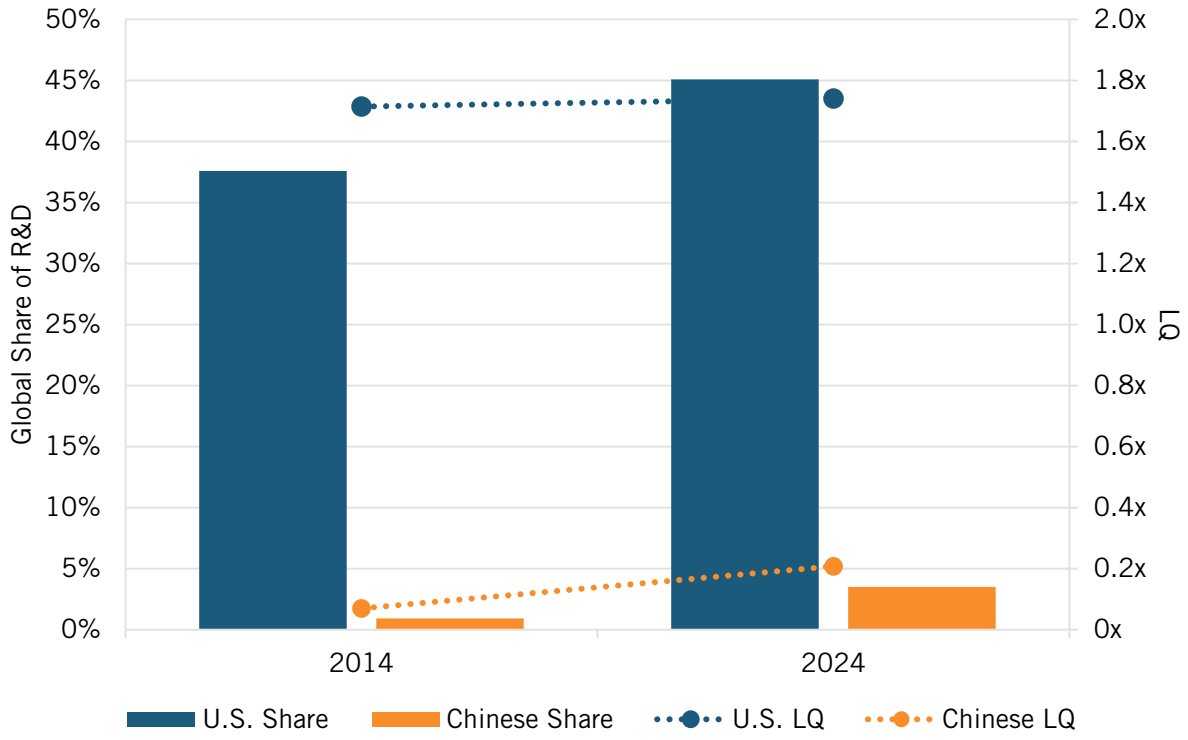
Despite China's aircraft sector remaining significantly behind the United States in innovation and technological sophistication, it is catching up rapidly as Beijing pours resources into its national champion, the Commercial Aircraft Corporation of China (COMAC). According to Center for Strategic & International Studies (CSIS) analyst Scott Kennedy, COMAC received between $49 billion and $72 billion in state-related support through 2020, largely through policy-bank financing and state-held bonds rather than direct subsidies.[97] By late 2016 alone, Chinese financial institutions had provided RMB 253.5 billion in financing, including RMB 50 billion from the China Export-Import Bank, while COMAC had issued RMB 55.5 billion in corporate

bonds likely held by state entities; direct government subsidies totaled just RMB 528 million over a decade.[98] This support has enabled COMAC to build and sell 148 aircraft and to displace more innovative incumbents at home, as China's state-owned airlines have delayed over 100 Boeing and Airbus deliveries in favor of COMAC planes.[99] While COMAC is unlikely to compete in developed markets soon, subsidized domestic demand and sales to Belt-and-Road countries are accelerating scale and learning, gradually catching up to U.S. aerospace firm Boeing.[100]

U.S. firms consistently invest more than Chinese firms do in R&D but Chinese firms' R&D is also growing. In 2014, U.S. firms' R&D share of the global sector was 38 percent compared with Chinese firms' 1 percent.[101] And in 2024, U.S. firms' share grew to 45 percent but was still significantly higher than Chinese firms' 4 percent.[102] Although Chinese firms' R&D investments are also growing, they are still considerably behind U.S. firms.

In the last decade, U.S. firms' size-adjusted R&D investment has remained above the global average but has not grown. In contrast, Chinese firms' investment has remained below the global average but has grown. In 2014, U.S. firms' size-adjusted R&D investment was 171 percent of the average global (1.7x), while Chinese firms' was 7 percent (0.1x).[103] By 2024, U.S. firms' R&D investment had remained about the same at 174 percent of the global average (1.7x), while Chinese firms' had risen to 21 percent (0.2x).[104] (See figure 25.)

Figure 25: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for aerospace and defense

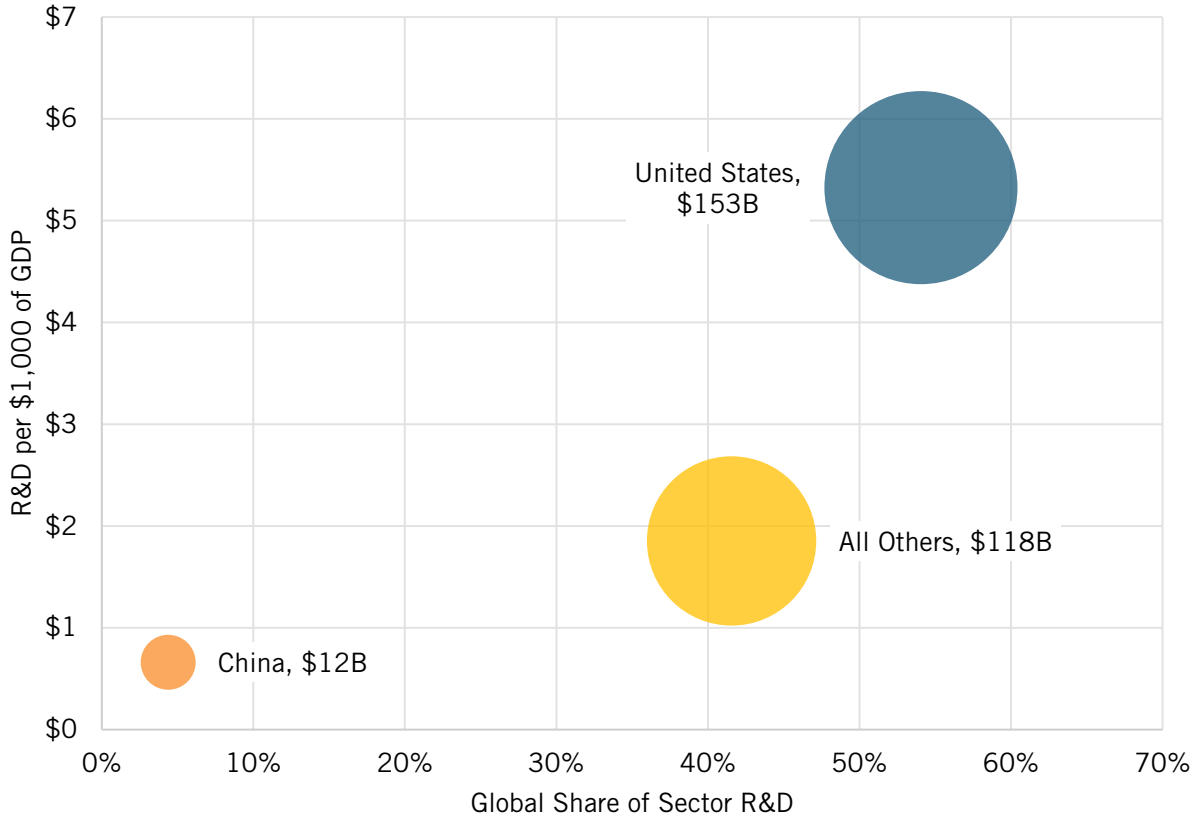


PHARMACEUTICALS AND BIOTECHNOLOGY

The pharmaceutical and biotechnology sector includes "companies engaged in research into and development of biological substances for the purposes of drug discovery and diagnostic development, and which derive the majority of their revenue from either the sale or licensing of these drugs and diagnostic tools."[105] It also includes manufacturers of prescription and over-the-counter drugs and companies that cultivate and distribute cannabis, or both.[106]

U.S. firms R&D investment dominates in the pharmaceutical and biotechnology sector. In 2024, U.S. firms invested $153 billion in R&D, making up 54 percent of the sector's global R&D investment. In comparison, Chinese firms invested $12.4 billion, making up 4 percent of the global R&D investment.[107] When controlling for GDP, U.S. firms invested about 8 times more than Chinese firms did.[108] For every $1,000 of GDP, U.S. firms invested $5.32, while Chinese firms invested only $0.66.[109] This is compared with the rest of the world's R&D share of 42 percent and investment of $1.85 for every $1,000.[110] (See figure 26.)

Figure 26: U.S. and Chinese firms' R&D investments in pharmaceuticals and biotechnology, 2024



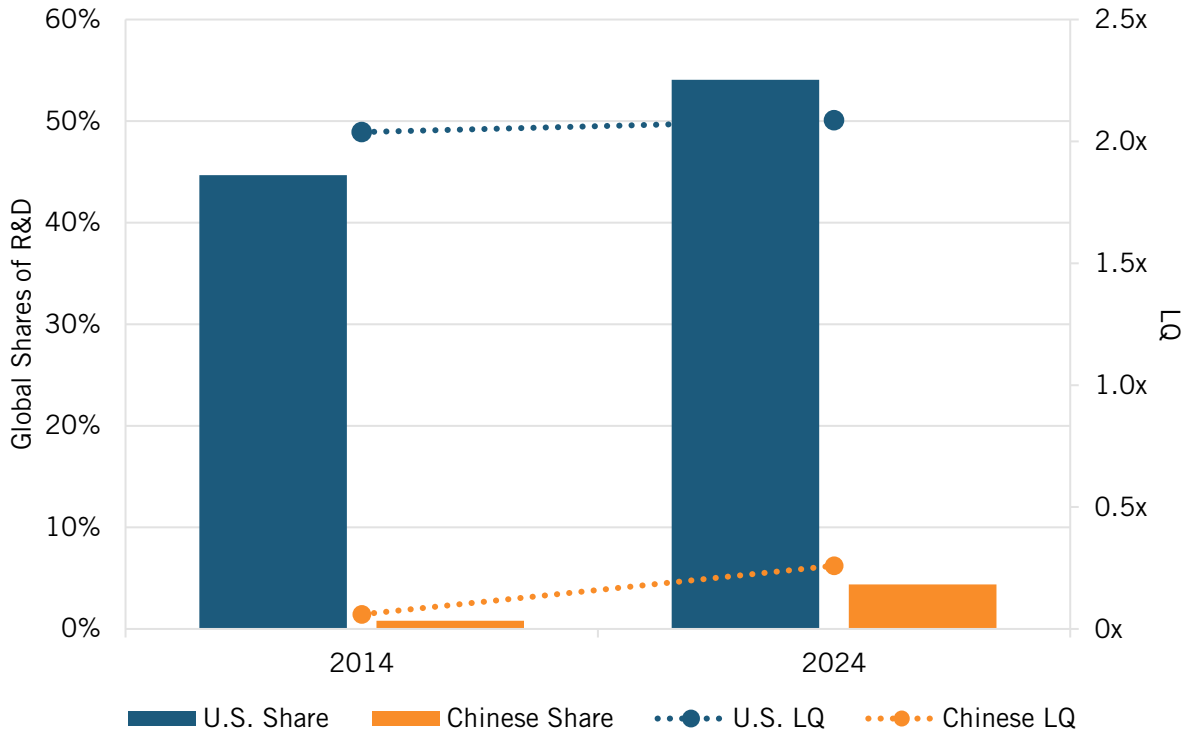
Despite China's lag behind the United States in biotech innovation, the gap is narrowing quickly. As ITIF has found, a combination of government subsidies, financial incentives, science parks, start-up incubators, talent recruitment programs, public-private partnerships, and regulatory reforms to speed up drug approvals and strengthen intellectual property protection is accelerating growth in China's biotech sector.[111] The report highlights that signs of rising innovation are increasingly visible: in 2023, the U.S. Food and Drug Administration (FDA) approved three new Chinese-developed drugs, and China's share of global value-added

pharmaceutical output surged from about 5.6 percent in 2002 to 24.2 percent by 2019, underscoring the speed of its catch-up.[112]

Due to the Unted States' strong pharmaceutical innovation ecosystem, U.S. firms have consistently invested more than Chinese firms have in R&D, though Chinese firms' investments are also growing. In 2014, U.S. firms' R&D share of the global sector was 45 percent compared with Chinese firms' 1 percent.[113] And in 2024, U.S. firms' share grew to 54 percent but was still significantly higher than Chinese firms' 4 percent.[114]

In the last decade, U.S. firms' size-adjusted investment grew slightly while Chinese firms' grew much more, but U.S. firms' investment remains above the global average while Chinese firms' remains below. In 2014, U.S. firms' size-adjusted R&D investment was 204 percent of the average global (2.0x), while Chinese firms' was 6 percent (0.1x).[115] By 2024, U.S. firms' R&D investment had increased to 210 percent of the global average (2.1x), while Chinese firms' had risen to 26 percent (0.3x).[116] (See figure 27.)

Figure 27: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for pharmaceuticals and biotechnology

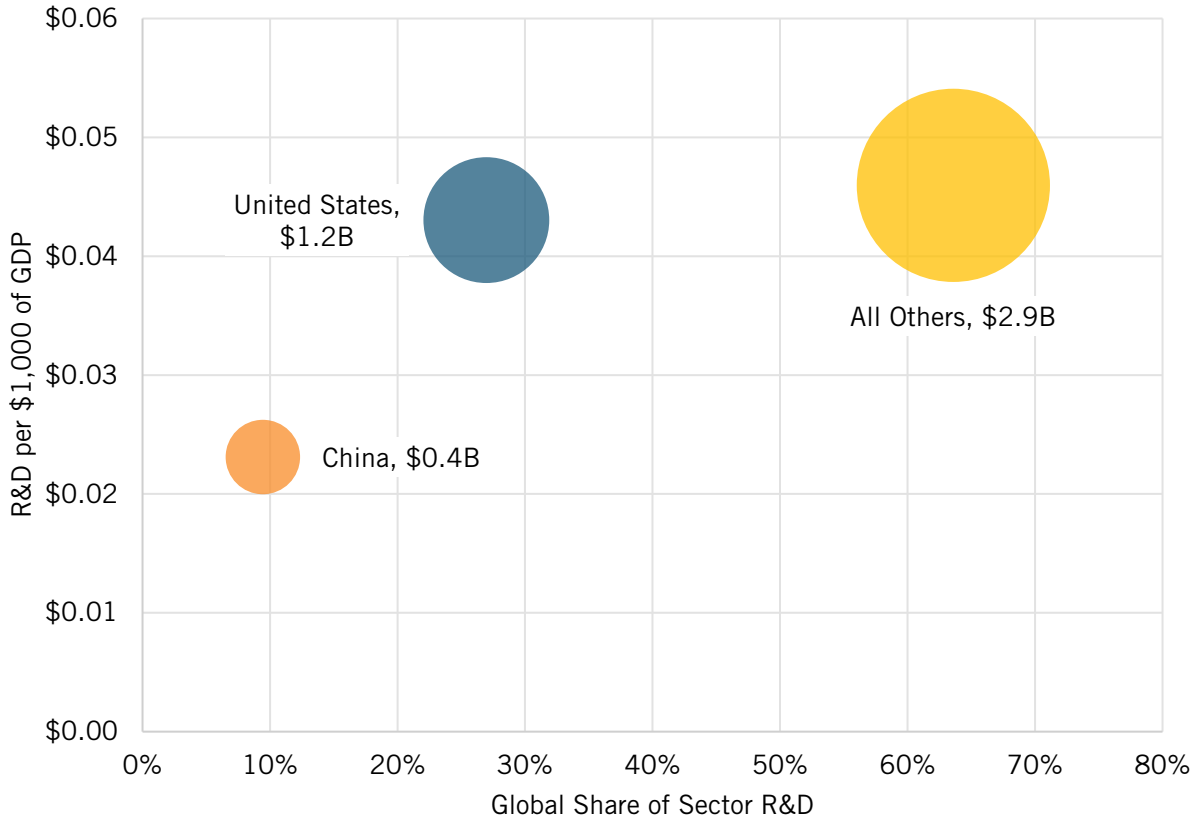


ALTERNATIVE ENERGY

The alternative energy sector includes "companies that produce alternative fuels such as ethanol, methanol, hydrogen and bio-fuels that are mainly used to power vehicles, and companies that are involved in the production of vehicle fuel cells and/or the development of alternative fueling infrastructure."[117] Moreover, the sector also includes "companies that develop or manufacture renewable energy equipment utilizing sources such as solar, wind, tidal, geothermal, hydro and waves."[118]

U.S. firms have invested more than Chinese firms in R&D. In 2024, U.S. firms invested $1.2 billion in R&D, making up 27 percent of the sector's global R&D investments. In comparison, Chinese firms invested $433 million, making up 9 percent of the global R&D investments.[119] When controlling for GDP, U.S. firms invested 1.9 times more than Chinese firms did.[120] For every $1,000 of GDP, U.S. firms invested $0.04, while Chinese firms invested only $0.02.[121] This is compared with the rest of the world's R&D share of 64 percent and investment of $0.05 for every $1,000.[122] (See figure 28.)

Figure 28: U.S. and Chinese firms' R&D investments in alternative energy, 2024



Although U.S. firms may be investing more aggressively in alternative energy R&D, Chinese firms are also investing heavily and making progress. For instance, in the area of EV batteries, Chinese institutions today account for 65.4 percent of the high-impact research publications in electric batteries, substantially outpacing U.S. institutions' 11.9 percent. Chinese entities' global share of patents in the field of electric propulsion increased from 2.4 percent in 2010 to 26.9 percent

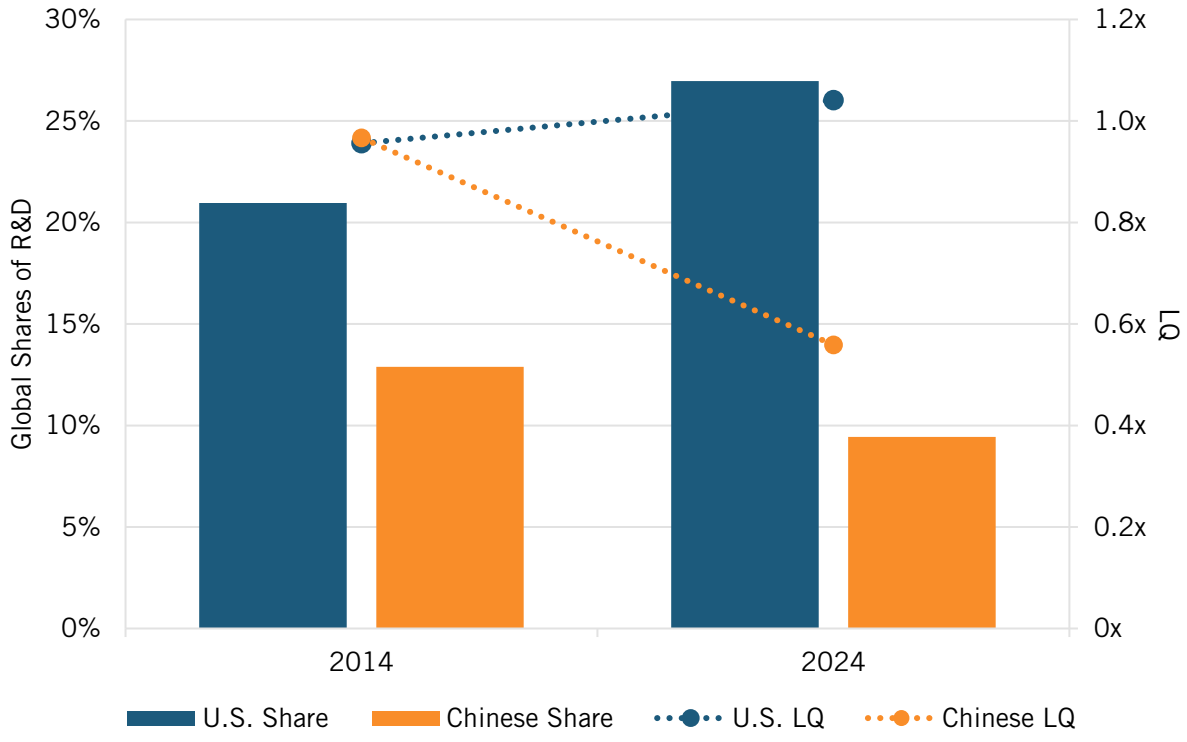
in 2020.[123] In other words, Chinese firms may not invest as much as U.S. firms do, but they are nonetheless making progress in alternative energy innovation.

U.S. firms have historically invested more than Chinese firms have in R&D. In 2014, U.S. firms' R&D share of the global sector was 21 percent compared with Chinese firms' 13 percent.[124] By 2024, U.S. firms' share had risen to 27 percent while Chinese firms' share had declined to 9 percent.[125] In other words, U.S. firms' R&D investments have grown while Chinese firms' have declined.

In the area of EV batteries, Chinese institutions today account for 65.4 percent of high-impact research publications, substantially outpacing U.S. institutions' 11.9 percent.

In the last decade, while U.S. firms' size-adjusted investments rose to above the global average, Chinese firms' fell and remained below the global average. In 2014, U.S. firms' size-adjusted R&D investment was 96 percent of the average global (1.0x), while Chinese firms' was slightly higher at 97 percent (1.0x).[126] By 2024, U.S. firms' R&D investment had risen to 104 percent of the global average (1.0x), while Chinese firms' had fallen to 56 percent (0.6x).[127] (See figure 29.)

Figure 29: 10-year change in U.S. and Chinese firms' shares of global R&D and LQ for alternative energy



RECOMMENDATIONS AND CONCLUSION

Scientific and engineering research is key to innovation success for firms and economies. This generated knowledge is translated into innovation, including novel products and processes. More importantly, business research resulting in knowledge is a crucial driver of global competitiveness for a nation because manufacturing industries and many service industries rely on R&D for competitive success.[128]

As such, if we want to reverse the process of Chinese firms closing the gap with U.S. firms in R&D investment, Congress should take three key steps. First, it should boost R&D tax incentives. According to a 2020 ITIF study, the United States ranked 24th out of 34 Organization for Economic Cooperation and Development (OECD) countries in the generosity of tax support for R&D, while China ranked 8th.[129] The Chinese credit is 2.7 times more generous than that of the United States.

Congress should at minimum 1) double the R&D tax credit rate from 20 to 40 percent for the regular credit and 2) double the Alternative Simplified Credit, an R&D tax credit, from 14 percent to 20 percent.[130]

Second, Congress needs to expand federally funded R&D, especially R&D related to strategic industries, and spend it in ways that engage with industry, as opposed to simply giving the money to a university or national lab researcher. One way to do this is to expand the Manufacturing USA Center program.

Finally, China unfairly benefits from the R&D done in other countries, including the United States. Congress and the Trump administration need to take stronger steps to limit the ability of Chinese firms to take advantage of U.S. R&D. A forthcoming ITIF report will provide a detailed list of policy recommendations.

APPENDIX: CAVEATS ABOUT THE DATASET

There are some caveats about this dataset. The companies' locations are categorized by their headquarters rather than where R&D investments occurred; company sectors are classified by main business activities; and most of the data does not adjust for purchasing power parity to reflect lower R&D salaries in China. If it did, Chinese expenditures would be considerably larger. Moreover, the Scoreboard collects R&D investment data from companies' annual financial records. As a result, companies' R&D investment is in their nations' nominal dollars and not adjusted to control for changes in currency values. If the values of the euro and dollar strengthen compared with other nations, then U.S. aggregate R&D investments will appear larger than if the euro or dollar value remained constant.

The Alarming Performance of US Advanced Technology Product Trade

TRELYSA LONG

Over the last decade, U.S. trade performance has deteriorated significantly in advanced industries. That is a major problem because these industries have high fixed costs and require substantial investments in R&D, so they depend on large customer bases to achieve scale economies and remain globally competitive.

KEY TAKEAWAYS

- Across nine groups of advanced technology products tracked by the U.S. Census Bureau, America went from having a net trade surplus of $29 billion in 2014 to a net trade deficit of $300 billion in 2024.
- Whereas U.S. imports exceeded exports in five out of nine ATP groups in 2014, imports outstripped exports in eight of nine ATP groups by 2024.
- In 2024, America imported a cumulative $762 billion in nine advanced technology product groups, with five major trading partners accounting for 59 percent: the EU, China, Japan, South Korea, and Mexico.
- The largest difference in net U.S. ATP trade from 2014 to 2024 came from the EU. Whereas America had $3.3 billion ATP surplus with the EU in 2014, it had a staggering $68 billion deficit in 2024.
- In the same period, net U.S. ATP trade with Mexico fell from a $3.2 billion surplus to a $46.5 billion deficit.
- America needs a national power industry strategy that prioritizes strategically important sectors, directs markets to preserve critical capabilities, balances production with innovation, and emphasizes long-term positioning over short-term efficiency.

INTRODUCTION

In advanced, globally traded industries, U.S. competitiveness hinges on gaining and sustaining global market share. Industries characterized by high fixed costs, particularly those requiring substantial investments in research and development (R&D), engineering, and capital equipment depend on large customer bases to achieve scale economies, reduce marginal costs, and accelerate learning from diverse users. By selling into major foreign markets while maintaining strong domestic market share, U.S. firms can spread innovation costs over greater volumes, sharpen their technological edge, and adapt more quickly to evolving global demand. These advanced industries are not merely sources of economic growth. They are what the Information Technology and Innovation Foundation (ITIF) calls "national power industries," supplying the technologies, inputs, and capabilities that underpin U.S. military strength, economic resilience, and geopolitical influence.[1]

The stakes therefore transcend mere economics. National power today depends on strength across a spectrum of sectors spanning pure defense production, dual-use technologies employed in both military and commercial applications, and enabling industries that support the broader industrial commons. These industries include semiconductors, aerospace, biopharmaceuticals, telecommunications equipment, advanced chemicals, precision machinery, robotics, artificial intelligence systems, and dozens of other advanced sectors. Weakening or fatally injuring firms in these industries would grant China dangerous leverage over the United States and its allies, while simultaneously eroding U.S. defense production capacity and surge capability in times of conflict.

Despite this, the United States is now running net trade deficits in many strategically important advanced industries. In fact, the Census Bureau publishes trade data on 10 advanced technology product (ATP) groups—ranging from biotechnology to nuclear technology—and U.S. trade performance has deteriorated sharply in most of them over the past two decades, signaling an erosion of America's advanced industrial base. Putting aside the weapons product group, the United States ran net trade surpluses in four of the other nine ATP groups in 2014.[2] But by 2024, that position had reversed to deficits in eight of those nine ATP groups.[3] Persistent trade deficits in the advanced industries that produce those products are not benign. They reflect declining global market share, weakened scale economies, slower learning effects, and reduced capacity to finance sustained innovation, all of which undermine the power industries that depend on these sectors.

The Census Bureau publishes trade data on 10 ATP groups—ranging from biotechnology to nuclear technology—and U.S. trade performance has deteriorated sharply in most of them over the past two decades, signaling an erosion of America's advanced industrial base.

Contrary to prevailing narratives, China has not been the primary driver of the deterioration. While U.S. net trade with China has consistently been in deficit, the largest negative shifts in ATP groups have come from other advanced economies, particularly the European Union and Mexico.[4] U.S. net trade with both regions has shifted from surplus to substantial deficit ATPs, with the magnitude of these changes multiple times larger than the net trade deterioration with China. In this context, European calls for digital sovereignty from the United States ring hollow—the EU already dominates the United States in trade across many ATPs.

This data predates the effects of the Trump administration's liberation day tariffs. Assessing forthcoming Census data therefore will be critical to determine whether those measures materially altered the trajectory of U.S. advanced industry trade performance. Regardless of the impact of the Trump administration's policies, the broader lesson remains unchanged. The United States lacks a coherent national power industry strategy that recognizes that competition in advanced industries is fundamentally a win-or-lose proposition, not a matter of mutual gain.

As ITIF explains in other reports in this series, such a strategy should be grounded in four key principles:

1. Industries differ fundamentally in their strategic importance, and defense, dual use, and enabling sectors must be prioritized even at short-term economic cost.
2. Markets are indifferent to national power, meaning unregulated market forces will not preserve strategic capabilities without active government direction.
3. Production matters as much as innovation does, and the United States cannot afford a model in which it invents technologies that strategic rivals manufacture.
4. Long-term strategic positioning must take precedence over short-term efficiency, including the acceptance of higher prices, redundant capacity, and sustained subsidies as the cost of not losing the techno-economic competition.

CHANGE IN ATP IMPORTS AND EXPORTS, 2014–2024

This report examines 9 of the Census Bureau's 10 ATP groups: biotechnology, life sciences, optoelectronics, information and communications, electronics, flexible manufacturing, advanced materials, aerospace, and nuclear power.[5] The industries that produce these products are dual-use industries that are critical to U.S. national power. And while the United States ran a net trade surplus in these sectors in 2014, it ran a large net trade deficit in 2024.[6]

All Advanced Technology Product Groups

In 2024, the United States imported a cumulative $762 billion in nine ATP groups from around the world, with five countries/regions accounting for 59 percent. This includes $180 billion (24 percent) from the European Union, $112 billion (15 percent) from China, $102 billion (13 percent) from Mexico, $29 billion (4 percent) from South Korea, and $28 billion (4 percent) from Japan. (See figure 1.) These measured imports from countries regardless of the nationality of the company exporting the goods.

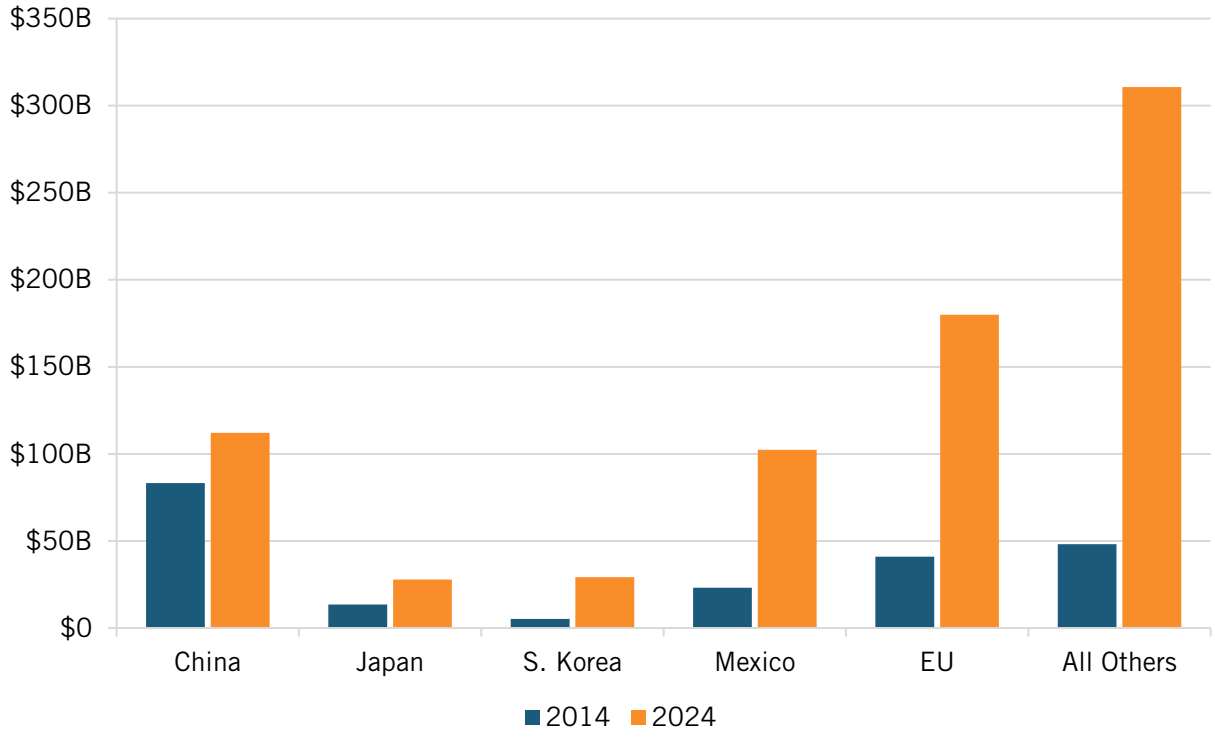
In 2014, China was the largest exporter of ATP to the United States; however, much faster growth in the EU has meant that this designation now belongs to Europe. U.S. trade restrictions imposed to counter China's restrictions, as well as some Western companies moving ATP production out of China, may be behind this slower growth.

From 2014 to 2024, the United States' ATP imports from the world rose 256 percent from $214 billion to $762 billion. In contrast, U.S. gross domestic product grew just 64 percent.

Imports from South Korea, Mexico, and the European Union grew the fastest at 459 percent, 342 percent, and 339 percent, respectively. Japan had a growth of 106 percent and China had a

growth of 35 percent. In other words, South Korea, Mexico, and the EU are becoming a larger share of U.S. ATP imports.

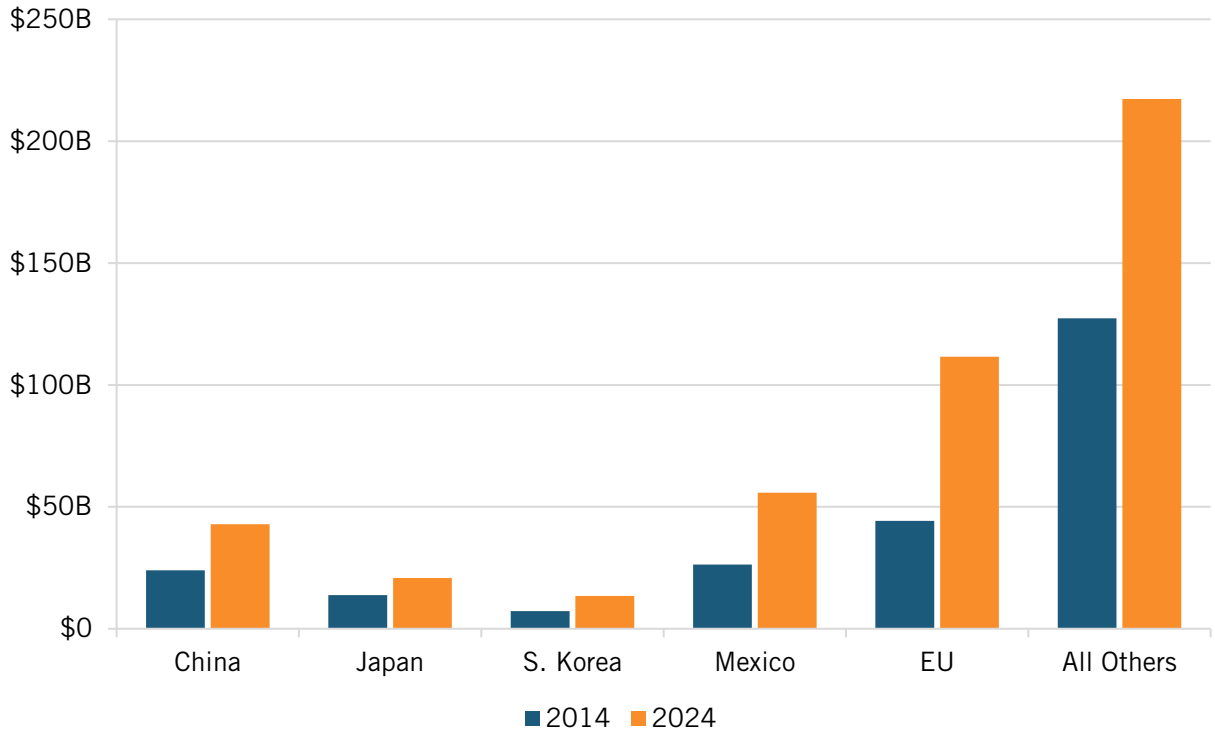
Figure 1: U.S. imports of all ATPs from China, Japan, South Korea, Mexico, the EU, and others[7]



In 2024, the United States exported a cumulative $462 billion in ATP products to the world. Of this $462 billion, the United States exported $112 billion (24 percent) to the EU, $56 billion (12 percent) to Mexico, $43 billion (9 percent) to China, $21 billion (5 percent) to Japan, and $13 billion (3 percent) to South Korea. (See figure 2.)

From 2014 to 2024, while U.S. ATP imports rose 256 percent, U.S. exports rose just 90 percent from $243 billion to $462 billion. Exports to the EU saw the highest growth at 152 percent while Mexico grew at 112 percent; however, these growth rates are still multiple folds lower than U.S. imports from these nations. Falling below this growth rate, South Korea grew at 87 percent, China at 79 percent, and Japan at 51 percent.

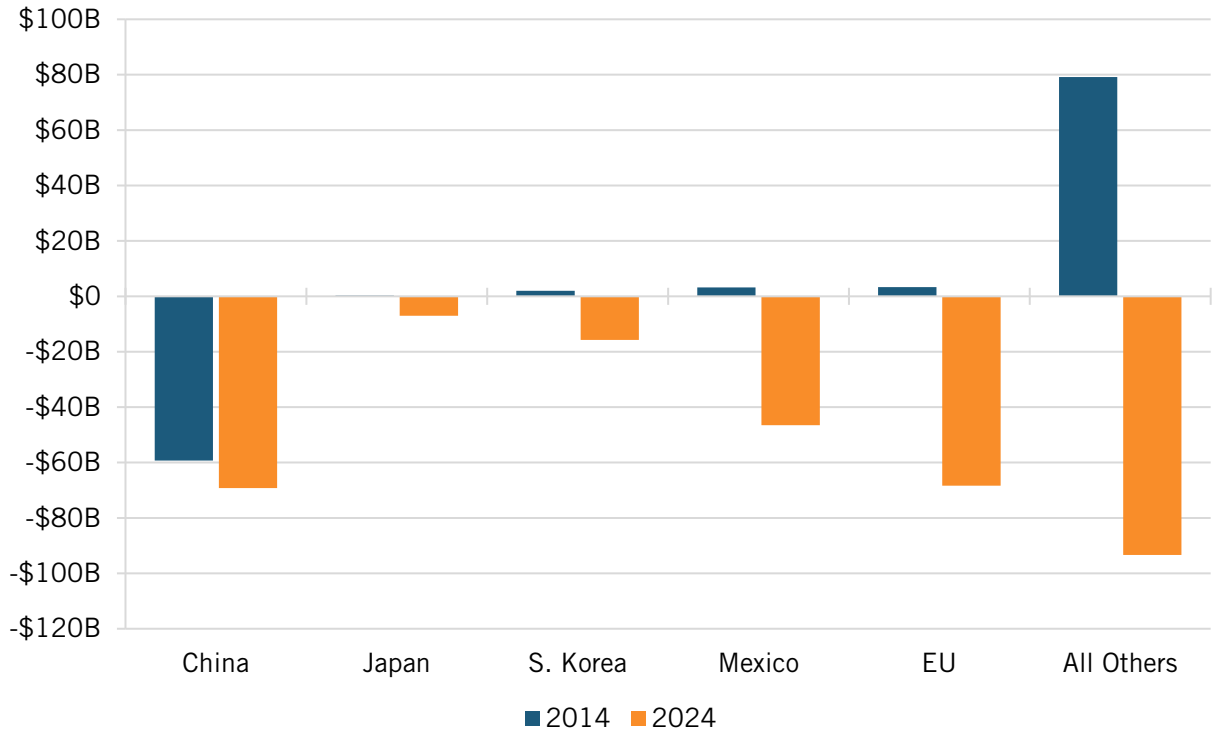
Figure 2: U.S. exports of all ATPs to China, Japan, South Korea, Mexico, the EU, and others[8]



Throughout this report, net trade figures were calculated by subtracting each ATP product category's imports from exports. However, due to the different products in imports and exports for each ATP group, the net trade figures reported here do not represent conventional trade balances. As such, this report examines the relative changes in net trade across nations. The main challenge of calculating net trade balance for each ATP category is that ATP import and export codes do not match up, as imports use HTS codes while exports use Schedule B codes.

Due to U.S. ATP imports rising faster than exports did, the U.S. ATP net trade with the world fell from a $29 billion surplus (+$29 billion) to a $300 billion deficit (–$300 billion) from 2014 to 2024. With the largest negative change, U.S. ATP net trade with the EU fell from +$3.3 billion in 2014 to a staggering –$68 billion in 2024 while net trade with Mexico fell from +$3.2 billion to a staggering –$46.5 billion. Meanwhile, net trade with Japan fell from +$250 million to –$7 billion while trade with South Korea fell from +$2 billion to a –$15.7 billion. U.S. ATP net trade with China also declined from –$59 billion to –$69 billion. U.S. net trade with the rest of the world declined from +$79 billion to –$93 billion. It should be noted that the rise in deficit with the rest of the world may reflect Chinese transshipments or Chinese firms moving some of their factories to other nations, such as Vietnam. (See figure 3.)

Figure 3: U.S. net trade of ATPs with China, Japan, South Korea, Mexico, the EU, and others[9]



Biotechnology

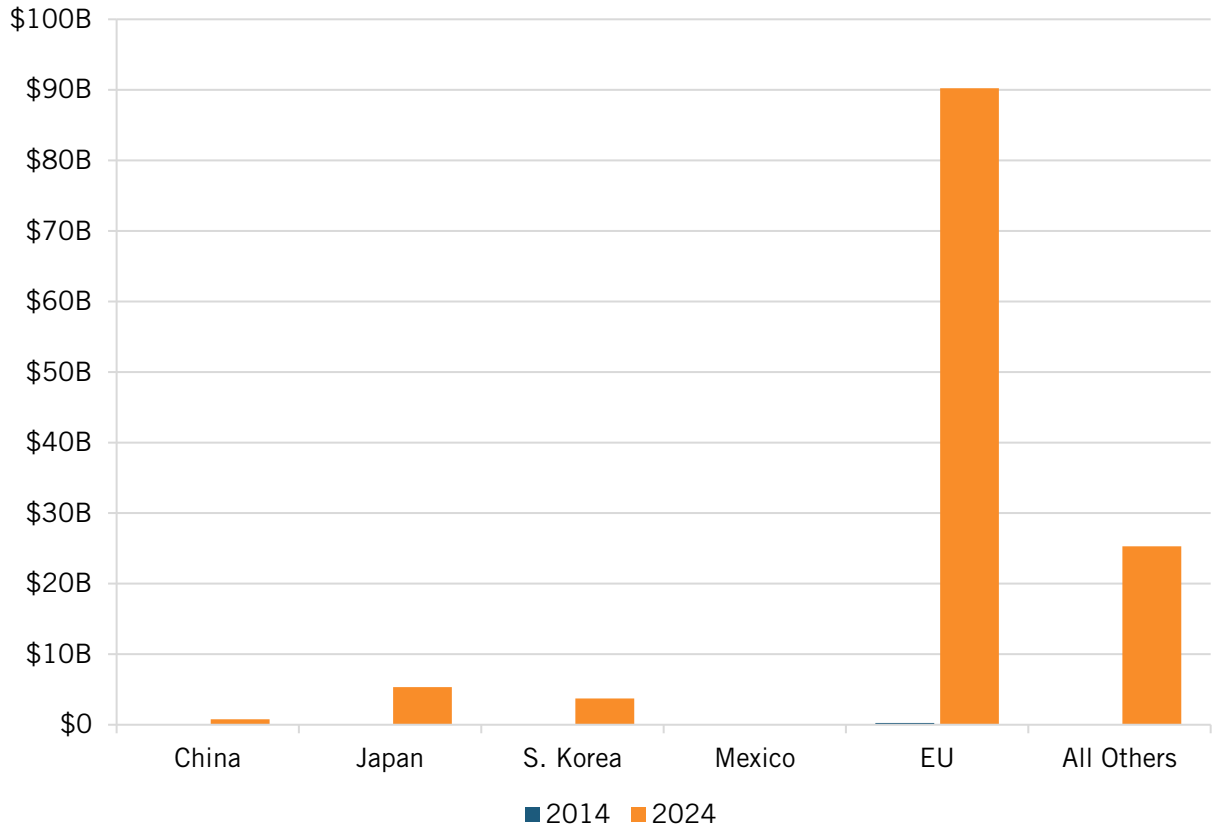
The biotechnology ATP group is defined as "medical and industrial applications of advanced scientific discoveries in genetics to the creation of new drugs, hormones and other therapeutic items for both agricultural and human use."[10]

In 2024, the United States imported $125 billion in biotechnology ATP products from the world. Of this $125 billion, the European Union provided 72 percent, or $90 billion. The United States imported $5.3 billion (4 percent) from Japan, $3.7 billion (3 percent) from South Korea, $782 million from China (1 percent), and $19 million (less than 1 percent) from Mexico. (See figure 4.)

From 2014 to 2024, U.S. biotechnology imports rose 301 times, from $415 million to $125 billion, reflecting in large part the rapid growth of the biotech sector. Partly due to its size, the EU continues to be the largest exporter of biotechnology to the United States, rising from $264 million in 2014 to $90 billion in 2024. Of the five regions, China is no longer the second highest exporter, as Japan has taken this spot with exports rising from $17 million to $5.3 billion.

U.S. imports from South Korea, the EU, and Japan were the highest with growth of almost 5,000 times, 341 times, and 314 times, respectively. Meanwhile, U.S. imports from China and Mexico grew 15 times and 1 time, respectively. The significant growth is largely due to 16 of 28 products in this group going from zero imports to a range of hundreds of thousands to billions.

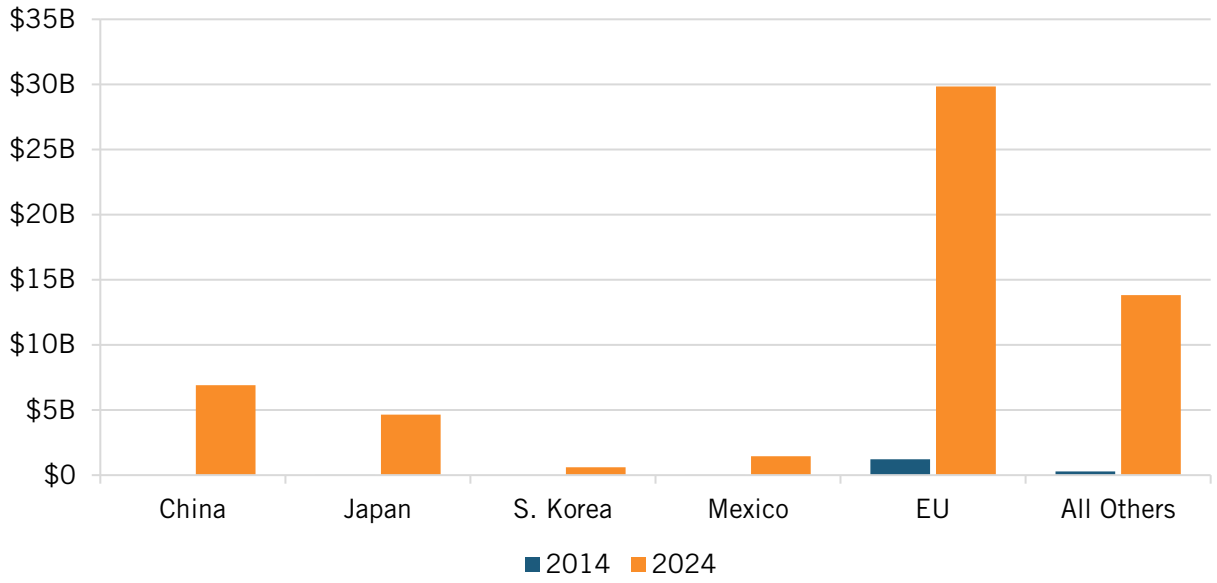
Figure 4: U.S. imports of biotechnology ATP from China, Japan, South Korea, Mexico, the EU, and others[11]



In 2024, the United States only exported $57 billion in biotechnology ATP products to the world, with $30 billion (52 percent) to the EU, $7 billion (12 percent) to China, $5 billion (8 percent) to Japan, $1.5 billion (3 percent) to Mexico, and $605 million (1 percent) to South Korea. (See figure 5.)

From 2014 to 2024, the United States' biotechnology ATP exports to the world rose from $1.5 billion to $57 billion, which meant it grew only 36 times while imports grew 301 times. U.S. exports to China grew 1,469 times followed by Japan at 264 times, Mexico at 119 times, and South Korea at 59 times. At the lowest, U.S. exports to the EU grew only 24 times despite its imports growing 341 times.

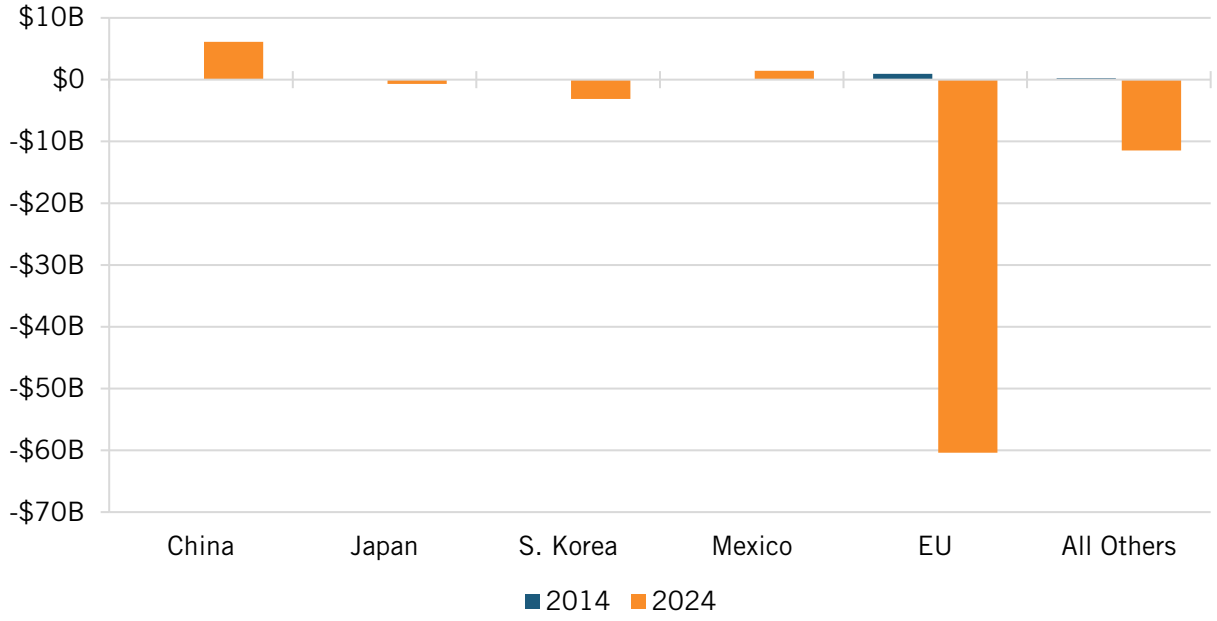
Figure 5: U.S. exports of biotechnology ATP to China, Japan, South Korea, Mexico, the EU, and others[12]



From 2014 to 2024, U.S. biotech net trade with the world declined from +$1.1 billion to –$68 billion. U.S. net trade with the European Union declined the most from +$950 million to –$60 billion.

Meanwhile, U.S. net trade with Japan declined from +$587,944 to –$697 million and South Korea from +$9.3 million to –$3.1 billion. In contrast, net trade with China and Mexico increased. During this period, net trade with China rose from –$43 million to +$6.1 billion surplus while net trade with Mexico increased from +$2.3 million to +$1.4 billion. U.S. net trade with the rest of the world declined from +$204 million to –$11.5 billion. (See figure 6.)

Figure 6: U.S. net trade of biotechnology ATP with China, Japan, South Korea, Mexico, the EU, and others[13]



Life Sciences

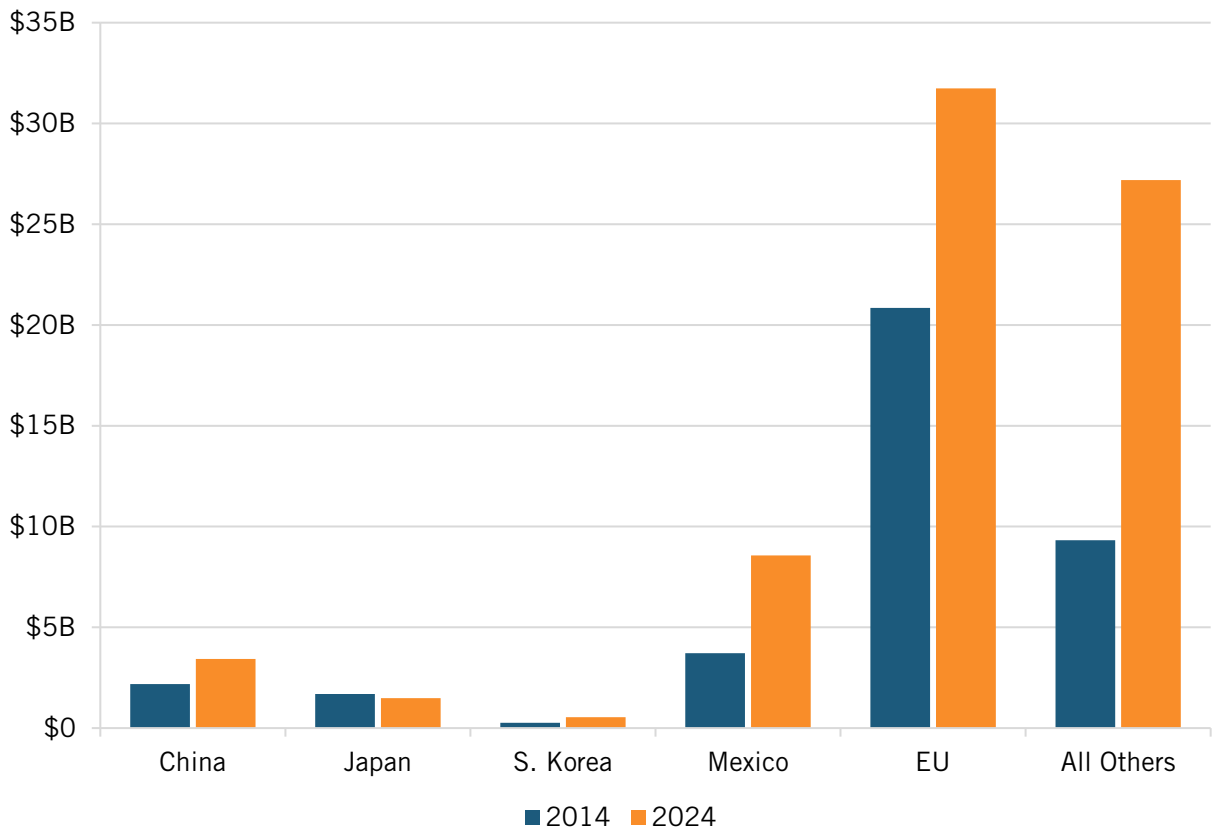
The life sciences ATP group is defined as products that are for "the application of scientific advances (other than biological) to medical science. Recent advances, such as nuclear resonance imaging, echocardiography, and novel chemistry, coupled with new production techniques for the manufacture of drugs have led to many new products for the control or eradication of disease."[14] U.S. trade in the life sciences sector is especially critical, as U.S. pharmaceutical companies need scale to recoup the cost of developing and bringing new drugs to the market.

In 2024, the United States imported $73 billion in life sciences ATP products from the world. Of this $73 billion, the United States imported $32 billion (44 percent) from the EU, $8.6 billion (12 percent) from Mexico, $3.4 billion (5 percent) from China, $1.5 billion (2 percent) from Japan, and $541 million (1 percent) from South Korea. (See figure 7.)

From 2014 to 2024, U.S. life sciences ATP imports from the world rose 92 percent from $38 billion to $73 billion. During this period, the EU and Mexico continue to have the highest exports of the five regions.

U.S. life sciences ATP imports from Mexico rose 130 percent while imports from South Korea rose 104 percent. Falling below the growth rate, U.S. imports from China rose 57 percent and imports from the EU rose 52 percent. U.S. imports from Japan fell 12 percent from $1.7 billion to $1.5 billion.

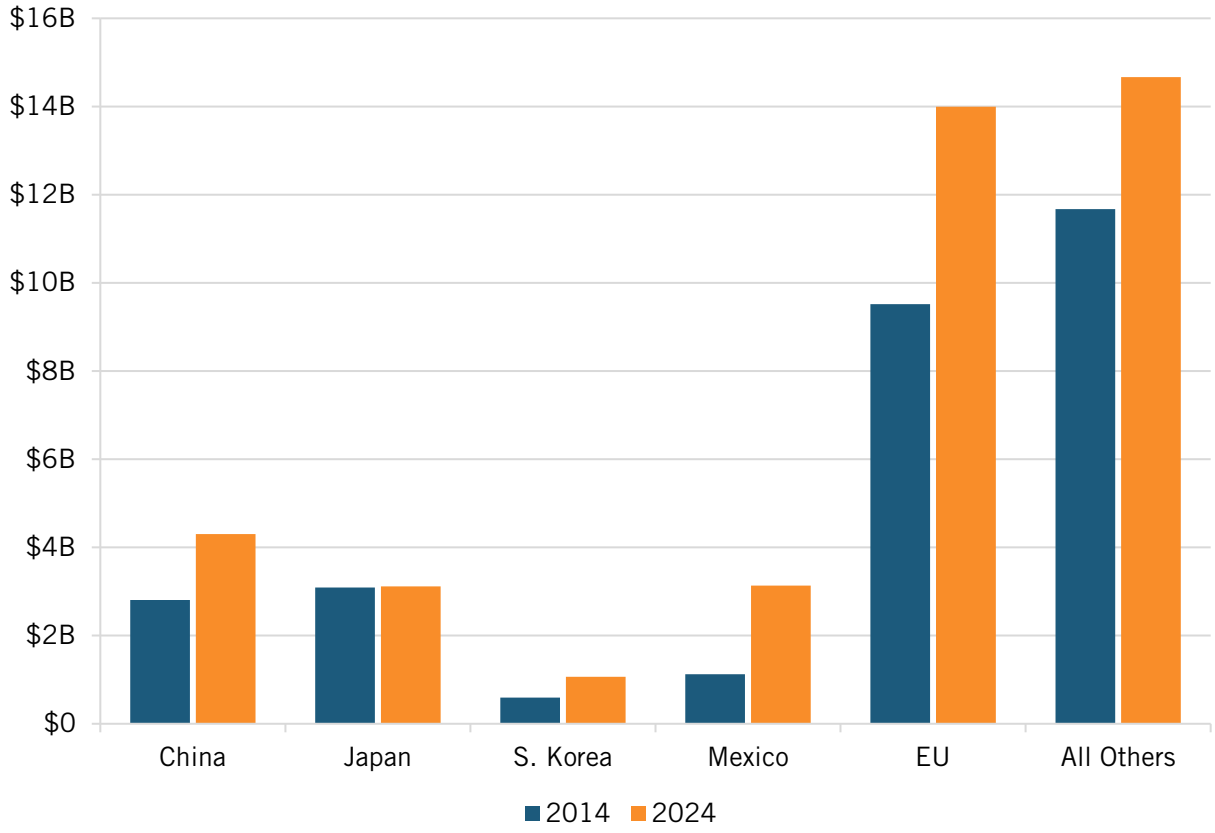
Figure 7: U.S. imports of life sciences ATP from China, Japan, South Korea, Mexico, the EU, and others[15]



In 2024, the United States only exported $40 billion in life sciences ATP products to the world. Of this $40 billion, the United States exported $14 billion (35 percent) to the EU, $4.3 billion (11 percent) to China, $3.1 billion (8 percent) to Mexico, $3.1 billion (8 percent) to Japan, and $1.1 billion (3 percent) to South Korea. (See figure 8.)

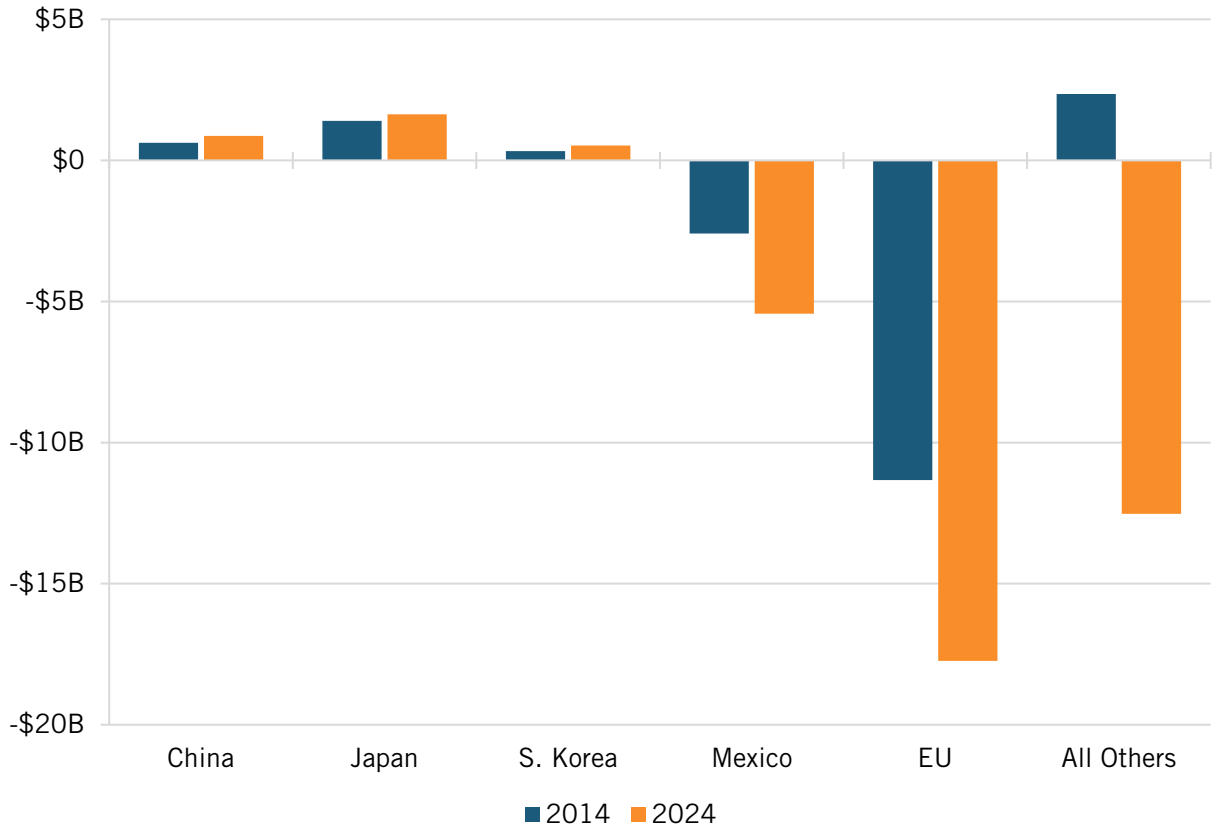
From 2014 to 2024, the U.S. life sciences ATP exports to the world rose 40 percent from $29 billion to $40 billion while imports rose faster at 92 percent. U.S. exports to China also rose 53 percent, the EU 47 percent, Mexico 179 percent, and Japan only 1 percent.

Figure 8: U.S. exports of life sciences ATP to China, Japan, South Korea, Mexico, the EU, and others[16]



From 2014 to 2024, the U.S. net trade with the world in life sciences products declined from –$9.2 billion to –$33 billion . During this period, U.S. net trade in life sciences products with the EU declined the most from –$11 billion to –$18 billion. Coming in second, U.S. net trade with Mexico declined from –$2.6 billion to –$5.4 billion. U.S. net trade with the other three nations saw increases in surplus. U.S. net trade with the rest of the world declined from +$2.4 billion to –$12.5 billion. In other words, U.S. trade deficit was primarily with the EU, Mexico, and the rest of the world. (See figure 9.)

Figure 9: U.S. net trade of life sciences ATP with China, Japan, South Korea, Mexico, the EU, and others[17]



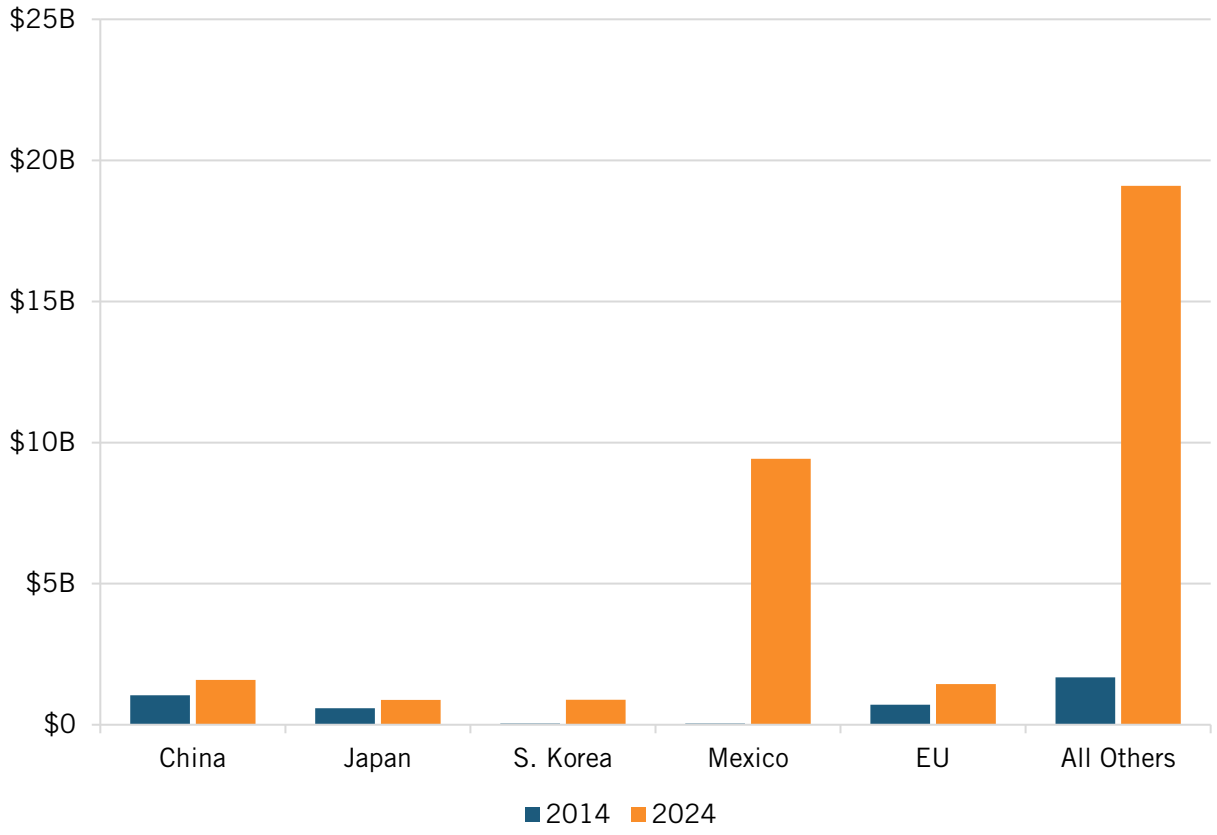
Optoelectronics

The optoelectronics ATP group consists of "electronic products and components that involve the emitting and/or detection of light."[18] Some products in this group include optical scanners, optical disc players, solar cells, photo-sensitive semiconductors, and laser printers.[19]

In 2024, the United States imported $33 billion in optoelectronics ATP products from the world. Of this $33 billion, the United States imported $9.4 billion (28 percent) from Mexico, $1.6 billion (5 percent) from China, $1.4 billion (4 percent) from the EU, $887 million (3 percent) from South Korea, and $879 million (3 percent) from Japan. (See figure 10.)

From 2014 to 2024, U.S. imports of optoelectronics ATP products from the world rose seven times from $4.1 billion to $33 billion. While China exported the most to the United States in 2014, Mexico exported the most to the United States as of 2024. Indeed, U.S. optoelectronics ATP imports to Mexico rose 232 times, rising from $40 million to $9.4 billion. U.S. imports from South Korea also grew at 20 times while imports from the EU rose 1 time and Japan and China both rose 0.5 times.

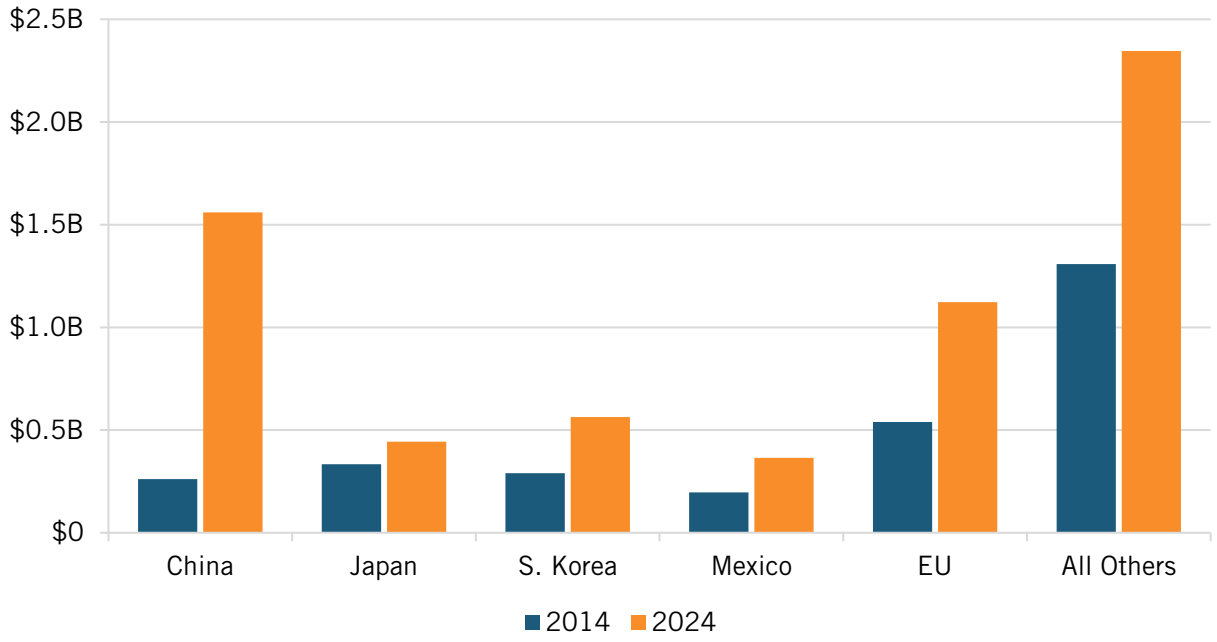
Figure 10: U.S. imports of optoelectronics ATP from China, Japan, South Korea, Mexico, the EU, and others[20]



In 2024, the United States only exported $6.4 billion in optoelectronic ATP products to the world. Of the $6.4 billion, the United States exported $1.6 billion (24 percent) to China, $1.1 billion (18 percent) to European Union, $564 million (9 percent) to South Korea, $444 million (7 percent) to Japan, and $365 million (6 percent) to Mexico. (See figure 11.)

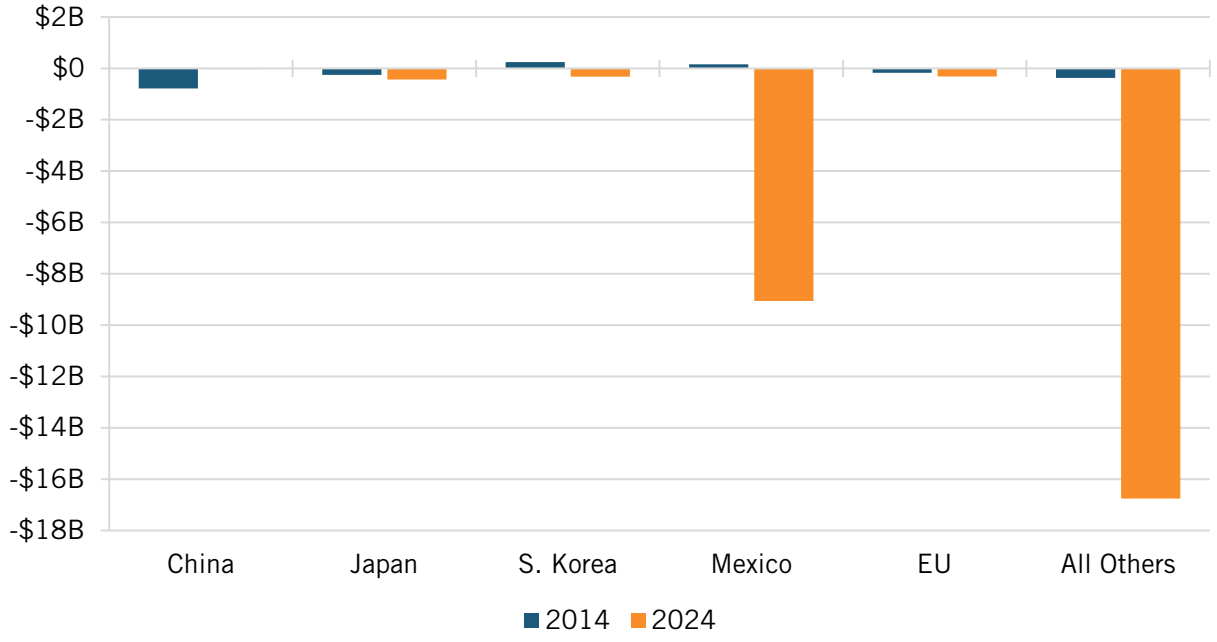
From 2014 to 2024, U.S. optoelectronic ATP exports to the world rose 118 percent, about 6 times less than imports, from $3 billion to $6.4 billion. U.S. optoelectronic ATP exports to China rose 498 percent, the EU rose 108 percent, South Korea 94 percent, Mexico 85 percent, and Japan 33 percent.

Figure 11: U.S. exports of optoelectronics ATP to China, Japan, South Korea, Mexico, the EU, and others[21]



From 2014 to 2024, U.S. net trade with the world in optoelectronic products declined from –$1.2 billion to –$27 billion . At its highest, U.S. net trade with Mexico declined $9.2 billion from +$156 million to –$9.1 billion. U.S. net trade with Japan declined from –$250 million to –$436 million while trade with the EU declined from –$170 million to –$318 million. Meanwhile, U.S. optoelectronics net trade with South Korea declined from +$247 million to –$324 million. In contrast, net trade with China increased from –$785 million to –$26 million. U.S. net trade with the rest of the world declined from –$369 million to –$16.8 billion. (See figure 12.)

Figure 12: U.S. net trade of optoelectronics ATP with China, Japan, South Korea, Mexico, the EU, and others[22]



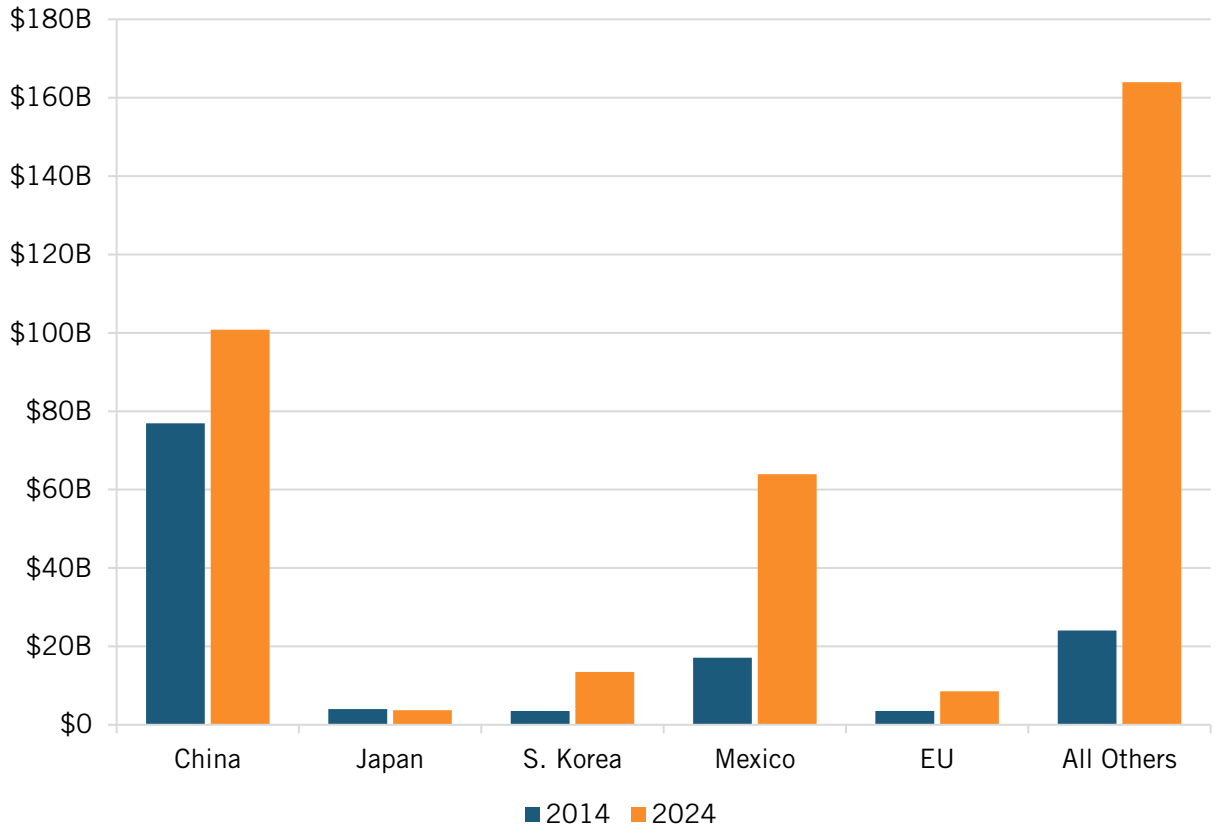
Information and Communications

The information and communications ATP group consists of products "that are able to process increased volumes of information in shorter periods of time."[23] Some of the products included in this group are central processing units, disk drive units and control units, modems, facsimile machines, and telephonic switching apparatus.[24] Note that semiconductors are in the electronics category.

In 2024, the United States imported $354 billion in information and communications ATP from the world. Of this $354 billion, the United States imported $101 billion (28 percent) from China, $64 billion (18 percent) from Mexico, $13.5 billion (4 percent) from South Korea, $8.5 billion from the EU (2 percent), and $3.7 billion (1 percent) from Japan. (See figure 13.)

From 2014 to 2024, U.S. information and communications ATP imports from the world rose 175 percent from $129 billion to $354 billion. During this period, China and Mexico both continued to export the most information and communications products to the United Stated States. Despite this, Chinese exports only rose 31 percent, but Mexico's exports rose 274 percent. Meanwhile, U.S. imports from South Korea rose 282 percent, the EU 143 percent, and China 31 percent. U.S. imports from Japan declined 7 percent from $4 billion to $3.7 billion.

Figure 13: U.S. imports of information and communications ATP from China, Japan, South Korea, Mexico, the EU, and others[25]

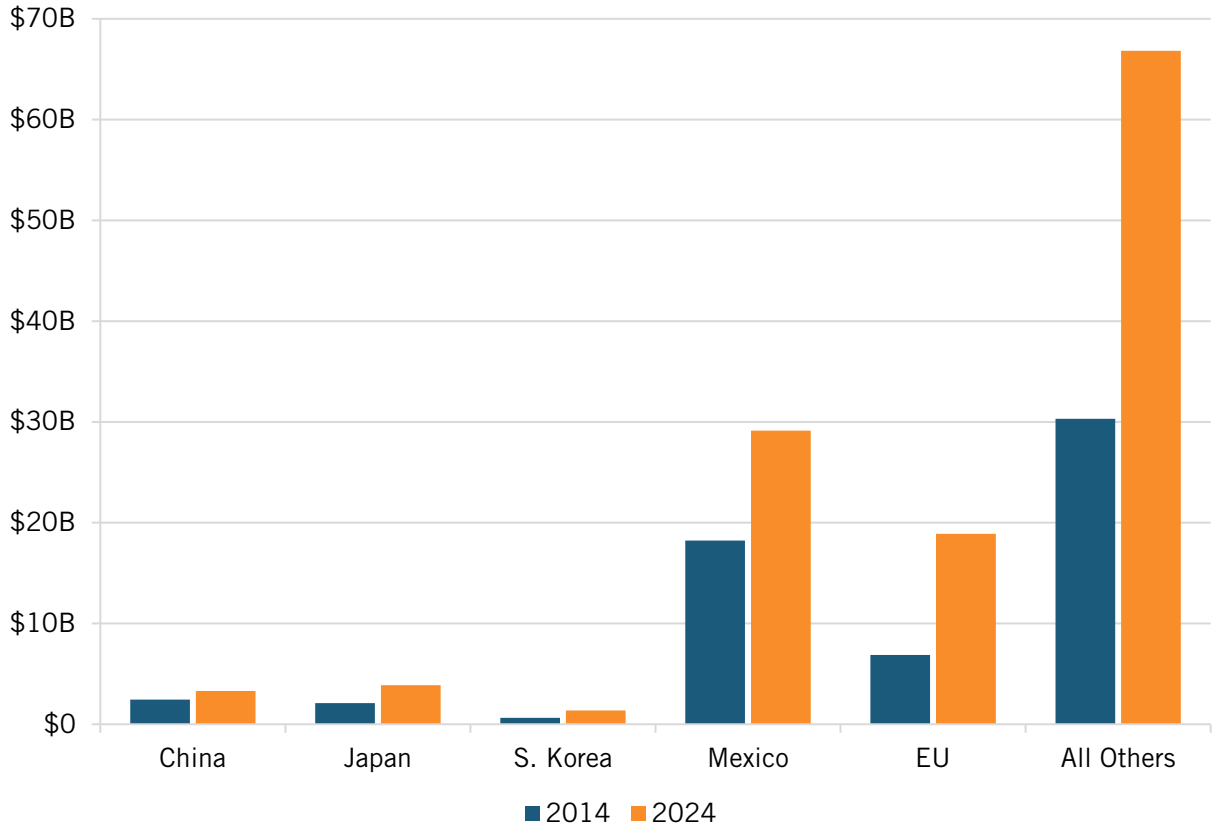


In 2024, the United States only exported $123 billion in information and communications ATP to the world. Of the $123 billion, the United States imported $29 billion (24 percent) to Mexico,

$19 billion (15 percent) to the EU, $3.9 billion (3 percent) to Japan, $3.3 billion (3 percent) to China, and $1.4 billion (1 percent) to South Korea. (See figure 14.)

From 2014 to 2024, U.S. information and communications ATP exports to the world rose 104 percent from $61 billion to $123 billion while imports rose at a higher rate of 175 percent. U.S. exports to the EU rose 175 percent and exports to South Korea rose 113 percent. Meanwhile, U.S. exports to Japan rose 86 percent, Mexico 60 percent, and China 35 percent.

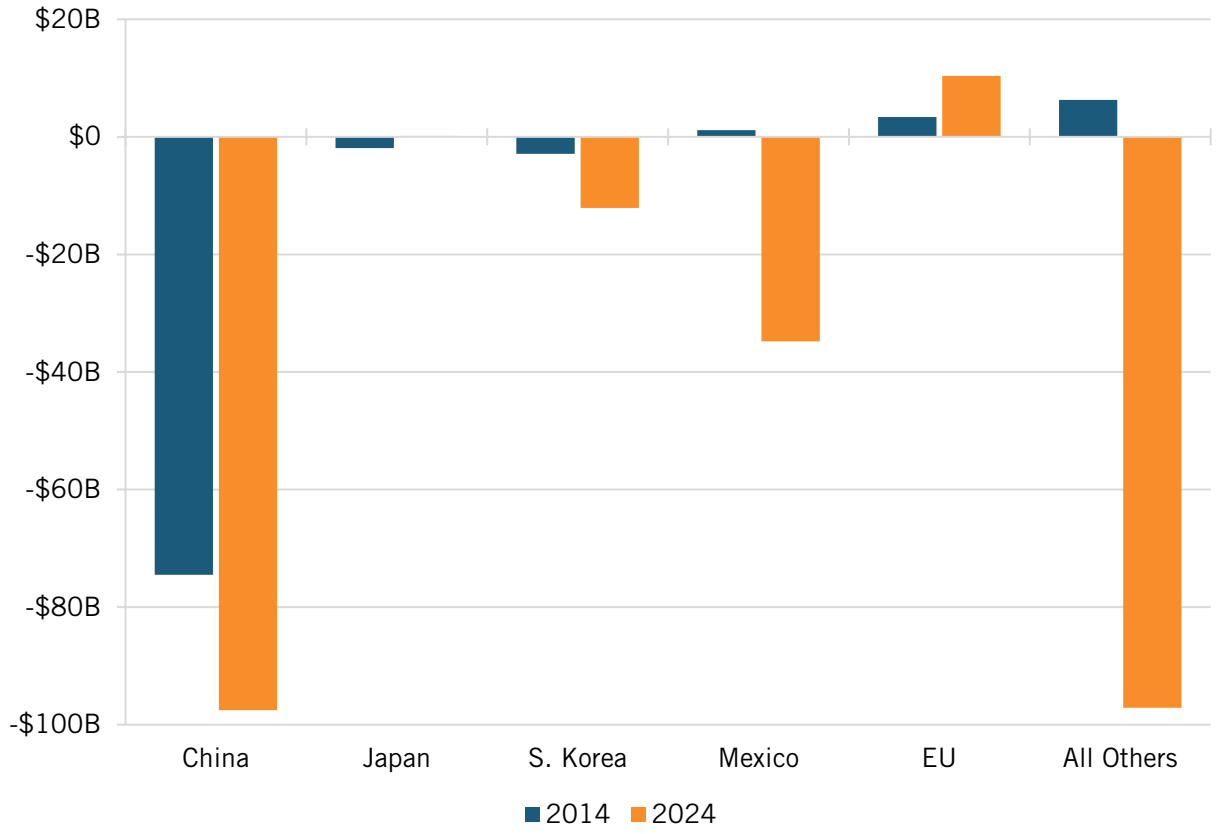
Figure 14: U.S. exports of information and communications ATP to China, Japan, South Korea, Mexico, the EU, and others[26]



From 2014 to 2024, U.S. net trade with the world in information and communications products declined from –$69 billion to –$231 billion. Of the five regions, U.S. net trade with Mexico saw the largest decline from + $1.1 billion to –$35 billion, indicating that it played a key role in the U.S. net trade deficit.

U.S. net trade with China and South Korea also saw a decline during this period. Indeed, net trade with South Korea saw a decline from –$3 billion to –$12 billion and China declined from –$74 billion to –$98 billion. In contrast, net trade with Japan rose from –$2 billion to +$147 million while net trade with the EU rose from +$3.4 billion to +$10 billion. U.S. net trade with the rest of the world declined from +$6.3 billion to –$97 billion. (See figure 15.)

Figure 15: U.S. net trade of information and communications ATP with China, Japan, South Korea, Mexico, the EU, and others[27]



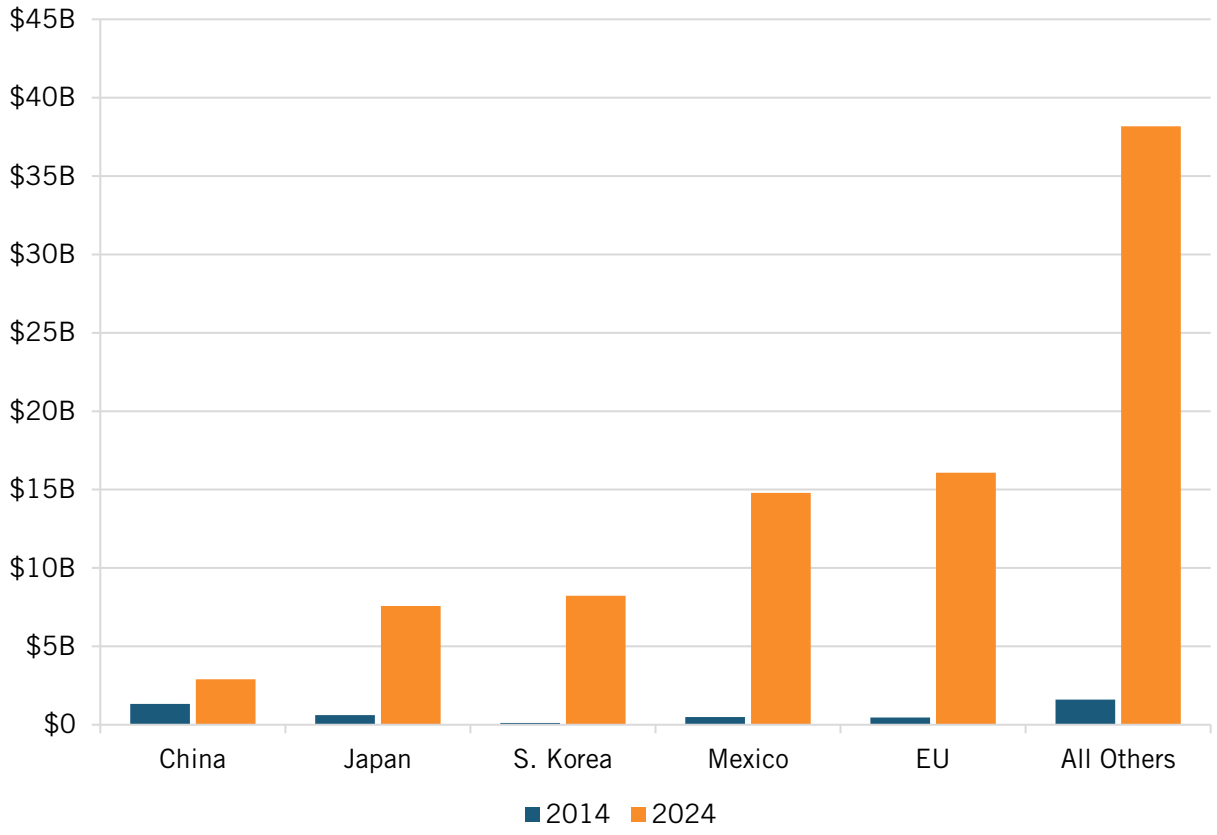
Electronics

The electronics ATP group consists of products that are "recent design advances in electronic components (with the exception of opto-electronic components) that result in improved performance and capacity and in many cases reduced size."[28] Some of the products included in this group are integrated circuits, multilayer printed circuit boards and surface-mounted components such as capacitors and resistors. This category includes semiconductors.[29]

In 2024, the United States imported $88 billion in electronic ATP products from the world. Of this $88 billion, the United States imported $16 billion (18 percent) from the EU, $15 billion (17 percent) from Mexico, $8.2 billion (9 percent) from South Korea, $7.6 billion (9 percent) from Japan, and $2.9 billion (3 percent) from China. (See figure 16.)

From 2014 to 2024, U.S. electronics ATP imports from the world rose 18 times from $4.6 billion to $88 billion. During this period, China exported the most to the United States in 2014, but by 2024, the EU was exporting the most to the United States in electronics. Indeed, U.S. imports from the EU rose 34 times while those from China only rose 1.2 times. Meanwhile, U.S. imports from South Korea rose almost 69 times, Mexico 29 times, and Japan 11 times.

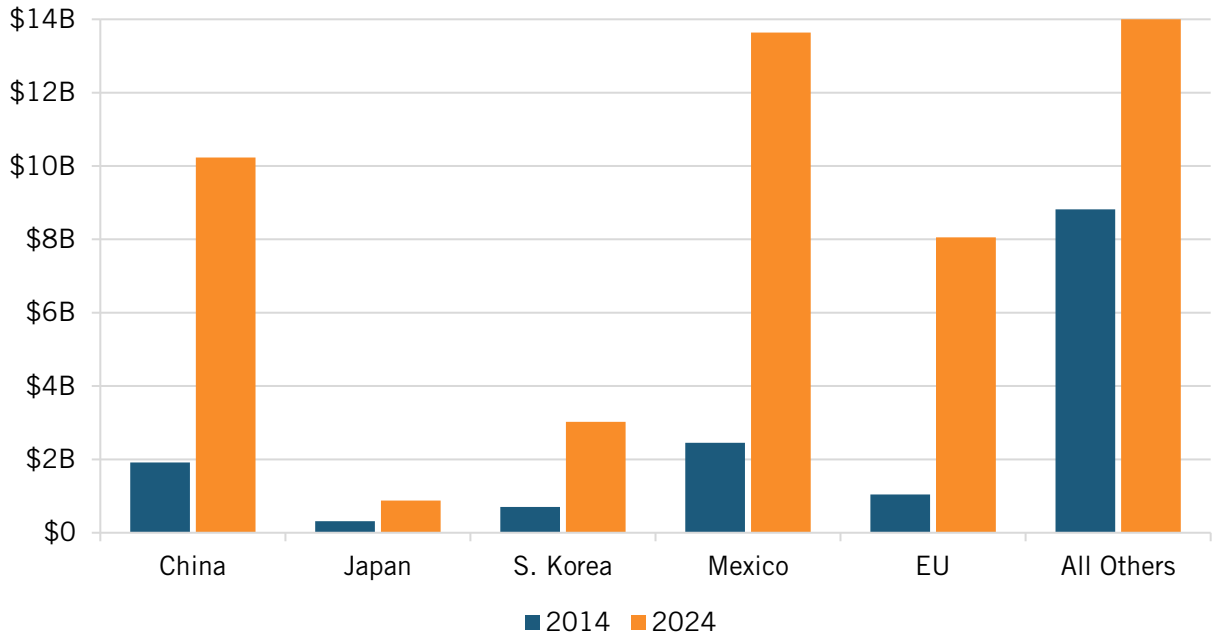
Figure 16: U.S. imports of electronics ATP from China, Japan, South Korea, Mexico, the EU, and others[30]



In 2024, the United States only exported $72 billion of electronics ATP product to the world. Of the $72 billion, the United States exported $13.6 billion (19 percent) to Mexico, $10 billion (14 percent) to China, $8.1 billion (11 percent) to the EU, $3 billion (4 percent) to South Korea, and $880 million (1 percent) to Japan. (See figure 17.)

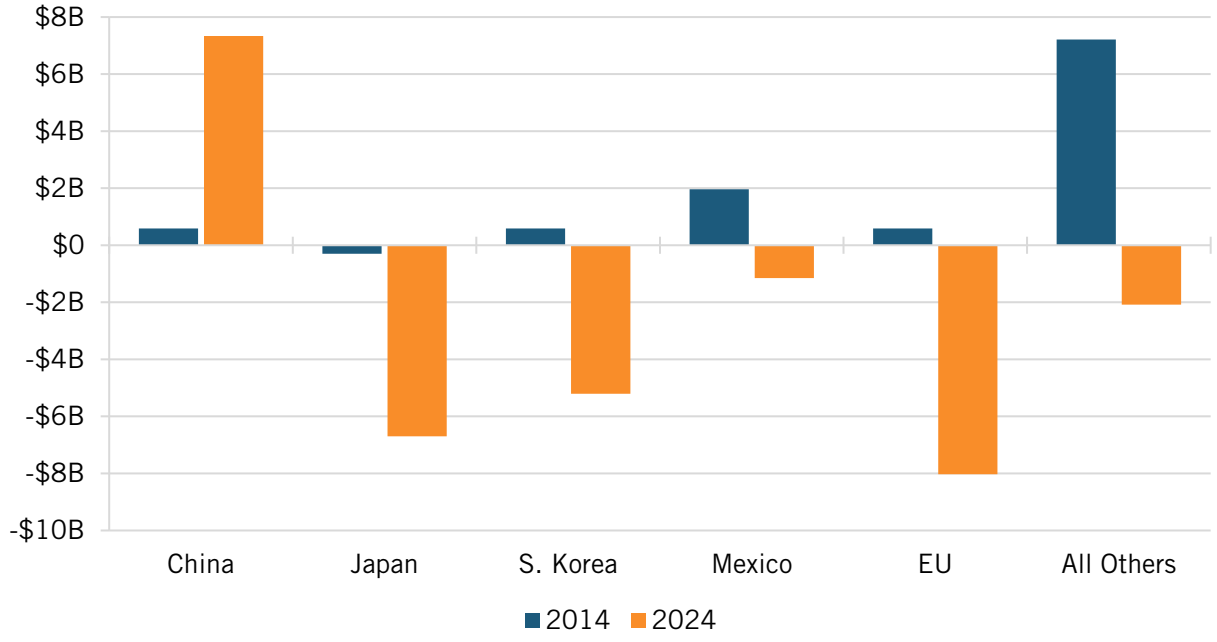
From 2014 to 2024, U.S. electronics ATP exports to the world rose 3.7 times from $15 billion to $72 billion while imports rose a staggering 18 times. U.S. exports to the EU rose 6.7 times, Mexico 4.6 times, and China 4.4 times. Meanwhile, U.S. exports to South Korea rose 3.3 times and exports to Japan rose 1.8 times.

Figure 17: U.S. exports of electronics ATP to China, Japan, South Korea, Mexico, the EU, and others[31]



U.S. net trade with the world in electronics products declined from +$10.1 billion to –$16 billion from 2014 to 2024. At the highest, U.S. net trade with the EU declined from +$586 million to –$8 billion, indicating it played the largest role of the five regions in the U.S. net trade deficit. Meanwhile, U.S. net trade with Japan declined from –$301 million to –$7 billion, South Korea from +$587 million to –$5.2 billion, and Mexico from +$2 billion to –$1.2 billion. Only net trade with China increased from +$588 million to +$7 billion. U.S. net trade with the rest of the world declined from +$7.2 billion to –$2.1 billion. (See figure 18.)

Figure 18: U.S. net trade of electronics ATP with China, Japan, South Korea, Mexico, the EU, and others[32]



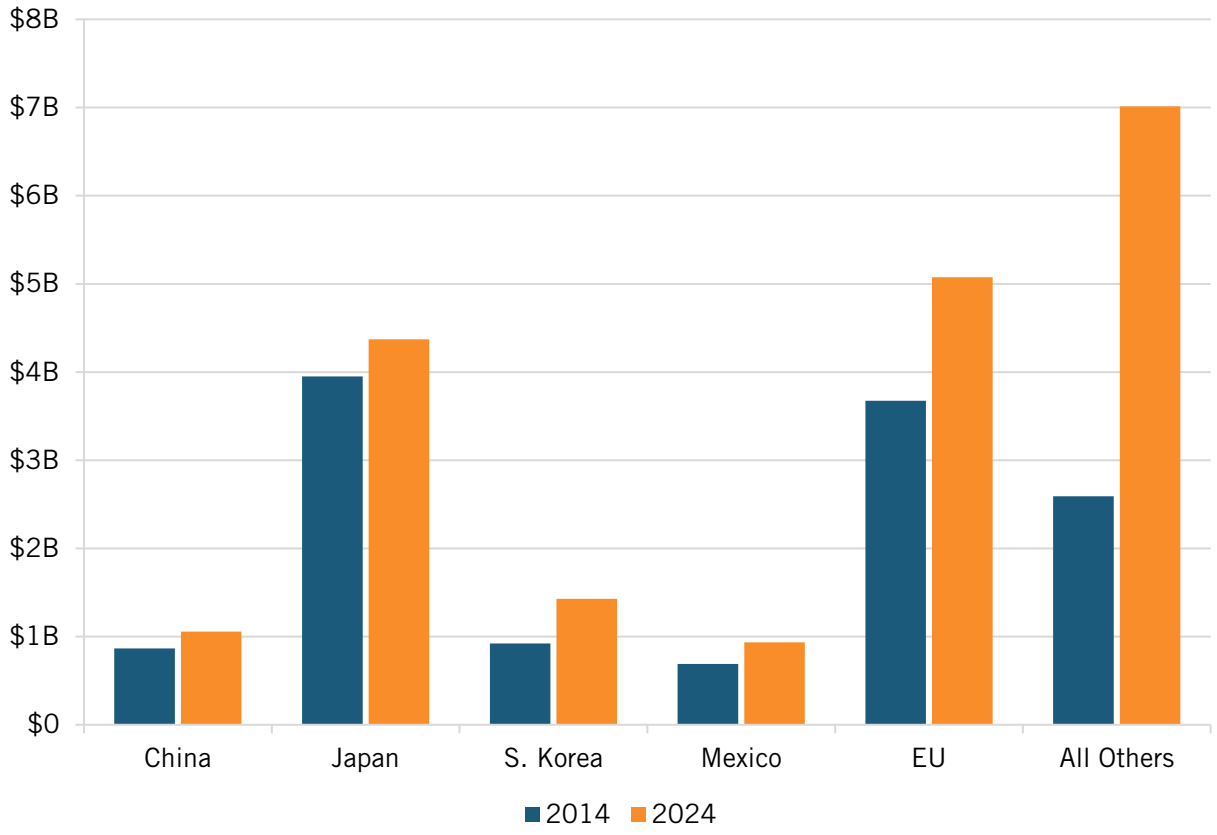
Flexible Manufacturing

The flexible manufacturing ATP group "encompasses advances in robotics, numerically controlled machine tools, and similar products involving industrial automation that allow for greater flexibility to the manufacturing process and reduce the amount of human intervention."[33] Some of the products included are robots, numerically controlled machine tools, and semiconductor production and assembly machines.[34]

In 2024, the United States imported $19.9 billion in flexible manufacturing ATP products from the world. Of the $20 billion, the United States imported $5.1 billion (26 percent) from the EU, $4.4 billion (22 percent) from Japan, $1.4 billion (7 percent) from South Korea, $1.1 billion (5 percent) from China, and $934 million (5 percent) from Mexico. (See figure 19.)

From 2014 to 2024, U.S. flexible manufacturing ATP imports from the world rose 57 percent from $12.7 billion to $19.9 billion. While Japan was the leading exporter of flexible manufacturing products to the United States in 2014, the EU is now leading in this area. This is partly because the EU export growth rate was 38 percent compared to Japan's 11 percent. Additionally, U.S. imports to South Korea also grew 55 percent, Mexico 36 percent, and China 22 percent.

Figure 19: U.S. imports of flexible manufacturing ATP from China, Japan, South Korea, Mexico, the EU, and others[35]

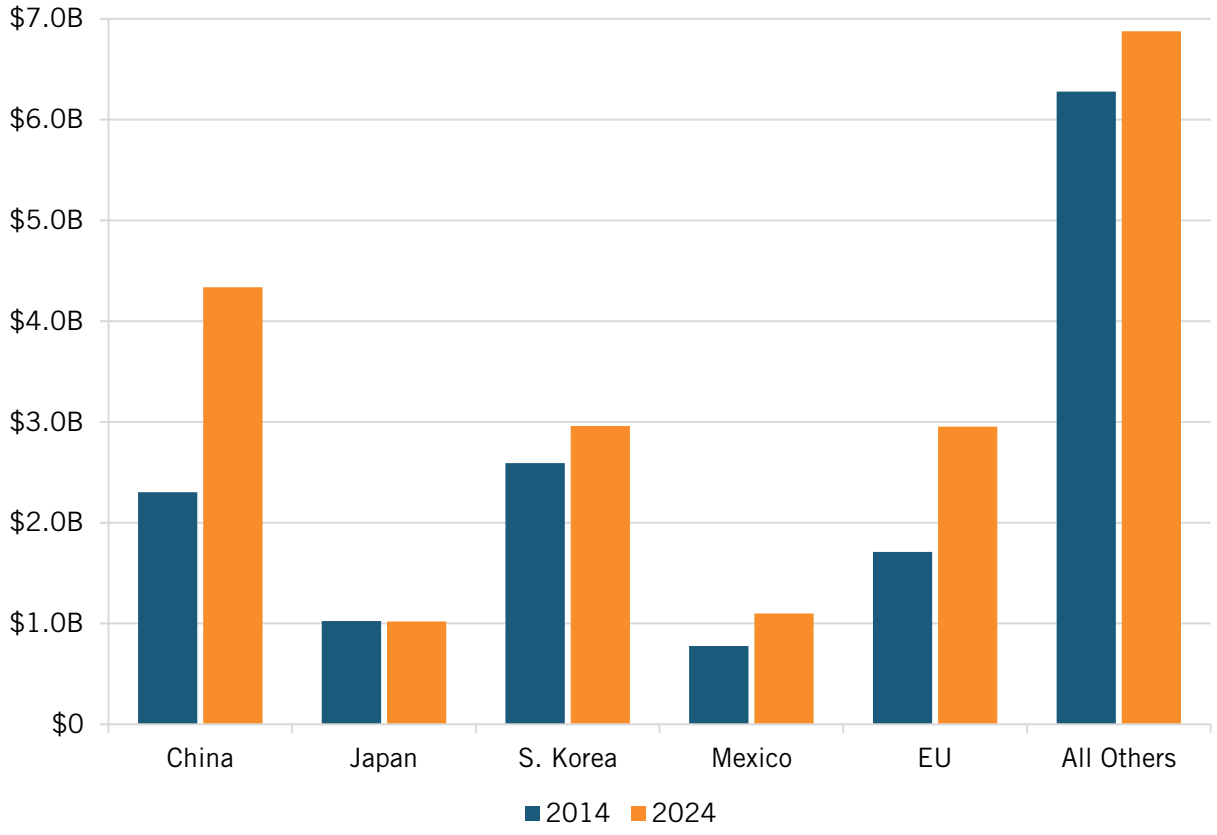


In 2024, the United States only exported $19.3 billion in flexible manufacturing ATP products to the world. Of the $19.3 billion, the United States exported $4.3 billion (23 percent) to China,

$3 billion (15 percent) to South Korea, $3 billion (15 percent) to the EU, $1.1 billion (6 percent) to Mexico, and $1 billion (5 percent) to Japan. (See figure 20.)

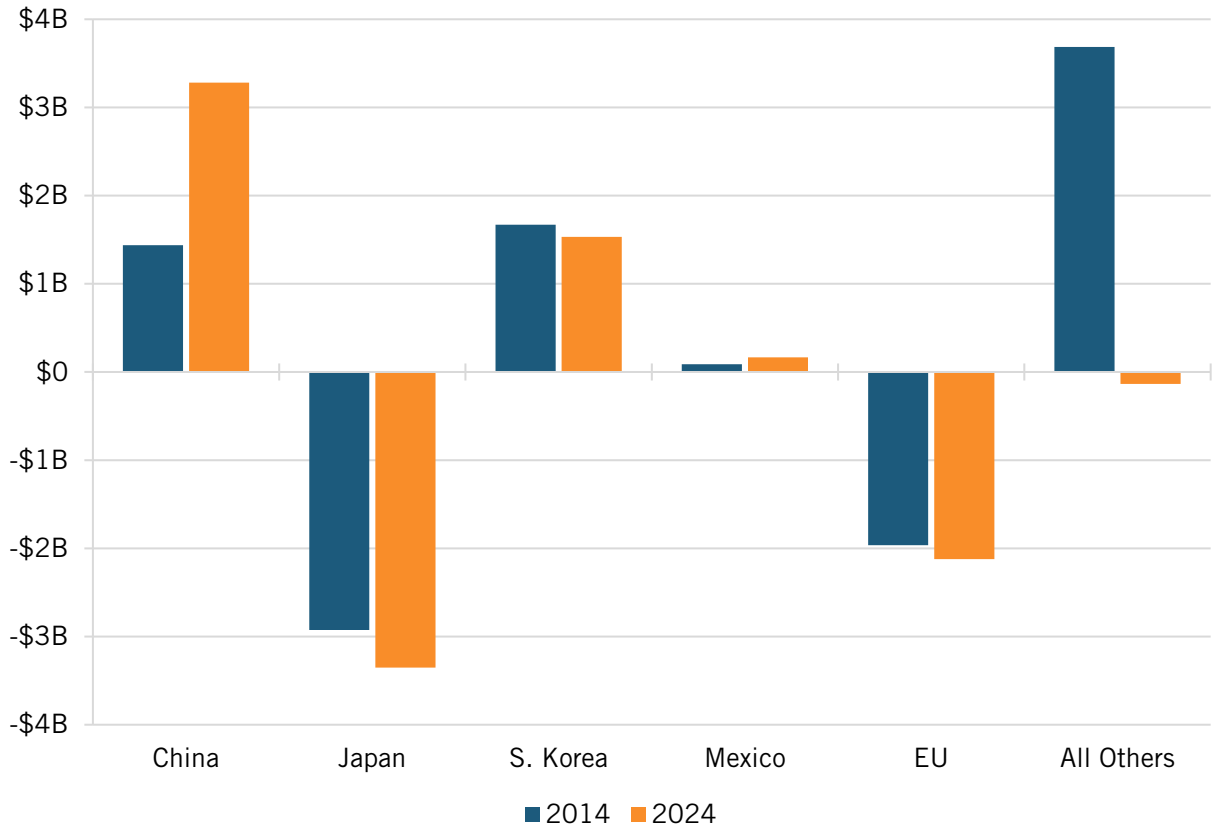
From 2014 to 2024, U.S. flexible manufacturing ATP exports to the world rose 31 percent from $14.7 billion to $19.3 billion compared to imports rising 57 percent. U.S. exports to China rose 88 percent, the EU 73 percent, and Mexico 42 percent. Falling below this rate, U.S. exports to South Korea rose 14 percent while exports to Japan declined 0.4 percent.

Figure 20: U.S. exports of flexible manufacturing ATP to China, Japan, South Korea, Mexico, the EU, and others[36]



From 2014 to 2024, U.S. net trade with the world declined from +$2 billion to –$631 million. Of the five regions, U.S. net trade with Japan declined the most from –$2.9 billion to –$3.4 billion, indicating it contributed the largest share to the U.S. net trade deficit. Meanwhile, U.S. net trade with South Korea also declined from +$1.7 billion to +$1.5 billion and the EU declined from –$2 billion to –$2.1 billion. Net trade with China saw an increase from +$1.4 billion to +$3.3 billion while Mexico saw an increase of $88 million to +$166 million. U.S. net trade with the rest of the world declined from +$3.7 billion to –$136 million. (See figure 21.)

Figure 21: U.S. net trade of flexible manufacturing ATP with China, Japan, South Korea, Mexico, the EU, and others[37]



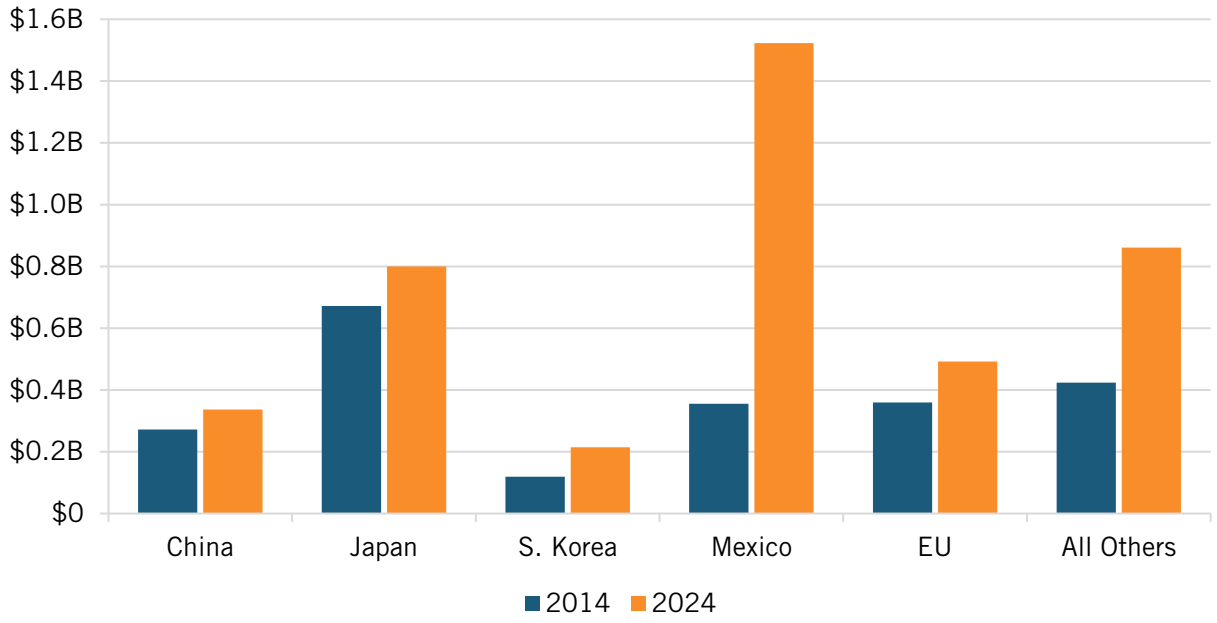
Advanced Materials

The advanced materials ATP group consists of products that are "recent advances in the development of materials that allow for further development and application of other advanced technologies."[38] Some products included in this group are semiconductor materials, optical fiber cable, and video discs.[39]

In 2024, the United States imported $4.2 billion in advanced materials ATP products from the world. Of the $4.2 billion, the United States imported $1.5 billion (36 percent) from Mexico, $800 million (19 percent) from Japan, $492 million (12 percent) from the EU, $337 million (8 percent) from China, and $215 million (5 percent) from South Korea. (See figure 22.)

From 2014 to 2024, U.S. advanced materials ATP imports from the world rose 92 percent from $2.2 billion to $4.2 billion. In 2014, Japan exported the most advanced materials to the United States but by 2024, Mexico was the highest exporter of the five regions. This is partly due to Mexico's exports rising 328 percent compared with Japan's 19 percent. Meanwhile, U.S. imports from South Korea also rose 80 percent, the EU 37 percent, and China 24 percent.

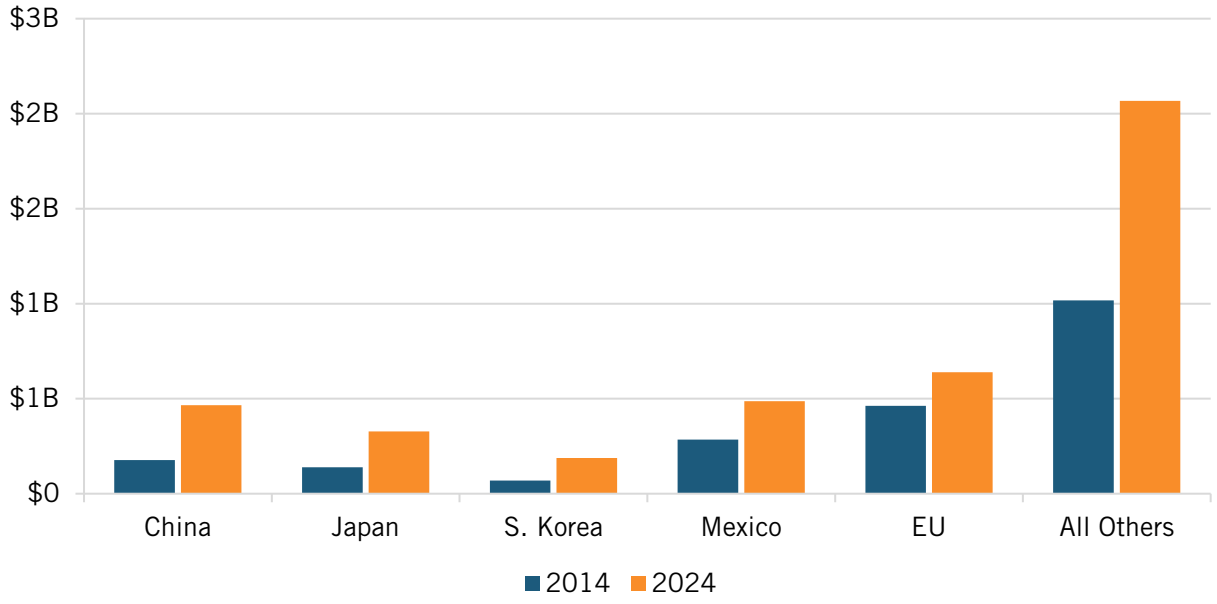
Figure 22: U.S. imports of advanced materials ATP from China, Japan, South Korea, Mexico, the EU, and others[40]



In 2024, the United States exported $4.2 billion in advanced materials ATP products to the world. Of the $4.2 billion, the United States exported $639 million (15 percent) to the EU, $486 million (12 percent) to Mexico, $466 million (11 percent) to China, $328 million (8 percent) to Japan, and $188 million (4 percent) to South Korea. (See figure 23.)

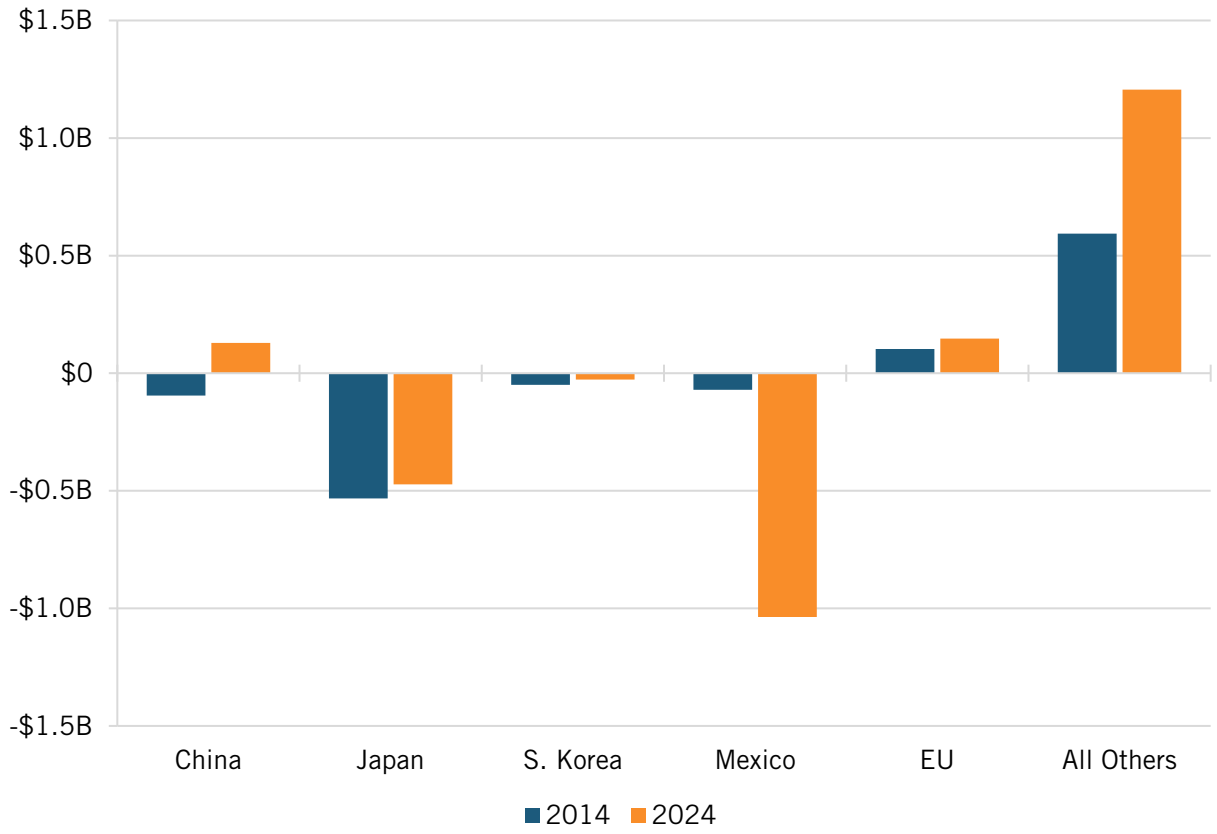
From 2014 to 2024, U.S. advanced materials ATP exports rose 94 percent from $2.2 billion to $4.2 billion while imports only rose 92 percent. U.S. exports to South Korea rose 170 percent, China 163 percent, and Japan 136 percent while U.S. exports to Mexico only rose 71 percent and the EU 38 percent.

Figure 23: U.S. exports of advanced materials ATP to China, Japan, South Korea, Mexico, the EU, and others[41]



From 2014 to 2024, U.S. net trade with the world in advanced materials products remained relatively the same, declining from –$51 million to –$54 million. Of the five regions, U.S. net trade with Mexico saw the largest decline from –$70 million to –$1 billion, indicating that it played a role in the U.S. net trade deficit. In contrast, U.S. net trade with China rose from a –$95 million to +$129 million. Meanwhile, net trade with Japan, South Korea, and the EU also rose. (See figure 24.)

Figure 24: U.S. net trade of advanced materials ATP with China, Japan, South Korea, Mexico, the EU, and others[42]



Aerospace

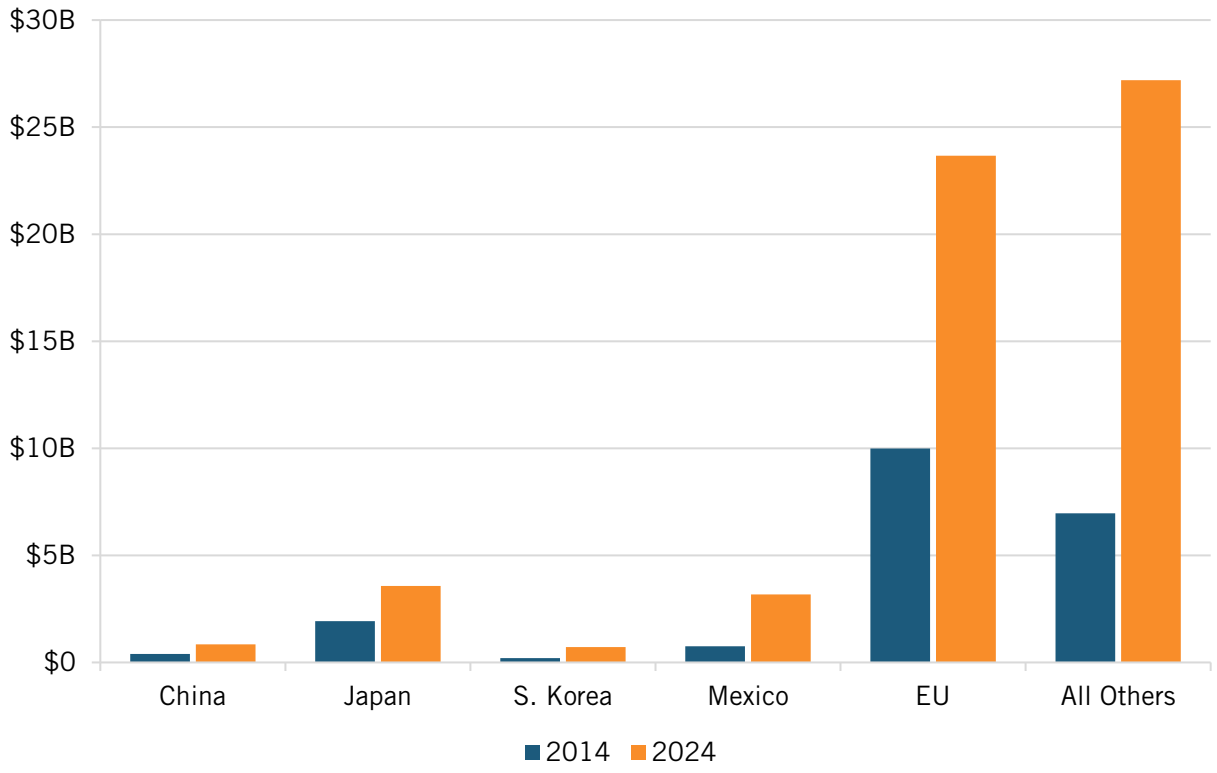
The aerospace ATP group consists of "most new military and civil helicopters, airplanes and spacecraft (with the exception of communications satellites that are included under Information & Communications Technology). Other products included are turbojet aircraft engines, flight simulators and automatic pilots."[43]

In 2024, the United States imported $59 billion in aerospace ATP product from the world. Of this $59 billion, the United States imported $24 billion (40 percent) from the EU, $3.6 billion (6 percent) from Japan, $3.2 billion (5 percent) from Mexico, $844 million (1 percent) from China, and $721 million (1 percent) from South Korea. (See figure 25.)

From 2014 to 2024, U.S. aerospace ATP imports rose 192 percent from $20 billion to $59 billion. During this period, the EU continued to be the largest exporter of aerospace products to the United States. U.S. imports from Mexico rose 322 percent and from South Korea rose 261

percent, while U.S. imports from the EU only rose 137 percent, China 113 percent, and Japan 85 percent.

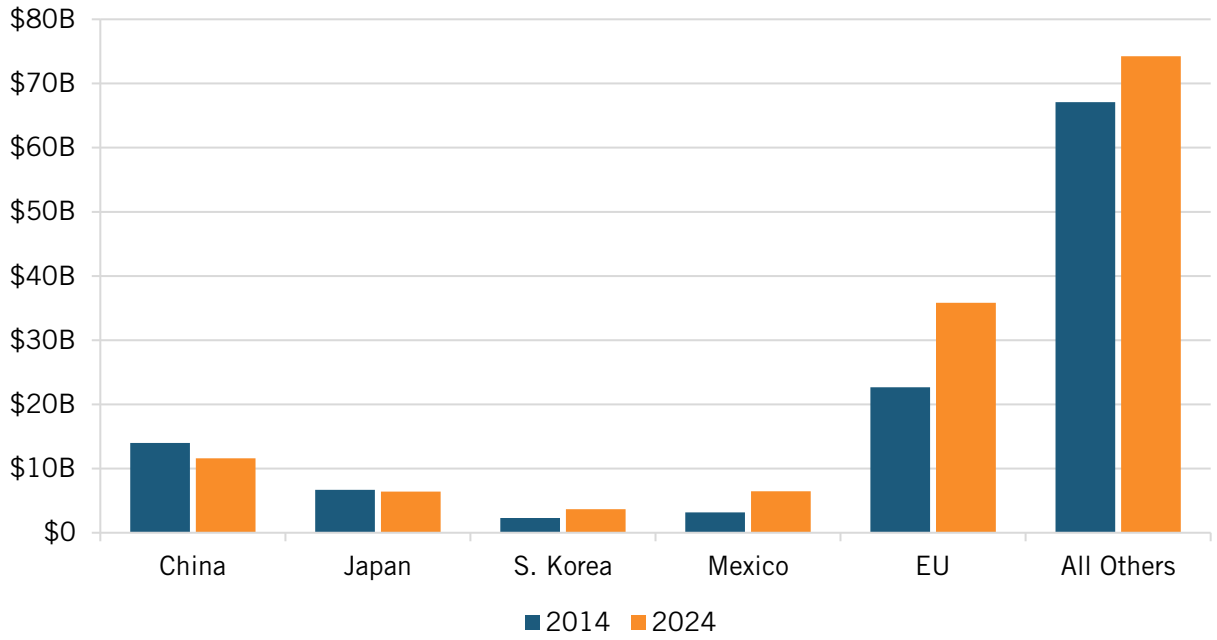
Figure 25: U.S. imports of aerospace ATP from China, Japan, South Korea, Mexico, the EU, and others[44]



In 2024, the United States exported $138 billion in aerospace ATP products to the world. Of the $138 billion, the United States exported $36 billion (26 percent) to the EU, $12 billion (8 percent) to China, $6.5 billion (5 percent) to Mexico, $6.4 billion (5 percent) to Japan, and $3.7 billion (3 percent) to South Korea. (See figure 26.)

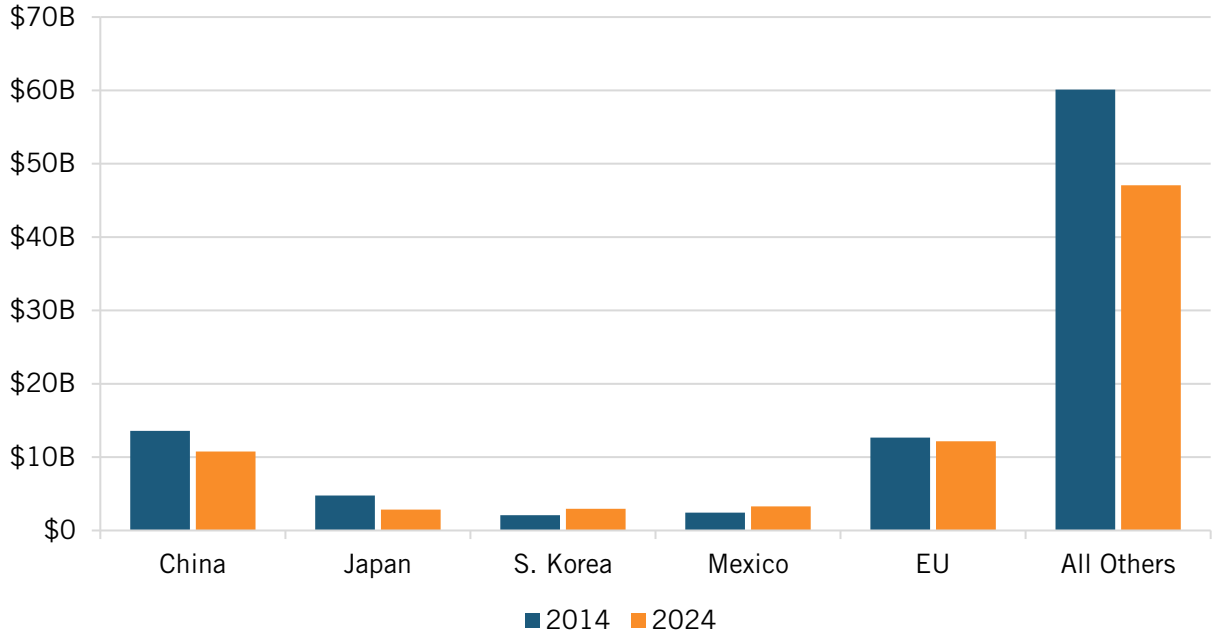
From 2014 to 2024, U.S. aerospace ATP exports to the world rose 19 percent from $116 billion to $138 billion while imports rose 192 percent. U.S. aerospace ATP exports to Mexico rose 103 percent, South Korea 60 percent, and the EU 58 percent. Meanwhile, U.S. exports to China and Japan declined by 17 percent and 4 percent, respectively.

Figure 26: U.S. exports of aerospace ATP to China, Japan, South Korea, Mexico, the EU, and others[45]



From 2014 to 2024, U.S. net trade with the world in aerospace products declined from +$96 billion to +$79 billion. Of the five regions, U.S. net trade with the China saw the largest decline from +$13.6 billion to +$10.8 billion, indicating that it played the largest role in the U.S. net trade decline. U.S. net trade with Japan and the EU also declined by $2 billion and $510 million, respectively. On the other hand, U.S. net trade with South Korea and Mexico rose by $853 million and $848 million, respectively. U.S. net trade with the rest of the world declined from +$60 billion to +$47 billion. (See figure 27.)

Figure 27: U.S. net trade of aerospace ATP with China, Japan, South Korea, Mexico, the EU, and others[46]



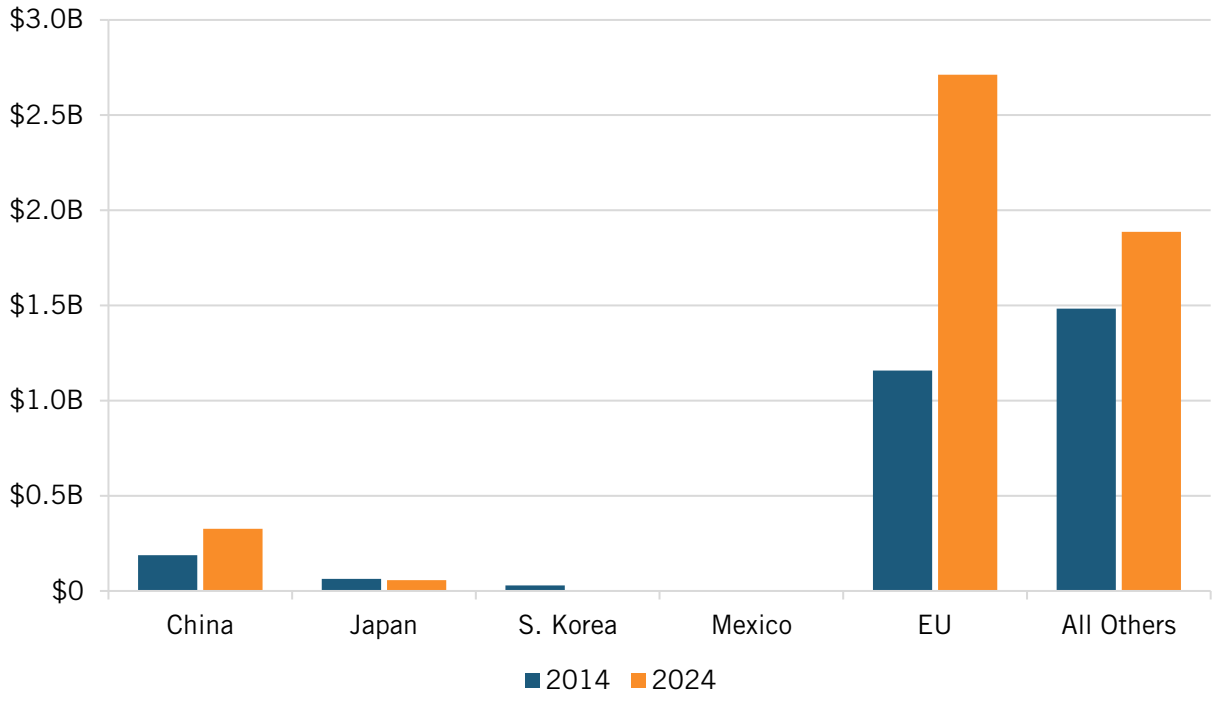
Nuclear Technology

The nuclear technology ATP group "encompasses nuclear power production apparatus. Includes nuclear reactors and parts, isotopic separation equipment and fuel cartridges. Excludes nuclear medical apparatus, which is included under Life Science."[47]

In 2024, the United States imported $5 billion in nuclear technology ATP products from the world. Of this $5 billion, the United States imported $2.7 billion (54 percent) from the EU, $326 million (7 percent) from China, $57 billion (1 percent) from Japan, $4 billion (0.08 percent) from South Korea, and $656,167 (0.01 percent) from Mexico. (See figure 28.)

From 2014 to 2024, U.S. nuclear technology ATP imports from the world rose 71 percent from $2.9 billion to $5 billion. During this period, the EU has continued to be the largest exporter of nuclear technology to the United States. Indeed, U.S. imports from the EU rose 134 percent during this period. U.S. imports to Mexico also rose 193 percent and China 74 percent. In contrast, U.S. imports to South Korea fell 86 percent while imports to Japan fell 10 percent.

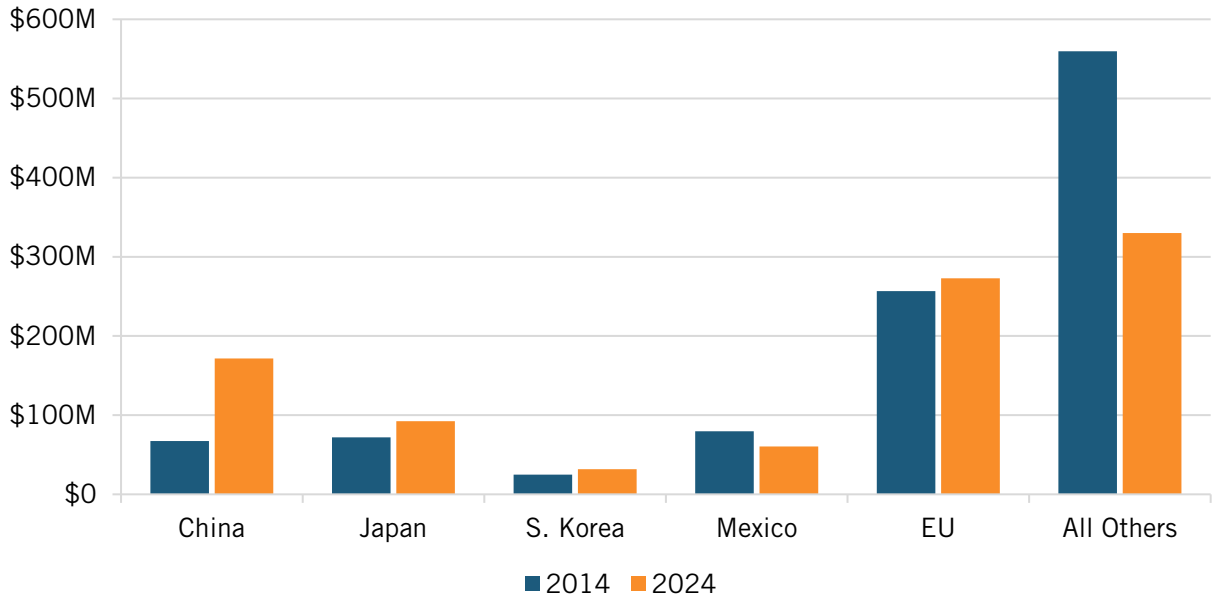
Figure 28: U.S. imports of nuclear technology ATP from China, Japan, South Korea, Mexico, the EU, and others[48]



In 2024, the United States exported only $959 million in nuclear technology ATP products to the world. Of this $959 million, the United States exported $273 million (28 percent) to the EU, $172 million (18 percent) to China, $92 million (10 percent) to Japan, $60 million (6 percent) to Mexico, and $32 million (3 percent) to South Korea. (See figure 29.)

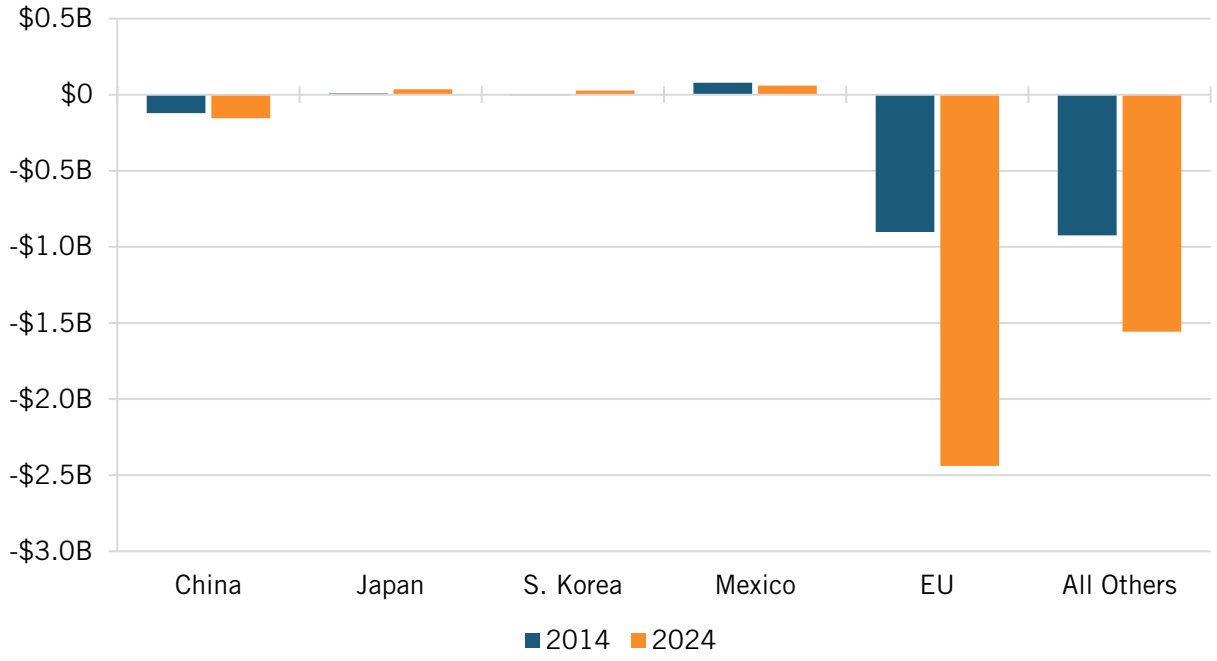
From 2014 to 2024, U.S. nuclear technology exports to the world declined 10 percent while imports rose 71 percent. U.S. exports to China rose 155 percent, Japan 28 percent, South Korea 28 percent, and the EU 6 percent. In contrast, U.S. exports to Mexico declined 24 percent.

Figure 29: U.S. exports of nuclear technology ATP to China, Japan, South Korea, Mexico, the EU, and others[49]



From 2014 to 2024, U.S. net trade with the world in nuclear technology declined from –$1.9 billion to –$4 billion. Of the five regions, U.S. net trade with the EU declined the most—by $1.5 billion—indicating that it contributed most to the U.S. net trade deficit. U.S. net trade with China also declined from –$120 million to –$155 million and Mexico from +$79 million to +$60 million. Meanwhile, net trade with Japan increased from +$8.9 million to +$36 million and net trade with South Korea increased from –$3.9 million to +$27.6 million. U.S. net trade with the rest of the world declined from –$924 million to –$1.6 billion. (See figure 30.)

Figure 30: U.S. net trade of nuclear technology ATP with China, Japan, South Korea, Mexico, the EU, and others[50]



CONCLUSION

The magnitude of the reversal cannot be overstated. As recently as 2014, U.S. advanced industries were broadly competitive in global trade markets. The United States ran a net trade surplus overall, with only five of nine ATP groups in deficit. A decade later, that position had only worsened. Today, the United States runs a net trade deficit in eight of nine ATP groups, signaling a systemic deterioration rather than isolated sectoral weakness. This is not a marginal shift at the edges of trade performance. It is a wholesale erosion of U.S. standing across the very industries that define technological leadership and future growth.

This depressing trade performance has direct consequences not just for U.S. competitiveness but also for national power itself. As foreign producers, particularly in the EU and Mexico, capture an increasing share of global and U.S. demand while importing less from the United States, American firms lose the scale necessary to sustain high fixed-cost innovation, accelerate learning, and commercialize new technologies rapidly. Over time, shrinking market share erodes scale economies, slows innovation cycles, raises unit costs, and reduces U.S. influence over global standards. These advanced industries, including producers of optoelectronics, aerospace, and nuclear technology, are critical to economic growth, defense readiness, technological edge, and geopolitical influence. Policymakers should implement a national power industry strategy that prioritizes strategically important sectors, directs markets to preserve critical capabilities, balances production with innovation, and emphasizes long-term positioning over short-term efficiency. Without decisive action, the United States risks a long-term loss of competitiveness and reliance on China or other foreign powers for capabilities that underpin both economic resilience and national security.

Assessing the Clout of US National Power Industries vs. China

KEITH BELTON

A select group of advanced, globally traded industries serves as the bedrock of U.S. technological leadership, economic power, and national security. Policymakers need to closely monitor the relative strength and vulnerability of its production capabilities.

KEY TAKEAWAYS

- The techno-economic clout of a nation is a function of both its domestic production capabilities in strategically important industries and its relative dependence on the production capabilities of its key geopolitical rivals.
- The federal government doesn't yet systematically monitor the capabilities of U.S. industries in those terms. To fill that void, this report uses statistical measures of comparative advantage and dependency to compile a "clout index."
- Illustrating its usefulness, the clout index shows that the U.S. machine tools industry regressed over 15 years, as its comparative advantage dropped and U.S. dependence on imports nearly doubled.
- Applied across 177 industries ITIF has identified as "national power industries," the clout index shows that just 5 are in a strong position, and 18 are somewhat strong, while 25 have scores indicating strategic weakness. The rest fall in between.
- More ongoing analysis of risk is needed in these industries. The Promoting Resilient Supply Chains Act can serve as the vehicle to establish that function in the Commerce Department. Congress should enact it, with definitions covering power industries.

INTRODUCTION

We live in an age of "weaponized interdependence," wherein China is working to gain advantage in a wide range of advanced industries in which it can employ economic coercion, including leveraging chokepoints. Case in point: Last year, the United States backed off Biden-era export controls of semiconductors and jet engines to China in return for China loosening restrictions on rare earth minerals to the United States. As Secretary of State Marco Rubio admitted, "[O]ur industrial capacity is deeply dependent on a number of potential adversary nation-states, including China, who can hold it over our head."[1] And China is not averse to doing so, as it recently banned the export of some dual-use technologies to Japan in response to Japan's statement that a Chinese invasion of Taiwan would represent an "existential threat."[2]

Not all industries can be used for coercive power. China has a near monopoly on Christmas tree tinsel, but no one cares. However, we do care about its strength in active pharmaceutical ingredients, since the United States cannot be without drugs.

This underscores the importance of "power" industries—defense, dual-use, and enabling industries—that are responsible for the wellspring of a nation's power. (See box 1.) In recent work, the Information Technology and Innovation Foundation (ITIF) identified 216 national power industries—representing approximately 22 percent of the 970 six-digit industries in the North American Industry Classification System (NAICS)—and compared each with respect to several economic indicators including value of shipments, employment, capital expenditures, value added, etc.[3]

In this report, we add to this body of work by introducing a clout index (CI), a measure that combines comparative advantage that the United States has in particular sectors with its relative dependency on China for imports compared with all other nations.

We apply it first to a single industry—machine tools—and then to all national power industries. We present the results, noting those industries at the top and the bottom, and then suggest a few other applications. Finally, we describe certain policy implications and recommend that the federal government establish a statistical monitoring system for power industries.

THE CLOUT INDEX

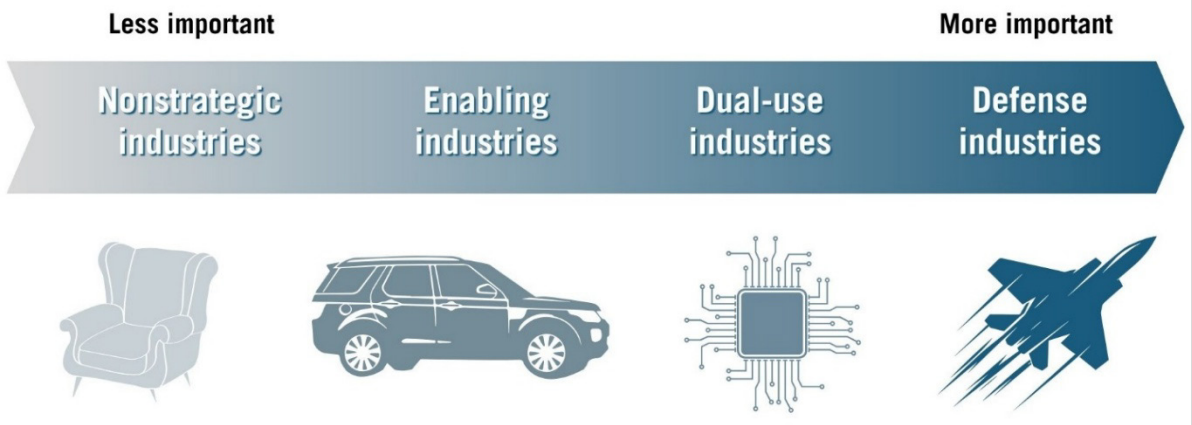
We start with a premise: The techno-economic clout of a nation is a function of its domestic production capabilities in key industries and its relative dependence on the production capabilities of its key geopolitical rivals.

To assess domestic production capabilities, we employ a long-established metric known as revealed comparative advantage (RCA), which is the share of a nation's exports of a certain good divided by the world exports of that good as a share of total world exports.[4] When RCA exceeds 1, the world signals that it prefers to purchase that good from the exporting country, thereby suggesting world-class production capability.[5] The higher the value of RCA, the greater the capability. For example, if U.S. airplane exports represent 6 percent of all U.S. exports and world exports of airplanes are 3 percent of all world exports, then the U.S. RCA in the airplane industry would be 2. If U.S. exports of airplanes were 1.5 percent of all U.S. exports—or half the global figure—then the U.S. RCA would be 0.5.

Box 1: Defining National Power Industries

The conventional view is that the only industries that matter to national power are defense industries. But that is now vastly too limiting. As Corelli Barnett wrote, "For munitions production for modern war is not primarily a question of specialized armament industries, as some suppose, but of all those varied industrial and scientific resources that in peacetime make for a successful and expanding export trade."6 As such, ITIF has developed a classification of U.S. industries based on their relevance to national power. This can be viewed as a continuum between defense industries on one side, nonstrategic industries on the other, and strategic industries and strategic enabling industries in the middle. See figure 1.

Figure 1: Industrial power scale



At one end of the continuum are defense industries. Clearly, industries such as ammunition, guided missiles, military aircraft and ships, tanks, drones, defense satellites, and others are strategic. Not having world-class innovation and production capabilities in these industries means weakened military capability. Policymakers across the aisle generally (with the exception of the isolationist Right and the pacifist Left) agree that these industries are strategic and that market forces alone will not produce the needed results.

At the other end of the spectrum are industries in which the United States has no real strategic interests. These include furniture, coffee and tea manufacturing, bicycles, carpet and rug mills, window and door production, plastic bottle manufacturing, wind turbine production, lawn and garden equipment, sporting goods, jewelry, caskets, toys, toiletries, running shoes, etc. If worst came to worst and our adversaries (e.g., China) gained dominance in any of these industries and decided to cut America off, we'd survive—in part, because none of these are critical to the running of the U.S. economy, as many are final goods that might inconvenience consumers but wouldn't cripple any industries, and also because, in most cases, domestic production could be started or expanded relatively easily because none of these products are all that technological complex from either a product or process concern and the barriers to entry are relatively low.

Next to defense industries, dual-use industries are critical to American strength. Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give our adversaries incredible leverage over America. Just the threat of cutting these off (assuming that they have also deindustrialized our allies in these sectors) would immediately bring U.S. policymakers to the bargaining table. National power industries tend to also need global scale in order to complete.

Moreover, many are intermediate goods such as semiconductors and chemicals, where a cutoff would cripple many other industries. Finally, these industries are hard to stand up once they're lost because of the complexity of the production process, the need for product knowledge, and the importance of the industrial commons that support them. In other words, barriers to entry are high and, if lost, would be very difficult and expensive to reconstitute.

Finally, there are enabling industries. These are industries wherein, if the United States were cut off, the immediate effects on military readiness would be small—and the U.S. economy could survive for at least a while without that production. America could survive for many years without an auto sector, as we would all just drive the cars we already own longer. But because of the nature of these industries—including technology development, process innovation, skills, and supporting institutions—their loss would harm both dual-use and defense industries. That is because enabling industries contribute to the industrial commons that support dual-use defense industries. A severely weakened motor vehicle sector would weaken the tank and military vehicle ecosystem. Similarly, a weakened commercial shipbuilding sector has weakened military shipbuilding. A weakened consumer electronics sector weakens military electronics.

As part of enabling industries is a core set of industries that make up the "industrial commons"—sometimes called the "mother industries." These include machine tools and dies, metal and alloy fabrications, injection molding, electronic packaging, specialty chemicals, etc. These are core to converting lab technologies into commercial products, building new supply chains, and scaling up US production capacity. And the United States has lost them substantially. They also seem to be in the blind spot of both policymakers and capital investors because they are not the new shiny toy.

ITIF has put the 970 industries classified by six-digit NAISC codes into these four categories: nonstrategic, enabling, dual use, and defense.7 Most industries (more than three-quarters) are not power industries, in large part because most are nontraded sectors such as law firms and barber shops. Less than a quarter (22.3 percent) are power industries, of which just 0.5 percent are defense industries, and 13.4 percent are dual use. The remaining 8.4 percent are enabling industries. Just 9.5 percent of U.S. workers were employed in power industries as of 2022—6.4 percent in dual-use industries, 2.9 percent in enabling industries, and just 0.2 percent in defense industries.

One measure of U.S. dependence on imports for a particular good is revealed comparative dependence (RCD), which is the share of a nation's imports of a good divided by the share of world imports represented by that good.[8] When RCD exceeds 1, a nation purchases more of that good from other nations than the global average. The higher the value of RCD, the greater the dependence on imports. For example, if the U.S. imports of telecom equipment represent 2 percent of all U.S. imports, and telecom equipment represents 1 percent of all world imports, then the U.S. RCD would be 2.

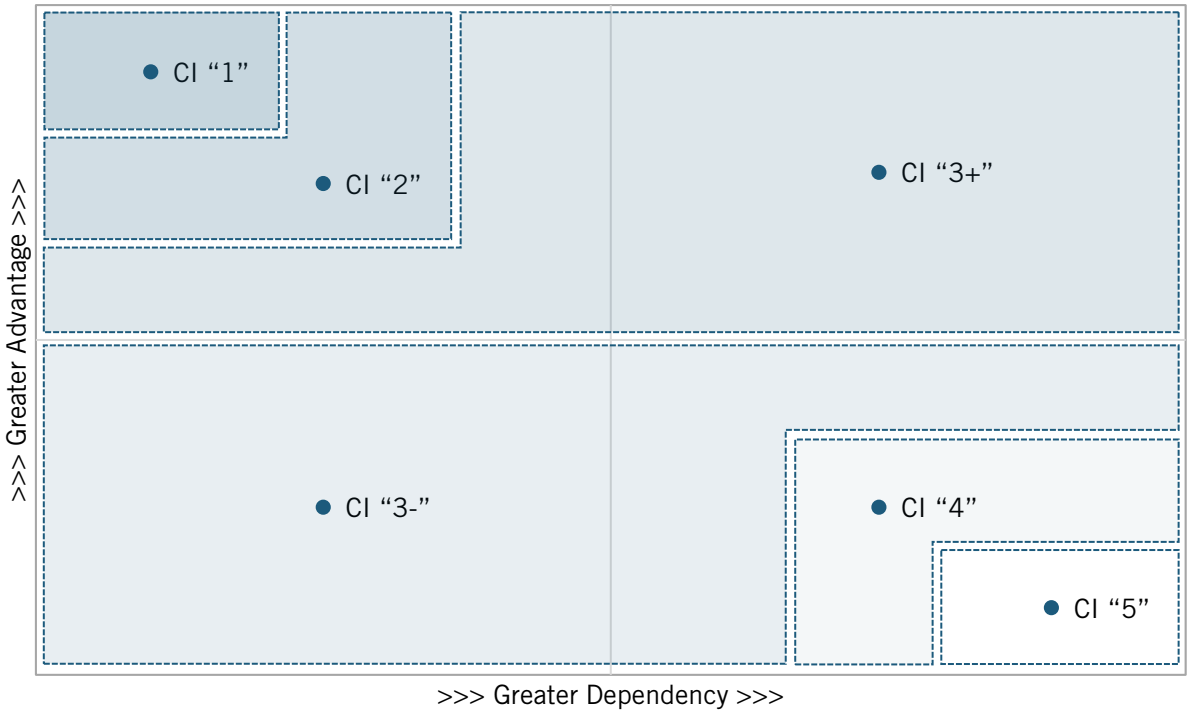
We can take this even further and look at dependence on a particular nation, in this case, China. When U.S. RCD for a good exceeds China's global trade share for all goods, then the United States is dependent on China for that good. In our telecom example, if telecom imports from China represent 0.8 percent of U.S. imports, then U.S. RCD (from China) would be 0.8. Because this number exceeds China's world total trade share (which was 0.13 in 2023), we can say that the United States is more dependent on China than it is on other nations for telecom equipment, on average.

The CI is a whole number that reflects both RCA and RCD. The quadrant chart in figure 2 illustrates how it is assigned. Note that it does not depend simply on the underlying quadrant. This is because both RCA and RCD are continuous variables, and there is no practical difference between an RCA of 0.99 and 1.01, even though the demarcation of superior production capabilities falls in between these two numbers. A similar situation arises with RCD. Therefore, we assign a CI of 1 to 5 depending on the combination of RCA and RCD. When the CI is low (4 or 5), a power industry is underperforming and has higher-than-average dependence on China, which the country could exploit. When the CI is high (1 or 2), a power industry is performing well (it exhibits world-class capabilities) and much less domestic vulnerability arises for China to exploit.

The techno-economic clout of a nation is a function of its domestic production capabilities in key industries and its relative dependence on the production capabilities of its key geopolitical rivals.

A CI of 3 reflects two kinds of risk. We differentiate by assigning either a 3+ or 3-. The former indicates RCA > 1 but is not CI = 1 or CI = 2. For example, pharmaceutical preparations (pills, tablets, intravenous solutions) and pressed or blown glass industries are 3+. The latter indicates RCA < 1 but is not CI = 4 or CI = 5. For example, industries such as steel foundries, power boilers, and heat exchangers and machine tools are 3-.

Figure 2: The CI matrix of revealed comparative advantage and dependence



The CI for an industry is determined by combining RCA and RCD for each traded good associated with that industry.[9] We employ the U.S. International Trade Commission (ITC) commodity translation tool to identify Harmonized Tariff Schedule (HTS) codes of traded goods associated with the six-digit NAICS for each national power industry.[10] We then truncate the 10-digit HTS codes (particular to the United States) to 6-digit HTS codes (used by all nations) to allow the gathering of international trade data (using Comtrade) sufficient to estimate RCA and RCD.[11]

- We assign a CI of "1" where RCA > 2 and RCD < 0.05.
- A CI of "2" is where CI is not "1" and where RCA > 1.2 and RCD < 0.1.
- A CI of "3" is simply where CI is not "1," "2," "4," or "5."
- A "3+" is a "3" when RCA > 1 and a "3-" is a "3" when RCA < 1.
- A CI of "4" is where CI is not "5" and where RCA < 0.8 and RCD > 0.15.
- A CI of "5" is where RCA < 0.4 and RCD > 0.25.

In employing this approach, we have made two methodological choices. First, we exclude from the CI any traded good where missing trade-flow data prevent an estimation of both RCA and RCD. For example, if there are 10 goods (i.e., 10 HTS codes) associated with an industry, and 1 of the goods contains missing information on U.S. exports, we exclude that good because RCA cannot be estimated.[12] Second, we base the CI on the mean value of both RCA and RCD for all traded goods associated with an industry; that is, we give equal weight to different goods produced by a single industry.[13]

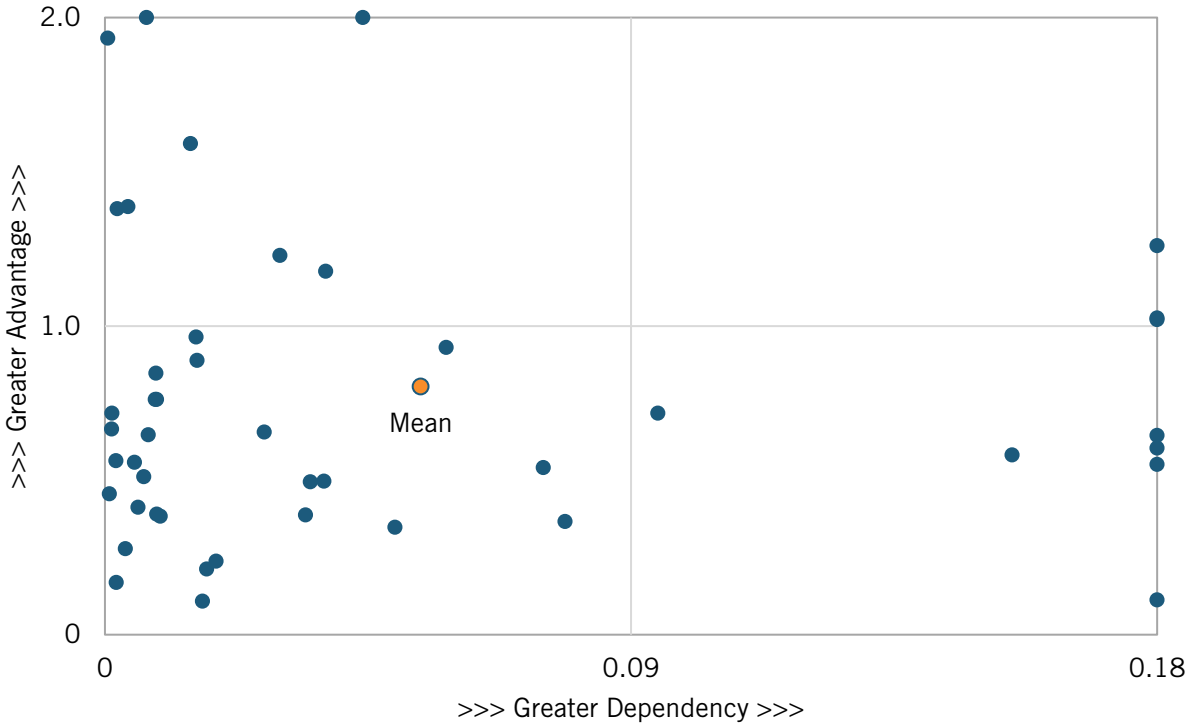
One drawback to this methodology is that we do not account for goods that are made in China and then rerouted through another nation (e.g., Vietnam) before being exported to the United States, a practice that has drawn increased attention after the first Trump administration imposed higher tariffs on Chinese goods. To the extent that such practices occur, our methodology understates RCD.

APPLICATION TO A SINGLE INDUSTRY

With the CI, one can see how clout changes over time for any industry. Figure 3 and figure 4 show RCA and RCD for all 41 categories of traded goods associated with the U.S. machine tool industry over a 15-year period, 2007–2022. The scatterplot is shown on a quadrant matrix chart. Each quadrant represents a combination of domestic advantage and dependence on China. For example, clout is highest in the upper-left quadrant, when domestic advantage is high and dependence on China is low. Conversely, clout is lowest in the bottom-right quadrant, when domestic advantage is low and dependence on China is high. In both figures, outliers are constrained to a maximum value for visual effect. These are shown on the upper and right-hand borders.

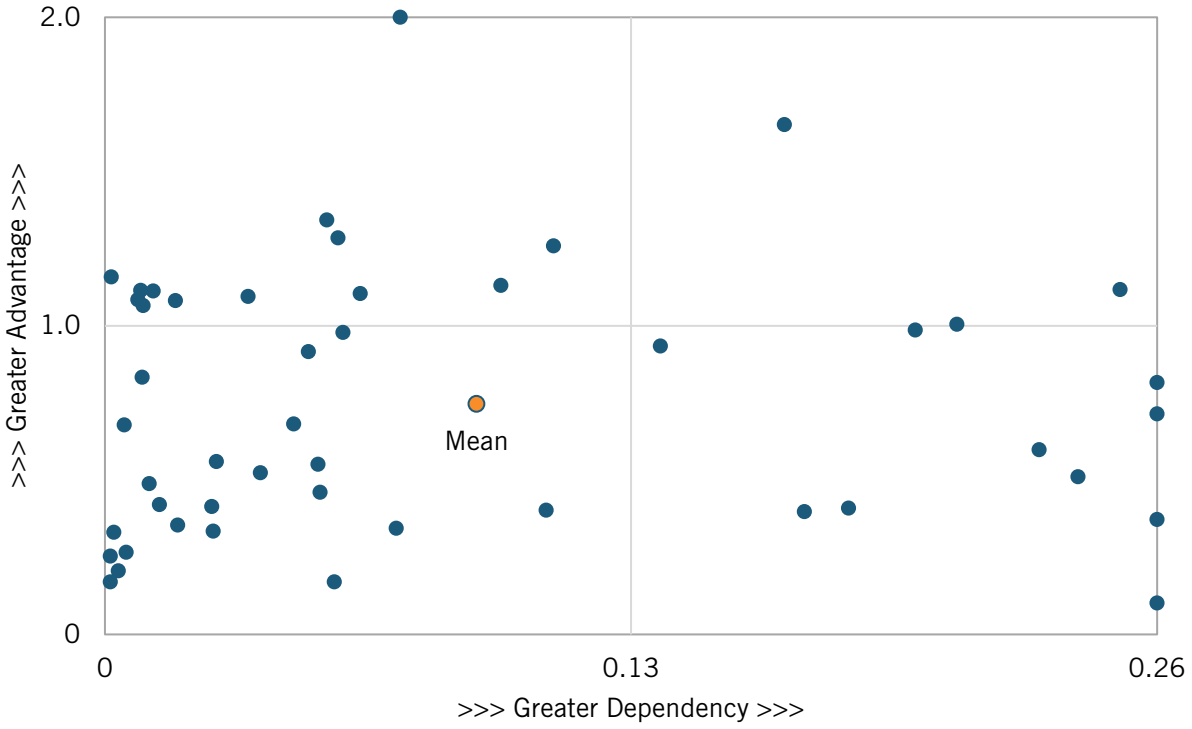
In 2007 (figure 3), most industries were in the bottom left quadrant, which indicates that the United States was dependent on other trading partners except China for these goods.

Figure 3: U.S. machine tool industry, 2007



By 2022 (figure 4), the U.S. preferences for machine tools from China (RCD) increased, as shown by the larger number of sub-industries in the upper-right and lower-right quadrants of these two charts. World preferences for U.S.-made machine tools (RCA) declined (leaving fewer subindustries in the left-hand quadrants). The overall CI (3-) remained the same.

Figure 4: U.S. machine tool industry, 2022



Over the period of interest, the mean value of both RCA and RCD changed. The mean RCA dropped from 0.80 to 0.75 and the mean RCD nearly doubled from 0.05 to 0.09. The net result was a decrease in clout, but not enough to change the overall CI. In both years, CI was 3-.

Instead of looking at just the mean value of RCA or RCD, one could look for outliers (i.e., goods whose exports or imports changed the most over time). Table 1 lists those goods where RCA changed the most between 2007 and 2022. The United States gained the most ground in producing lathes for removing metal (HTS 845899) and lost the most ground in producing shaping/slotting machines (HTS 846120). For those seeking to understand U.S. capabilities, exploring the reasons behind these large changes might be a worthwhile exercise. Similarly, one could look at machine tools where RCD changed the most. Such outliers (in RCA or RCD) could serve as critical case studies to link specific factors (e.g., policies) to changes in manufacturing capabilities.

Table 1: Largest changes in domestic capabilities, machine tools, 2007–2022

HTS Code	Description	Change in RCA
845899	Lathes (including turning centers) for removing metal	0.83
845910	Way-type unit head machines	0.81
846229	Machine tools (including presses) for working metal by bending	0.72
845951	Machine-tools for milling by removing metal, knee-type, numerically controlled	-1.47

HTS Code	Description	Change in RCA
845690	Machine tools for working any material by removal of material, operated by electro-chemical, electron-beam, ionic-beam, or plasma arc processes	-1.62
846120	Shaping or slotting machines that work by removing metal	-2.49

Instead of choosing the starting or ending year of this period, we could examine all 15 years. Such an approach would reveal swings in clout that would not otherwise be noticeable. We could also select two different years if we want to explore the impact of an important event or policy. For example, China joined the WTO in 2001, and choosing the year 2000 to compare with a recent year would likely reveal, for many industries, a significant rise in RCD associated with the well-documented offshoring trend of the early 2000s.[14]

APPLICATION TO ALL NATIONAL POWER INDUSTRIES

To compare CI across industries, we estimate RCA, RCD, and then CI for all 216 national power industries previously identified by ITIF.[15] Our methodology requires us to exclude industries that are service industries and industries for which missing data on trade flows excludes estimation of RCA or RCD. Using the most recent year for which complete trade data is available (2023), we estimate CI for 177 industries, as shown in figure 5. As before, we constrain outliers (appearing on the upper and right-hand borders of the figure) for visual effect.

Figure 5: Vulnerability of U.S. national power industries, 2023



As figure 5 shows, the CI for U.S. power industries spanned the gamut, reflecting a relatively normal distribution with a CI of 3 being by far the most common among industries. A small subset of industries represented considerable U.S. strength (RCA values exceeding 2), and a larger but still small subset of other industries represented U.S. dependence on China (RCD exceeding 0.3).

National power industries with the highest clout (i.e., CI = 1 or 2) are shown in table 2. These industries provide the United States with world-class manufacturing. To the extent they are important to the defense industrial base (e.g., small arms manufacturing, other aircraft parts manufacturing), they are a significant asset to national security.

Of the 177 industries covered in the dataset, just 5 are strong (with a CI score of 1), while 18 are somewhat strong (with a CI score of 2).

Table 2: Power industries with the highest CI scores, 2023

NAICS	Industry Description	CI
325110	Petrochemicals	1
325414	Biological products	1
325920	Explosives	1
332994	Small arms and ordnance	1
336413	Other aircraft parts	1
324110	Petroleum refining	2
324122	Asphalt paving and block	2
325211	Plastics material and resin	2
325212	Synthetic rubber	2
325320	Pesticides and other ag chemicals	2
325413	In vitro diagnostic substances	2
325612	Polish and other sanitation goods	2
325992	Photographic film and chemicals	2
331314	Aluminum smelting and alloys	2
331491	Nonferrous metal (except copper and aluminum) rolling, drawing and extruding	2
333131	Mining machinery and equipment	2
333994	Industrial process furnace and ovens	2
334515	Instruments for testing electricity and signals	2

NAICS	Industry Description	CI
334516	Analytical laboratory instruments	2
336112	Light truck and utility vehicles	2
336120	Heavy duty trucks	2
336412	Aircraft engine and engine parts	2
336510	Railroad rolling stock	2

National power industries with the lowest CI scores versus China (i.e., CI = 5 or 4) are shown in figure 6 and listed in table 3. These industries represent a potential risk for the United States. For example, battery storage and electronic computer manufacturing are both critical to national security; low U.S. production capabilities and high U.S. dependence on China present a real vulnerability that China could exploit.

There are also many industries on the verge of a low CI (moving from 3- to 4), among them being synthetic dyes and pigments (325180), food product machinery (333241), other industrial machinery (333249), industrial commercial fans and blowers (334412), totalized fluid meter and counting devices (334514), and power distribution transformers (335311).

As shown in figure 6, of the 177 U.S. power industries, 25 have the lowest CI scores (either 4 or 5), reflecting strategic weakness.

Figure 6: Most vulnerable power industries

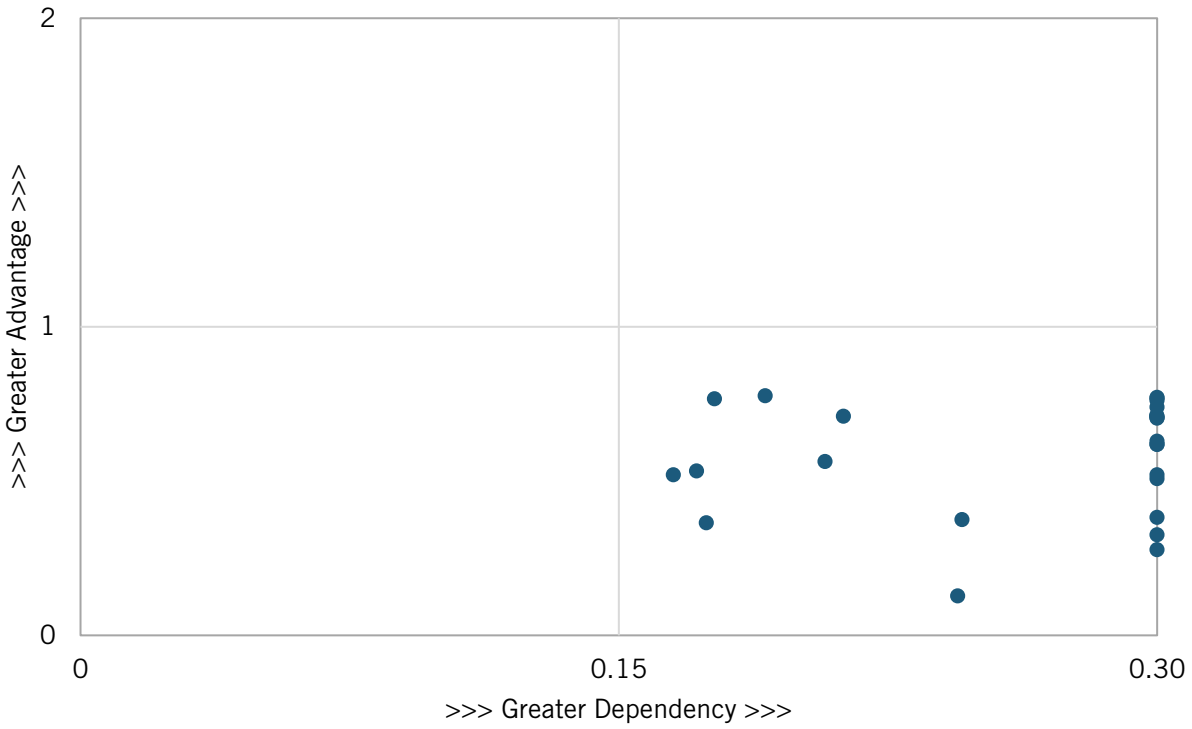


Table 3: Economic power industries with the lowest CI scores, 2023

NAICS	Industry Description	CI
335129	Other lighting equipment	5
335210	Small electrical appliances	5
316998	All other leather good and allied products	5
326199	All other plastic products	4
326211	Tires	4
327991	Abrasive products	4
327999	Miscellaneous nonmetallic mineral products	4
332215	Metal cookware and utensils (except precious)	4
332321	Metal window and door	4
332510	Hardware (items found in hardware stores)	4
332618	Other fabricated wire	4
332999	All other Fabricated metal products	4
333243	Sawmill, woodworking, and paper machinery	4
333511	Metalworking machinery	4
333921	Elevator and moving stairway	4
333923	Overhead traveling crane and monorail system	4
333991	Power driven hand tools	4
333999	Other miscellaneous general-purpose machinery	4
334111	Electronic computers	4
334310	Audio and video equipment	4
335110	Electric light bulbs and tubes	4
335911	Storage batteries	4
336211	Motor vehicle bodies	4
339114	Dental equipment and supplies	4
339999	All other miscellaneous manufacturing	4

Given China's rapid advancement, we can expect quite a few 3- industries to drop, over time, to 4 or 5. Examples include NAICS 325180 (other basic inorganic chemicals) and 334412 (bare printed circuit boards).

In a previous report, ITIF documented differences between defense, dual-use, and enabling industries, suggesting that government support for defense industries was a factor in their overall health.[16] We can use RCA and RCD to compare each category of power industry in 2023. The results are shown in table 4. RCA for defense industries was much higher (and RCD lower) than that for dual-use or enabling industries, both of which were close to par in RCA but also reflect relative U.S. dependence on China. However, there is significant uncertainty for the defense power category because we have complete data for just two industries (ammunition and shipbuilding), far fewer than for enabling (57) or dual-use (118) power categories. We exclude three other defense industries (guided missiles, guided missile parts, and armored vehicles) due to missing trade data. Nevertheless, the data align with ITIF's observation.

Table 4: RCA by Power Category, 2023

Power Category	Number of Six-Digit NAICS Codes	Mean RCA	Mean RCD
Defense	2	2.95	0.02
Dual Use	118	1.01	0.22
Enabling	57	0.91	0.26

POLICY IMPLICATIONS

What can the U.S. government do to improve an industry's CI score? That will be the subject of several forthcoming ITIF reports. But an overarching principle is that industry-specific measures are also needed. Some power industries may be beyond saving because an industrial commons, once eroded, is nearly impossible to bring back. Some power industries are more important than others. And some may be relatively weak yet pose little risk if the underlying goods are adequately produced by core allies.

However, what is clear is that more ongoing analysis of national power industry risk is needed. We developed the CI to fill a void; the federal government doesn't systematically monitor the capabilities of domestic power industries. But that may be about to change. Congress is considering legislation to establish, by statute, such a monitoring function within the Department of Commerce. The bill, the Promoting Resilient Supply Chains Act, has been introduced and passed in both the Senate (S.257, sponsored by Senator Maria Cantwell, D-WA) and the House of Representatives (H.R. 2444 sponsored by Rep. John James, R-MI).[17] Discussions are underway to resolve differences between the two bills. The legislation focuses on critical industries, critical supply chains, and critical and emerging technologies, with definitions broad enough to include U.S. national power industries and the goods produced by these industries. Ideally, if this effort within Commerce is stood up, it would employ the CI methodology, among others.

CONCLUSION

The CI is a useful and versatile tool to assess the strengths and weaknesses of U.S. economic power industries. It is most informative when it is combined with other available information as a robustness check and to provide a clearer picture of U.S. strengths and vulnerabilities. For example, a CI score of 5 does not necessarily convey a dire threat to U.S. economic or national security. Additional information—such as whether the goods produced by the industry are critical to national security and the extent to which excess production capacity exists among allied trading partners—would have to be developed before such a conclusion could be drawn.

The CI index can be used to compare a single national industry over time, to compare national industries at the same point in time, or to compare the same industry in two different nations over time. This versatility comes with some drawbacks associated with the use of international trade data: real-time information is not available (complete data is available for all nations after 1.5 or 2 years), the specificity is limited to 6-digit HTS codes (instead of 8- or 10-digit codes), and some trade flows for certain goods are unreported or unavailable.

Congress should enact the "Promoting Resilient Supply Chains Act" because it would create an interagency home for analysis to underpin a stronger and more robust domestic manufacturing sector, which is critical to economic and national security. When implementing this statute, the Commerce Department should include in its definition of critical industries the national power industries identified by ITIF, and in its definition of "critical technologies," those goods associated with power industries. The CI metric should be employed to evaluate the strength of national power industries and could be used to evaluate the vulnerabilities of U.S. supply chains. The Commerce Department also should establish an ongoing monitoring program focused on China's production capabilities and track its mercantilist policies that aim to displace the manufacturing share of the United States and other allied nations. It should invite and welcome industry expertise to inform its duties.

The Global Trade Battleground: US-China Competition in the Global South

RODRIGO BALBONTIN

Countries in the Global South are key markets for Chinese and U.S.-allied national power industries, which require scale economies to flourish. U.S. policymakers should stop viewing them as a "backyard" and recognize that they are a key battlefield in an industrial war.

KEY TAKEAWAYS

- Since 2000, Global South import shares have shifted sharply: China has experienced a growth of over 21 percentage points and the United States a decline of 10 percentage points—and the gap is even larger in national economic power goods.
- Exports of Chinese goods to the Global South increased more than 39 times between 2000 and 2024, while exports from the United States during the same period increased by roughly two times.
- The displacement is most pronounced in strategic sectors—telecom equipment, electrical machinery, vehicles, and pharma/chemicals—where scale and learning curves determine which countries and their companies stay on the frontier.
- Chinese firms are translating export scale into on-the-ground market share dominance: subsidized pricing and fast expansion are driving rapid sales growth across consumer goods and appliances in key emerging markets.
- China's outward push is not accidental: state-directed investment and infrastructure deals in emerging markets expand Chinese firms' footprint and reduce commercial space for U.S. competitors.
- The Global South is not exempt from China's predatory practices. A "Globalization 2.0" approach to the Global South should assume that America has the primary role in countering China's mercantilism and pursuing pragmatic trade.

INTRODUCTION

The Global South—defined as developing countries outside Europe and not considered U.S. foreign adversaries—is at the front line of the U.S./allied-China techno-industrial war. The People's Republic of China (PRC) is a power trader, with historical parallels to Germany's late-19th-century strategy—focusing on inducing trade dependencies and using trade to gain a competitive advantage for its advanced industries, all in an effort to limit the development of its adversaries.[1] America needs to respond by expanding its competitiveness in national power industries—sectors that are strategic to U.S. techno-economic leadership, encompassing defense, dual-use, and enabling industries.[2]

National power industries such as semiconductors and pharmaceuticals are capital intensive. They need the revenues derived from scale to offset the intensive initial investments in research and development (R&D) and to gain revenues to reinvest in future generations of innovation. The Information Technology and Innovation Foundation (ITIF) has explained that "the first chip of a new generation is extraordinarily expensive because of the scale of R&D involved. Producing subsequent chips is far cheaper, as only material and labor costs remain. As a result, fixed costs in these industries are extremely high, while marginal costs are low."[3]

While, in 2020, U.S. exports to developing economies were more than six times China's, by 2024, they were 56 percent of China's—this gap is exacerbated when analyzing only national power exports.

This report examines the United States's and China's trade, investment, and sales in the Global South through a techno-economic lens. Access to developing economies matters so companies can reach scale—and China's exports, sales, and investments are growing in these markets relative to those of the United States. The Global South—excluding China—represents 5.2 billion people and 34 percent of the world's economy, and that share is expected to grow to 45 percent by 2050.

While, in 2020, U.S. exports to developing economies were more than six times China's, by 2024, they were 56 percent of China's—this gap is exacerbated when analyzing only national economic power exports. Chinese products in manufactured consumer goods, automobiles, and telecommunications equipment are dominating Global South markets. Lastly, while total foreign direct investment (FDI) from China and the United States to emerging economies over the last 15 years is similar in aggregate terms, Chinese state-supported infrastructure investment has surpassed U.S. federal support by a factor of 10.

China's push to dominate advanced industries follows a familiar playbook.[4] It starts by attracting foreign investment and pulling multinational firms up the value chain inside China. These investments—coupled with forced technology transfer—enable learning from knowledge new to the country, leading to a shift toward a "China Inc." development model focused on indigenous innovation. Over time, those firms become independent innovators, and foreign firms' influence—and access—shrinks. The final stage is outward: once Chinese firms have won at home, the state helps them scale globally, capture market share, and set the terms of competition. In that sense, the international expansion of China's domestic champions is not a side effect of industrial policy; it is the very culmination of the strategy.

In that context, the remainder of this report describes China's international expansion in the Global South. First, it defines what is understood as the "Global South." Later, the report describes China's expansion in emerging markets through trade, investment, and sales and compares it with the United States. The report concludes by outlining how the United States can "win back" the Global South—namely, by shifting toward a "Globalization 2.0" framework.

THE CONCEPT OF THE GLOBAL SOUTH

There are many definitions of the "Global South" or "developing economies," none of which are uncontroversial. High-income countries—such as Australia, France, and the United States—are clearly excluded from this group, while lower-middle-income Sub-Saharan African economies, such as Kenya and Nigeria, are evidently part of the Global South.

Multilateral organizations have multiple definitions. The World Trade Organization's (WTO's) self-classification is perhaps a more problematic definition for a developing country, since each country can define itself in order to access preferential trade schemes—according to WTO criteria, rich countries such as Israel, Singapore, and South Korea are considered "developing economies."[5] In contrast, the World Bank's country categorization by income level is a better proxy for identifying Global South countries by excluding high-income economies; however, under this criterion, some European economies, such as Albania, North Macedonia, and Serbia, would be part of the Global South, and some Latin American countries, such as Chile, Costa Rica, and Uruguay, would fall outside this scope.[6] Likewise, countries that are not members of the Organization for Economic Co-operation and Development (OECD)—a group of mostly rich countries—are insufficient, as nations such as Argentina, Brazil, Indonesia, and Thailand are officially in the OECD accession process.[7]

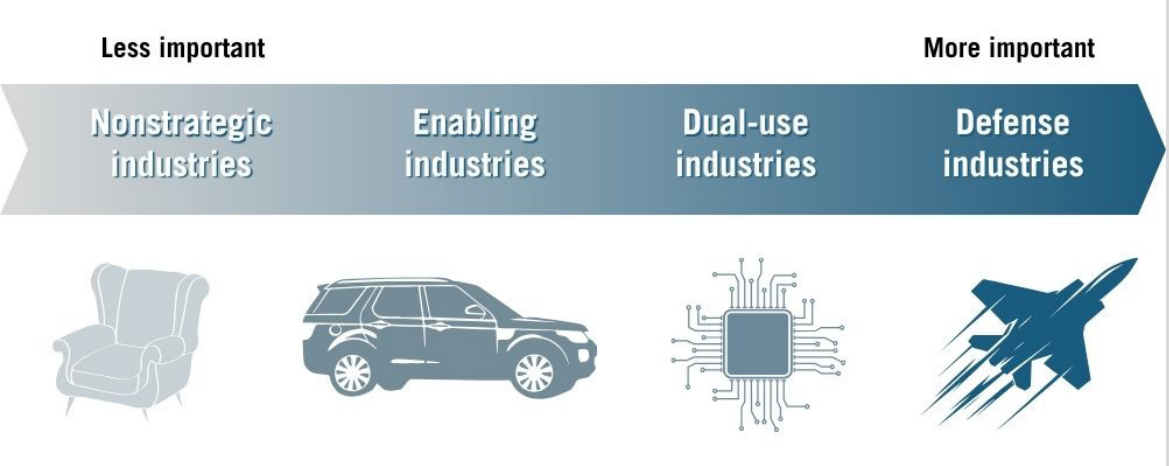
China sees itself as part of the Global South. As Xi Jinping stated, "China will always be a member of the Global South, a reliable long-term partner of fellow developing countries, and a doer and go-getter working for the cause of global development."

Box 1: Defining National Economic Power Industries

The conventional view is that the only industries that matter to national power are defense industries. But that is now vastly too limiting. As Corelli Barnett, wrote, "For munitions production for modern war is not primarily a question of specialized armament industries, as some suppose, but of all those varied industrial and scientific resources that in peacetime make for a successful and expanding export trade."[8] As such, ITIF has developed a classification of U.S. industries for their relevance to national power. This can be viewed as a continuum between defense industries on one side and nonstrategic industries on the other, with strategic industries and strategic enabling industries in the middle. (See figure 1.)

At one end of the continuum are defense industries. Clearly, industries such as ammunition, guided missiles, military aircraft and ships, tanks, drones, defense satellites, and others are strategic. Not having world-class innovation and production capabilities in these industries means a weakened military capability. Policymakers across the aisle generally (with the exception of the isolationist Right and the pacifist Left) agree that these industries are strategic and that market forces alone will not produce the needed results.

Figure 1: Industrial power scale



At the other end of the spectrum are industries in which the United States has no real strategic interests. These include furniture, coffee and tea manufacturing, bicycles, carpet and rug mills, window and door production, plastic bottle manufacturing, wind turbine production, lawn and garden equipment, sporting goods, jewelry, caskets, toys, toiletries, running shoes, etc. If worst came to worst and our adversaries (e.g., China) gained dominance in any of these industries and decided to cut America off, we'd survive—in part, because none of these are critical to the running of the U.S. economy, as many are final goods that might inconvenience consumers but wouldn't cripple any industries, and also because, in most cases, domestic production could be started or expanded relatively easily because none of these products are all that technological complex from either a product or process concern and the barriers to entry are relatively low.

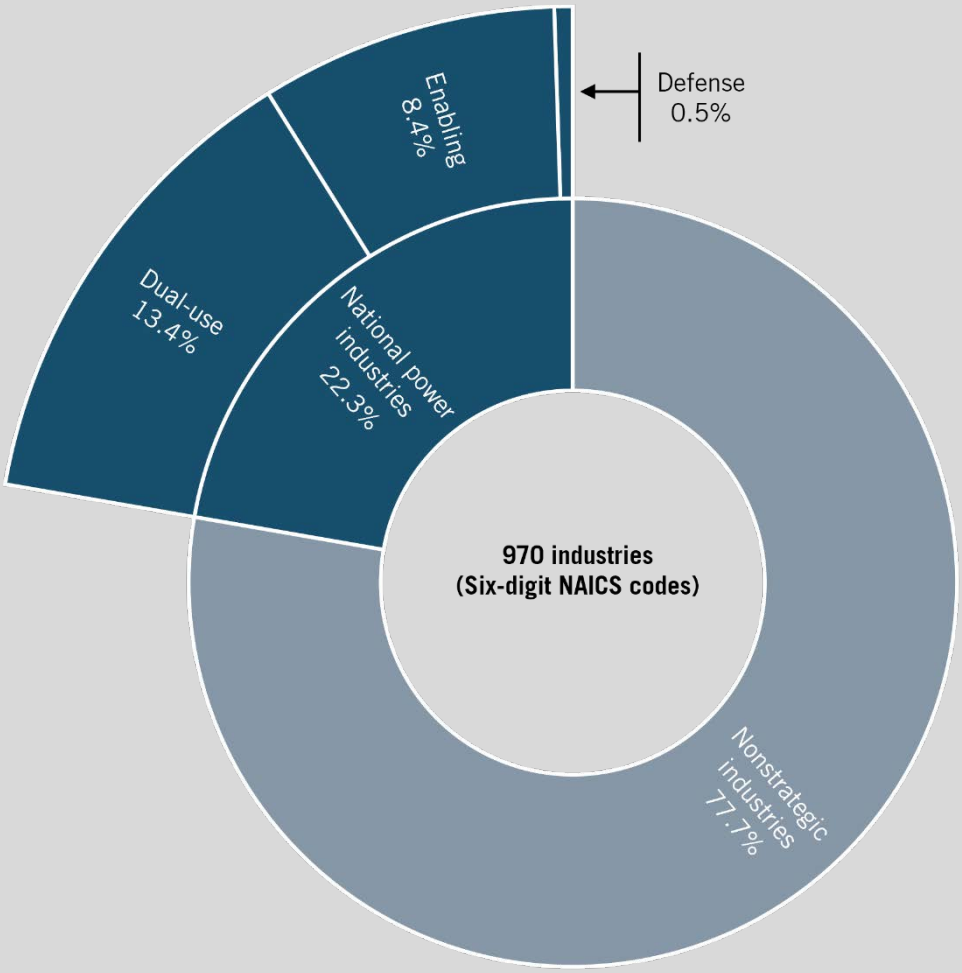
Next to defense industries, dual-use industries are critical to American strength. Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give our adversaries incredible leverage over America. Just the threat to cut these off (assuming that they have also deindustrialized our allies in these sectors) would immediately bring U.S. policymakers to the bargaining table. National power industries also tend to need a global scale to operate. Moreover, many are intermediate goods such as semiconductors and chemicals, where a cutoff would cripple many other industries. Finally, these industries are hard to stand up once they're lost because of the complexity of their production processes, the product knowledge required, and the importance of the industrial commons that support them. In other words, barriers to entry are high, and if lost, they would be very difficult and expensive to reconstitute.

Finally, there are enabling industries. These are industries wherein, if the United States were cut off, the immediate effects on military readiness would be small and the U.S. economy could survive for at least a while without production. America could survive for many years without an auto sector, as we would all just drive cars longer. But because of the nature of these industries—including technology development, process innovation, skills, and supporting institutions—their loss would harm both dual-use and defense industries. That is because enabling industries contribute to the industrial commons that support dual-use defense industries. A severely weakened motor vehicle sector would weaken the tank and military vehicle ecosystem. Similarly, a weakened commercial shipbuilding sector has weakened military shipbuilding. A weakened consumer electronics sector weakens military electronics.

As part of enabling industries is a core set of industries that make up the "industrial commons"—sometimes called the "mother industries." These include machine tools and dies, metal and alloy fabrication, injection molding, electronic packaging, and specialty chemicals and are core to converting lab technologies into commercial products, building new supply chains, and scaling up U.S. production capacity. And the United States has lost them substantially. They also seem to be in the blind spot of both policymakers and capital investors because they are not the new shiny toy.

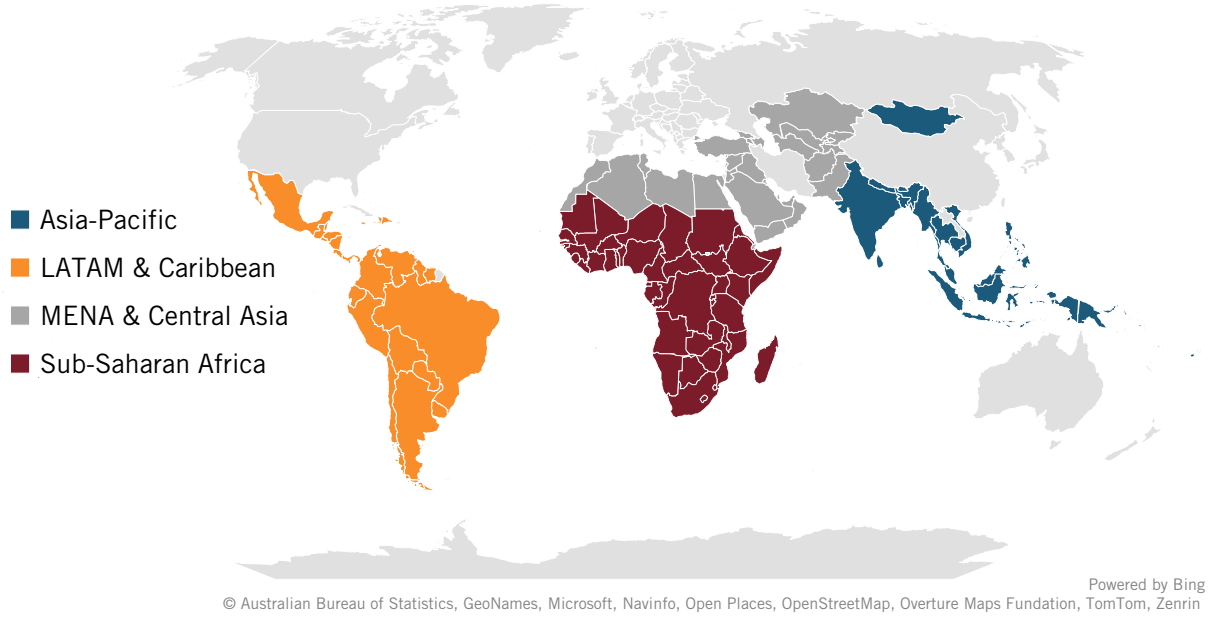
ITIF has put the 970 industries classified by the North American Industry Classification System (NAICS) codes into the four categories.[9] Power industries account for 22.3 percent of the industries. (See figure 2.) Most industries are not power industries, in large part because most are nontraded sectors such as law firms and barber shops. Of the 22.3 percent that are power industries, just 0.5 percent are defense industries, and 13.4 percent are dual use. The remaining 8.4 percent are enabling industries. In terms of employment, in 2022, just 9.5 percent of workers were employed in power industries. Of this, 6.4 percent worked in dual-use industries and 2.9 percent in enabling industries, with just 0.2 percent employed in defense industries.

Figure 2: Breakdown of six-digit NAICS industries according to ITIF's national power industry typology



Global South countries—for the purposes of this study—are understood as developing countries outside Europe and not considered U.S. foreign adversaries. This report uses the International Monetary Fund's (IMF's) characterization of "emerging and developing economies" to identify the Global South. The IMF list includes countries out of the scope of this report.[10] The PRC was excluded from this group, as it is one of the countries analyzed in the techno-economic competition. The European countries on the list—Albania, Belarus, Bosnia and Herzegovina, Hungary, Kosovo, Moldova, Montenegro, North Macedonia, Serbia, and Ukraine—are also excluded. Since American firms have limited ability to compete in adversarial countries, this report also excludes countries on the U.S. Department of State's list of foreign adversaries: Cuba, Iran, North Korea, and Russia.[11] Thus, this report considers 139 countries as part of the so-called Global South, which covers 5.2 billion people, or 64 percent of the world's population.[12] (See figure 3 and appendix 2.) The analysis indistinctly refers to this group of countries as "Global South," "developing economies," and "third markets."

Figure 3: Global South countries covered in this report, by region



China sees itself as part of the Global South. As Xi Jinping stated during the 2024 G20 Summit, "China will always be a member of the Global South, a reliable long-term partner of fellow developing countries, and a doer and go-getter working for the cause of global development."[13] The expansion of China's scientific and technological cooperation with countries in the Global South is a priority for the PRC. For example, in March 2025, Foreign Minister Wang Yi called for giving "priority to scientific and technological capacity-building of the Global South."[14] This cooperation is often framed as "South-South," a narrative that allows China to differentiate itself from Western initiatives and present China as an example of development—exemplifying how the Chinese model, in its view, constitutes a successful development pathway.[15]

The PRC's approach to the Global South has been to both serve as the convenor of this group of nations and openly oppose the United States, which is framed as a unilateral world hegemon. Under the veil of "South-South cooperation," China has pursued some of its flagship foreign

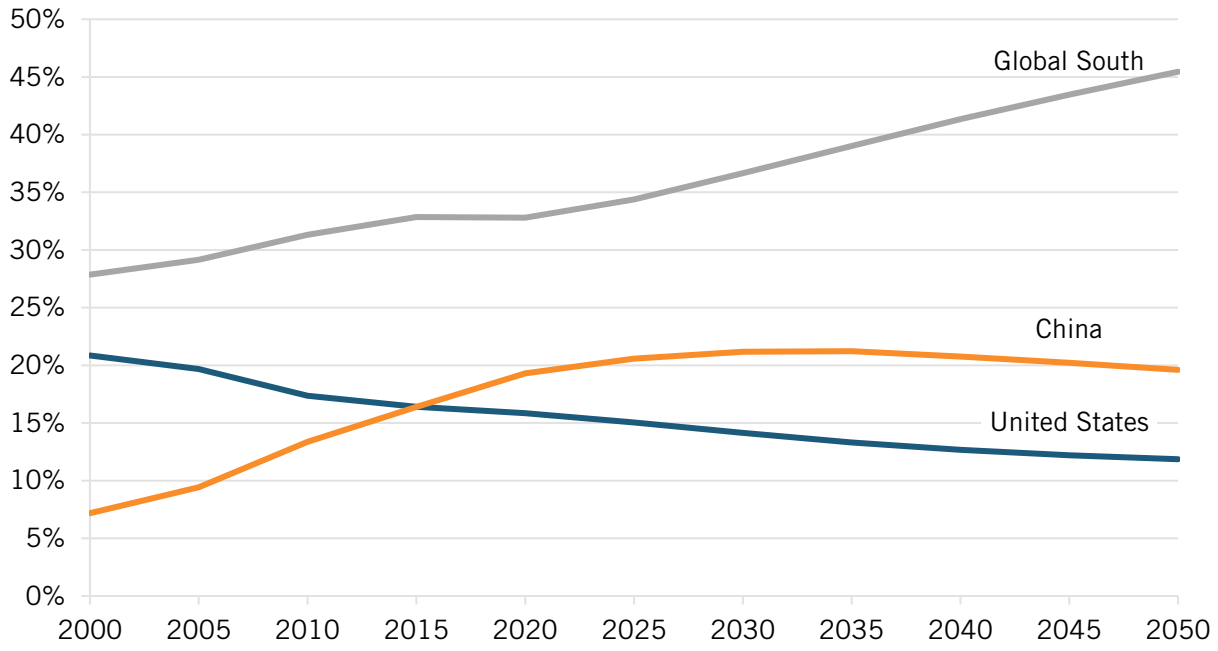
policy initiatives. The diplomatic vision promoted by the PRC is under the "Global Community of Shared Future" vision (also called "Common Destiny").[16] The messaging is not subtle, as it attempts to insert China among developing countries, opposing Western democratic values, and seeing jurisdictions—not individuals—as equals: "With their interests intertwined and futures interlocked, countries are turning into a community of shared future. Such a vision rises above the exclusive rules of bloc politics, the notion of might makes right, and the 'universal values' defined by a handful of Western countries."[17] Under this vision, China created the Belt and Road Initiative (BRI)—an investment and loan program discussed in further sections of this report.

Another relevant diplomatic venue is BRICS—a group that started with Brazil, Russia, India, China, and South Africa in 2010, and with Argentina (which withdrew its membership), Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE added in 2024—is a loose, informal grouping of countries pursuing a shared global agenda that opposes Western multilateralism.[18] Within the BRICS, there have been scattered attempts to create funding mechanisms outside the scope of multilateral financial organizations and to encourage the use of a currency other than the U.S. dollar.[19] For example, attempts such as the "Buy in the BRICS" initiative signal a willingness to promote trade among BRICS members.[20] Other—even more egregious—views cast China and BRICS as an inflection point for developing countries, particularly in Sub-Saharan Africa, helping to prevent them from being "looted" by Western economies.[21] As this report shows, while Chinese investment is notable in Africa, it does not alter the extractive approach other global powers have taken toward the continent. Finally, paradoxically, the term "BRICS" was coined by an American Goldman Sachs economist in 2001.[22]

In terms of foreign aid to countries in the Global South, China has disbursed significantly more resources than the United States has. A *Foreign Affairs* article states, "Between 2000 and 2021, China extended about $68 billion per year in overseas development financing. The U.S. average over this period, by contrast, was about $39 billion per year."[23] The article, published in December 2025, argues that there are clear patterns distinguishing Chinese and American foreign aid—at least as observed by the now-extinct USAID. First, China seems to allocate more funds to countries that chair relevant multilateral or regional venues, such as the ASEAN (Association of Southeast Asian Nations) annual Chairmanship. Second, nearly all aid is government to government rather than being implemented in coordination with civil society or local private-sector companies, as Western aid traditionally has been. (ITIF has advocated for aligning development finance and foreign assistance with U.S. competitiveness and strategic interests.[24])

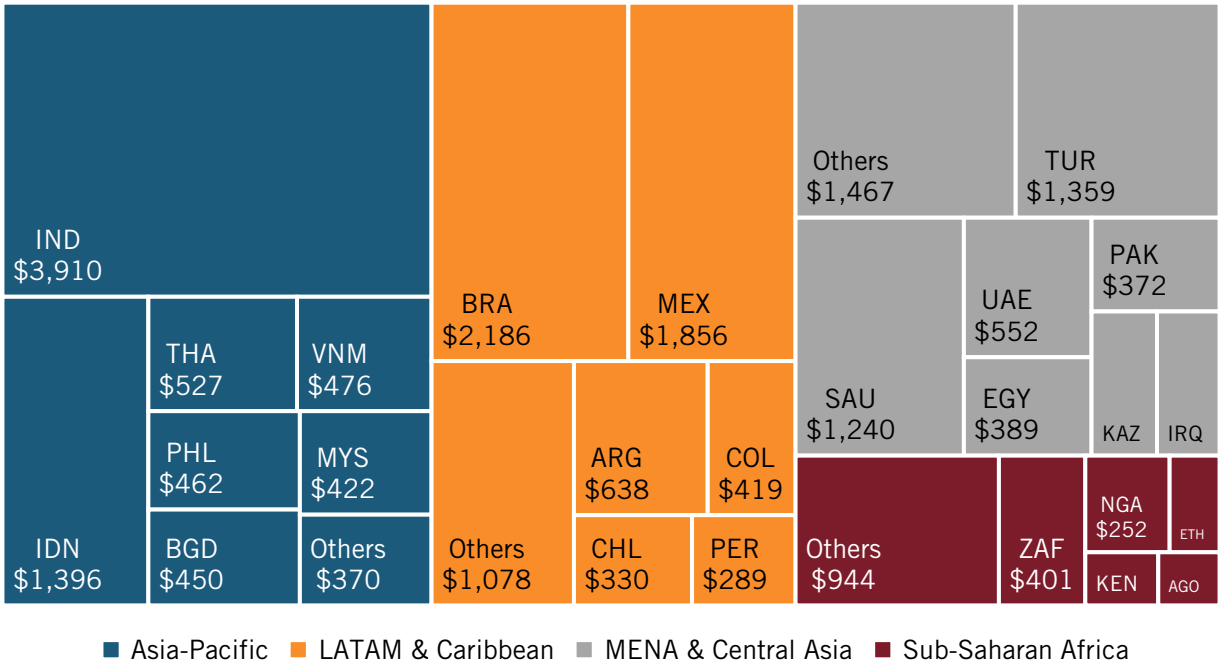
Global South countries accounted for 34 percent of the world's gross domestic product (GDP) in 2025, measured in purchasing power parity (PPP)—compared with 15 percent for the United States and 21 percent for China. It is projected that Global South countries will account for 45 percent of the world's economy by 2050, while the United States' share will fall to 11 percent and China's share will peak in the 2030s. (See figure 4.) China's economy as a share of the global economy has increased over 14 percentage points since 2000. ITIF has a vast repository of research both demonstrating that much of this growth has resulted from China's innovation mercantilism and describing the techno-economic consequences of this.[25]

Figure 4: GDP by country category as a share of the world economy, 2000–2050 (PPP)[26]



Countries in Asia and the Pacific account for 35 percent of the Global South's total economy, while Latin America accounts for 30 percent, the Middle East and North Africa (MENA) and Central Asia for 26 percent, and Sub-Saharan Africa for 9 percent. The five-largest economies of the Global South—Brazil, India, Indonesia, Mexico, and Turkey—account for 42 percent of the Global South's population and 47 percent of its economy. Figure 5 shows the share of the main Global South economies by region.

Figure 5: Global South countries by region and GDP, 2024 (billions of current USD)[27]



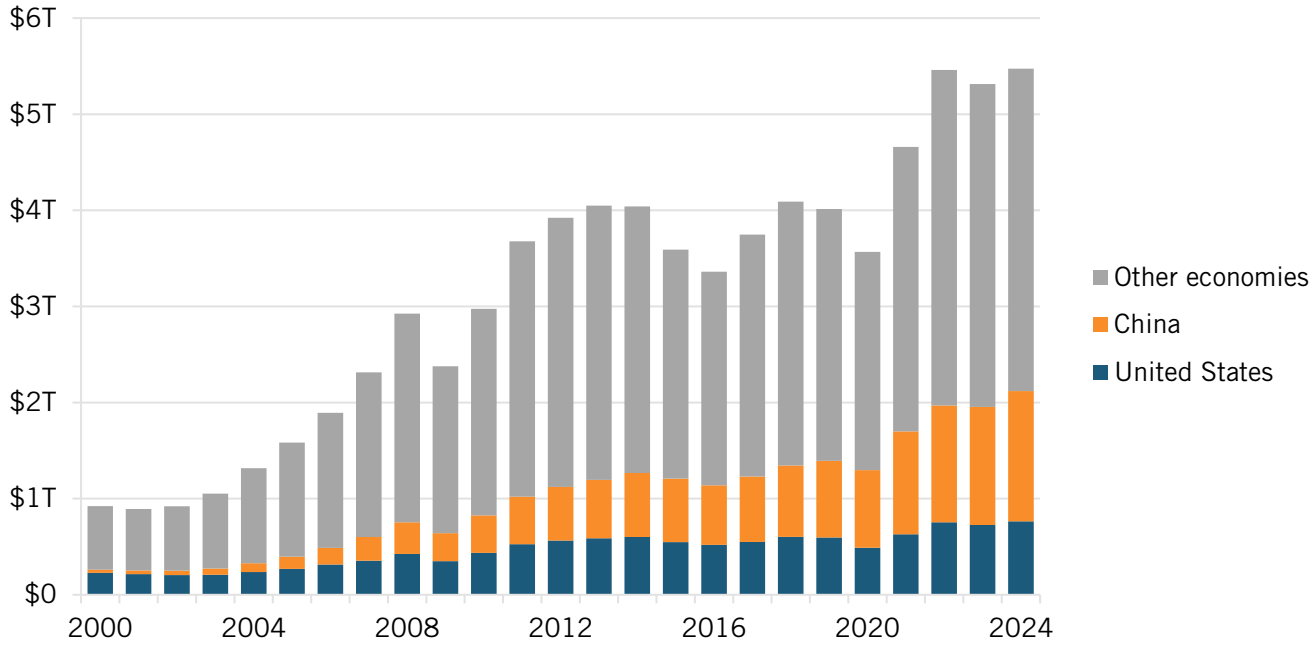
TWO DECADES OF AMERICA'S DECLINE AND CHINA'S GROWTH IN NATIONAL POWER EXPORTS TO GLOBAL SOUTH COUNTRIES

This section analyzes the share of total exports to Global South countries (i.e., the nations these countries import from), showing a sustained increase in the share of Chinese exports and a persistent decline in the share of American exports to the Global South. Chinese exports have gained share across all dimensions analyzed—total exports, exports by region, exports among the largest Global South economies, and by national economic power sectors—while American exports have experienced a decline in their share during the same period. Exports to the Global South are estimated country by country and then aggregated, considering South-South trade (e.g., total exports to South Africa include exports from Brazil or India).

Exports of Chinese goods to the Global South increased by more than 39 times between 2000 and 2024—from roughly $34 billion to over $1.3 trillion. On the other hand, exports from the United States during the same period increased by roughly over two times.

The economic growth and consequent expansion of consumption in Global South countries during the 2000s and 2010s led to an increase in total imports from these economies. By 2024, developing countries had imported over $5.4 trillion in goods, more than four times what they imported in 2000. This increase is largely explained by the lower base from which Global South countries traded in 2000, population growth, and the increasing openness to trade in certain countries during this period—notably in Latin America and Southeast Asia. China saw a larger increase in relative terms. Exports of Chinese goods to the Global South increased by more than 39 times between 2000 and 2024—from roughly $34 billion to over $1.3 trillion. On the other hand, exports from the United States during the same period increased by roughly twice, less than half of the Global South's import growth. (See figure 6.)

Figure 6: Exports from China and the United States to Global South countries, 2000–2024 (current US$)[28]



Total exports from China and the United States are relevant to analyze because they reveal several underlying aspects of great power competition. First, they indicate the exporting country's installed capacity and competitiveness relative to the trade partner. As developing economies are fast-growing markets, exporting to the Global South can secure future demand, improving returns on scale. Second, trade facilitates the adoption of technology and standards, creating path dependencies that shift costs to the importer—thereby giving the exporting country a relative advantage, since it is relatively costly to adopt a rival's technologies while also gaining market share and revenues.

Advanced industries have high fixed costs—scale is crucial for leading in these industries. Exports support these sectors' economies of scale, enabling them to generate the revenues needed to reinvest in R&D—underscoring that the race for global advantage in these industries is a zero-sum competition.[29] As this section shows, American exports to Global South markets have consistently declined over the last two decades, and the decline in strategic industries is even more pronounced. This affects America's relative power, as firms that lose market share risk falling into a death spiral in which they invest less in the future and, as a result, their subsequent products/services fall further behind competitors'.

American exports to Global South markets have consistently declined over the last two decades, and the decline in strategic industries is even more pronounced.

However, using trade data also has limitations in analyzing U.S.-China competition. First, some U.S. companies produce in China and export to countries in the Global South, so the market share of exports does not necessarily reflect the market share of companies headquartered in the same country. According to data from the U.S. Bureau of Economic Analysis (BEA), roughly 21 percent of what U.S multinational companies produce in China serves third countries—that share is more for some technology sectors, such as electrical equipment, appliances, and components (25 percent), and computers and electronics (33 percent).[30] Second, both American and Chinese companies produce in third markets—e.g., the U.S. automaker Ford and the Chinese automaker BYD have production facilities in Mexico—limiting the analysis of market share by company based solely on its headquartered jurisdiction.[31] Reshoring of production out of the headquarters country has increased for both U.S. and Chinese multinational companies in the last two decades.[32]

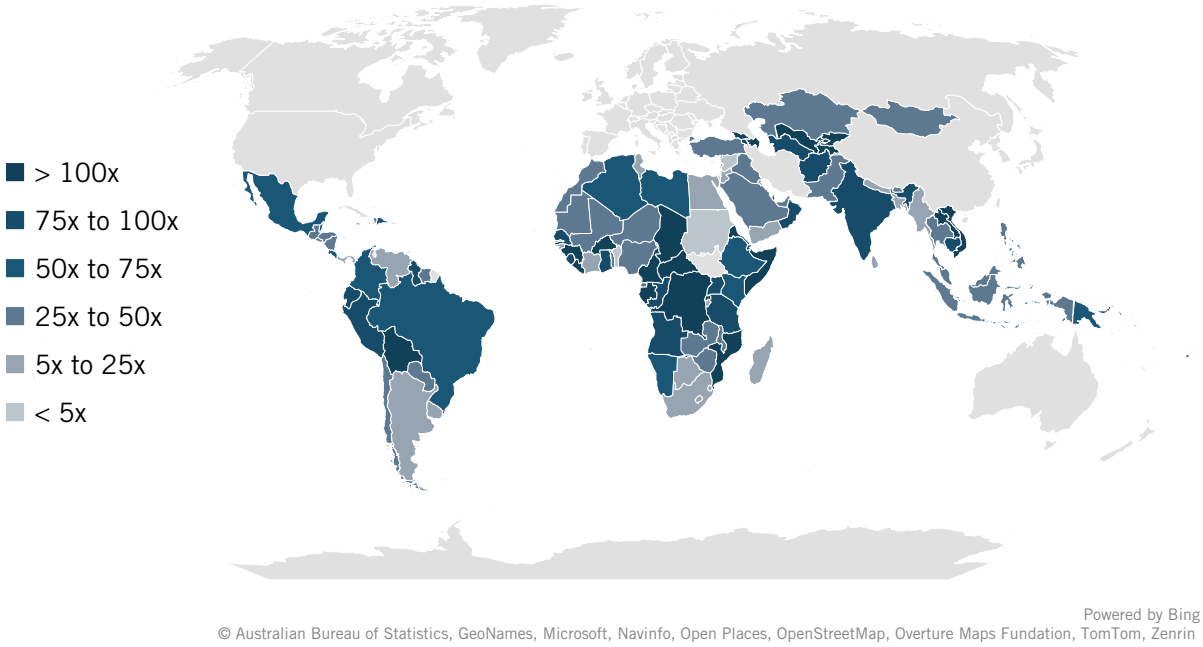
China's Export Growth and U.S. Exports' Decline to the Global South Are More Pronounced in National Power Industries

China has taken over trade relations with countries in the Global South. While, in 2000, U.S. exports to developing economies were more than six times China's, by 2024, they were only 56 percent of China's. The analysis using trade data first considers total exports—considering all products and goods from national power industries. National power industries is a categorization developed by ITIF, recognizing that the products and industries that matter in the techno-economic rivalry with China are not limited to defense industries.[33] The list of the 581 products considered as part of national power industries in this report is summarized in appendix 2.[34]

China's exports between 2000 and 2024 increased above the regional mean in nearly all Global South countries. Figure 7 shows that Chinese exports increased by at least five times during this

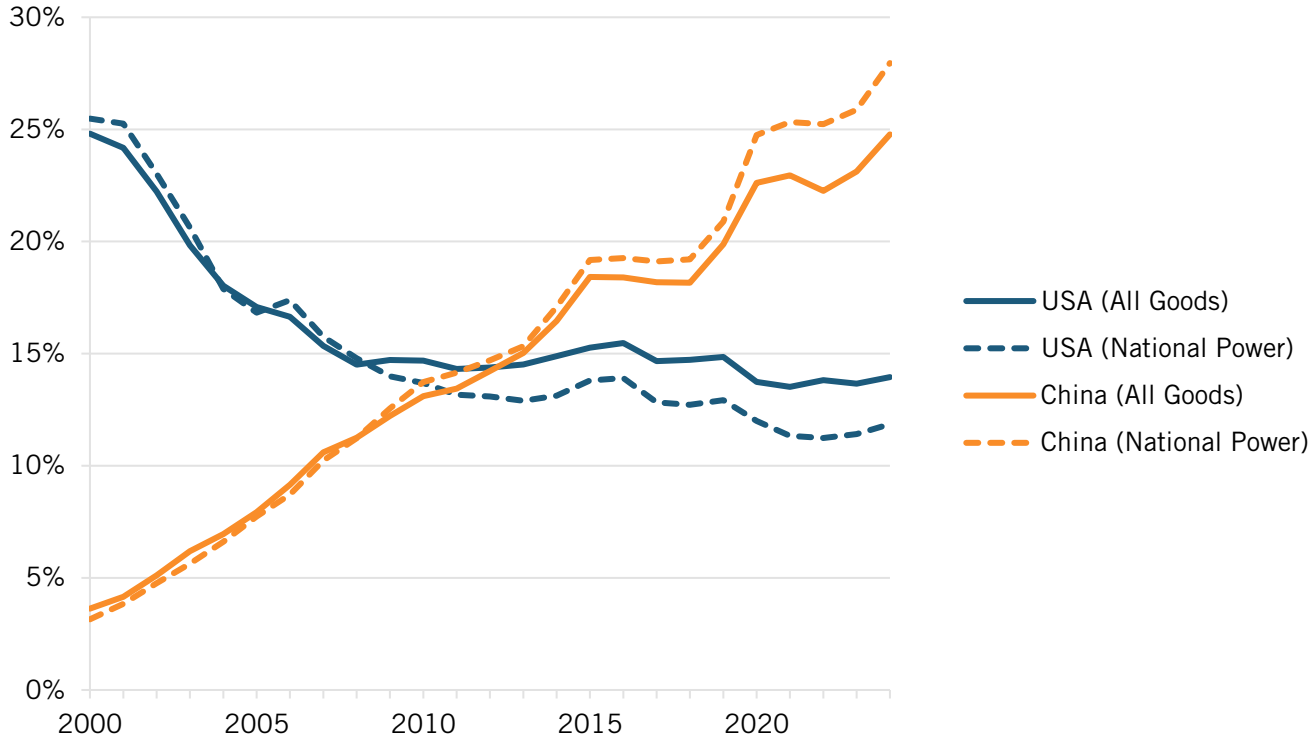
period, with the exception of Benin, Dominica, Saint Vincent and the Grenadines, Sudan, and Syria. Chinese exports increased by more than 100 times in 32 developing economies—most of them in Sub-Saharan Africa. Among the largest economies in the Global South, India and Vietnam experienced the largest increases in the influx of Chinese goods, at 77 times and 106 times, respectively.

Figure 7: Expansion of Chinese exports to Global South countries between 2000 and 2024 (1x = 100 percent)



Between 2000 and 2024, Global South countries decreased the share of their total imports from the United States—relative to total imports—by over 10 percentage points, while they increased the share of their imports from China by over 21 percentage points. The decline in the share of imports of American products and the subsequent increase in the share of imports of Chinese products by developing economies are more pronounced when only goods produced by national power industries are considered. Overall, China's exports to the Global South are 10.8 percentage points higher than the United States'. When only national power goods are considered, this gap increases to 16.1 percent. (See figure 8.)

Figure 8: Exports from China and the United States to Global South countries as a share of total exports to Global South countries, 2000–2024[35]



China Exports More Manufacturing Products and Has a Manufacturing Trade Surplus With Global South Countries

Another way to show how China has been gaining a foothold in key sectors in countries of the Global South is to compare trade in manufacturing goods with the United States. Figure 9 shows that China's exports of manufacturing goods to developing economies increased by more than 44 times, while U.S. exports increased by only 2.5 times. China's manufacturing exports to the Global South in 2024 were more than twice those of America. In addition, China's manufacturing exports to emerging markets have expanded the trade surplus with the PRC (i.e., a negative trade balance from the Global South perspective)—net manufacturing exports to the Global South were over $1 trillion for 2024. In contrast, the United States has observed a negative trade balance in manufacturing goods with developing economies, with the exception of 2008, the year of the Great Recession. (See figure 10.)

Figure 9: Total manufacturing goods exports from China and the United States to the Global South, 2000–2024 (current USD)[36]

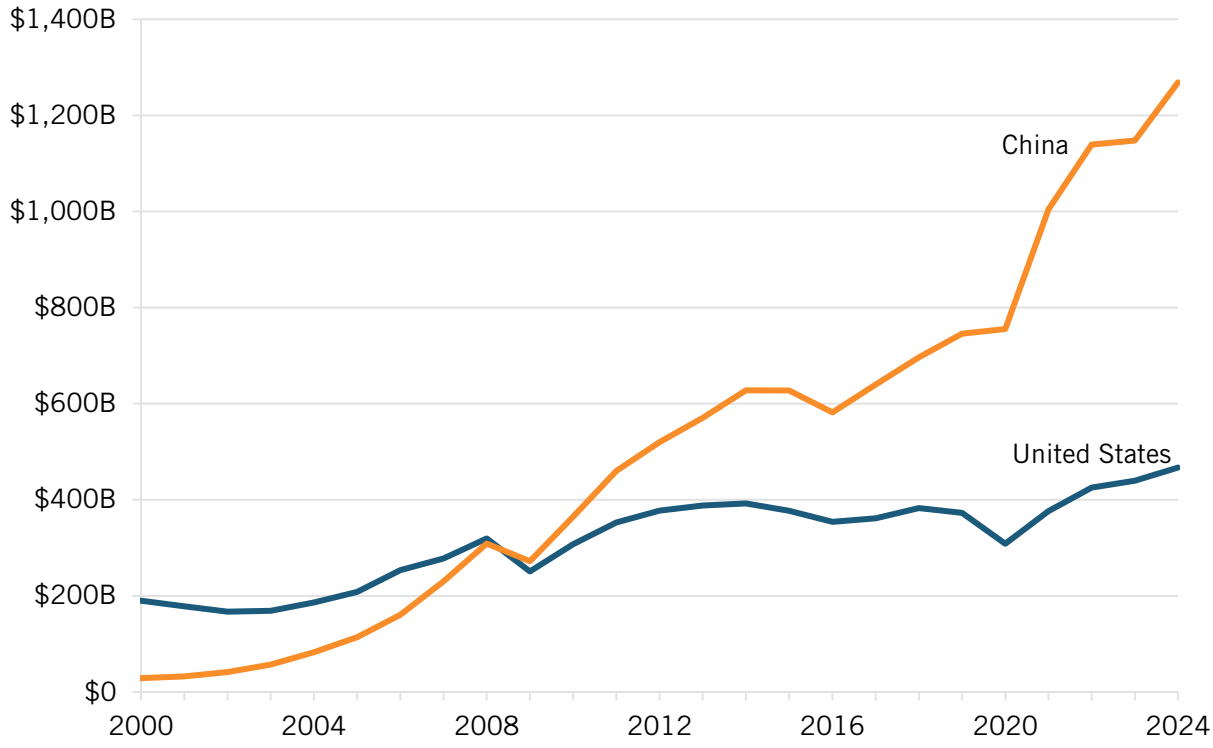
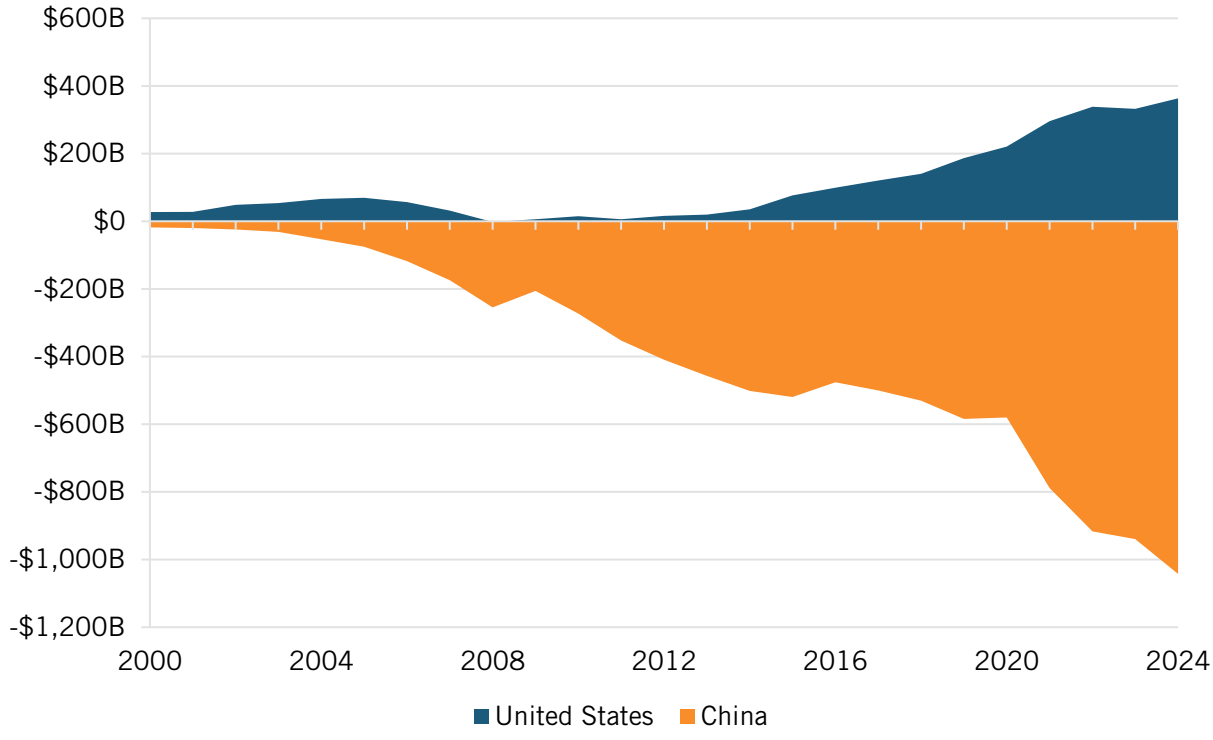


Figure 10: Global South trade balance with China and the United States in manufacturing goods, 2000–2024 (current USD)[37]



Global South Countries Are Decreasing Their Share of Imports From the United States and Increasing Their Share of Imports From China Across All Regions

Exports from China are increasing, while U.S. exports are declining, across all regions of the Global South. The disaggregation of Chinese and U.S. exports by region reveals that the trend of declining American exports and rising Chinese exports to the Global South—more pronounced for non-power goods—occurs across all regions. Figures 11 through 14 show exports from China and the United States—for all goods and national power products—in Asia and the Pacific, Latin America, the MENA and Central Asia, and Sub-Saharan Africa, respectively.

While the U.S. government is pivoting toward expanding its influence in the Americas, China is seeking to position itself as a more predictable partner to Latin American countries. This has occurred mainly due to trade with Mexico facilitated by the North American Free Trade Agreement (NAFTA) and later the United States-Mexico-Canada free trade agreement (USMCA)—yet, U.S. exports declined by more than 9 percentage points over the period analyzed (13 percentage points for national power industries). The PRC Foreign Ministry's December 2025 policy paper on Latin America and the Caribbean clearly marks China's attempt to contrast with the United States, stating that "China will firmly defend international fairness and justice, uphold the multilateral trade system and oppose unilateral bullying practices."[38] China has signed free trade agreements (FTAs) with Chile (2005, amended in 2017), Peru (2009), Costa Rica (2011), Ecuador (2023), and Nicaragua (2023) and is in early-stage discussions for an FTA with Mercosur—an economic bloc among Argentina, Bolivia, Brazil, Paraguay, and Uruguay.[39]

Figure 11: Exports from China and the United States to Global South countries in Asia and the Pacific as a share of total global exports to the region, 2000–2024[40]

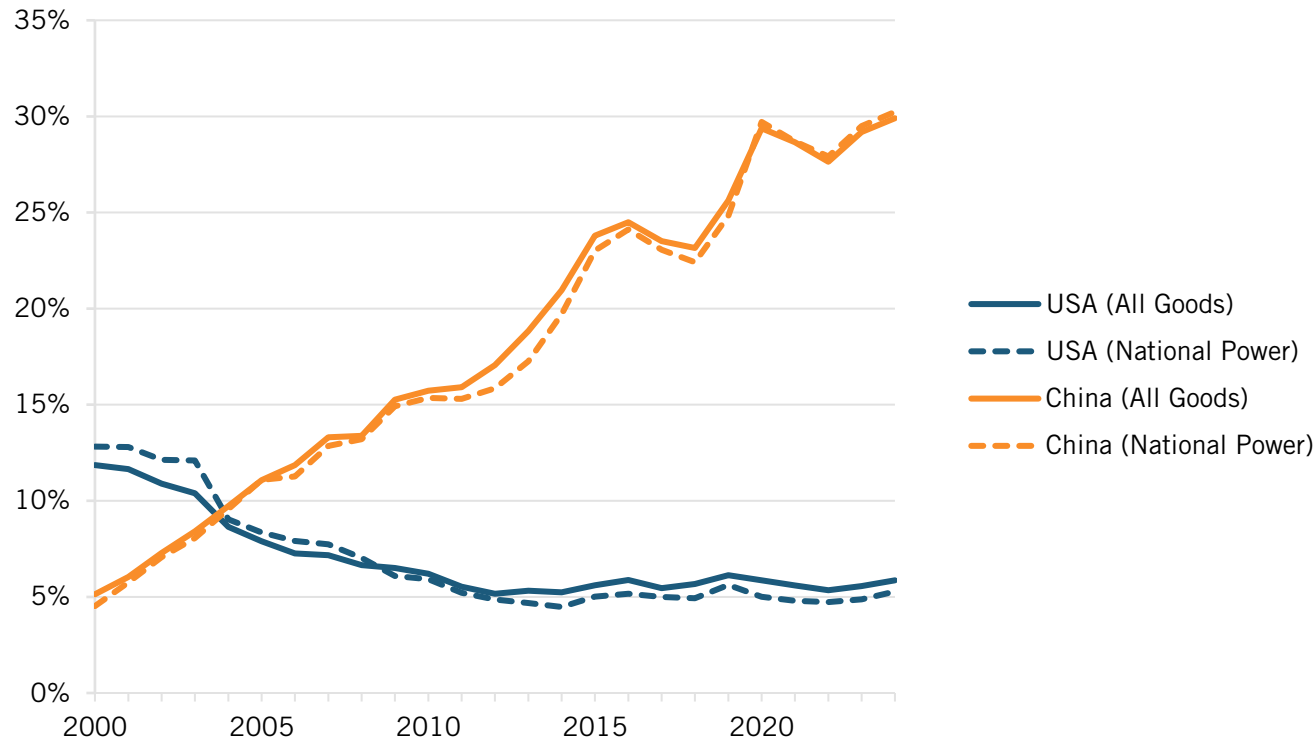


Figure 12: Exports from China and the United States to Global South countries in Latin America as a share of total global exports to the region, 2000–2024[41]

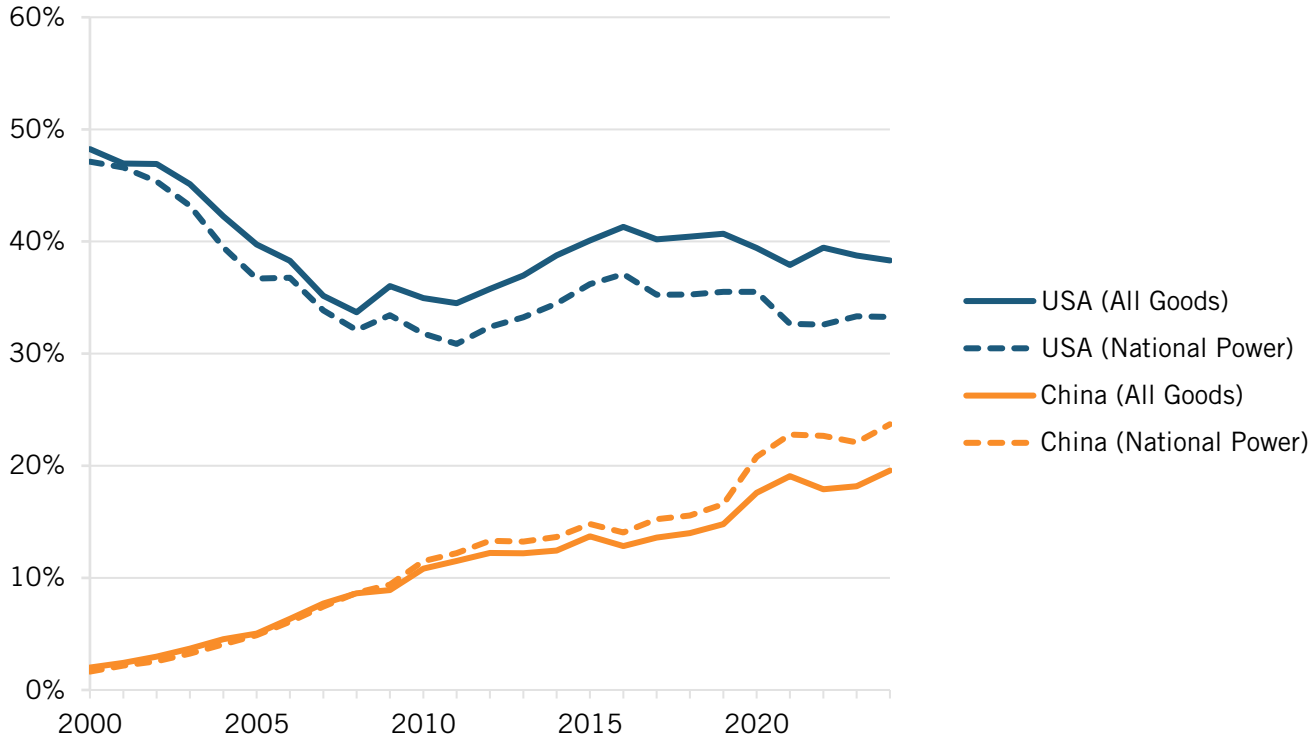


Figure 13: Exports from China and the United States to Global South countries in the Middle East and Central Asia as a share of total global exports to the region, 2000–2024[42]

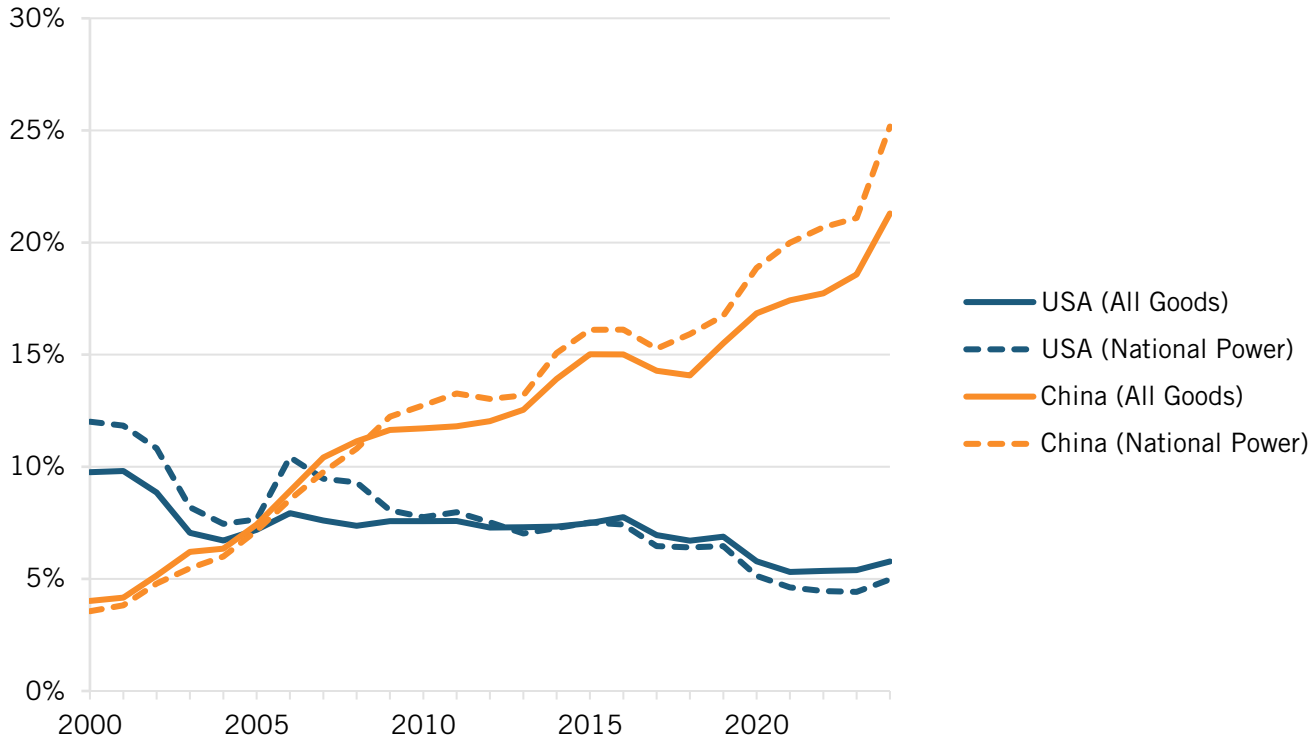
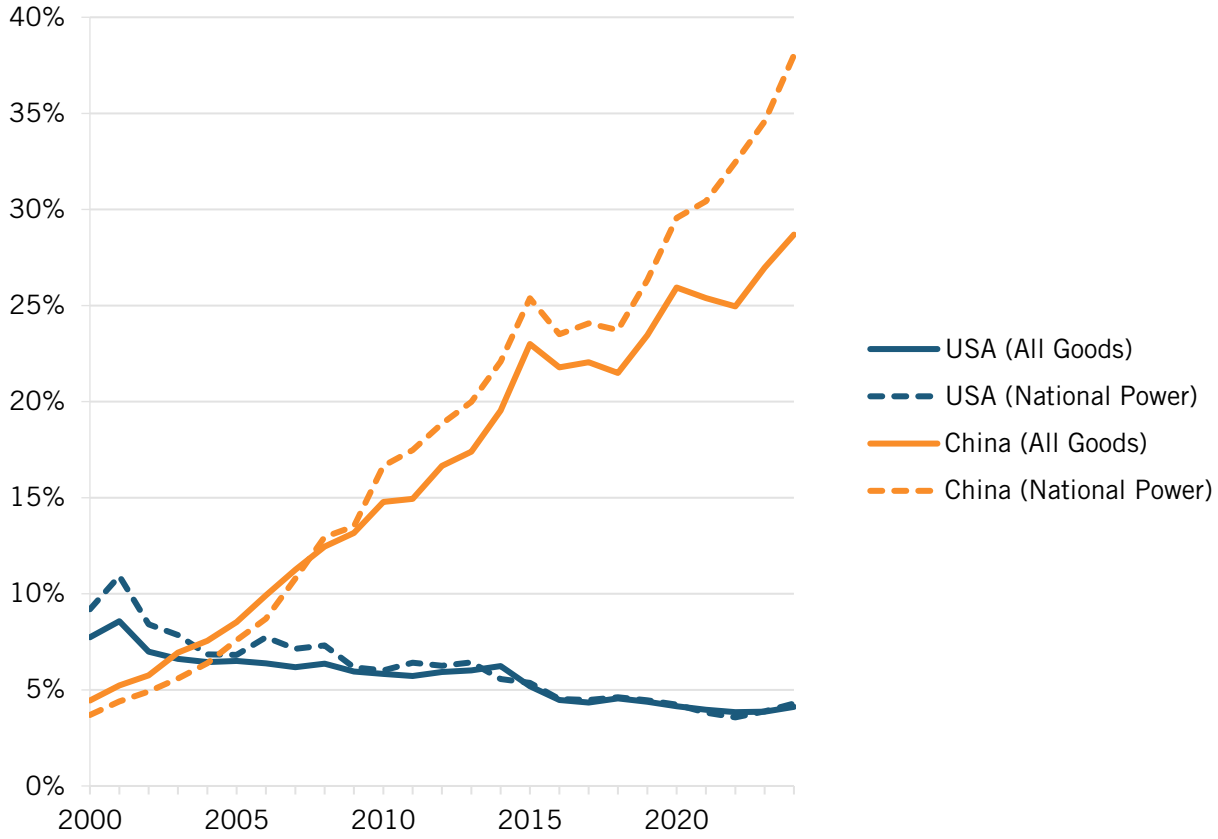
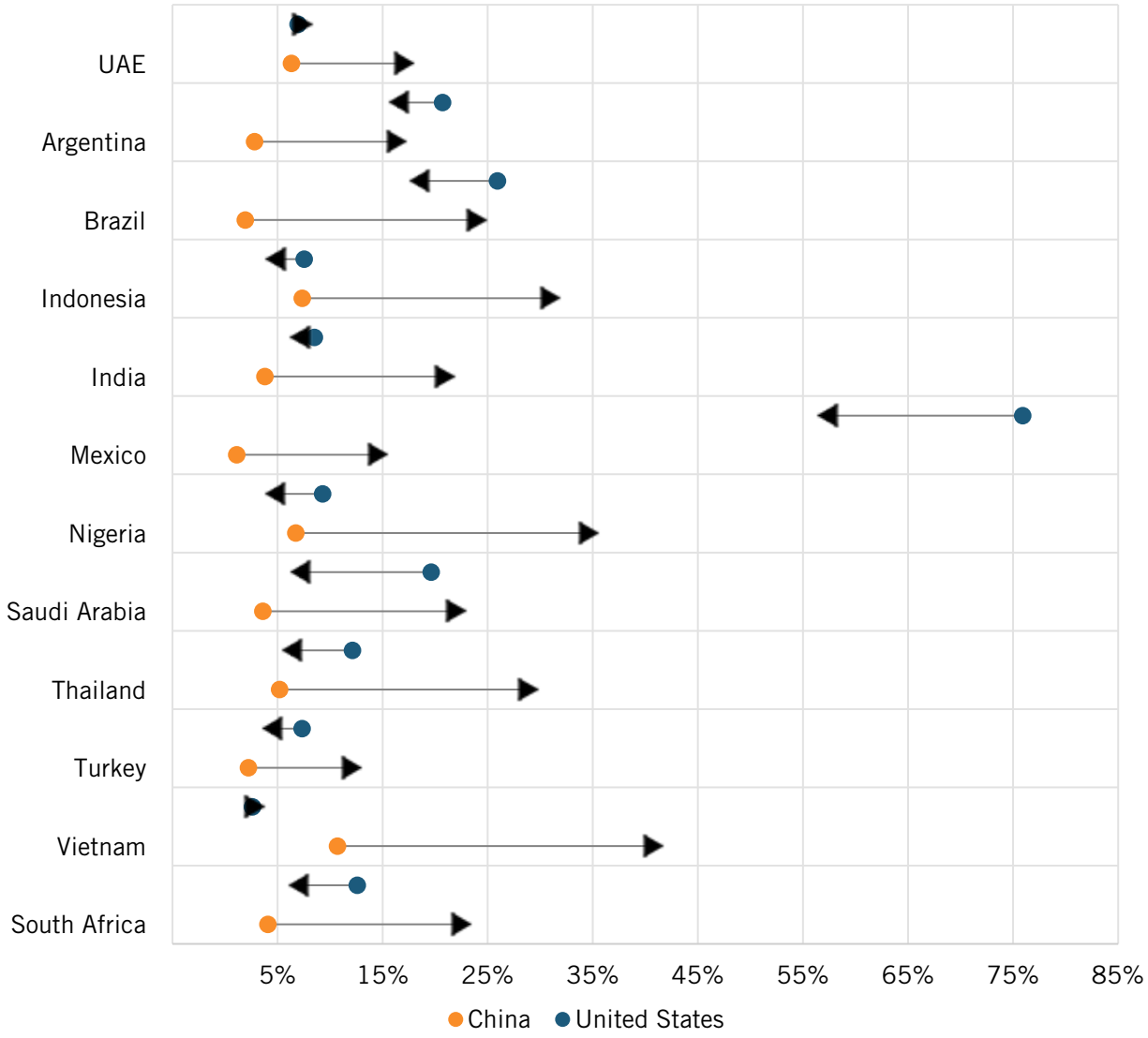


Figure 14: Exports from China and the United States to Global South countries in Sub-Saharan Africa as a share of total global exports to the region, 2000–2024[43]



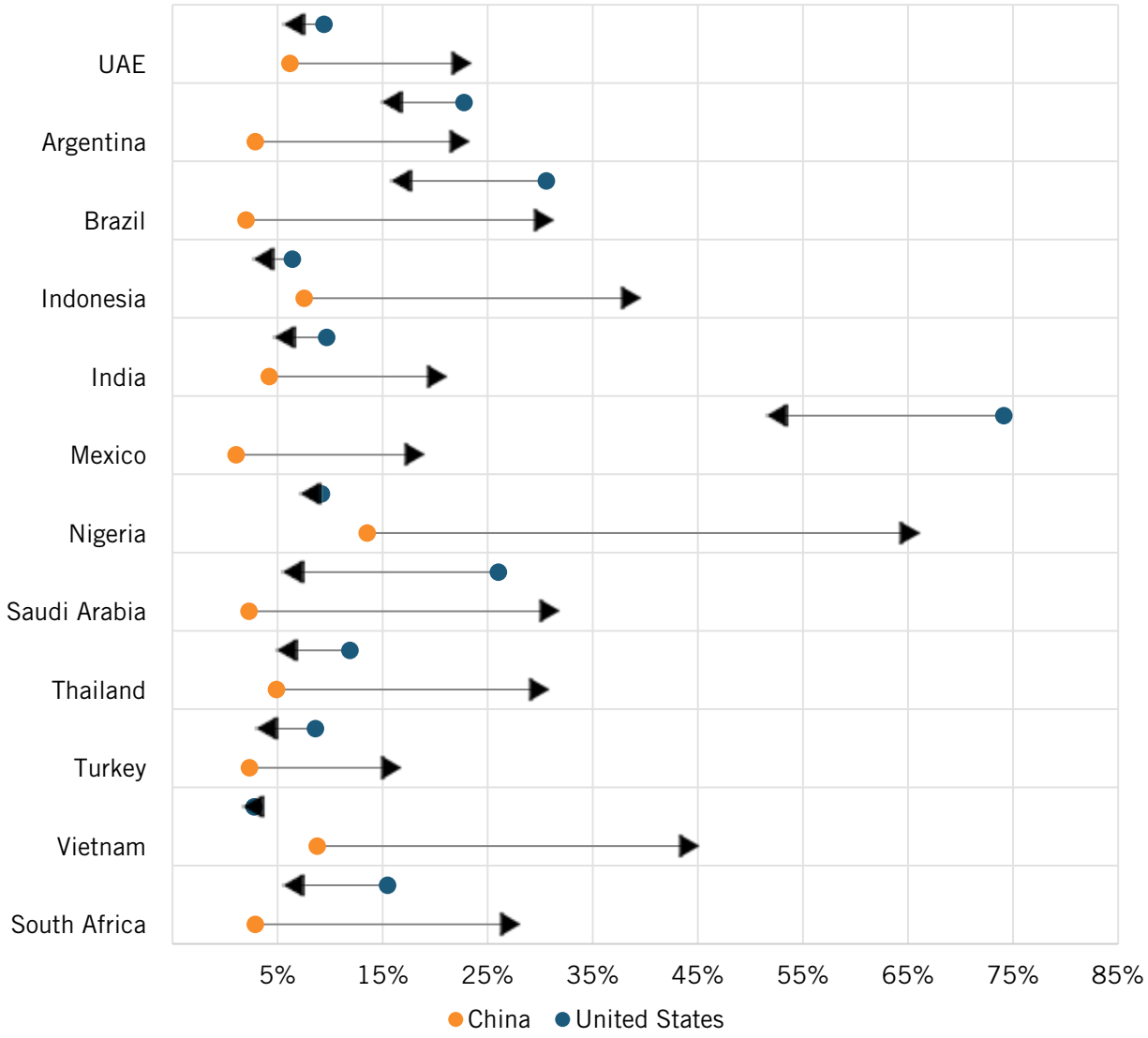
Chinese exports are expanding, widening the gap with U.S. exports across almost all of the 12 largest Global South economies. Figure 15 shows a summary of the shift—if by 2000 the United States had exported more to all the largest developing economies than China did, except for Vietnam, by 2024, Chinese exports surpassed those of the United States in all cases, except for Mexico, America's main trade partner. However, Mexico—along with Nigeria—is also one of the countries where Chinese exports closed the gap the most vis-à-vis American exports relative to the total value exported to the country; in both cases, China's export share increased by more than 33 percentage points relative to the United States.

Figure 15: Share of all goods imports from China and the United States among the largest Global South economies, 2000–2024



Considering exports of national power industries, Chinese exports' expansion relative to the United States among the largest Global South economies is even more pronounced. On average, the Chinese share of exports of national power industries to the 12 largest developing economies is 5 percentage points higher than the share of total exports. In other words, while China is gaining export share across all major Global South countries, it is gaining even more when considering only national power industries. Figure 16 shows that Chinese exports widened the gap relative to American exports by more than 20 percentage points across all countries in this sample, except the United Arab Emirates and Turkey, where the China-U.S. export gap increased by 19 and 18 percentage points, respectively.

Figure 16: Share of imports from China and the United States among the largest Global South economies (national power goods, 2000–2024



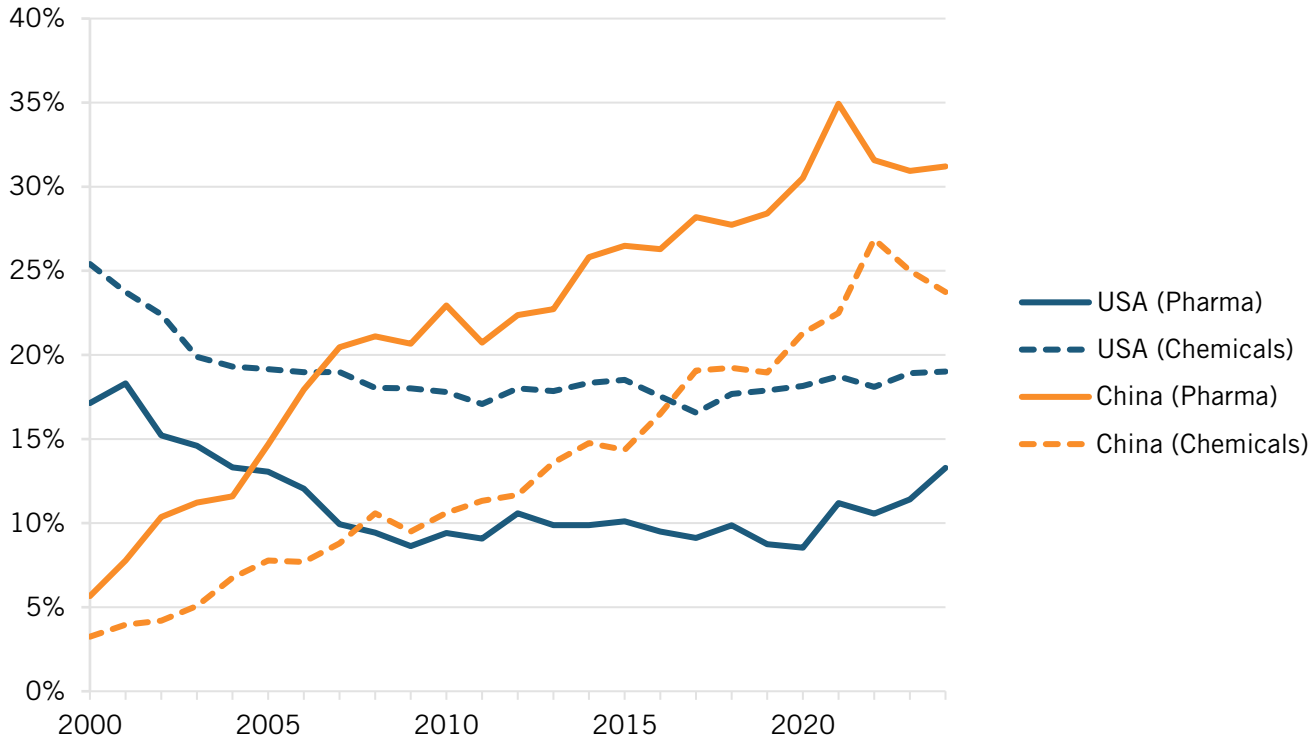
Two Decades of Chinese Growth and U.S. Decline in National Power Exports Share

This subsection analyzes U.S. and Chinese exports to developing economies across five sectors: pharmaceuticals, chemicals, vehicles, electrical machinery, and telecommunications equipment.[44] The analysis follows the same pattern as the previous subsections: Chinese exports are increasing across all sectors, while American exports are decreasing. (See figure 15 and figure 16.) The Chinese share of exports relative to American exports increased by 27 percentage points in chemicals, 29 percentage points in pharmaceuticals, and 33 percentage points in vehicles. Additionally, the gap widened to 54 percent in electrical machinery and 61 percent in telecommunications.

From another perspective, China's share of exports to the Global South in pharmaceuticals, chemicals, vehicles, electrical machinery, and telecommunications equipment increased by at

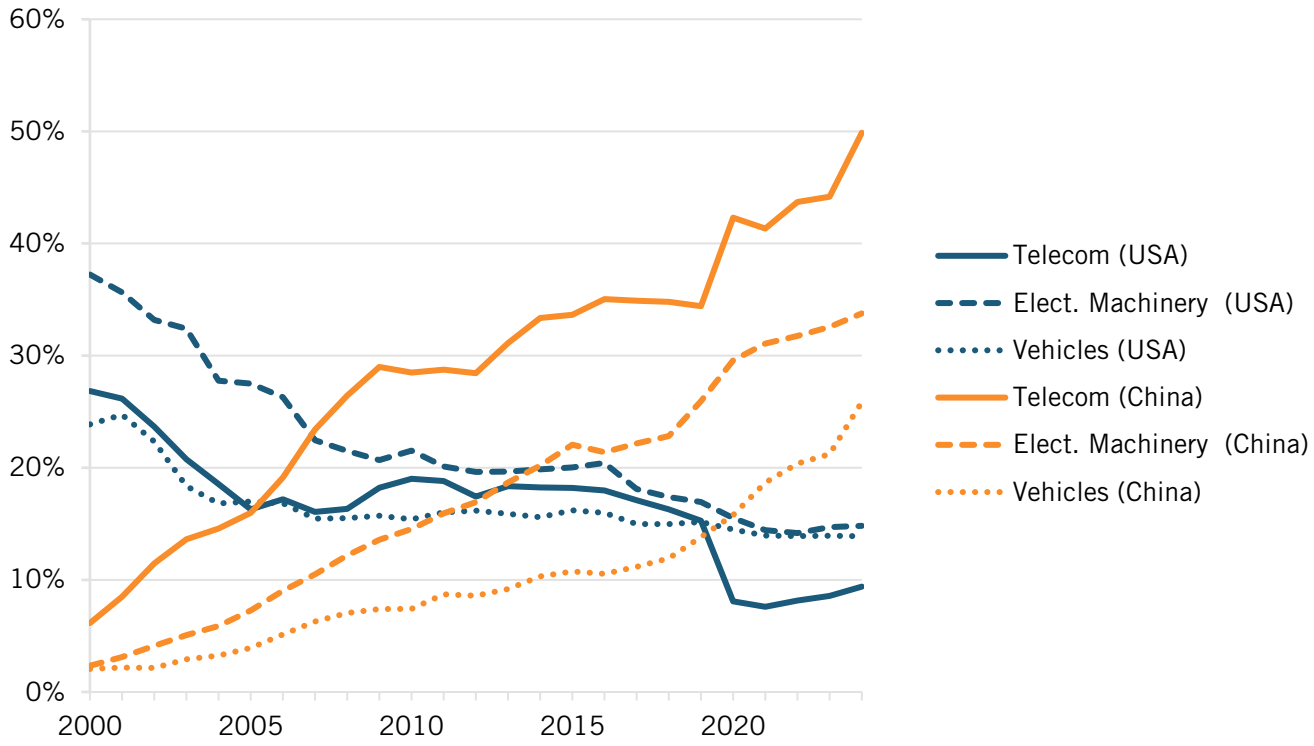
least 20 percentage points between 2000 and 2024. For the United States, the share of exports to the Global South across these product groups declined by at least 4 percentage points.

Figure 17: Exports from China and the United States to Global South countries of pharmaceuticals and chemical products, 2000–2024[45]



China's share of exports to the Global South in pharmaceuticals, chemicals, vehicles, electrical machinery, and telecommunications equipment increased by at least 20 percentage points between 2000 and 2024.

Figure 18: Exports from China and the United States to Global South countries of telecommunications equipment, electrical machinery, and vehicles, 2000–2024[46]



SUBSIDIZED PRODUCTS HELP CHINA GAIN MARKET SHARE IN THE GLOBAL SOUTH

To complement the export data presented in the previous section, this section focuses on selected cases wherein Chinese products are gaining market share in emerging economies. As there is no reliable, open source information on market share across countries, the description first focuses on anecdotal evidence of companies growing their sales in the Global South. Later, the section shows how Chinese automobile manufacturers—and particularly electric vehicle (EV) manufacturers—and mobile makers have outpaced their Western competitors in the Global South.

There is anecdotal evidence of Chinese companies increasing their sales and presence in Global South markets. For example, table 3 shows a selected group of retail and consumer firms headquartered in the PRC—all of which are experiencing growth in developing markets relative to other regions, including the Chinese local economy. Some of these companies do not necessarily export from China; for example, Midea, a home appliances company, has factories in Brazil and Thailand, among other destinations.[47] Chinese appliance company Haier entered the Indian market in 2024 and, by 2025, reported 15 percent market share in refrigerators and 8 percent in air conditioners, washing machines, and LED televisions.[48] Meituan, a platform company, announced plans in August 2025 to invest $1 billion to enter the Brazilian market and compete with local app iFood and U.S.-based Uber.[49]

Table 1: Selected Chinese companies and their presence in Global South markets[50]

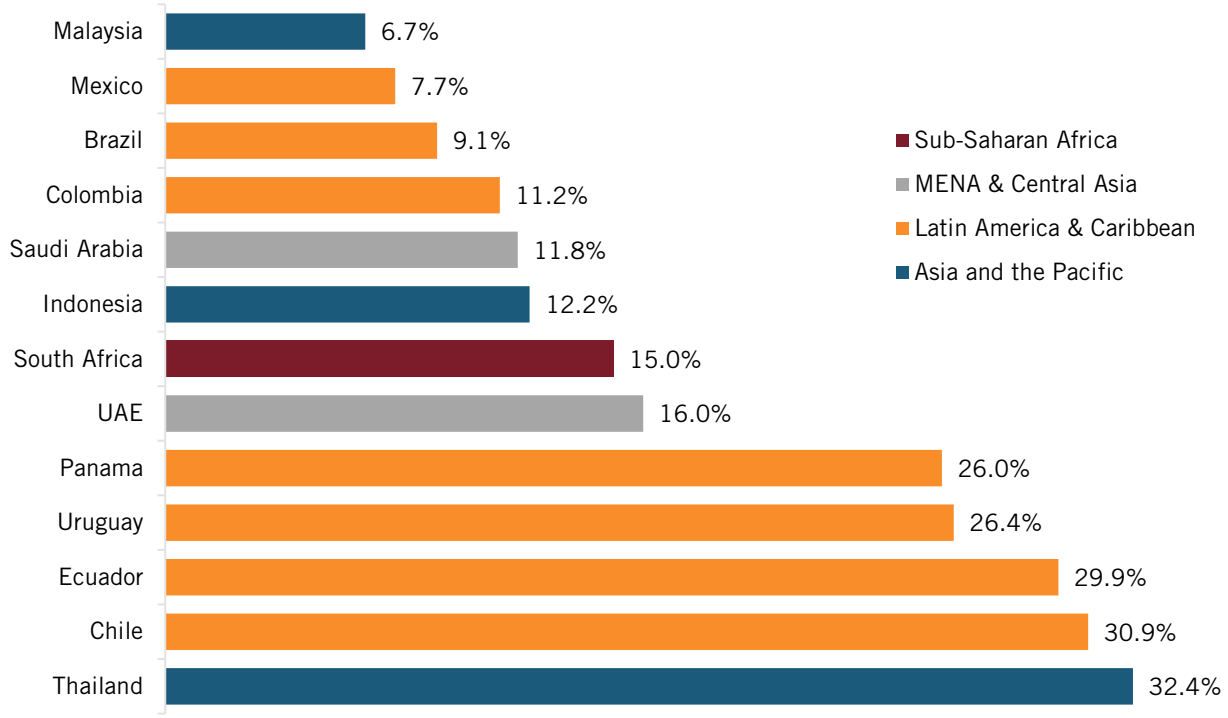
Company	Main Products	Footprint in the Global South
MINOSO Group Holding Ltd	Value retail (lifestyle consumer goods: household items, cosmetics/personal care, toys, accessories, small electronics).	The Global South accounted for 25 percent of sales and 33 percent of its 7,504 stores in 2024. The company added 389 stores in the Global South in 2024.
Anta Sports Products Ltd	Sportswear and sporting goods (athletic footwear, apparel, accessories; multi-brand sports portfolio).	Opened first overseas stores in Singapore and Thailand in 2023. It later opened 240 stores in 2024 in Brunei Darussalam, Malaysia, Nepal, the Philippines, Singapore, Thailand, and Vietnam.
Midea Group Co. Ltd	Home appliances and HVAC (major appliances, small appliances, air conditioners, and industrial robotics segments).	The company aimed to double its number of overseas branches to 60 in 2025, currently selling in over 200 countries.
Fufeng Group Ltd	Industrial food/biochem ingredients (amino acids, MSG, xanthan gum, starch/sweeteners; fermentation-based products).	Overseas sales increased by 11 percent in 2024, while domestic sales fell 5 percent. Some of the company's main markets are in Latin America, the Middle East, Southeast Asia, and South Africa.
Meituan	Local services platform (food delivery, on-demand retail delivery, travel/booking, and other local commerce services).	In 2024, the company launched Keeta, Meituan's international food delivery brand, in Saudi Arabia, its first market outside China.

Developing Economies Represent a Growing Market for Chinese EVs

Chinese companies are increasing their automotive sales and dominating the EV market in the Global South. Exports of vehicles from China to the Global South increased from 2 percent in 2000 to 22 percent in 2023, while U.S. exports fell from 24 percent to 14 percent during that same period. Figure 17 shows the market share of Chinese car brands in a selected group of emerging markets. Notably, more than 3 out of 10 cars sold in Chile, Ecuador, Thailand, and Panama are manufactured by Chinese automakers.

Chinese EVs are ubiquitous in emerging economies. Although it is not possible to determine the precise market share across all the developing economies covered in this report using open source data, some estimates place Chinese EV imports as being responsible for 75 percent of the increase in EV sales in the Global South.[51] In Brazil, analysts estimate that Chinese EVs account for 80 to 99.5 percent of the market share, while in Malaysia and Thailand, their market share exceeds 80 percent.[52] All in all, reports estimate that U.S. automakers General Motors, Ford, and Stellantis have lost over 6 percent of global market share to the expansion of subsidized Chinese EVs.[53] For instance, China lavished over $230 billion in subsidies on its EV sector from 2009 to 2023, principally in the form of buyers' rebates and sales tax exemptions.[54]

Figure 19: Market share of Chinese vehicles, 2024[55]



Chinese Mobile Makers Have Consolidated Their Market Share in Emerging Economies

Previous ITIF reports have shown how Chinese telecommunications equipment companies, such as Huawei and ZTE, have grown into global giants, supported by unfair, mercantilist Chinese government policies.[56] Chinese market-share gains have come at the expense of innovative telecom equipment providers in other countries, particularly Ericsson and Nokia.

Chinese mobile brands have increased their market share by more than 40 percentage points in Africa, nearly 70 percentage points in India, and roughly 50 and 20 percentage points in Indonesia and Latin America, respectively.

European companies such as Nokia and Ericsson, Japanese companies such as Sony, and Korean companies such as LG were once major players in emerging-economy mobile markets. This subsection briefly describes their decline and the rise of Chinese mobile makers such as Xiaomi, Alcatel, Huawei, and Oppo. Since 2010, Chinese mobile brands have increased their market share by more than 40 percentage points in Africa, nearly 70 percentage points in India, and roughly 50 and 20 percentage points in Indonesia and Latin America, respectively. (See figure 20 through figure 23.)

U.S. mobile brands have also increased their market share in Africa, India, Indonesia, and Latin America—though this growth remains modest compared with that of Chinese brands. Apple and Motorola, for example, had a combined market share of 1 percent in India in 2010, rising to 11 percent by 2025. In Latin America, these two companies had a combined market share of 24 percent in July 2010, largely due to the introduction of the iPhone. The combined market share

in Latin America fell to 11 percent a year later, and since then, the combined market share of all U.S. mobile brands has fluctuated between 10 and 17 percent.

Figure 20: Market share of smartphones in Africa for Chinese and U.S. companies, May 2010 to December 2025[57]

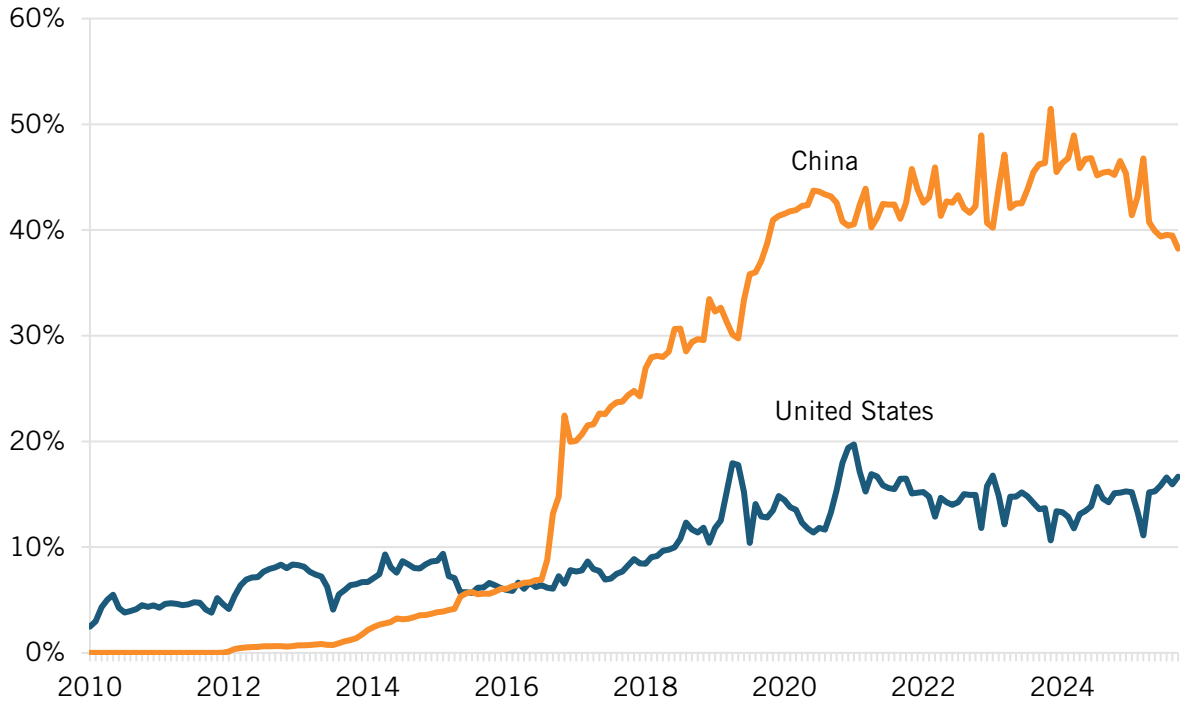


Figure 21: Market share of smartphones in India for Chinese and U.S. companies, May 2010 to August 2025[58]

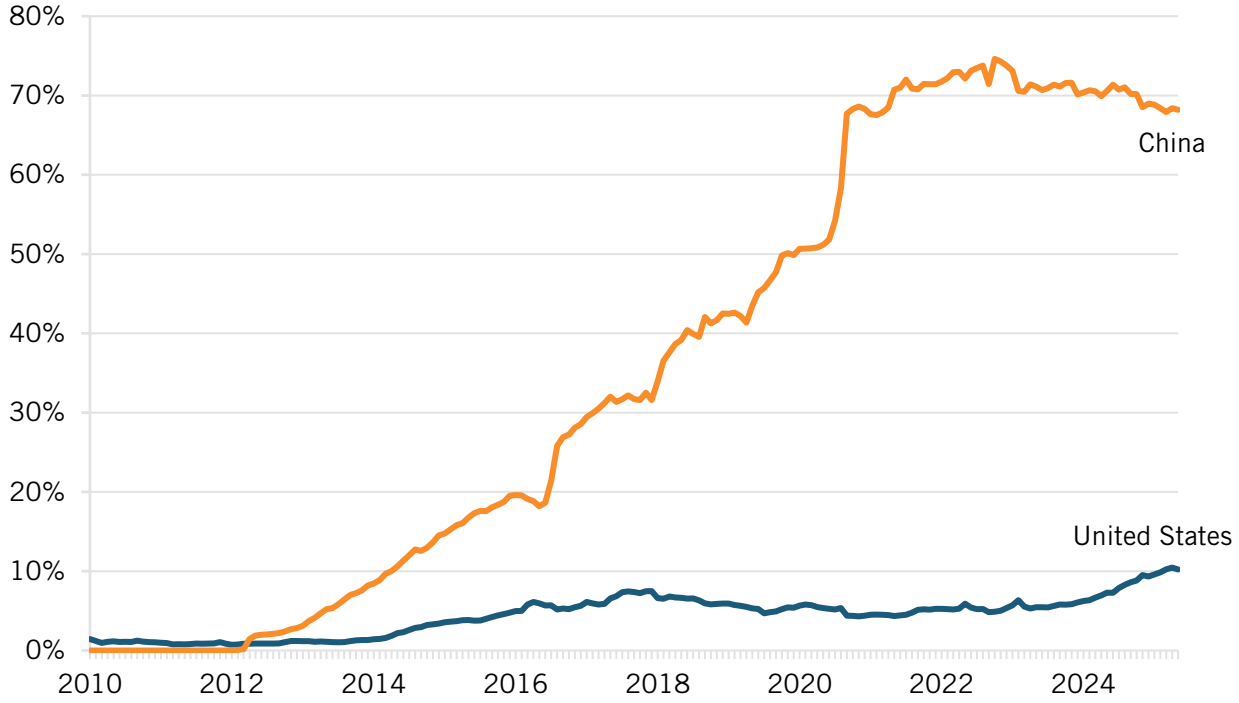


Figure 22: Market share of smartphones in Indonesia for Chinese and U.S. companies, May 2010 to December 2025[59]

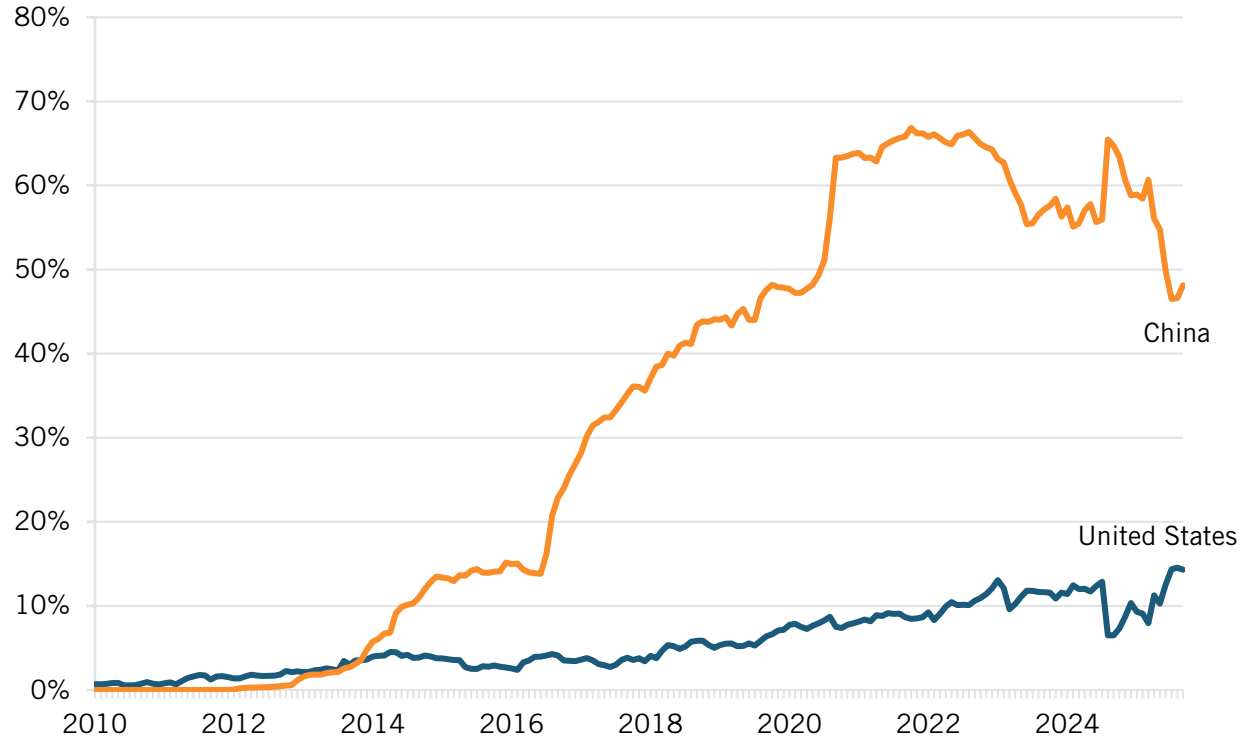
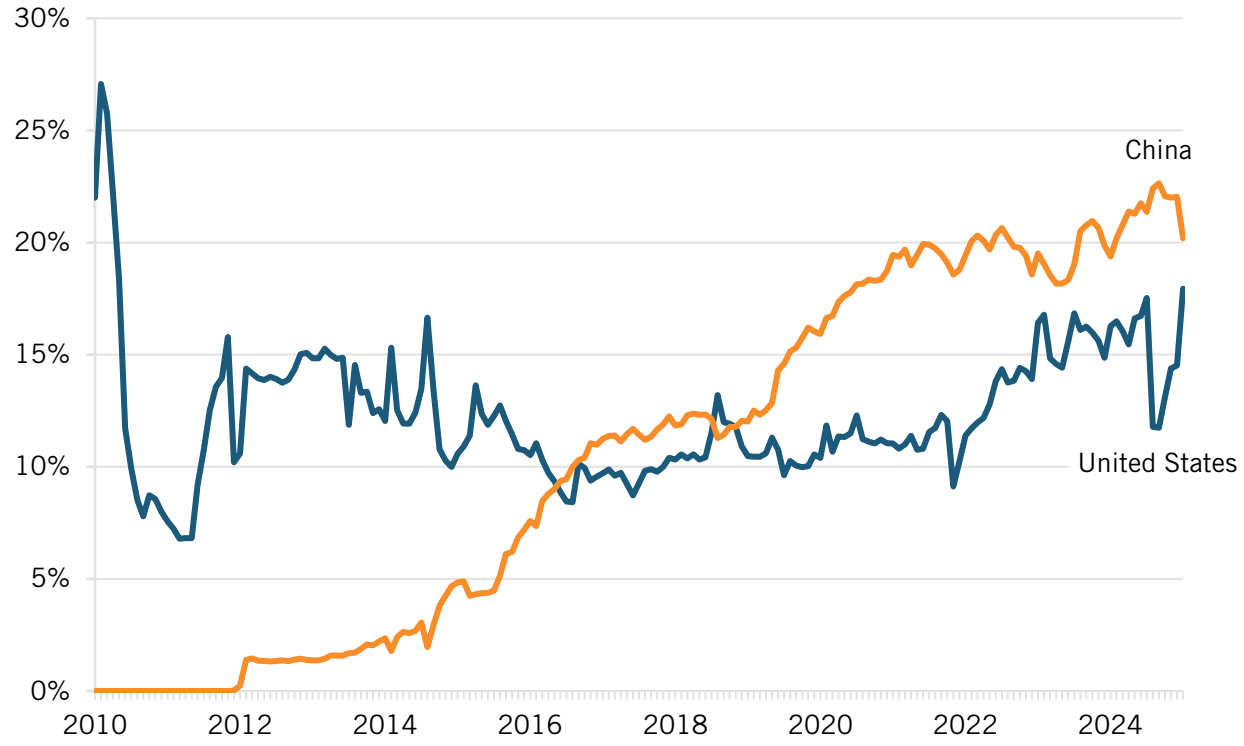


Figure 23: Market share of smartphones in Latin America for Chinese and U.S. companies, May 2010 to April 2025[60]



China's Increasing Market Share in the Global South's Digital Economy

The increasing footprint of Chinese software applications and their presence across other key aspects of the digital economy in the Global South are well documented. ITIF published a 2020 report outlining how China's digital strategy has been wildly successful worldwide, first capturing the Chinese domestic market and later expanding its market share overseas.[61] Nearly six years after that report, Chinese products in the digital economy continue to grow globally and gain market share in developing economies. As of October 2025, there are at least four Chinese apps installed in more than a billion devices—although a large share of the users are in Mainland China. (See figure 24.)

Figure 24: Chinese apps installed on more than a billion devices[62]



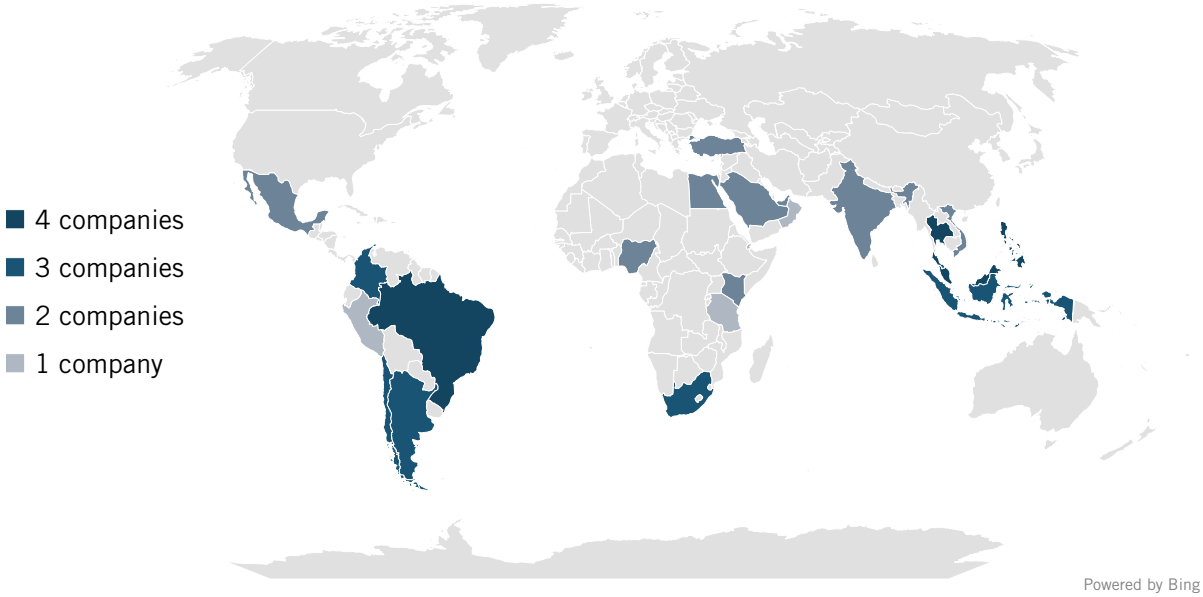
Chinese e-commerce apps are competing in markets in which American e-commerce platforms cannot enter successfully. In Southeast Asia—a market widely dominated by local digital companies—TikTok Shop accounted for 18 percent of e-commerce gross merchandise value in 2024, while Amazon's share was less than 1 percent.[63] TikTok Shop more than doubled its market share in Southeast Asia in just three years (2021–2023), quadrupling its revenues in the region.[64]

Latin American e-commerce is also highly dominated by a local champion—Mercado Libre, an Argentine company—however, AliExpress has been able to account for 42 percent of the market share in Chile.[65] Other Chinese e-commerce apps are increasing their share in Latin American markets. Temu's monthly active users in Latin America increased over 140 percent during the first half of 2025.[66] Temu was the third-most preferred app in Mexico in 2025, surpassing Walmart, while Shein is also well-regarded among Mexican consumers.[67]

Chinese companies also have a ubiquitous presence in the Global South cloud infrastructure. The global cloud market is largely dominated by American companies such as Amazon Web Services, Google Cloud Platform, and Microsoft Azure—accounting for over 63 percent of the global market share.[68] Alibaba and Huawei, in contrast, have a global market share of 4 percent and 2 percent, respectively.[69] However, Chinese cloud providers' global expansion is focusing on emerging markets. In Latin America, a 2025 study finds that Chinese data center providers accounted for 25 percent in Brazil, 40 percent in Chile, and 100 percent in Argentina, Mexico, and Peru each.[70] The same study finds that 57 percent in Indonesia and 100 percent in Thailand, the Philippines, and Malaysia were owned by Chinese companies.[71] Figure 25 shows the presence of interconnection facilities—a key link between data centers and cloud service

providers—in 21 Global South countries, including the 12 largest, provided by four Chinese companies: Alibaba Cloud, China Mobile, Huawei, and Tencent.

Figure 25: Presence of interconnection facilities by the largest Chinese companies[72]



CHINA IS INVESTING MORE THAN THE UNITED STATES IN THE ASIA PACIFIC AND IN SUB-SAHARAN AFRICA

Chinese foreign investment is not a neutral byproduct of globalization—it is a core instrument of the PRC's campaign for global advanced industrial hegemony. Unlike FDI from market economies, Chinese outbound investment is frequently directed by the state and aligned with industrial policy goals rather than commercial returns. As ITIF has documented, Beijing deploys a coordinated set of innovation-mercantilist tools—including state-backed capital, discriminatory market access, and coerced technology transfer—to accelerate firm upgrading and skew global competition.[73] In this context, Chinese FDI in third markets is rarely an isolated financial transaction. It is part of a broader predatory system designed to acquire technology, embed Chinese firms in critical ecosystems, and lock in long-term market share in strategically important sectors.

The Belt and Road Initiative

The BRI, an investment plan aimed at strengthening China's connectivity with the world, is China's signature foreign policy. Through the BRI, the Chinese government invested over $1.3 trillion between 2013 and the first half of 2025 across more than 150 countries, with roughly $755 billion in construction contracts and $554 billion in non-financial investments.[74] Most of the BRI-related large infrastructure projects involved resource extraction, such as oil and gas, with relatively low financial risks for Chinese counterparts.[75] According to the Griffith Asia Institute, the last few years have observed the trend that the majority of construction contracts "are typically financed through loans provided by Chinese financial institutions and/or contractors, with the project often receiving guarantees through the host country's government

institutions, potentially backed up by resources."[76] The BRI program includes non-Global South countries such as Austria, Bulgaria, Croatia, the Czech Republic, Estonia, Greece, Hungary, Luxembourg, Poland, Portugal, the Slovak Republic, and Slovenia.[77]

BRI investments are directly linked to the expansion of Chinese techno-economic power. A wide range of Chinese firms participate in BRI projects, embedding Chinese technical standards and raising switching costs for host countries. Huawei, a Chinese telecommunications company and a direct competitor of many U.S. technology companies, has been a recipient of BRI projects, helping it expand its global footprint and build the necessary connections with government officials in the Global South.[78] For example, Huawei built a data center in Papua New Guinea in 2018, thanks to a $53 million development loan from the Export-Import Bank of China (EXIM).[79] Other Chinese technology companies, such as Alibaba, Baidu, China Telecom, Tencent, and ZTE, have received funding to gain presence in Global South countries through BRI projects.[80] Over time, the presence of Chinese technology firms translates into durable market advantages, reducing the commercial and regulatory space available to American competitors.

BRI projects are not solely state-funded, but they are state-directed. The Chinese government determines which projects to support, who the beneficiaries will be (both contractors and the target population), and the terms and conditions of the projects. The PRC does this through a mix of public banks, state-owned enterprises, and diplomacy.[81] Through the BRI, Chinese public financial institutions such as the Chinese Development Bank (CDB) and the EXIM can issue low-cost loans, as their bonds are treated as Chinese government debt, with very low interest rates.[82]

The BRI has a component called the "Digital Silk Road" (DSR), which is focused on building telecommunications infrastructure (e.g., 5G networks, fiber-optic networks, data centers) and promoting Chinese technical standards, for example, in e-commerce, artificial intelligence (AI), and smart cities.[83] In the last few years, the DSR has been subsumed by other BRI-related initiatives, in part because recipient countries have increasingly opposed it due to the sector's sensitivity and Chinese domestic economic pressures.[84] However, Chinese companies have continued their global expansion, demonstrating Huawei's presence in countries home to over 3.2 billion people.[85]

As Chinese investments in the Global South are non-market-driven, there are distinctive patterns in the regional allocation of resources compared with those of the United States or other traditional investors. First, the perception of geopolitical and institutional risk—a key factor in market-driven investments—does not necessarily play a primary role in the PRC's investment decisions. For example, BRI projects are particularly relevant in low- and middle-income countries that are deemed less creditworthy by private capital investors and traditional donors—such as Pakistan—due to lower risk aversion than U.S. market-driven investments.[86] This also partially explains the difference between Chinese and American investments in Sub-Saharan Africa.

Second, Chinese investment decisions—public and private—are shaped by strategic priorities that support the supply chain of China's military-civil manufacturing sector. Investments from China in developing economies are disproportionately oriented toward commodity-based projects, strategic transport and logistics nodes (such as port access), and telecommunication infrastructure.[87] While this may seem beneficial to the country receiving the investment, this focus exposes it to geopolitical tensions by hosting dual-use infrastructure, such as the Hambantota port in Sri Lanka and the Chancay Port in Peru.[88]

The different nature of Chinese investments in Global South countries has sometimes created conflict and pushback from host countries. This is exacerbated by cultural differences, a lack of understanding of the host country, and China's work culture. Foreign investment—particularly in mining and infrastructure projects—is often controversial regardless of the investor, but the factors driving the PRC's foreign investments, as described previously, add an additional source of tension. To wit, there have been cases of workers treated in near-slavery conditions in Chinese-owned factories in Mozambique and Chinese-owned mines in Zambia, employees in Zimbabwe being shot by a Chinese mine owner, and workers being banned from leaving the working facilities in Angola.[89]

Chinese investment companies traditionally staff technical, highly qualified, and management roles with Chinese employees rather than hiring or training local talent.[90] While *The Economist* recently reported anecdotal evidence that some Chinese investors are hiring local employees in higher-responsibility roles, this seemed to be limited to "sales, customer service, and public relations," with just a few roles in management.[91]

There is evidence that China and the United States effectively "compete" in investments in the Global South. American investments push the PRC to invest more, and vice versa. For example, Japanese researchers found that the United States "may have invested more in BRI countries to strategically compete with China in those locations."[92] This competition does not necessarily occur across all Western allies—for example, Italy, France, Japan, the Netherlands, Switzerland, and the United Kingdom have signed agreements with the PRC to cooperate in third-party markets.[93] Conversely—as described previously—one of the BRI's main goals is to counter Western global influence.

The distinct nature and structure of Chinese investments overseas make a one-to-one comparison with U.S. foreign investment difficult. It is already challenging to track investments from any country, but this is exacerbated by the PRC's lack of transparency and the unreliability of publicly available information. The Congressional Research Service has d that "no comprehensive, standardized, or authoritative data are available on all Chinese overseas economic activities."[94] Thus, depending on the source, the flow of Chinese investments to countries outside the United States can vary by as much as 50 percent.[95]

Chinese public investments in the Global South are significantly higher than U.S. federal funding for developing countries.

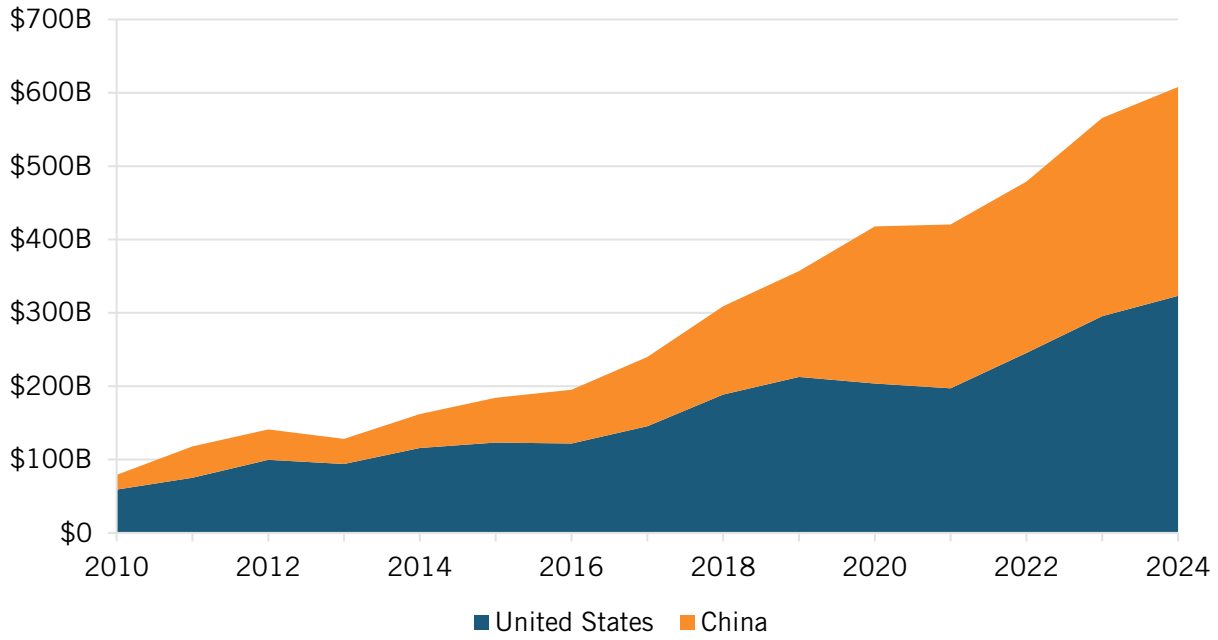
Chinese public investments in the Global South are significantly higher than U.S. federal funding for developing countries. A 2024 study by the U.S. Government Accountability Office (GAO) compared BRI projects supported by the U.S. government, including loans, insurance, grants, and loan guarantees, generally for private entities.[96] According to GAO's study, while China's BRI infrastructure projects provided $679 billion across seven key sectors—transportation, energy, industry, mining, construction, telecommunications, and water supply and sanitation—the U.S. government provided $76 billion in the same sectors.[97]

This section uses IMF reports on outward FDI. Instead of measuring government-to-government investments in the Global South, a more direct way to compare American and Chinese investments is to use this data, as it has the advantage of being an official, unique source that

allows identification of investment amounts by country of origin, recipient country, and year. However, IMF's FDI data still has limitations. First, it is not categorized by sector, so FDI data includes "shovel-ready" construction or investment projects, financial transactions, and mergers and acquisitions. Second, the country of origin recorded in the data does not always reflect the ultimate home country of the investing firm. This is because multinational companies frequently route investments through intermediary jurisdictions that offer more favorable tax, legal, or regulatory treatment. As a result, countries such as the Cayman Islands, the Netherlands, and the Virgin Islands appear as disproportionately large global investors despite serving primarily as financial conduits rather than sources of real economic control.[98] These intermediate jurisdictions can account for as much as 40 percent of global FDI in some years.[99]

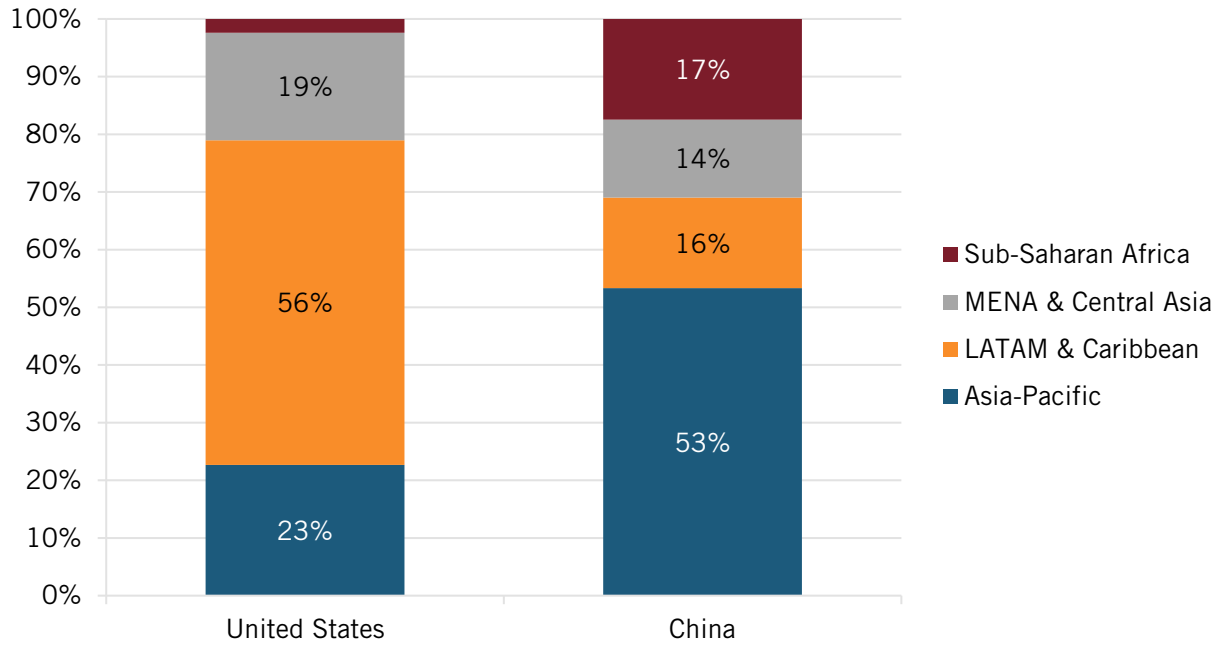
Using this methodology, U.S. entities invested more than $323 billion in the Global South between 2010 and 2024, representing 13 percent more than Chinese outward FDI to developing economies during the same period. Figure 26—and the rest of the figures using FDI data in this section—use outward FDI data, measured on a net basis (assets minus liabilities) and covering all financial instruments and reporting entities from China and the United States to Global South countries. This metric captures the net bilateral stock of direct investment—combining equity and intercompany debt—between each reporting economy and its counterpart, while netting out reverse investment within the same investment relationship. Net positions reduce distortions caused by intra-company financing, round-tripping, and pass-through investment—practices that can significantly inflate gross FDI figures without reflecting real control, risk, or productive activity.[100] Notably, China experienced 54 percent growth over the four years between 2017 and 2020, while the United States grew only 29 percent during that period, allowing China to surpass the cumulative FDI outflows since 2010 through the first year of the COVID-19 pandemic.

Figure 26: Outward direct investment positions in Global South countries, accumulated between 2010 and 2024 (current USD)[101]



The destinations of outward FDI positions are skewed toward the home region of China and the United States. Figure 27 shows that 53 percent of China's accumulated FDI to Global South countries between 2010 and 2024 was directed to countries in Asia and the Pacific. Similarly, 56 percent of the U.S. FDI positions in the Global South are allocated in Latin America. While investments from China and the United States in developing economies account for roughly 10 percent of their total, 25 percent of Chinese investments go to these countries.[102] Figure 27 also shows the difference in priorities between China and the United States in investing in Sub-Saharan Africa—while China's FDI in this region accounts for 17 percent of all investments in developing economies, the United States' FDI in this region accounts for only 2 percent.

Figure 27: Destinations of outward FDI among Global South countries, accumulated between 2010 and 2024[103]



China's accumulated FDI positions between 2010 and 2024 exceeded American investments in developing countries in the Asia-Pacific by more than fivefold and doubled U.S. FDI in Sub-Saharan Africa. By contrast, U.S. FDI accumulated positions in Latin America are triple those of Chinese investments, while in the Middle East and Central Asia, American investments are 56 percent higher than China's during the same period. (See figure 28 through figure 31.)

China's accumulated FDI positions between 2010 and 2024 exceeded American investments in developing countries in the Asia-Pacific by more than fivefold and doubled U.S. FDI in Sub-Saharan Africa.

The United States' tariffs on Chinese products have changed the composition of Chinese investments in developing economies. Chinese investments in Latin America during recent decades were mostly limited to resource-based sectors, such as mining, and enabling infrastructure for commodity extraction and trade.[104] This made Chinese investment in Latin America dependent on commodity price fluctuations; indeed, most of the PRC's lending to the region during the 2010s decade was concentrated in the first half of the period, aligned with the

price cycle.[105] However, during the 2020–2024 period, over 45 percent of FDI in the region was focused on vehicles and auto parts, mostly as a result of not only the U.S.-China trade war initiated during the first Trump administration and continued during Biden's but also the tariff-free environment for products made in Mexico, thanks to the USMCA.[106]

Figure 28: Outward direct investment positions in Global South countries in Asia and the Pacific, accumulated between 2010 and 2024 (current USD)[107]

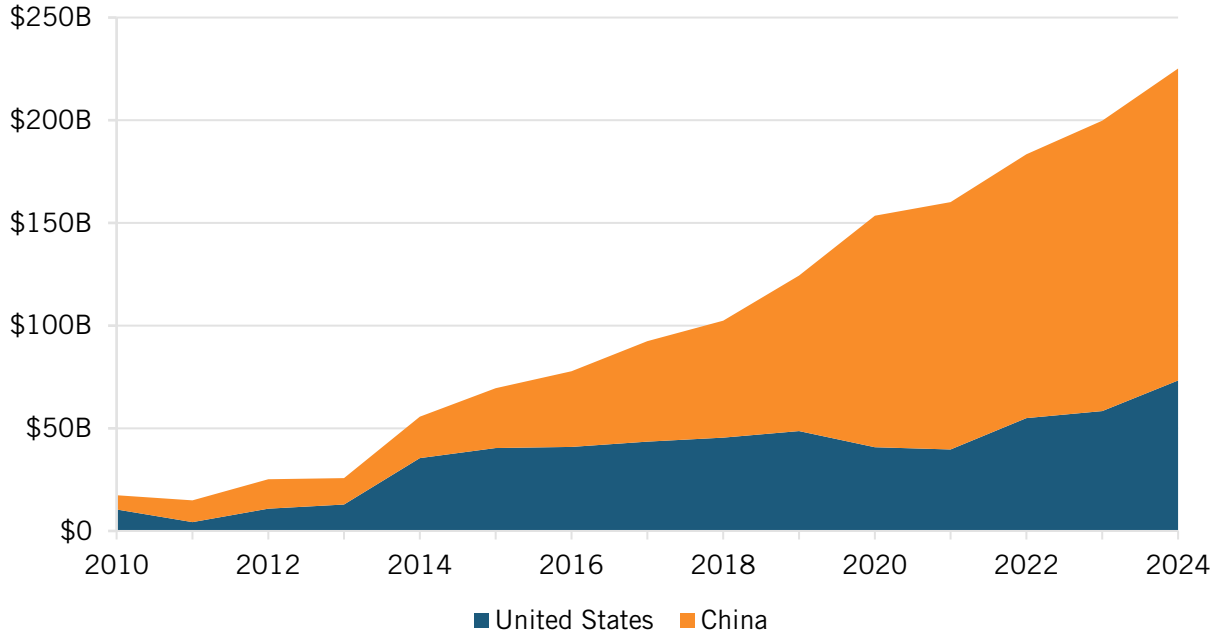


Figure 29: Outward direct investment positions in Global South countries in Latin America, accumulated between 2010 and 2024 (current USD)[108]

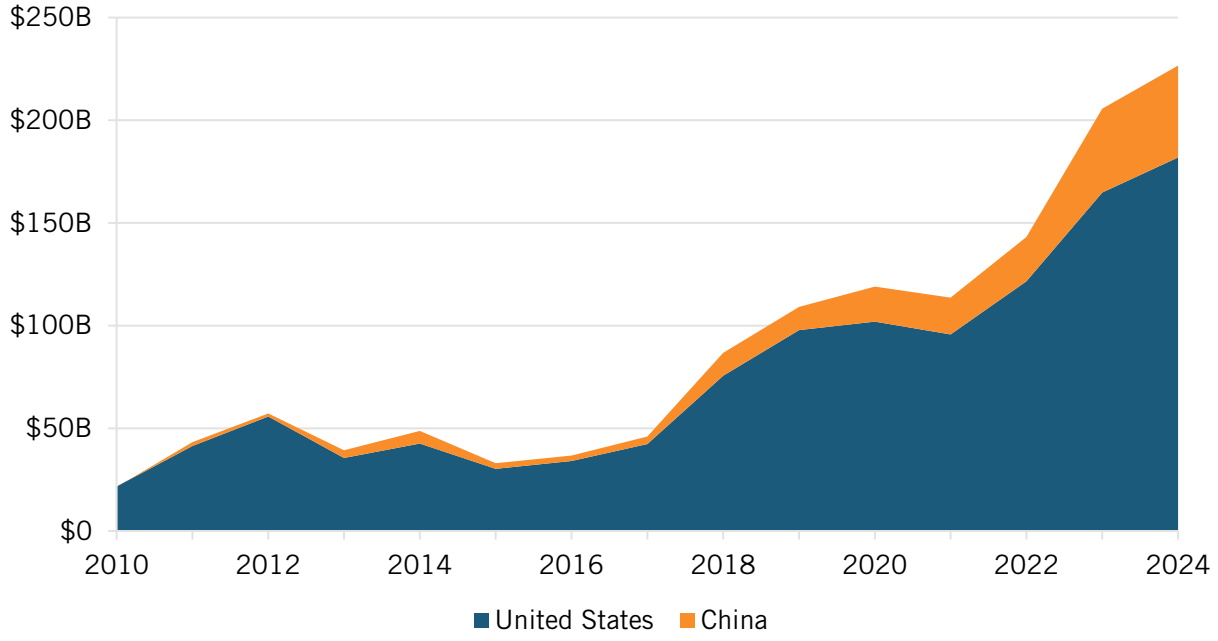


Figure 30: Outward direct investment positions in Global South countries in the MENA and Central Asia, accumulated between 2010 and 2024 (current USD)[109]

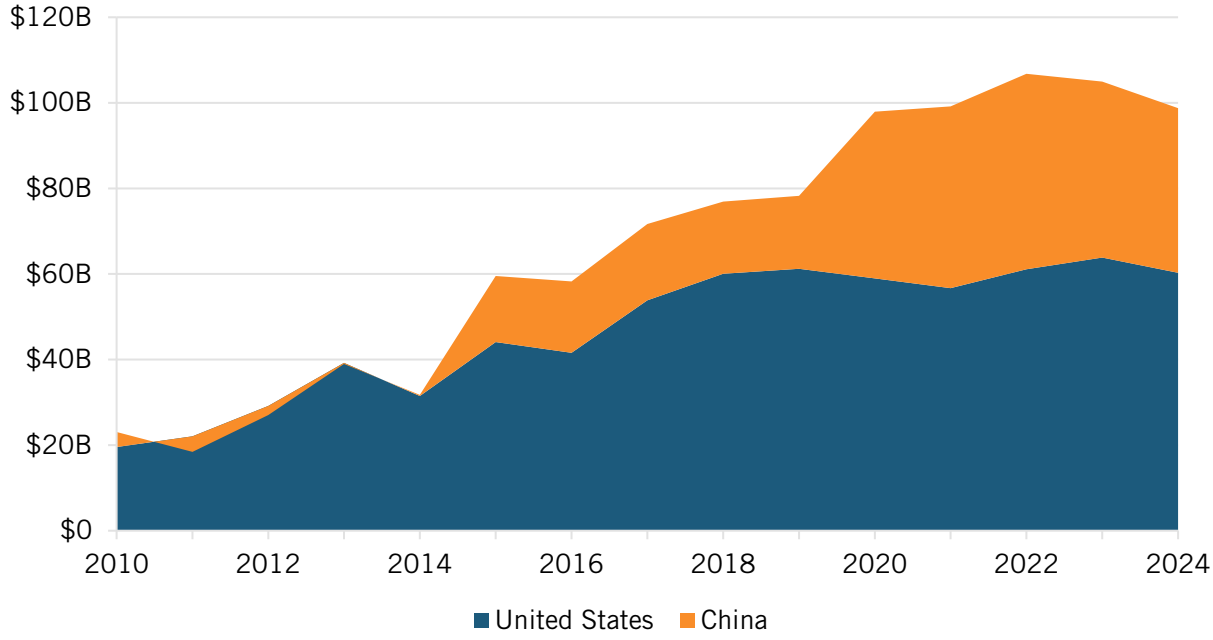
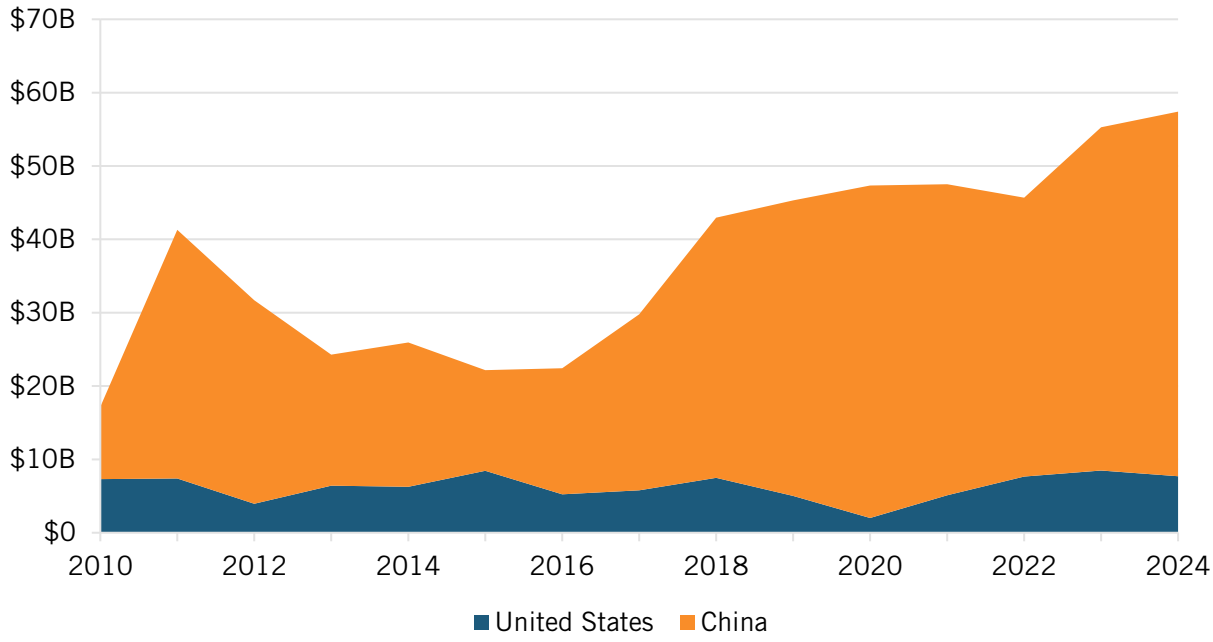


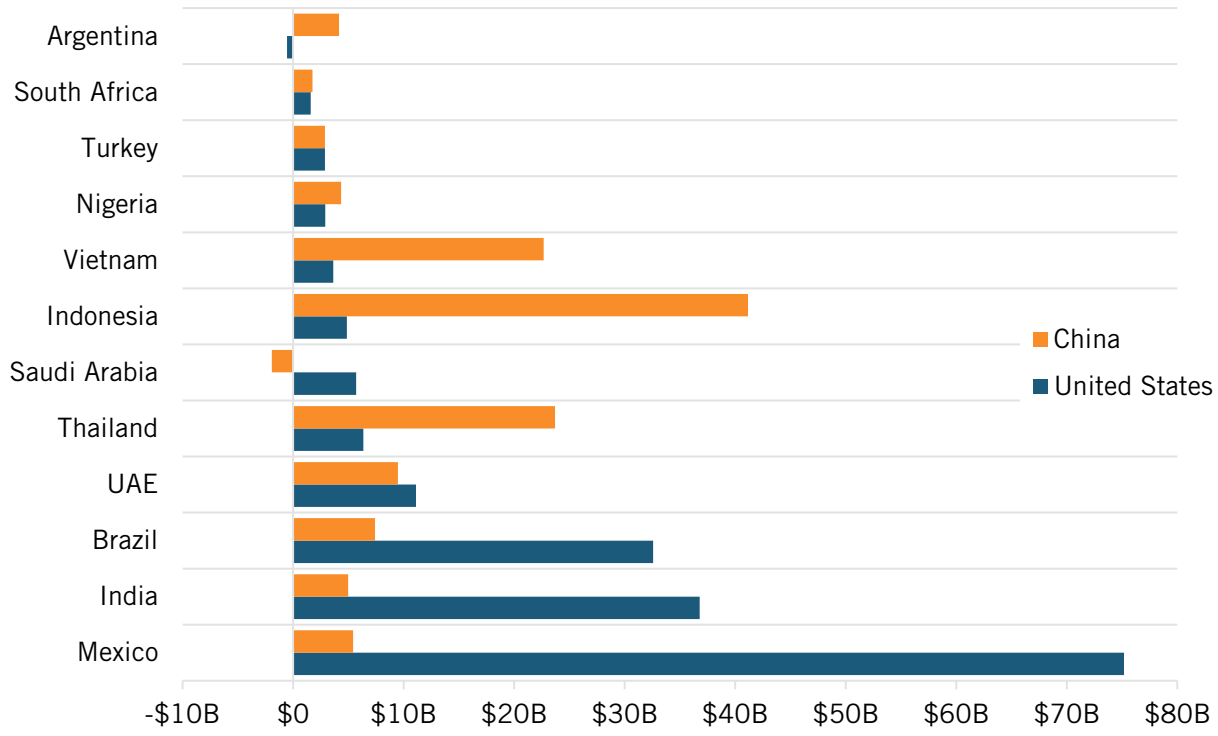
Figure 31: Outward direct investment positions in Global South countries in Sub-Saharan Africa, accumulated between 2010 and 2024 (current USD)[110]



Between 2010 and 2024, 45 percent of total U.S. FDI investment positions were allocated to Brazil, India, and Mexico. In contrast, 31 percent of Chinese FDI investment positions in emerging markets during the same period were allocated to the main developing countries in Southeast Asia—Indonesia, Thailand, and Vietnam. Figure 32 shows FDI outflows from China and the United States to the 12 largest developing economies. Overall, China accounts for 44

percent and the United States for 57 percent of their total FDI positions in this group of countries. (Mexico alone represents 23 percent of the total outward FDI positions from the United States.)

Figure 32: Outward direct investment positions in a selected group of countries in the Global South, accumulated between 2010 and 2024[111]

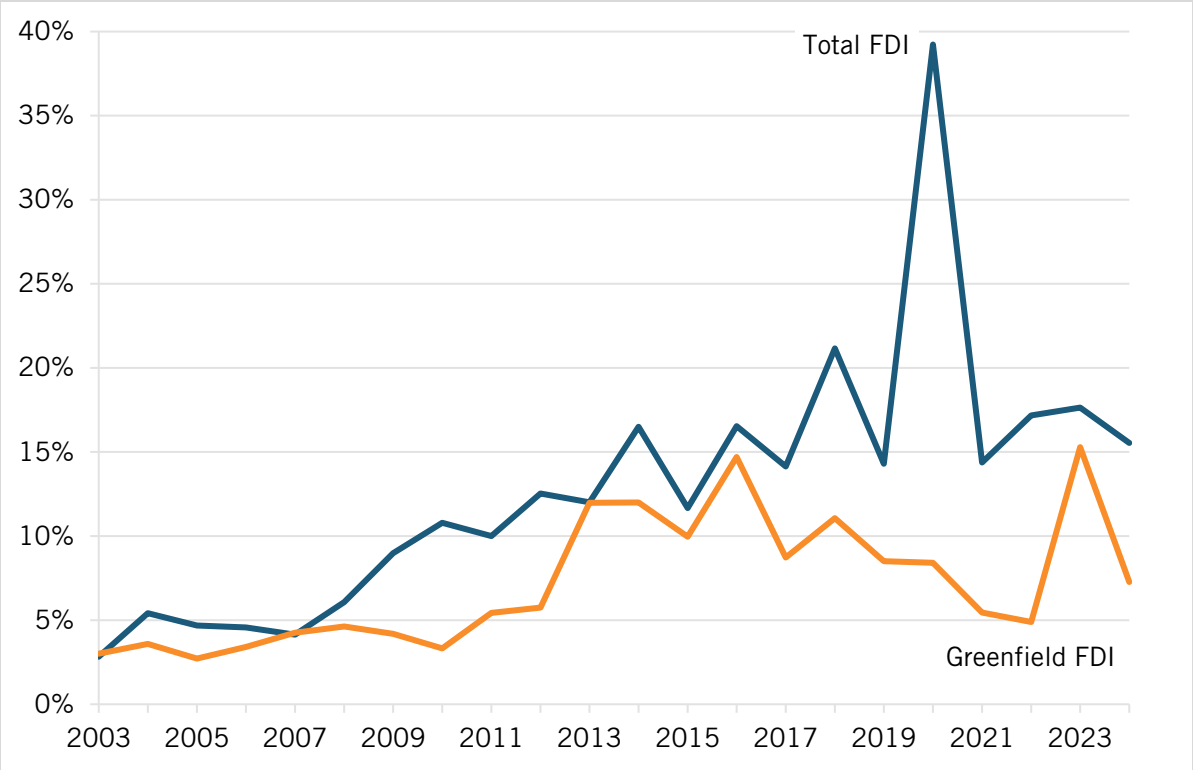


Are Chinese Investments Real, Physical Investments?

The limitation of FDI data is that it includes transactions that are not necessarily capital stock accumulation or financial transactions. FDI data includes transactions involving reinvested earnings (i.e., transfers of funds) and mergers and acquisitions (i.e., transfers of ownership). As a result, it is important to determine whether Chinese FDI constitutes new capital formation or greenfield investment. While it is not possible to determine the specific composition of China's outward FDI by investment type, a good approximation can be obtained by using UN Trade and Development's (UNCTAD's) aggregate data and comparing it with the global share.

Figure 33 shows the sum of China and Hong Kong's outward FDI as a share of the world total, and contrasts it with China and Hong Kong's value of announced greenfield FDI projects as a share of the world's total. (The 2020 peak is explained by China's initial response to the COVID-19 pandemic.) While it is possible to conclude that China is investing less in greenfield FDI than in financial transactions, it is still possible to observe an increase in Chinese greenfield FDI. If, between 2003 and 2008—the first five years of the available data—China's greenfield FDI accounted for 3 percent of the world's greenfield foreign investments, by the last five years of the sample (2000-2024), the average had increased to 8 percent.

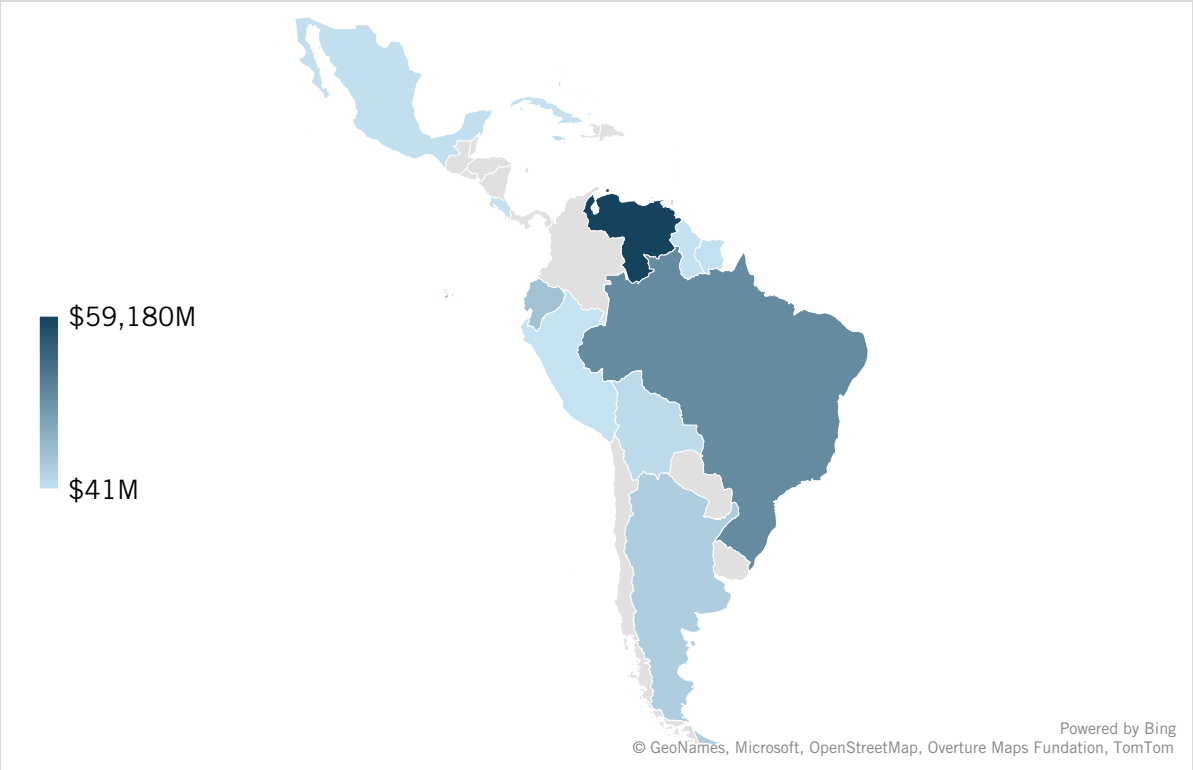
Figure 33: China + Hong Kong's FDI as a share of the world total[112]



Rhodium Group, a market intelligence company, has a proprietary dataset on Chinese FDI. According to the firm, Chinese mergers and acquisitions started to decline significantly in 2016, shifting toward greenfield FDI.[113] The growth of Chinese greenfield investments might be explained by trade and investment barriers from the United States and other high-income economies that impede financial transactions, and by internal competition—for example, among Chinese EV companies—pushing them to seek new markets and cheaper supply chains.[114]

To be clear, Chinese investments often lead to significant increases in capital stock creation. A project by the Inter-American Dialogue and the Boston University Global Development Policy Center estimates that, between 2005 and 2023, the CDB and EXIM have loaned more than $120 billion to Latin American countries and state-owned enterprises, typically for energy and infrastructure projects, of which more than 88 percent were allocated to energy and infrastructure projects.[115] As shown in figure 34, nearly half of these loans targeted the Venezuelan economy. Other studies—beyond loans—report Chinese investments in potentially dual-use infrastructure and supply chains, such as the "Lithium Triangle"—Argentina, Bolivia, and Chile—and the previously mentioned Chancay Port in Peru.[116]

Figure 34: Loans from CDB and EXIM to Latin American countries between 2005 and 2023[117]



Perhaps the BYD plant in Camaçari, Brazil, captures all the nuances of Chinese FDI in the Global South. The plant was formerly a Ford production site—symbolizing the retreat of U.S. national power influence in the Global South and the rise of China.[118] Also, this investment likely had both acquisition and greenfield elements, as it required upgrading the plant and bringing in new technologies. As noted, internal competition in China—particularly in EVs—is partly driving Chinese multinationals to invest in the Global South. Lastly, the project has not been exempt from controversies—Brazilian prosecutors sued BYD, accusing the company and some of its contractors of being "responsible for human trafficking and conditions analogous to slavery."[119]

WHY AND HOW CHINA HAS GAINED IN THE GLOBAL SOUTH

Market share in the Global South matters in the context of U.S.-China techno-economic competition, as leadership is defined by scale. Cheap, subsidized Chinese products are flooding the Global South's consumer markets, making them a primary mechanism for Chinese companies to grow, as the domestic Chinese market is arguably saturated and has already displaced foreign companies in many sectors, such as electronics and retail.

China's expanding footprint in the Global South has its roots in the country's free-riding on global trade rules. China is a nonmarket economy—a country that "does not operate on market principles of cost or pricing structures, so that sales of merchandise in such a country do not reflect the fair value of the merchandise."[120] The U.S. Deputy Permanent Representative to the WTO stated that:

> The PRC directs and enables PRC companies to manufacture excessive amounts of products and sell them at unreasonably low or below-cost prices, particularly in

export markets. Notably, the PRC's pursuit of these industrial plans does not merely harm other developed economies with mature industries. It especially harms emerging and developing economies, as too often they cannot successfully develop their own competing industries and, instead, become more dependent on the PRC, something economists call premature deindustrialization.[121]

China's mercantilism is leading to premature deindustrialization in the Global South, flooding markets with subsidized, low-cost goods, dismantling developing economies' nascent manufacturing, and limiting their economic growth opportunities as commodity and service exporters. ITIF has well-documented China's mercantilism:

- **Domestic industrial policies and export subsidies allow Chinese products to flood Global South markets.** While most advanced countries have used industrial policies and subsidies to promote certain local industries and technologies, the scale and disregard for WTO rules with which China does so make the country an exception. In addition, market economies—such as that of the United States and Western allies—implement targeted government interventions, acting as third-party investors or benevolent financiers rather than seeking centrally planned control. China, in contrast, seeks to establish control over the economy rather than shape market outcomes. Ultimately, the PRC government is exempt from external accountability or domestic political pressure to balance its interventions.
- The scale of Chinese nonmarket interventions is not comparable to any other major economy. For example, a 2024 study from the Kiel Institute for the World Economy finds that more than 99 percent of listed Chinese firms received government subsidies totaling more than $37 billion in 2022 alone.[122] (These subsidy estimates do not include government support that is not easily quantifiable, such as preferential access to raw materials and forced technology transfer, which are of considerable value.) The Center for Strategic and International Studies estimated that China's industrial policy spending is at least 1.7 percent of its GDP, using a conservative estimation.[123]

China's mercantilism is leading to premature deindustrialization in the Global South, flooding markets with subsidized, low-cost goods, dismantling developing economies' nascent manufacturing, and limiting their economic growth opportunities as commodity and service exporters.

- **Wage suppression disincentivizes countries in the Global South from competing with the Chinese workforce.** China's productivity gains are not necessarily reflected in salary increases. China appears to be an outlier in the relationship between wages and productivity, with wages to productivity averaging nearly half the global average.[124] The divergence between labor productivity and real wage growth has been a trend in China since the early 2000s.[125] In other words, China's productivity gains are not translated into higher salaries, allowing the Chinese economy to keep its comparative advantage as a low-cost labor jurisdiction while simultaneously upgrading its industries.
- Wage suppression helps the PRC government maintain its global competitiveness, while other jurisdictions (even nondemocratic ones) cannot compete on the same terms. Lower salaries also mean that the Chinese economy relies more on overcapacity-driven

production for exports to foreign markets than on local consumption.[126] Low wages reinforce the cycle of building scale, outcompete foreign manufacturers with lower production costs, gain market share in third markets, and displace third-market competitors.

- **Currency manipulation allows China to have preferential terms of trade.** The U.S. Department of the Treasury has consistently reported that "China provides very limited transparency regarding key features of its exchange rate mechanism, including the policy objectives of its exchange rate management regime and its activities in the offshore RMB market."[127] Reports from IMF estimate that the RMB may be undervalued by 18 percent, while Goldman Sachs's 2026 outlook estimates an undervaluation of 25 percent.[128] This distortion serves as a tax for exporters from the rest of the world. Currency manipulation helps the PRC artificially gain competitive advantages, causing the RMB to devalue in order to make exports cheaper, ultimately outcompeting market economies in the Global South.
- **Massive aid to the Global South.** China has disbursed significantly more resources than the United States has. A *Foreign Affairs* article states, "Between 2000 and 2021, China extended about $68 billion per year in overseas development financing. The U.S. average over this period, by contrast, was about $39 billion per year."[129] The article, published in December 2025, argues that there are clear patterns distinguishing Chinese and American foreign aid—at least as observed by the now-extinct USAID. First, China seems to allocate more funds to countries that chair relevant multilateral or regional venues, such as the ASEAN annual Chairmanship. Second, nearly all aid is government-to-government rather than being implemented in coordination with civil society or local private-sector companies, as Western aid traditionally has been. Foreign assistance with these characteristics helps China access markets and appease regulators, particularly in jurisdictions captured by elites, characterized by poor transparency or lacking democratic accountability. (ITIF has advocated for aligning development finance and foreign assistance with U.S. competitiveness and strategic interests.[130])

HOW TO AVOID THE UNITED STATES LOSING THE GLOBAL SOUTH

Many policymakers in the Global South increasingly share concerns regarding China's unrelenting innovation mercantilism. They see the cheap, subsidized Chinese products flooding their markets as a threat to their economies and security—a concern similar to that held by many American and allied policymakers.[131]

As China's exports, sales, and investments in the Global South grow, U.S. policymakers should realize that using the same tools and frameworks—namely a "Globalization 1.0" approach—won't reverse this trend. America needs an approach to the Global South that recognizes China as the century's main techno-economic challenge. A Globalization 2.0 approach in the Global South should include the following steps:

Develop a "bill of particulars" against China's innovation mercantilism with key developing country allies.

Through the National Trade Estimate Barriers Report, the Special 301 Report, and the annual U.S. Trade Representative (USTR) report on China's WTO compliance, the United States has

developed a comprehensive inventory of China's mercantilist practices. China similarly steals intellectual property (IP), dumps subsidized products, and employs other innovation mercantilist practices in third-party markets. It's how China amassed a record $1.2 trillion trade surplus with the rest of the world in 2025.[132] The United States should work with key developing-country partners to develop a "bill of particulars" that documents how Chinese innovation mercantilism harms third-party countries and their enterprises.

Create a National Export Promotion System.
There is no national export strategy or system. Various federal agencies maintain their own export programs. GAO addressed this issue more than 30 years ago, and little has changed.[133] At the same time, most state governments, some city governments, and other subnational organizations operate export promotion agencies. This creates a jumble of different programs at different levels of government that are disorganized and uncoordinated, making it difficult for exporters to obtain the information and assistance they need. There is no comprehensive list of these. There is no attempt to create a coordinated network of all these organizational efforts, at least to identify synergies. Congress should charge the Commerce Department with establishing a national, interagency, and intergovernmental trade promotion system.

Promote trade with most Global South countries.
The WTO and the most-favored-nation principle envisions a world in which America treats all other nations equally in trade. However, China's behavior in the global trade system has made it unviable to continue this approach. The second Trump administration has already changed this system, yet there is no clarity on the U.S. government's long-term strategy. Regarding trade relations with the Global South, the United States should pursue trade agreements that reduce trade imbalances (particularly nontariff barriers such as policies that discriminate against U.S. companies) and prioritize supply chains for U.S. national power industries. As ITIF contends, most of the Global South countries "are not adversaries, but also not fair and free traders, such as India, Brazil, and other quasi-mercantilists."[134] The United States should urge these nations to both remove trade barriers and help trade and investment flow to the maximum extent possible to increase American companies' market share in third-party countries.

The Generalized System of Preferences (GSP), a duty-free access program, provides the United States with critical leverage in its engagement with countries in the Global South. However, several countries that are beneficiaries of the GSP program have implemented policies that discriminate against U.S. companies, despite their agreement to provide reasonable and fair market access to them in exchange for tariff-free access to the U.S. market.[135] The GSP program is an important tool to "win back" the Global South, but enjoying preferential access to the U.S. market should come with certain expectations—for example, not being in the USTR's Special 301 Report on Intellectual Property Protection and Enforcement (i.e., the IP Watch List) or not having discriminatory policies that unfairly target American companies.

The Export-Import Bank of the United States (Ex-Im Bank) plays a key role in helping U.S. exporters gain sales.[136] The bank provides financing for export transactions that might not otherwise occur when private commercial lenders are unable or unwilling to finance foreign purchases of U.S. exports. However, Ex-Im Bank funding has declined dramatically in recent years. For instance, in FY 2011, Ex-Im Bank authorized $32 billion in transactions; in FY 2012, $35.8 billion. Ex-Im Bank authorizations haven't exceeded $10 billion since FY 2015.

Meanwhile, global export credit expenditures grew from $71 billion in 2015 to $115 billion in 2024. China—the leading provider of export credit—extended $24 billion in export credit in 2024, almost three times the U.S. amount.[137] Congress should significantly increase Ex-Im lending levels. It should also permit Ex-Im Bank's China and Transformational Exports Program workstream to accept greater loan-loss risk across its portfolio and expand its transformational export areas to include all national power industries.

Expand aid and development assistance oriented to strengthening U.S. national power industries. The United States and like-minded countries need to codevelop a long-term strategy to jointly build development assistance and loan programs to expand Western national power and counter the BRI. The Bretton Woods organizations—IMF and the World Bank—were in part created to consolidate U.S. global power in the postwar period, albeit in the interest of advancing a market-based international economic and trade system.[138] However, the bureaucratic complexities of these organizations and China's deepening influence over them mean that these institutions are no longer fully aligned with efforts to strengthen global freedom and democracy.

The Development Finance Corporation (DFC), recently reauthorized by Congress, should become the centerpiece of U.S. foreign development assistance. The DFC should center its programs and projects on advancing U.S. techno-economic power, financing infrastructure that facilitates the supply chains of critical inputs for U.S. strategic sectors, and creating incentives to prevent Global South countries from being "locked-in" to Chinese technologies and standards. The recent reauthorization of the DFC gives the agency greater flexibility, for example, to invest in equities.[139] However, these new authorities are thwarted by limited scale. While China invests roughly $100 billion a year, the DFC made only $3.5 billion in new commitments in 2025.[140]

Still, there exist legislative and executive actions that can strengthen U.S. interests through financial development tools. Congressional reauthorization of the DFC has given the entity a large remit and important flexibilities, but if it's going to fulfill its potential to mobilize private capital and scale development impact, it's going to need a clear strategy and effective leadership to professionally restaff the organization (the DFC lost almost 200 career specialists amid federal workforce reductions in 2025).[141] In addition, the Trump administration should ensure that the DFC prioritizes transactions that reduce recipient countries' reliance on the PRC and, to the extent possible, focuses on national economic power industries. The DFC should also produce annual reports detailing how much of its maximum contingent liability—its "credit card"—has been committed to countering the PRC, including descriptions of those projects and the sums committed to each. Finally, Congress should explore mechanisms to provide funding for multilateral financial development organizations, such as the World Bank and the Inter-American Development Bank, contingent on efforts to counter Chinese influence.

The United States needs to strengthen its relationships with development finance entities from like-minded nations—notably the Japan Bank for International Cooperation, the Korea Development Bank, the European Investment Bank, and the European Bank for Reconstruction and Development—and co-invest in development initiatives that support supply-chain diversification efforts of mutual interest. For instance, the United States can invest alongside allies to create alternative suppliers of critical minerals, rare earth elements, and other strategic resources in developing economies.

However, the United States can no longer afford to support nations whose actions militate against U.S. techno-economic interests, including those with close technology transfer and other economic relationships with China. Similar to access to the U.S. market under the GSP program, development assistance and loans should be conditioned on countries that are reversing trade-irritant policies that undermine U.S. companies overseas.

Promote national power exports to high-growth/high-density Global South countries.
This report shows that the five largest Global South countries—Brazil, India, Indonesia, Mexico, and Turkey—account for a large share of the population and economies of developing countries: 42 percent and 47 percent, respectively. Other relevant Global South economies include Argentina, Nigeria, Saudi Arabia, South Africa, Thailand, the UAE, and Vietnam. Gaining market share in national power industries in these countries should be a top priority for U.S. foreign and trade policymakers.

While the Trump administration has already significantly improved diplomatic relations with some of these countries (Argentina and Saudi Arabia, for example), it needs to reinforce the importance of U.S. national power industries across all of these major Global South economies. Policy actions and approaches should be tailored on a case-by-case basis. U.S. influence in Mexico, for example, will always be driven by the size of the American economy and proximity (i.e., trade's law of gravity), but the 2026 review of the USMCA will be a key milestone in determining both countries' positions to compete with and counter the PRC's mercantilism. Promoting U.S. national power industries in Thailand, on the other hand, requires a different approach. Thailand is a longtime U.S. ally, but unfortunately, it is increasingly engaging in military-to-military cooperation with China.[142]

In this context, the Department of State should lead a coalition of Western countries to increase allied market share in national power industries in Global South markets—prioritizing high-growth/high-density markets. At first, it will be challenging to establish common goals among economies competing for market share in third markets—all in all, American and German carmakers would benefit if the other faced more difficulty expanding its footprint in Global South markets. In this context, the first approach should address how Chinese mercantilism is expressed in the Global South—with dual-use infrastructure projects and flooding markets to block potential competitors, what is called the "premature deindustrialization" in developing economies. This coalitional work should encompass all areas of foreign affairs—from securing safe supply chains through loans and development assistance to people-to-people exchange programs that raise awareness of the consequences of Chinese mercantilism for the development paths of emerging countries.

Promote the economic and security benefits of adopting the U.S. AI stack.
The Trump administration has made significant efforts to promote the global adoption of U.S. AI, such as the Department of Commerce's "American AI Exports Program," which promotes the export of U.S.-built AI technology, and the State Department's "Pax Silica" initiative, which is endorsed by Australia, Israel, Japan, the Netherlands, South Korea, the UAE, and the United Kingdom to build a secure global supply chain for AI, semiconductors, and critical minerals.[143] The U.S. government should develop a coordinated trade and diplomatic effort to integrate countries from the Global South into its trusted AI ecosystem and deny China's expansion into these markets.[144]

Urge Global South countries to adopt FDI screening and transparency standards that are compatible with a safe and secure supply chain to U.S. national power industries.
The White House should incorporate investment screening into ongoing trade negotiations. As China's national power exports and investments in the Global South grow, U.S. supply chains become more exposed to the PRC. Chinese telecommunications companies, such as Huawei, are ubiquitous in 4G and 5G networks in emerging economies, and BRI funds and loans target infrastructure and mining investments in countries such as Indonesia and Peru. Chinese-controlled logistics increase vulnerabilities to U.S. investments, thereby making it harder to reliably access this country's supply chain.

The U.S. government has implemented programs to address this problem. For example, the first Trump administration's Clean Network Initiative, despite problematic elements, such as calls to remove trusted U.S. apps from Chinese mobile app stores, went in this direction.[145] The initiative was a diplomatic effort with two components addressing the PRC's presence in foreign countries' telecommunications networks: the "Clean Carrier" program to ensure that no Chinese carriers provide international telecommunications services between the United States and foreign destinations, and the "Clean Cable" program to prevent China from gathering intelligence from undersea cables.[146] Some Global South countries, such as Brazil and Ecuador, initially endorsed this initiative.[147]

The United States needs a similar, broader initiative on FDI screening and transparency standards in the Global South, led by the Department of States. Establishing standards to share FDI screening information—or using pre-approved vendors through "know-your-customer" schemes—overseas would have multiple benefits. First, it would help identify (or deter) the final beneficiaries of Chinese FDI—often linked to the PRC's civic-military sector. Second, it would facilitate complementary investments in U.S. industries; for example, safe and secure assembly, testing, and packaging supply chains in Latin America can feed semiconductor foundries in the United States. Third, it would ease transaction costs for American companies investing in the Global South, as they would be supported by the U.S. diplomatic apparatus.

CONCLUSION

The United States and China are competing for global market share in national economic power industries, as scale is needed to offset initial R&D investment and reinvest in new technologies. Countries in the Global South play a key role in this zero-sum competition, accounting for over 60 percent of the world's population—and they will account for 45 percent of the world's economy by the middle of the century.

The U.S.-China techno-economic competition will define the remainder of the 21st century—and there is still time for U.S. policymakers to reverse this trend. The first step is to stop treating Global South economies as a "backyard" and to recognize them as a key battlefield in the industrial war.

APPENDIX 1. LIST OF COUNTRIES CONSIDERED "GLOBAL SOUTH" IN THIS REPORT

Country	Region
Afghanistan	MENA & Central Asia
Algeria	MENA & Central Asia
Angola	Sub-Saharan Africa
Antigua and Barbuda	Latin America & Caribbean
Argentina	Latin America & Caribbean
Armenia	MENA & Central Asia
Aruba	Latin America & Caribbean
Azerbaijan	MENA & Central Asia
The Bahamas	Latin America & Caribbean
Bahrain	MENA & Central Asia
Bangladesh	Asia and the Pacific
Barbados	Latin America & Caribbean
Belize	Latin America & Caribbean
Benin	Sub-Saharan Africa
Bhutan	Asia and the Pacific
Bolivia	Latin America & Caribbean
Botswana	Sub-Saharan Africa
Brazil	Latin America & Caribbean
Brunei Darussalam	Asia and the Pacific
Burkina Faso	Sub-Saharan Africa
Burundi	Sub-Saharan Africa
Cabo Verde	Sub-Saharan Africa
Cambodia	Asia and the Pacific
Cameroon	Sub-Saharan Africa
Central African Republic	Sub-Saharan Africa
Chad	Sub-Saharan Africa
Chile	Latin America & Caribbean

Country	Region
Colombia	Latin America & Caribbean
Comoros	Sub-Saharan Africa
Democratic Republic of the Congo	Sub-Saharan Africa
Republic of the Congo	Sub-Saharan Africa
Costa Rica	Latin America & Caribbean
Côte d'Ivoire	Sub-Saharan Africa
Djibouti	MENA & Central Asia
Dominica	Latin America & Caribbean
Dominican Republic	Latin America & Caribbean
Ecuador	Latin America & Caribbean
Egypt	MENA & Central Asia
El Salvador	Latin America & Caribbean
Equatorial Guinea	Sub-Saharan Africa
Eritrea	Sub-Saharan Africa
Eswatini	Sub-Saharan Africa
Ethiopia	Sub-Saharan Africa
Fiji	Asia and the Pacific
Gabon	Sub-Saharan Africa
The Gambia	Sub-Saharan Africa
Georgia	MENA & Central Asia
Ghana	Sub-Saharan Africa
Grenada	Latin America & Caribbean
Guatemala	Latin America & Caribbean
Guinea	Sub-Saharan Africa
Guinea-Bissau	Sub-Saharan Africa
Guyana	Latin America & Caribbean
Haiti	Latin America & Caribbean
Honduras	Latin America & Caribbean

Country	Region
India	Asia and the Pacific
Indonesia	Asia and the Pacific
Iraq	MENA & Central Asia
Jamaica	Latin America & Caribbean
Jordan	MENA & Central Asia
Kazakhstan	MENA & Central Asia
Kenya	Sub-Saharan Africa
Kiribati	Asia and the Pacific
Kuwait	MENA & Central Asia
Kyrgyz Republic	MENA & Central Asia
Lao P.D.R.	Asia and the Pacific
Lebanon	MENA & Central Asia
Lesotho	Sub-Saharan Africa
Liberia	Sub-Saharan Africa
Libya	MENA & Central Asia
Madagascar	Sub-Saharan Africa
Malawi	Sub-Saharan Africa
Malaysia	Asia and the Pacific
Maldives	Asia and the Pacific
Mali	Sub-Saharan Africa
Marshall Islands	Asia and the Pacific
Mauritania	Sub-Saharan Africa
Mauritius	Sub-Saharan Africa
Mexico	Latin America & Caribbean
Micronesia	Asia and the Pacific
Mongolia	Asia and the Pacific
Morocco	MENA & Central Asia
Mozambique	Sub-Saharan Africa

Country	Region
Myanmar	Asia and the Pacific
Namibia	Sub-Saharan Africa
Nauru	Asia and the Pacific
Nepal	Asia and the Pacific
Nicaragua	Latin America & Caribbean
Niger	Sub-Saharan Africa
Nigeria	Sub-Saharan Africa
Oman	MENA & Central Asia
Pakistan	MENA & Central Asia
Palau	Asia and the Pacific
Panama	Latin America & Caribbean
Papua New Guinea	Asia and the Pacific
Paraguay	Latin America & Caribbean
Peru	Latin America & Caribbean
Philippines	Asia and the Pacific
Qatar	MENA & Central Asia
Rwanda	Sub-Saharan Africa
Samoa	Asia and the Pacific
São Tomé and Príncipe	Sub-Saharan Africa
Saudi Arabia	MENA & Central Asia
Senegal	Sub-Saharan Africa
Seychelles	Sub-Saharan Africa
Sierra Leone	Sub-Saharan Africa
Solomon Islands	Asia and the Pacific
Somalia	Sub-Saharan Africa
South Africa	Sub-Saharan Africa
South Sudan	Sub-Saharan Africa
Sri Lanka	Asia and the Pacific

Country	Region
St. Kitts and Nevis	Latin America & Caribbean
St. Lucia	Latin America & Caribbean
St. Vincent and the Grenadines	Latin America & Caribbean
Sudan	Sub-Saharan Africa
Suriname	Latin America & Caribbean
Syria	MENA & Central Asia
Tajikistan	MENA & Central Asia
Tanzania	Sub-Saharan Africa
Thailand	Asia and the Pacific
Timor-Leste	Asia and the Pacific
Togo	Sub-Saharan Africa
Tonga	Asia and the Pacific
Trinidad and Tobago	Latin America & Caribbean
Tunisia	MENA & Central Asia
Turkey	MENA & Central Asia
Turkmenistan	MENA & Central Asia
Tuvalu	Asia and the Pacific
Uganda	Sub-Saharan Africa
United Arab Emirates	MENA & Central Asia
Uruguay	Latin America & Caribbean
Uzbekistan	MENA & Central Asia
Vanuatu	Asia and the Pacific
Venezuela	Latin America & Caribbean
Vietnam	Asia and the Pacific
West Bank and Gaza	MENA & Central Asia
Yemen	MENA & Central Asia
Zambia	Sub-Saharan Africa
Zimbabwe	Sub-Saharan Africa

APPENDIX 2. NATIONAL POWER INDUSTRIES AT SITC REV. 2 FOUR-DIGIT CLASSIFICATION

The list of national power industries is based on 581 goods across the divisions described below, using SITC (Standard International Trade Classification) Rev. 2 at the four-digit level. Not all the articles within a four-digit division are necessarily national power industry goods.

SITC Rev 3	Division Title
23	Crude rubber (including synthetic and reclaimed)
24	Cork and wood
26	Textile fibres (other than wool tops and other combed wool) and their wastes (not manufactured into yarn or fabric)
27	Crude fertilisers, other than those of division 56, and crude minerals (excluding coal, petroleum and precious stones)
28	Metalliferous ores and metal scrap
29	Crude animal and vegetable materials, n.e.s.
32	Coal, coke and briquettes
33	Petroleum, petroleum products and related materials
34	Gas, natural and manufactured
35	Electric current
43	Animal or vegetable fats and oils, processed; waxes of animal or vegetable origin; inedible mixtures or preparations of animal or vegetable fats and oils, n.e.s.
51	Organic chemicals
52	Inorganic chemicals
53	Dyeing, tanning and colouring materials
54	Medical and pharmaceutical products
55	Essential oils and resinoids and perfume materials; toilet, polishing and cleaning preparations
56	Fertilizers (other than those of group 272)
57	Plastics in primary forms
58	Plastics in non-primary forms
59	Chemical materials and products, not elsewhere specified (n.e.s.)
62	Rubber manufactures, n.e.s.
63	Cork and wood manufactures (excluding furniture)

SITC Rev 3	Division Title
64	Paper, paperboard and articles of paper pulp, of paper or of paperboard
65	Textile yarn, fabrics, made-up articles, n.e.s., and related products
66	Non-metallic mineral manufactures, n.e.s.
67	Iron and steel
68	Non-ferrous metals
69	Manufactures of metals, n.e.s.
71	Power generating machinery and equipment
72	Machinery specialised for particular industries
73	Metal working machinery
74	General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.
75	Office machines and automatic data processing machines
76	Telecommunications and sound recording and reproducing apparatus and equipment
77	Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non-electrical counterparts n.e.s. of electrical household type equipment)
78	Road vehicles (including air-cushion vehicles)
79	Other transport equipment
81	Prefab buildings; sanitary plumbing, heating and lighting fixtures and fittings, n.e.s.
82	Furniture and parts thereof; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings
83	Travel goods, handbags and similar containers
84	Articles of apparel and clothing accessories
87	Professional, scientific and controlling instruments and apparatus, n.e.s.
88	Photo apparatus, equip. and supplies and optical goods, n.e.s.; watches and clocks
89	Miscellaneous manufactured articles, n.e.s.
97	Gold, non-monetary (excluding gold ores and concentrates)

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The Hamilton Index, 2026: China's Dominance in Advanced Industries Is Growing

MEGHAN OSTERTAG

China now produces nearly one-quarter of global output in the 10 advanced industries that make up ITIF's Hamilton Index, outpacing all other nations. America and the West must recognize that China's gains are coming at the expense of their techno-economic and national power.

KEY TAKEAWAYS

- China now dominates advanced industry production globally, holding nearly one-quarter of the global market across all 10 Hamilton industries combined, and leading production in 7 of the 10 advanced industries.
- China's rise in advanced industry output has been unprecedented in speed and scale, having grown from less than one-fifth of global output in 2012 (19 percent) to nearly one-quarter in 2022 (24.9 percent).
- Overall, China overperforms relative to the size of its economy, with an LQ of 1.36 (meaning 36 percent above the global average). By comparison, America underperforms with an LQ of just 0.88 (12 percent below average).
- America's global market share in Hamilton industries grew marginally faster than China's from 2020 to 2022. But to match China's overall LQ in 2022, U.S. advanced-industry output would have needed to be 56 percent higher—a margin of $1.5 trillion.
- OECD nations experienced a dramatic loss of industrial leadership over the last decade for which data is available on trade in value added. Their combined share of advanced industry output fell from 64 percent in 2012 to 58 percent in 2022.
- Without stronger policy action, the United States and its allies across the West risk suffering continued erosion of their advanced industrial base, which will leave them increasingly vulnerable to techno-economic and national security coercion.

INTRODUCTION

Advanced industries sit at the core of modern economic growth. They drive productivity gains across the broader economy, support high-wage employment, and generate export revenues that underpin strong currencies and favorable terms of trade. And because these sectors are deeply embedded in global supply chains and characterized by scale, nations that secure leadership in advanced industries tend to lock in durable advantages. Winning in innovation alone in these industries is not enough; without domestic or allied production capacity, countries forfeit much of the economic value of discovery, lose critical knowledge, and weaken the ecosystems that translate research into commercial and strategic power. These industries are what the Information Technology and Innovation Foundation (ITIF) calls "national power industries."[1]

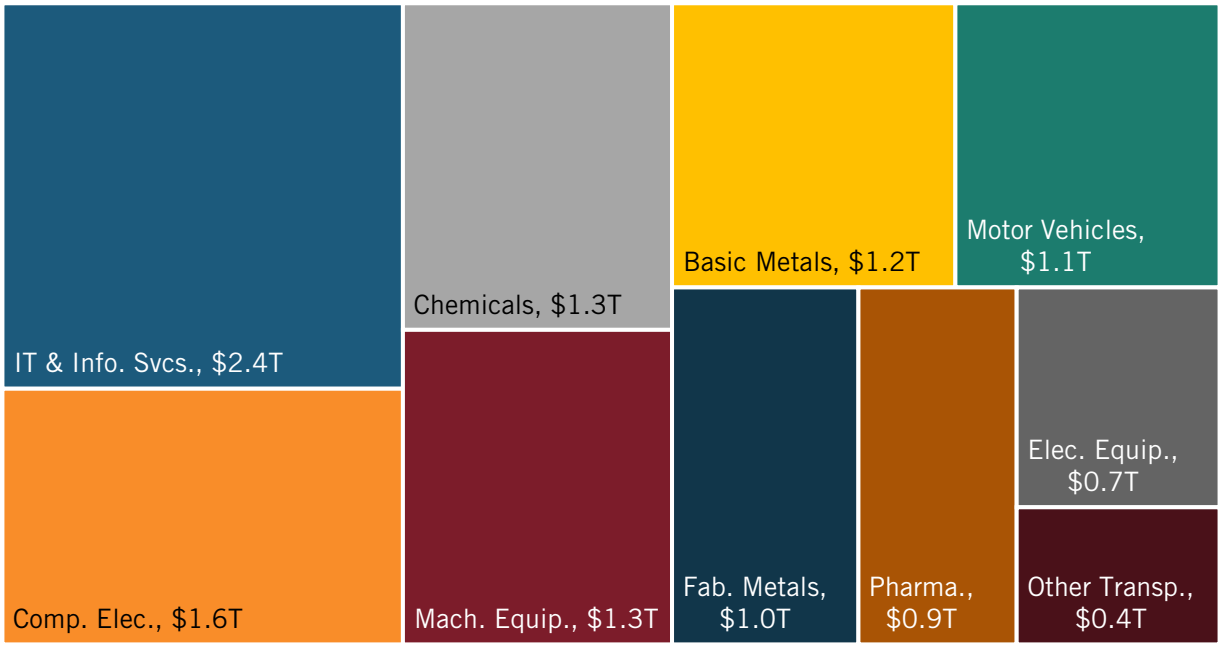
China's rapid ascent into advanced industry production has fundamentally altered the global landscape. It has not become more specialized in these advanced sectors over the past decade (because the rest of its economy has also grown), but its absolute output and share of global production in these advanced industries has grown steadily. Indeed, China has moved from a peripheral manufacturer to a central player and, in some sectors, a global leader in advanced industries. This shift poses a direct challenge to the United States and the broader Western alliance bloc. As advanced industries increasingly underpin defense supply chains, digital infrastructure, and economic growth, China's gains are often coming at the expense of U.S. and allied capacity. The result is a more fragile industrial base, making the United States increasingly vulnerable to the coercive pressures from China.

METHODOLOGY

To assess U.S. and other nations' performance, ITIF has examined changes in global shares of value-added output in 10 advanced industry sectors aggregated into the Hamilton Index of Advanced-Technology Performance: information technology (IT) and information services; computers, electronics, and optical products; chemicals (not including pharmaceuticals); machinery and equipment; basic metals; motor vehicles; fabricated metals; pharmaceuticals; electrical equipment; and other transportation equipment. This report serves as the second update of the Hamilton Index, following the first edition published in 2022 and the second published in 2023.[2] It is accompanied by three data visualization tools covering the entire dataset, which are available on ITIF's website.[3] To conduct this analysis, ITIF uses value-added data from the Organization for Economic Cooperation and Development's (OECD's) trade in value added dataset, which covers the period from 1995 to 2022.[4] ITIF's analysis focuses on 39 countries included in that dataset. Because of problems with how Ireland's output is reported, it is not included in the analysis or in EU-wide aggregate data.[5]

The 10 industries included in the Hamilton Index together accounted for nearly $12 trillion in global production in 2022 (figure 1). The information technology (IT) and information services industry (which includes software, Internet services, and data processing) is the largest of the 10, accounting for 20 percent of global advanced industry output.

Figure 1: Global output from industries included in the Hamilton Index, 2022 ($11.9 trillion, total)

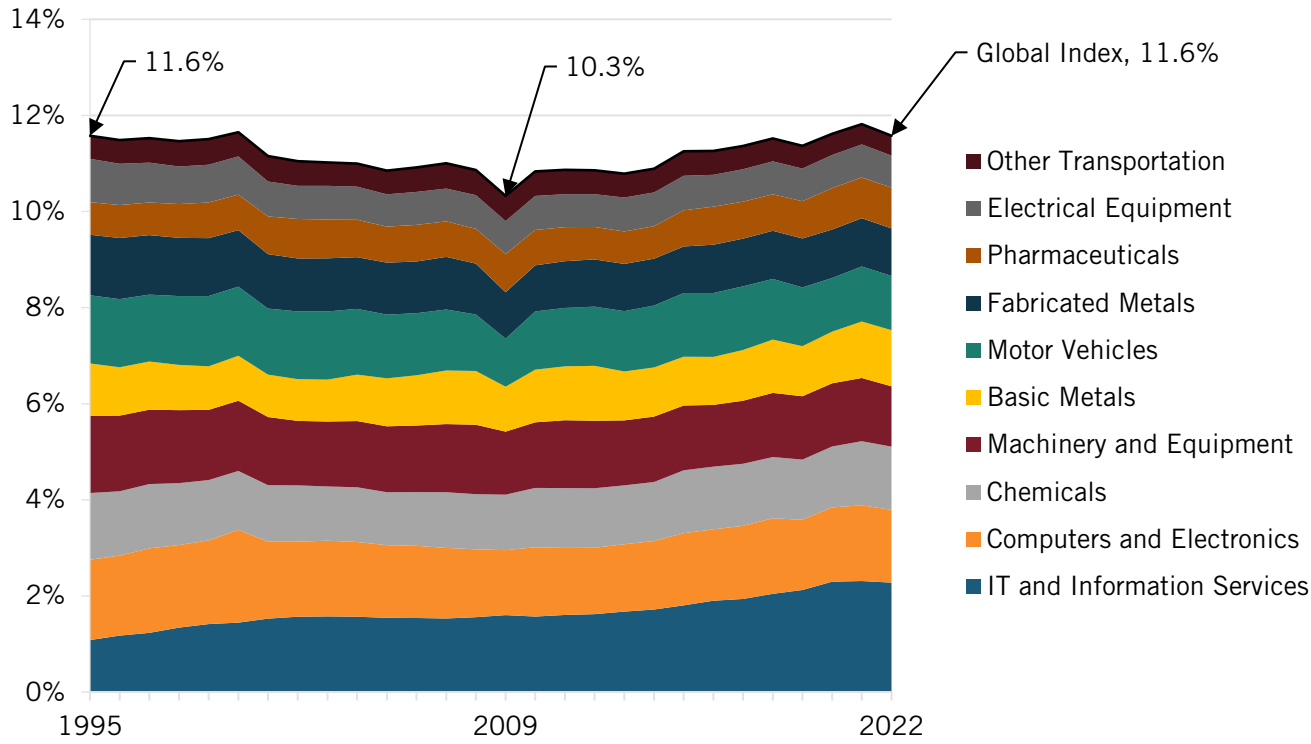


The aggregate production of the 10 industries equaled 11.6 percent of the global economy in 2022, the same as in 1995, rebounding from a nadir of 10.3 percent in 2008, when advanced industry production declined more than the overall gross domestic product (GDP). (See figure 2.) However, the output of each individual industry has changed, with IT and information services' share of the global economy growing 45 percent since 2002. The fact that the overall share of advanced industry output in the global economy has not changed underscores the zero-sum competition between nations.

Nations are, or at least should be, competing for a greater share of this fixed pie, as China has shown itself to be. The United States, the world's dominant techno-economic power for over 125 years, has allowed itself to stand on the sidelines of this global competition as China and the rest of the world capture growing slices of market share, and is now at risk of losing this race—and a loss would be catastrophic, turning the United States into a deindustrialized economy with weak economic growth and innovation capabilities. Time is short. The first half of this decade was one in which China proved its prowess in dominating advanced industries, moving from simply a copier to an innovator. The second half of this decade will be the time for the United States to demonstrate its willingness and ability to turn around U.S. advanced industry fortunes because, once China gains sufficient global market share, allied and U.S. production risks being permanently weakened.

This report is one of a series published by ITIF addressing the Chinese national techno-economic power industry challenge and will demonstrate the decline in U.S. advanced industry production over the past 27 years and China's rise as a global leader. Future reports in this series will lay out in great detail the specific policy actions needed to better combat Chinese dominance.

Figure 2: Hamilton industry shares of the global economy, 1995–2022



Of course, global market shares of advanced industries cannot serve as the only metric of national competitiveness because nations have different-sized economies. To assess nations' relative performance in strategically important industries, ITIF uses an analytical statistic known as a "location quotient" (LQ), which measures any region's level of industrial specialization relative to a larger geographic unit—in this case, a nation relative to the rest of the world.

The LQ is calculated as an industry's share of a country's economy divided by the global industry's share of the global economy, or as a country's share of global output in an industry divided by the country's overall share of the global economy. Either way, an LQ greater than 1 means the country's share of global output in an industry is greater than the global average, and an LQ less than 1 means a country's share is less than the global average. For example, the U.S. motor vehicle industry's output in 2022 was 13.79 percent of global motor vehicle production, while the U.S. economy overall accounted for 25.39 percent of global GDP. Thus, the U.S. LQ in the motor vehicles industry was 13.79 percent divided by 25.39 percent, or 0.54, meaning the United States significantly underperformed in the industry. Its output was just 54 percent of the level we would expect based on the size of the U.S. economy.

Because LQ measures the importance of an industry relative to the size of a country's economy, a country's LQ can decline even if its industries are expanding rapidly, provided the rest of the economy is growing even faster.

OVERALL FINDINGS

Specialization Rankings

Fifteen countries overperformed in their composite Hamilton Index LQ in 2022, led by Taiwan with an LQ of 2.63 (the large majority of which was driven by the country's semiconductor industry, which is included under the computer and electronics industry). (See figure 3.) South Korea, Singapore, and Japan, all technologically advanced East Asian nations, ranked second, fourth, and seventh, respectively. These three nations have intensively focused on advanced industry development over the past several decades—a strategy that has been reflected in their LQs and global market shares in industries such as computers and electronics. European nations, including Switzerland, Germany, Sweden, and Austria, rank 5th, 6th, 10th, and 11th, respectively, leading in engineering and chemical-intensive industries.

While most developing nations underperformed with LQs significantly below 1, Vietnam stands out as an outlier, ranking third overall with an LQ of 1.82. This marks a rapid rise in relative performance, driven primarily by its growth in the computers and electronics industry. Other developing nations that overperformed include Malaysia, India, Mexico, and Thailand.

The United States' LQ was 0.88, meaning that as a share of GDP, U.S. Hamilton industries' value added was lower than the global average. For the United States to achieve an LQ of 1, advanced industry output would have needed to be $370 billion greater in 2022, a 14 percent increase. This would be equivalent to more than doubling the output of the computer and electronics industry in the United States last year.

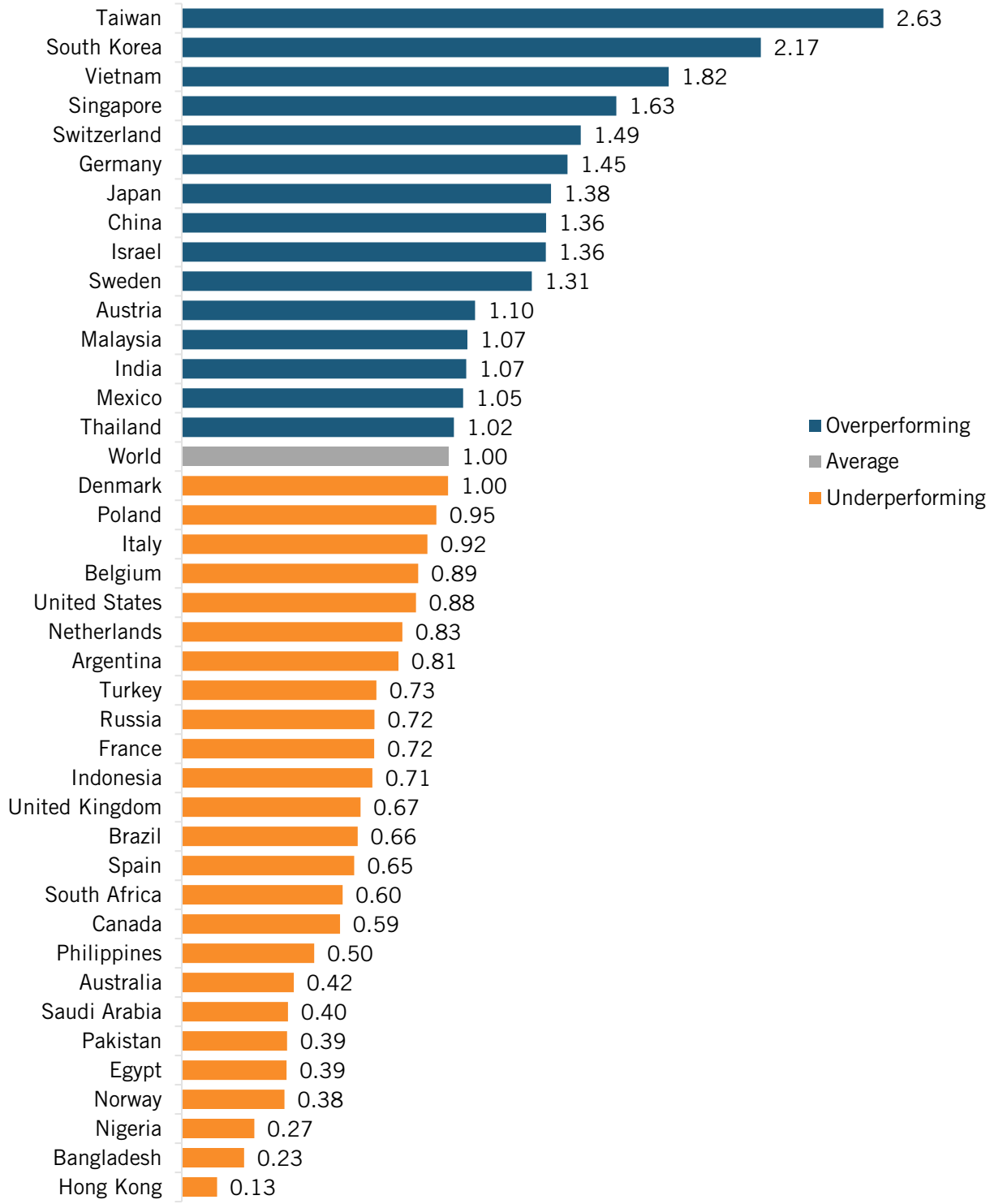
Some will argue that it's acceptable or even normal for the U.S. LQ to be this low because it is a large economy and one in which the share of GDP that is globally traded is below average. But LQ is not a measure related to trade; it's a measure related to production. Moreover, there was a small but positive correlation between national GDP and LQ in 2022 (0.05), suggesting that the U.S. score should not be below average and, if anything, should be above average. The reality is America's low LQ reflects failure, not success.

The United States' LQ was 0.88. For the United States to achieve an LQ of 1.00, advanced industry output would have needed to be $370 billion greater in 2022, equivalent to more than doubling the output of the computer and electronics industry last year.

China, which ranked eighth, has perhaps focused more than any other country on cultivating advanced industries, becoming a top performer in several Hamilton industries, including basic metals, machinery and equipment, and electrical equipment. Yet, over the past decade, China experienced the largest decline in overall LQ among countries in the sample, falling by 21 percentage points. (See figure 4.) Importantly, this decline does not reflect a weakening of China's advanced industry production. China's output in these industries grew by 7.3 percent annually over the previous decade—faster than the United States, OECD, or the global average. Instead, it reflects China's extraordinary economic growth, with GDP growing nearly 9 percent annually over the same period, meaning the rest of the economy expanded even faster than advanced industries did. As a result, advanced industries make up a slightly smaller share of China's economy even as China continues to capture growing global market share and remains a

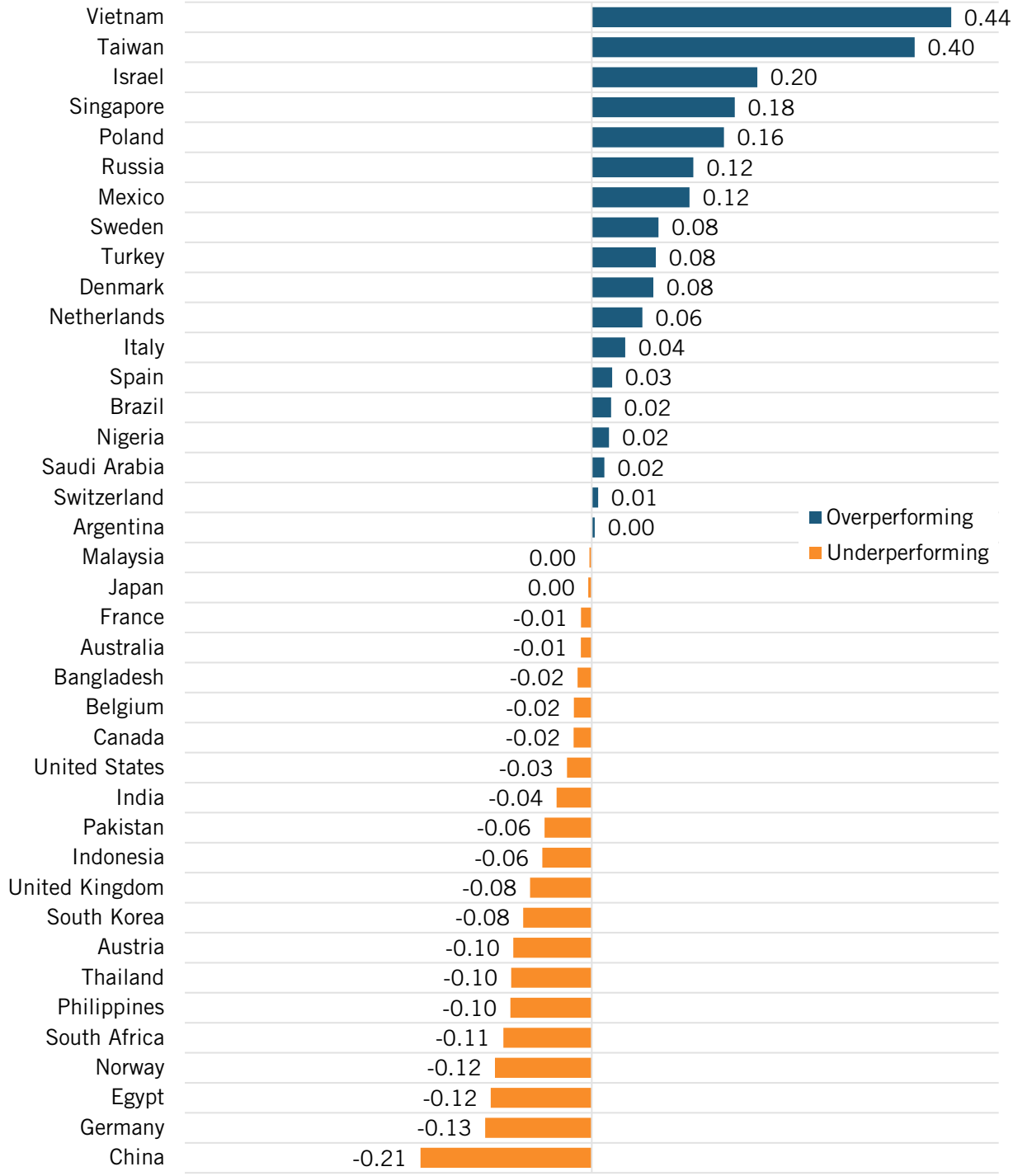
dominant force in these sectors. China also continues to overperform in the Hamilton Index, with its LQ being 36 percent higher than the world average.

Figure 3: Relative national performance in the composite Hamilton Index (2022 LQ)



Vietnam saw the largest increase in LQ, rising by 44 percentage points, followed by Taiwan and Israel. Several developing nations saw a moderate rise in LQ, including Poland, Mexico, and Turkey, while the United States, Canada, and Japan were among the nations that experienced moderate declines.

Figure 4: Change in relative national performance in the composite Hamilton Index (LQ difference, 2013–2022)



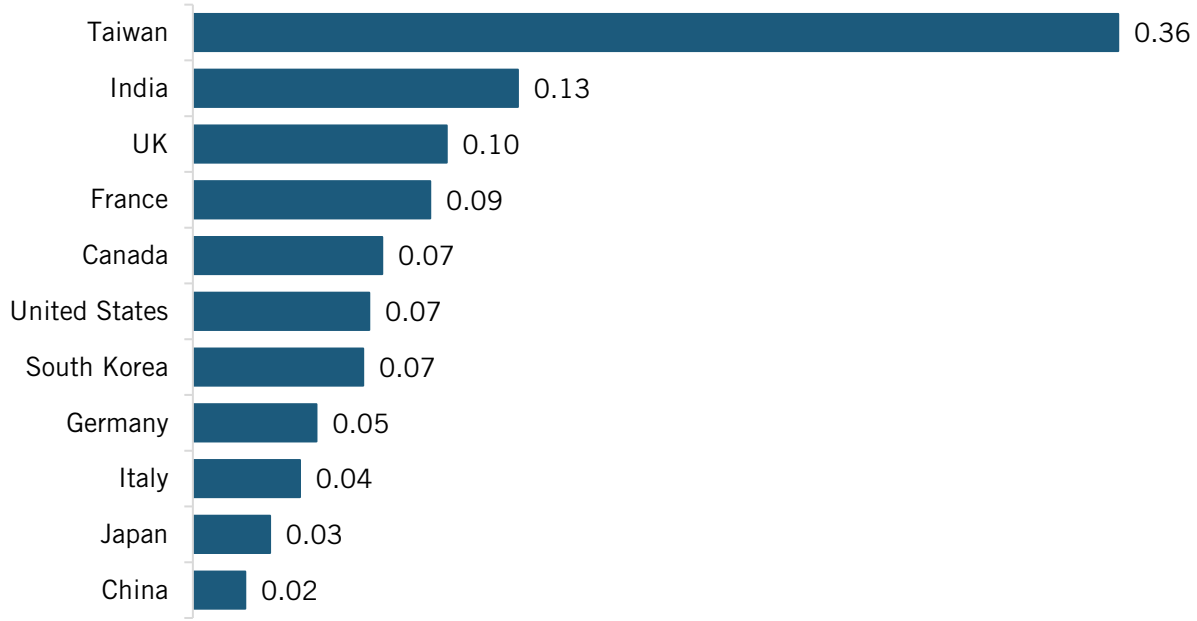
For many countries that overperform on the LQ measure, that strong performance is driven by one or two dominant industries. For example, nearly two-thirds of Taiwan's and Vietnam's advanced industry output is from the computer and electronics industry. Countries such as these dominate specific niches but have limited influence over the broader advanced industry ecosystem. By contrast, countries with capabilities spread across multiple advanced industries can exert influence over several supply chains, shaping multiple segments of global trade.

Figure 5 shows the specializations of the largest advanced industry producers using a normalized Herfindahl-Hirschman Index ranging from 0 to 1, wherein 0 indicates an equal distribution of output across all 10 Hamilton industries, while a 1 indicates complete concentration in a single industry (a detailed explanation can be found in appendix D). An index score of 0 to 0.06 indicates that output is broadly distributed across industries, a score of 0.06 to 0.17 indicates moderate specialization, and a score above 0.17 indicates strong specialization.

Unsurprisingly, Taiwan is the most specialized among the top producers, with the majority of its advanced industry output concentrated in a single industry. India, the United Kingdom, France, Canada, the United States, and South Korea all exhibit moderate specialization, with about one-third of advanced industry output originating from their largest sector. China's relatively low specialization score highlights the broad distribution of its advanced industry production across the full range of Hamilton industries. Even China's largest advanced industry by output, basic metals, accounts for only 17 percent of its advanced industry output, significantly less than other peer countries'.

China's dominance differs structurally from that of the United States, and its breadth of capability across industries poses a more systemic challenge. Rather than leading in a narrow set of industries, China is simultaneously building strength across a number of critical sectors. This broad-based industrial capacity enables China to shape multiple supply chains, creating dense industrial ecosystems that reinforce its long-term technological and manufacturing leadership.

Figure 5: Specialization Index Rankings, 2022



And just like countries, some industries are more concentrated than others. For example, South Korea, the country most specialized in chemical manufacturing, has an LQ of 2.16, the lowest among the leading countries, while Taiwan leads in the computer and electronics industry with an LQ of 12.88, the highest among the leading countries. In many industries, a high LQ is reflective of the size of a nation's economy, with smaller economies, such as those of Taiwan, Israel, Mexico, and Indonesia, more likely to have a single industry that dominates each country's economy. But in other cases, it is because industries such as machinery, chemicals, and electrical equipment are much broader and have wider arrays of subindustries.

Without IT and information services, the United States has failed to measurably increase its market share in advanced industries over the past decade. The same cannot be said for China.

In terms of absolute production, China is far and away the leader in almost every industry, capturing the largest share of the global market in 7 of 10 advanced industries and holding nearly 25 percent of global market share across Hamilton Industries.

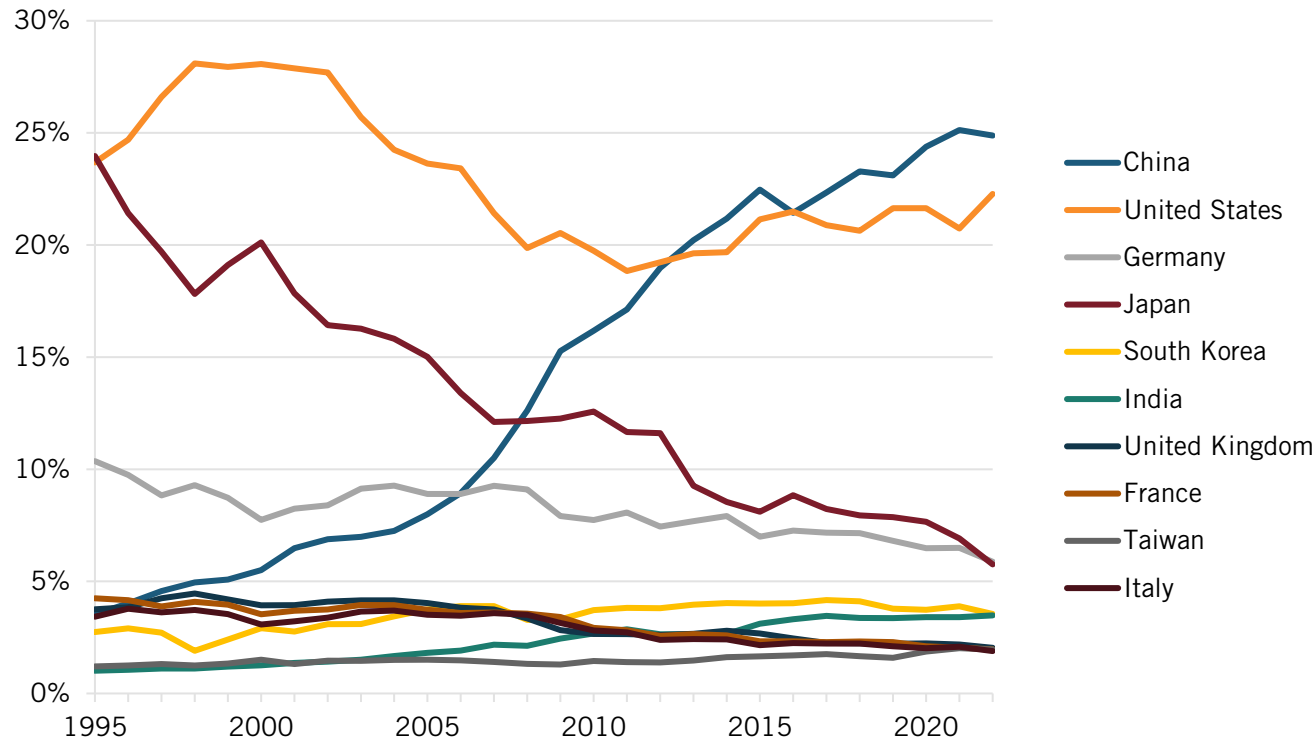
Table 1: Hamilton Index leaders by industry, 2022

Industry	Global Output (Billions)	Leading Producer	Leader's Share	Relative Leader	Leader's LQ
IT and Information Services	$2,333	USA	36.1%	Israel	3.39
Computers and Electronics	$1,551	China	24.9%	Taiwan	12.88
Chemicals	$1,347	China	28.2%	South Korea	2.16
Machinery and Equipment	$1,287	China	33.4%	Japan	2.43
Basic Metals	$1,197	China	42.1%	China	2.31
Motor Vehicles	$1,155	China	25.3%	Mexico	3.94
Fabricated Metals	$1,013	China	26.7%	Indonesia	3.16
Pharmaceuticals	$872	USA	28.5%	Switzerland	5.62
Electrical Equipment	$680	China	38.5%	South Korea	2.68
Other Transportation	$423	USA	38.5%	Taiwan	2.87
Composite Hamilton Index	**$11,858**	**China**	**24.9%**	**Taiwan**	**2.63**

Top 10 Producers

From 1996 to 2012, the United States was the leader in advanced industry output, holding the largest slice of global market share in these 10 industries. However, China's accession to the World Trade Organization (WTO) in 2001 opened the floodgates to Chinese dominance. Since 2012, China has taken the lead from the United States, currently holding 24.9 percent of global market share, while the United States has fallen to 22.3 percent. Advanced industries being the zero-sum game that they are, the rise of China has been coupled with the decline of several other once-dominant countries. Japan, which led the world in advanced industry market share in 1995, regressed to fourth by 2022, a decline of more than 18 percentage points. Germany, while not declining as much as Japan, also fell by about 5 percentage points. The United Kingdom, France, and Italy have also seen their shares of the global market fall over the past 27 years.

Figure 6: Top 10 producers' historical shares of global output in Hamilton industries, 1995–2022



China's dominance is even more evident when the IT and information services industry is removed from the equation. IT and information services is the largest advanced industry in the United States by a large margin (it made up 32 percent of U.S. advanced industry output in 2022), but it is one of the smallest in China, making up just 7 percent of its output.

When excluding IT, China became the world's largest producer of advanced industries in 2010, surpassing the United States, and its share has continued to grow rapidly. By 2022, it held nearly 29 percent of the global market share. The United States, on the other hand, has seen its share of these nine industries fall rapidly and then stagnate. Between 2000 and 2011, U.S. market share declined from a high of 28.1 percent to a low of 17.2 percent, and in the years since, it has hovered between 17 and 19 percent. (See figure 7.) Without IT and information

services, the United States has failed to measurably increase its market share in advanced industries over the past decade. The same cannot be said for China.

Later in this report, each country is assessed on its LQ in each industry based on whether it is overperforming or underperforming and whether it has improved or regressed since 2013. Both measures taken together are important because having industries that are overperforming but also regressing is not a sign of a strong advanced economy, but rather of a weakening one, while industries that are underperforming but also improving exemplify a developing economy. Figure 8 shows the two extremes, the number of industries that are both overperforming and improving, which will be referred to as strong and growing industries, and underperforming and regressing, which are weak and declining, for the top 10 performers in this Hamilton Index. The countries are organized by the number of industries that are strong and growing relative to those that are weak and declining. South Korea leads the top producers with four strong and growing industries and only one, IT and information services, that is weak and declining. Italy and Taiwan also have four strong and growing industries, but have two and three weak and declining sectors, respectively. These three countries are also the only 3 in the top 10 to have more strong and growing industries than weak, declining ones.

The United States and China have the same number of industries that are strong and growing: just one. However, where they differ is the number of weak industries they have. China has just two industries that fit this classification, whereas the United States has seven. The United Kingdom performs the worst with eight industries that are weak and declining and only one that is strong and growing.

Figure 7: Top 10 producers' historical shares of global output in Hamilton industries minus IT, 1995–2022

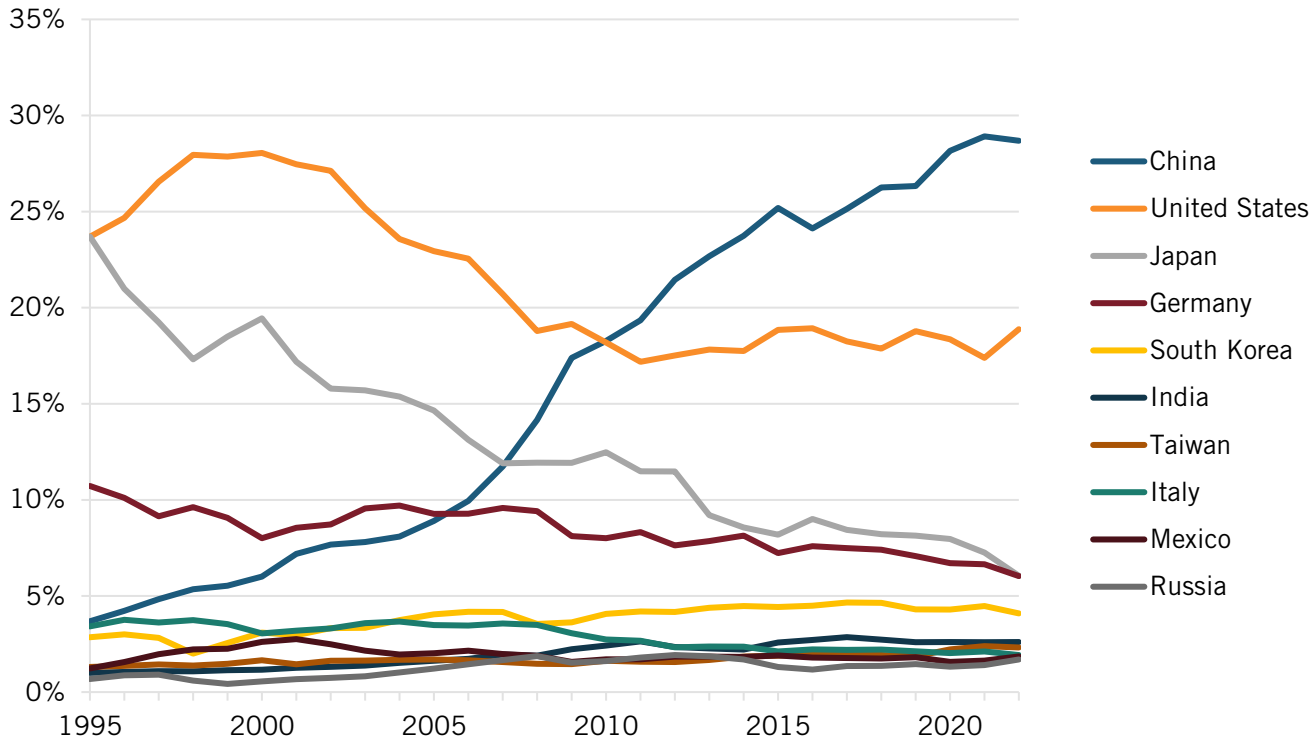
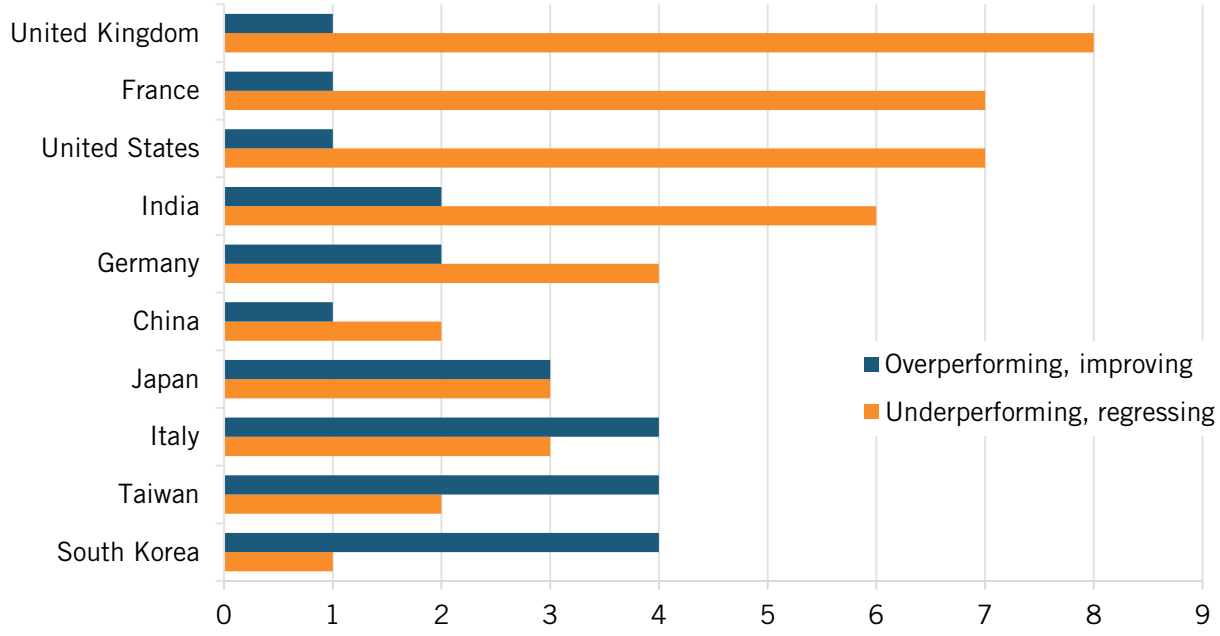
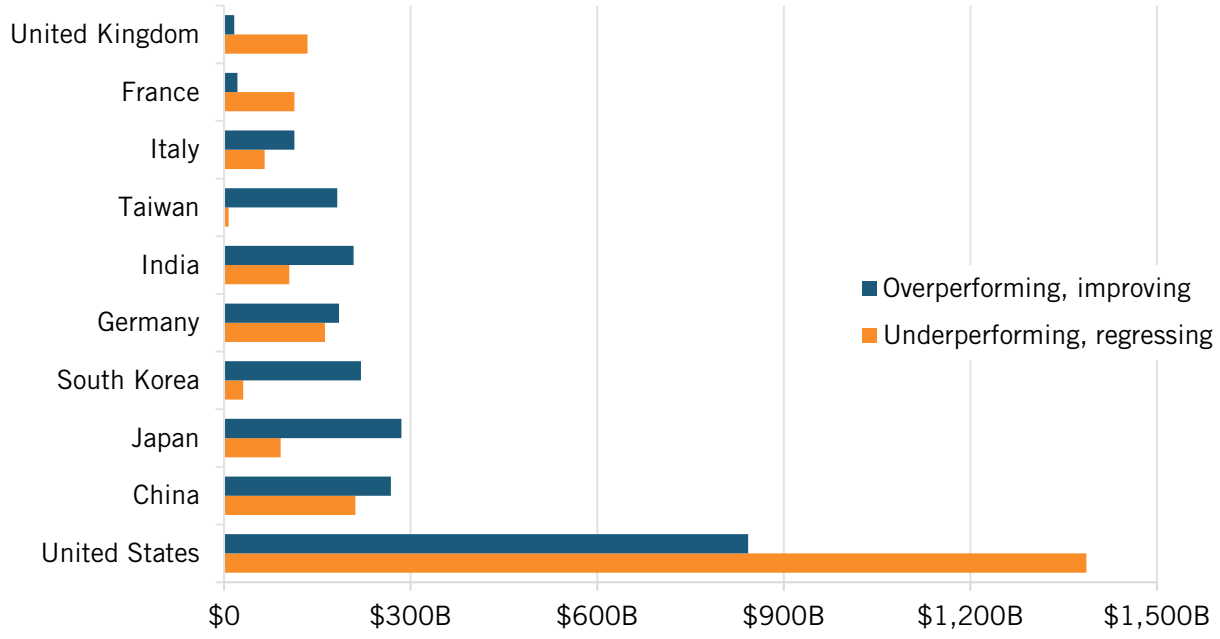


Figure 8: Numbers of comparatively strong and weak industries in the top 10 producer nations



Looking at the value added of these industries, the one industry in which the United States overperformed and improved was the IT and information services industry, with an output of over $800 billion. (See figure 9.) However, the value of industries in which the United States underperformed and regressed was much higher, at $1.4 trillion. Aside from the United States, weak and regressing industries outvalued strong and improving industries only in France and the United Kingdom.

Figure 9: Value-added output by comparatively strong and weak industries in the top 10 producer nations



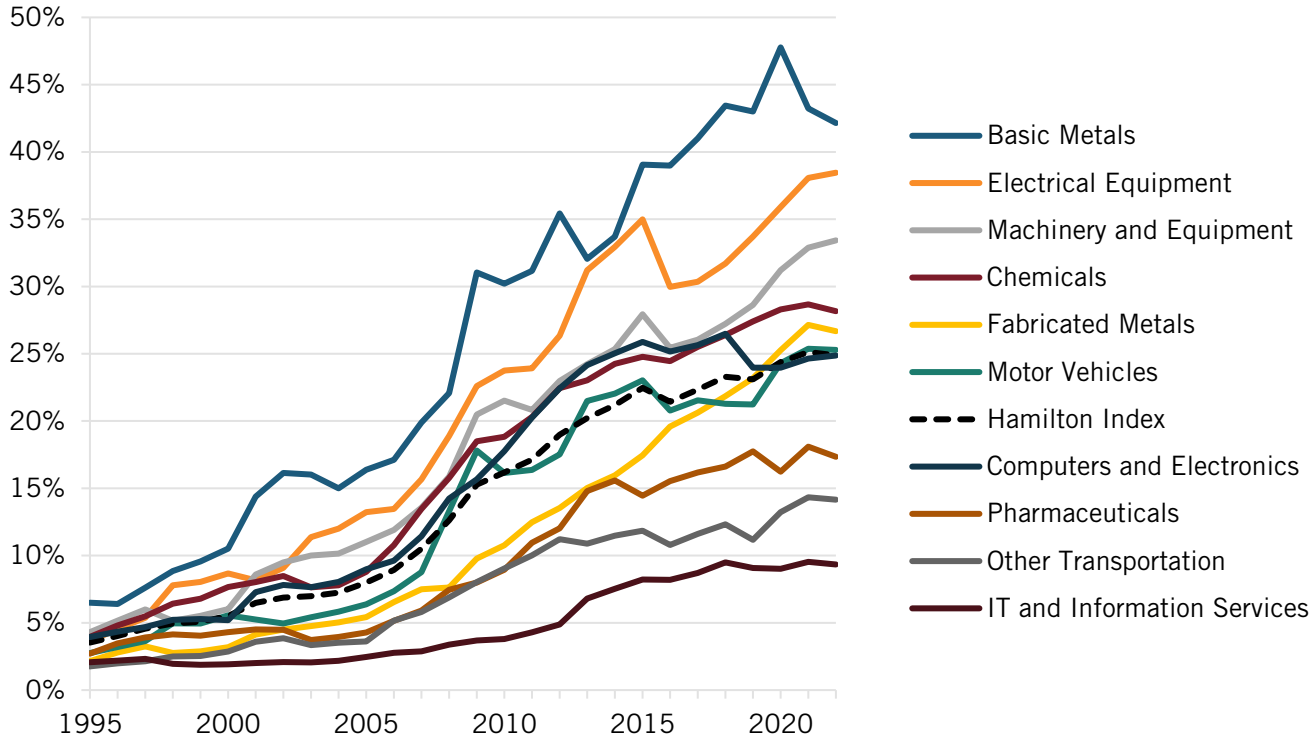
The China Juggernaut

If there is one takeaway from the past 27 years of advanced industry analysis it is that China is not a normal competitor. Its output across all advanced industries has grown at rates unmatched by any other nation, making it the leader in almost every industry.

China's share of global advanced industry output has increased by over 21 percentage points, from 3.5 percent in 1995 to nearly 25 percent in 2022. In every advanced industry, China's output has increased by at least 1,750 percent, with the average increase over 2,200 percent. Compare that with the United States, where output, on average, increased by just 200 percent.

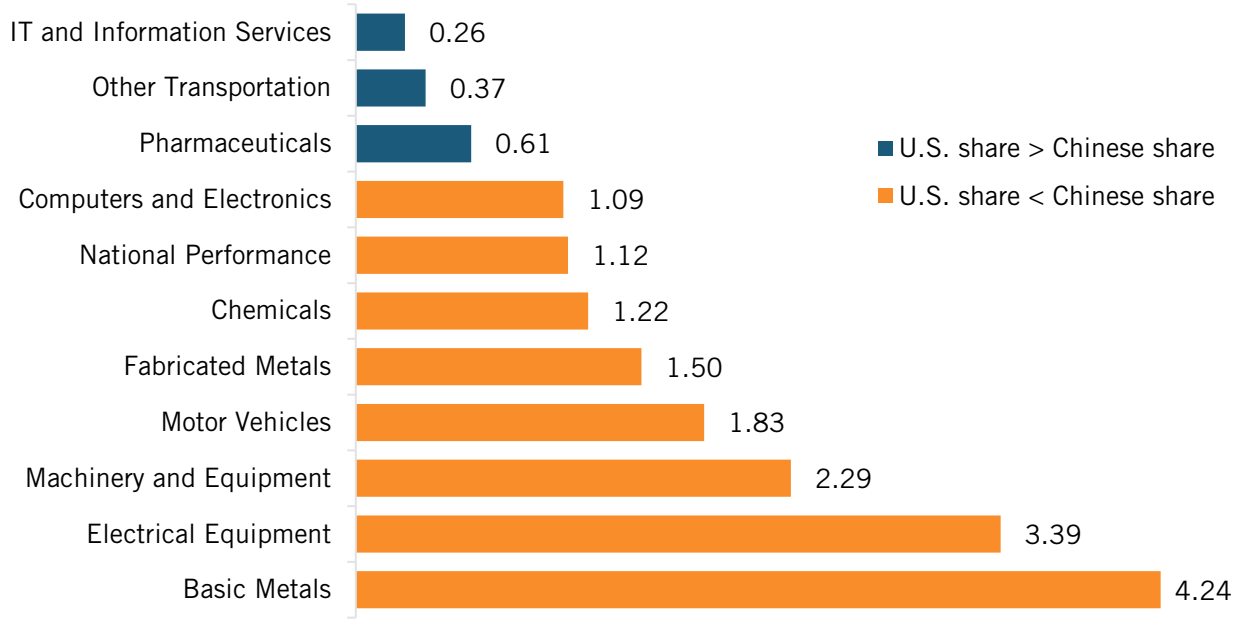
As previously discussed, advanced industry output as a share of GDP has been stable over the 27-year period analyzed in this report, meaning that when one country gained market share, other countries lost it. China's market share in every advanced industry has grown threefold or more over the past 27 years, leaving it with more than a quarter of global market share in several industries, including fabricated and basic metals, chemicals, machinery, and electrical equipment. (See figure 10.)

Figure 10: China's global market shares in Hamilton industries, 1995–2022



China leads the world in 7 out of the 10 Hamilton industries and therefore leads the United States. Excluding IT and information services, other transportation, and pharmaceuticals, China holds a greater share of the global market than the United States does. Figure 11 shows the ratio of China's global market share in 2022 to the United States' share, meaning that industries with a value greater than one are industries in which China holds a larger share of the global market. Though the United States is close to China's market share in some industries, such as computers and electronics and chemicals, in other industries, such as basic metals, China has a clear and definitive lead.

Figure 11: Ratio of Chinese to U.S. global market share in Hamilton industries, 2022

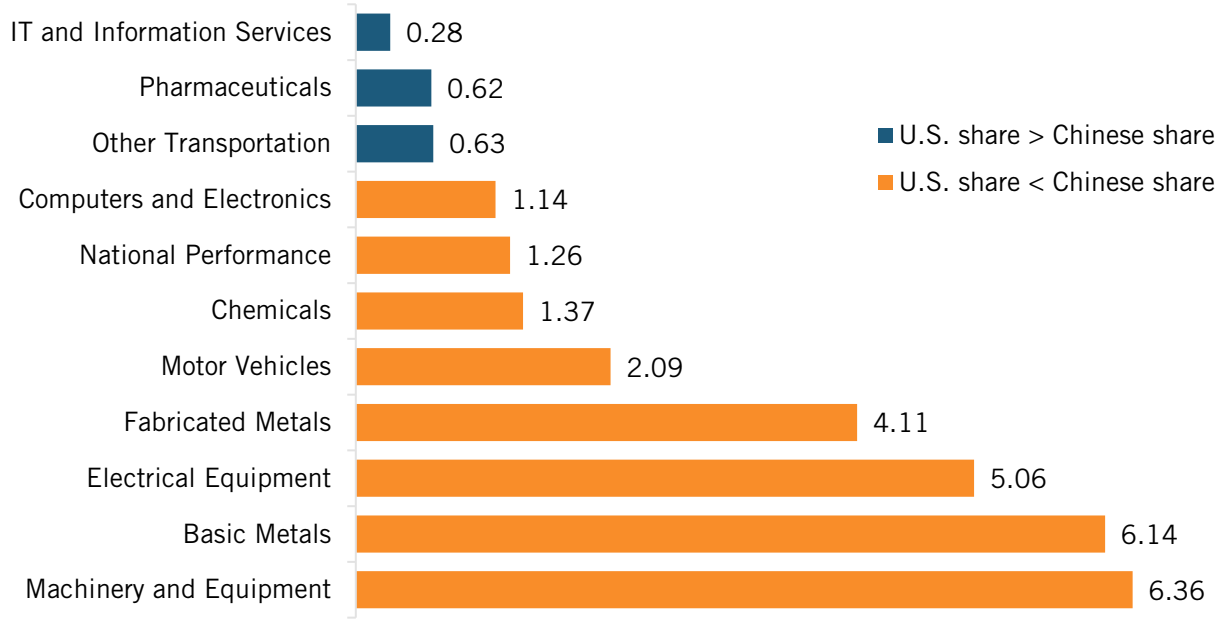


In the years immediately after its accession to the WTO and up to 2011, China's advanced industries underwent their most rapid growth in history, with output in these sectors increasing by up to 34 percent annually in some years and by 18 percent on average. Since then, China's growth has cooled moderately, but it is still one of the fastest-growing advanced industry economies in the world. Overarching industrial strategies, such as the Made in China 2025 Plan, and sector-specific industrial policies have led advanced industries in China to continue growing at unprecedented speed. For example, China's fabricated metals industry output increased by over 9 percent annually between 2018 and 2022, while output for the rest of the world grew by just 2 percent.

Overall, China's output in Hamilton industries has increased by over 26 percent since 2018, while the rest of the world's output has grown by only 15.6 percent. When removing IT and information services, an industry in which the United States and OECD perform strongly, the picture is even grimmer. China's output increased by 25.9 percent; the rest of the world's output increased by only 11.4 percent.

Looking more closely, China's output has increased faster than the United States' in seven Hamilton industries. Figure 12 shows the change in China's output in advanced industries divided by the change in U.S. output. Industries with a value of 1 or more are industries in which China's output has grown faster than the United States'. In all but IT and information services, other transportation, and pharmaceuticals, China's output has grown at a greater rate than the United States', with industries such as basic metals and machinery and equipment growing six times more than that of the United States.

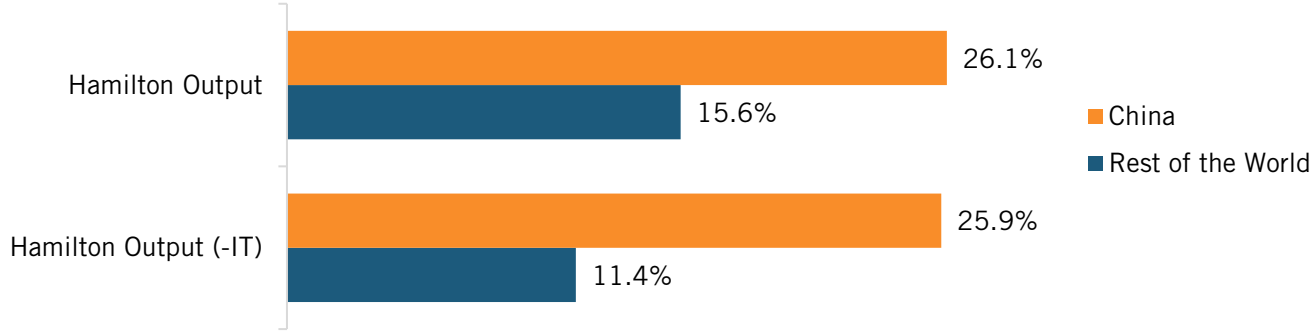
Figure 12: Change in China's output as a share of the change in U.S. output in Hamilton industries, 2013–2022



To appreciate the enormity of the gap between the United States and China, consider that, in order to match the advanced-industry share of China's economy, the United States would have needed to increase its output by nearly $1.5 trillion in 2022, a 56 percent increase. An increase of this kind would have required almost doubling output in IT and information services, quadrupling output in computers and electronics, or increasing pharmaceutical output by a factor of six.

But it is also worth noting that since 2020—the final year covered in the previous Hamilton Index—growth in advanced industry market share has been slightly stronger in the United States than in China. China's share increased by 0.5 percentage points over this period, while the United States' rose by 0.64 percentage points. This difference is too small to suggest that this is a canary in the coal mine for a slowdown in China's industrial growth, but it may indicate that the economic challenges China has faced since the COVID-19 pandemic—including deflationary pressures, declining property values, and high unemployment—are beginning to affect overall industrial growth.

Figure 13: Nominal change in output from 2018 to 2022, China vs. the rest of the world

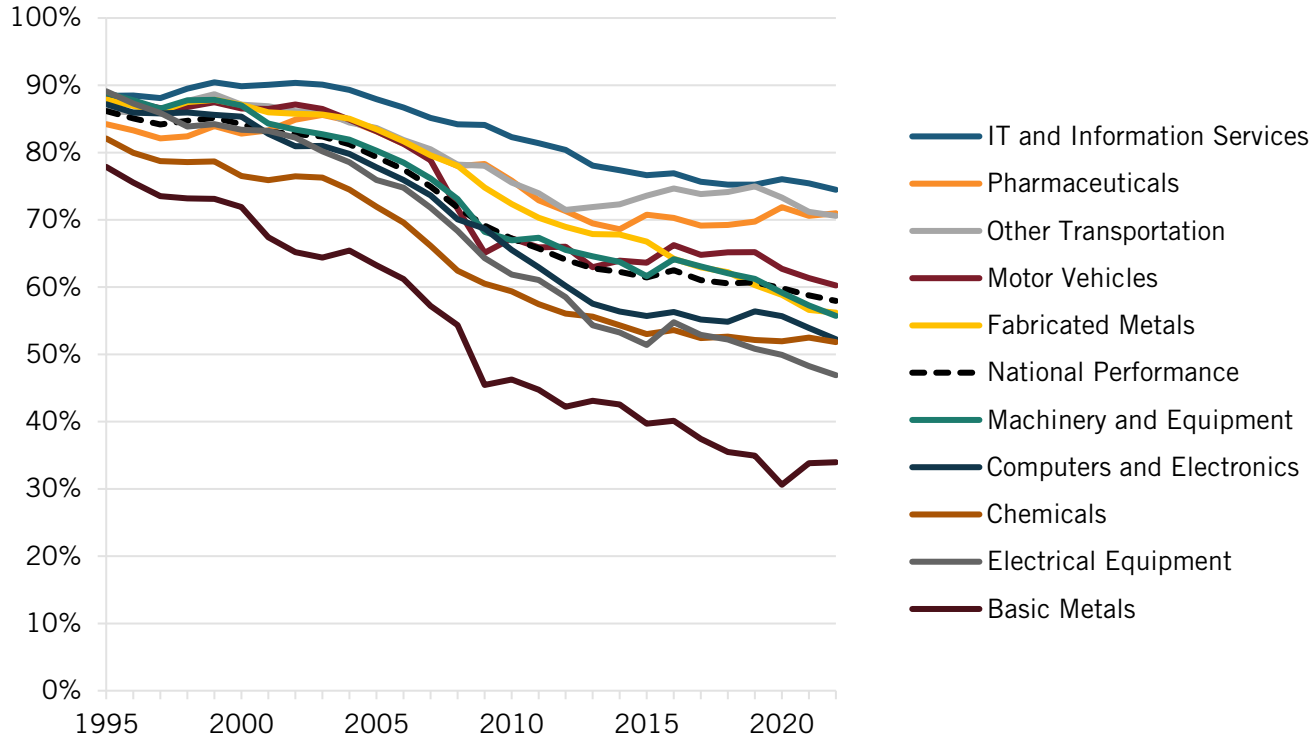


The Fall of the OECD

China's rise as the leader in advanced industries meant that OECD nations that were once leaders were now followers, and the OECD as a whole no longer had the economic power it once did. Between 1995 and 2022, OECD nations' market share in advanced industries fell from 86 percent to 58 percent, a 28 percentage-point decline. Put another way, in 1995, more than 8 out of every 10 dollars of value added in advanced industries originated in the OECD; now that figure is down to less than 6. China's gains in global market share across all Hamilton industries were strongly correlated with the OECD's losses, with a correlation coefficient of -0.94.

The OECD's market share declined in every Hamilton industry, but these losses were not distributed evenly. The largest declines for the OECD came in basic metals, where the bloc's market share fell by 44 percentage points, and in electrical equipment, which declined by 42 percentage points. However, the losses in the basic metals industry appear to have mitigated over the past two years, as the OECD has begun to regain market share (4 percentage points) since 2020. Although not a large jump, the gain represents the first time since 1995 that the OECD's market share in basic metals has increased for two years in a row. In fact, basic metals is the only industry in which the OECD has increased its market share since 2020. Perhaps unsurprisingly, China ceded market share in this industry between 2020 and 2022. Notably, China still leads the world, controlling 42 percent of the basic metals market.

Figure 14: OECD's global market share in Hamilton Industries, 1995–2022



It would be one thing if China's performance in advanced industries were proportional to the size of its own economy, but over the period from 1995 to 2022, that was not the case. China made a concerted effort to overperform in these industries, recognizing their importance from a geopolitical and economic standpoint, perhaps before many other leading countries. And these

efforts largely succeeded. In 2022, China's value-added output was 36 percentage points more than the global average, while the OECD's was 2 percentage points less than the global average.

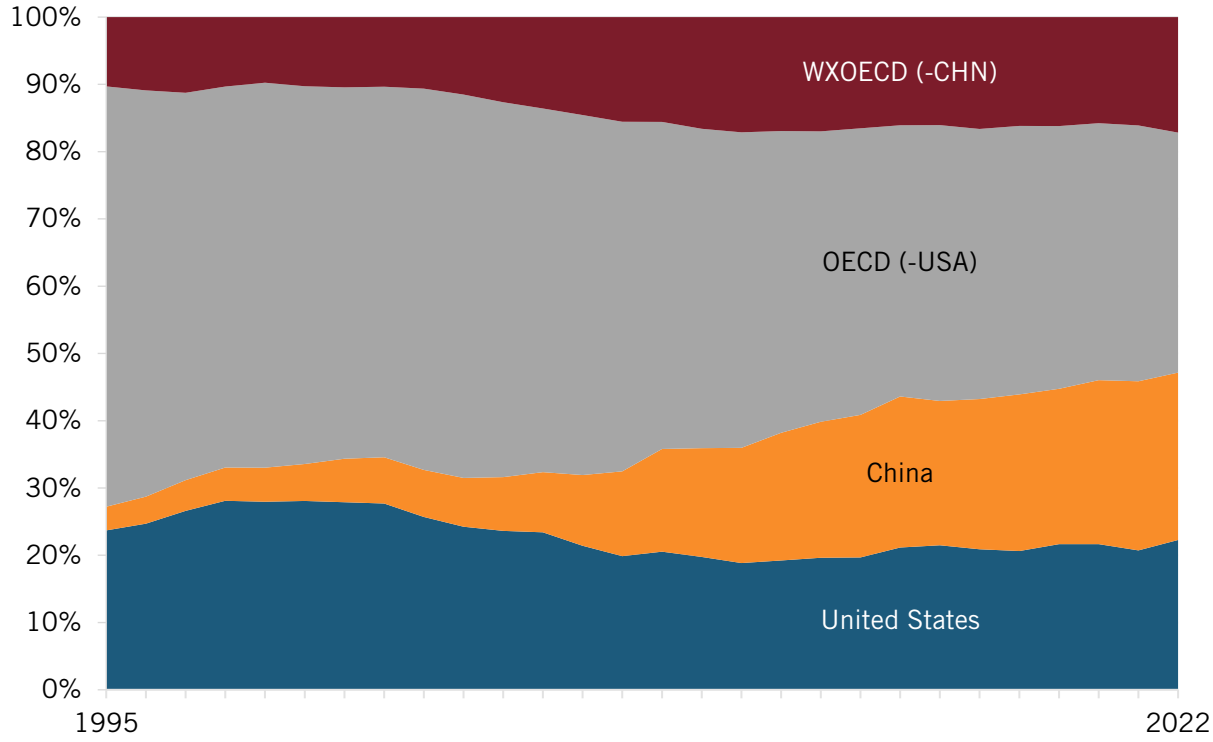
The United States and OECD vs. China and the Rest of the World

The growth of China, while coupled with the decline of the West, has also occurred alongside another geopolitical trend: the rise of the Global South and the developing world. Through programs such as the Belt and Road Initiative, China has leveraged large-scale infrastructure investment worldwide to entrench trade dependencies, reinforce strategic partnerships, and cultivate export markets. Not every non-OECD country takes part in the Belt and Road Initiative; however, the initiative is just an example of how China has used its economic and political power to strengthen the economies of historically economically weaker countries.

The global market share of non-OECD countries increased by 28.2 percentage points between 1995 and 2022, but most of that increase was driven by China's growth. Excluding China from the calculation, non-OECD countries still experienced a sizeable increase in market share, rising by 6.9 percentage points. (See figure 15. The bloc of non-OECD countries without China is shown as WXOECD (-CHN).)

Most of the industries that non-OECD economies, excluding China, excelled in include traditional heavy manufacturing industries, such as basic and fabricated metals and electrical equipment. These industries saw their market shares increase between 7 and 8.5 percentage points. However, the industry in which the bloc experienced the greatest increase was computers and electronics, where its global market share rose by 14 percentage points, driven by Vietnam's growth as a hotspot for electronics manufacturing.

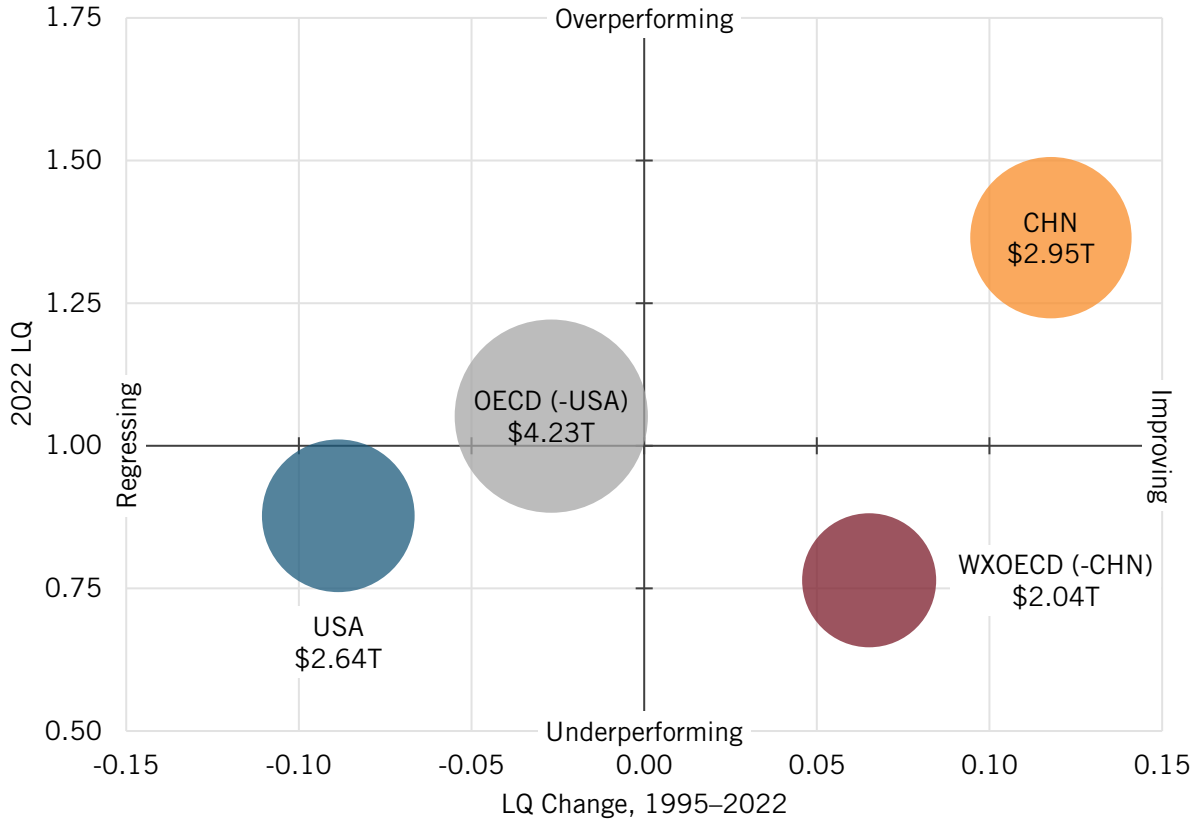
Figure 15: Global market shares of Hamilton industries for the United States, OECD, China, and non-OECD countries, 1995–2022



In terms of LQ, both China and non-OECD countries have seen their LQs improve since 1995, though non-OECD nations still underperformed relative to the world average as of 2022 (figure 16). Between 1995 and 2022, non-OECD nations, excluding China, saw their LQ increase by 7 points, while China's increased by 12 points. In comparison, OECD and the United States declined in relative performance, with their LQs falling by 9 and 3 points, respectively, further demonstrating the shift from Western world dominance to closer parity in advanced industry production between developed and developing nations.

In 1995, more than 8 out of every 10 dollars of value added in advanced industries originated in OECD; now that figure is down to less than 6.

Figure 16: Net performance in Hamilton industries since 1995 (scaled to 2022 output)



China's growth as a leader in advanced manufacturing and its ability to capture large swaths of market share over the past 27 years have meant that many developing nations have not been able to become strong advanced manufacturing hubs when they otherwise may have. However, the tensions around China have driven companies toward China-Plus-One or China-Plus-Many strategies, in which they diversify manufacturing by opening operations in other countries with lower labor costs. These strategies may mean that non-OECD countries will see a greater increase in market share in the near future.

INDUSTRY PROFILES

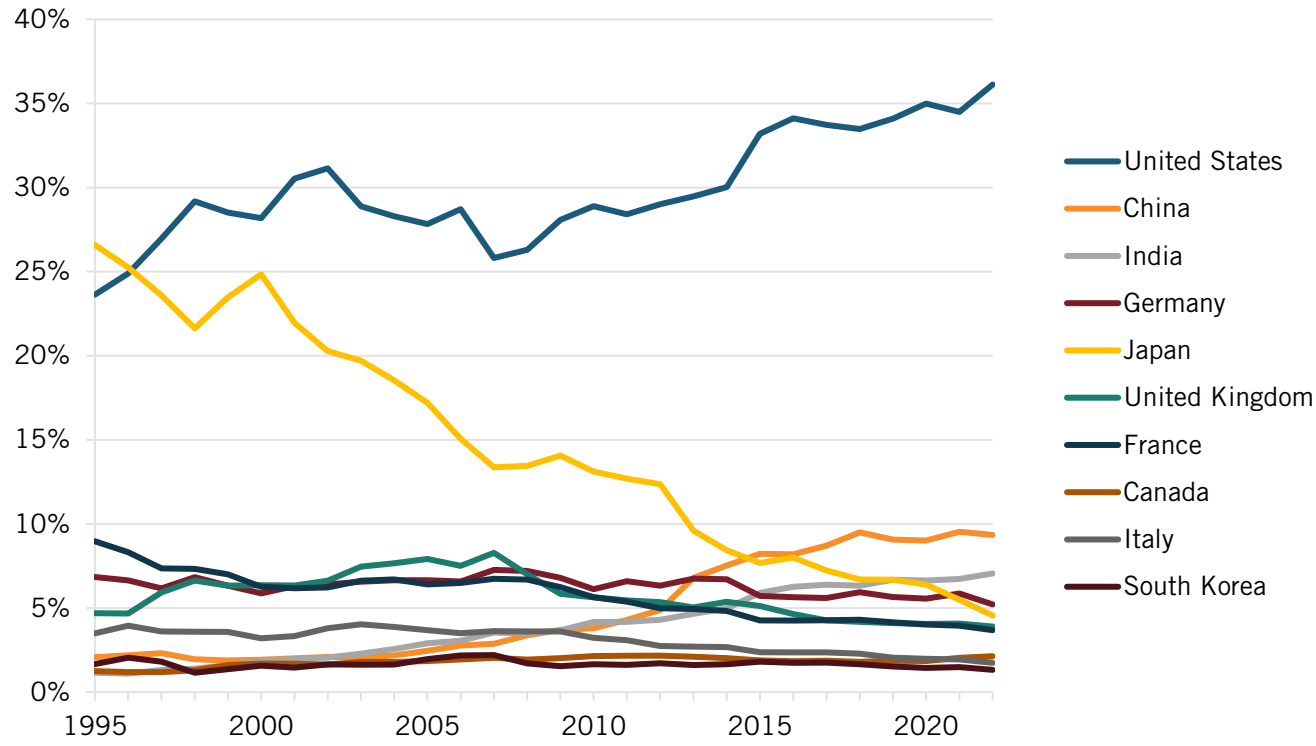
IT and Information Services

IT and information services includes several IT services subindustries, such as software development (including artificial intelligence (AI)), cloud computing, Internet services, and data processing and hosting. It is strategically important due to its high wages and international trade volume and is recognized as a key driver of innovation, as seen in the AI industry in recent years.

The industry has grown substantially over the past 27 years, with output rising 592 percent in nominal U.S. dollars from 1995 to 2022, making it the largest advanced industry in the world since 2003. The industry also grew by more than two times global GDP over the same period: 229 percent. Unlike most other advanced industries, the IT and information services industry is concentrated in the OECD, accounting for 74 percent of global market share. However, the OECD's dominance in this industry has declined slightly, falling from a peak of 90 percent in 2003.

The United States leads as the top individual nation, holding 35 percent of global market share in the industry, up from 24 percent in 1995. U.S. dominance in IT and information services has been driven by the emergence and growth of key technology companies, including Amazon, Google, Meta, and, more recently, leading AI firms such as OpenAI and Anthropic. (See figure 17.) Considering the United States' continued dominance in AI through 2026, it is likely the United States will maintain its leadership in the industry for the next several years. The next highest-ranking nations are China (9.3 percent), India (7 percent), and Germany (5.2 percent). The EU, not including Ireland, has seen its share fall by 6 percentage points since 1995 as its reliance on U.S. and Chinese information systems has grown.

Figure 17: Top 10 producers' historical shares of global output in IT and information services, 1995–2022



Countries that saw the greatest growth in their global market share of the IT industry over the 27-year period include the United States, which increased its lead by 12.5 percentage points, China (7.3 percentage points), and India (5.9 percentage points). Non-OECD countries collectively saw their global market share increase by more than 13 percentage points, to 38.4 percent, as of 2022. Conversely, Japan, which led the world in this industry through 1996, experienced a 22 percentage-point decline, the largest among any nation. The United Kingdom also saw its share fall by over 5 percentage points.

The OECD's dominance in the IT services industry has declined slightly, falling from a peak of 90 percent in 2003 to 74 percent in 2022. The market share of non-OECD countries increased to 38.4 percent in 2022.

Looking at relative performance, Israel leads the world with an LQ of 3.39, driven by high investment and technology crossover from its well-funded military and defense industry. Other strong relative performers include India (LQ of 2.16), Sweden (2.10), the United States (1.42), France (1.35), Switzerland (1.30), the Netherlands (1.29), and Germany (1.28). Several European nations make up the top 10, with others, including Belgium, Austria, Denmark, and Spain, performing well, with LQs of 0.9 or higher. Collectively, the EU boasts an LQ of 1.23, not far behind the United States, which it targets with nontariff attacks such as substantial fines on U.S. tech firms. The EU has recently reignited rhetoric pushing for "digital sovereignty"—a costly mission that is sure to damage European firms and consumer connectivity more than improve European technology production.

China has an LQ of 0.51, the lowest of all its advanced industries, putting it on par with other developing and low-income nations, including Argentina, Russia, and Malaysia. Despite its high global market share, China's output in this industry is relatively low relative to the size of its economy. It is likely that, as China continues to invest more in AI development and pushes toward digital and technological sovereignty, China's LQ in this industry will increase. It has already begun elevating national champions such as start-up DeepSeek and Alibaba, both of which have developed high-level AI tools. Lagging nations include Pakistan, Egypt, Indonesia, and Mexico, which have LQs of 0.2 or lower. (See figure 18.)

As well as having the highest LQ, Israel has experienced the greatest growth in LQ over the past decade, increasing by 102 percentage points from 2013 to 2022. Other highly improved nations include Poland (48 points increase), Singapore (34 points), Argentina (33 points), and India (20 points). The U.S. LQ increased by 6 points over this period, rising slowly but steadily each year, while China's LQ declined by 2 points. Nigeria experienced the greatest decline in its LQ, with a fall of 38 points, just slightly more than the next-greatest decline, Japan. This coincides with the substantial decline in Japan's global market share over the same period.

Figure 18: Relative performance in IT and information services (2022 LQ)

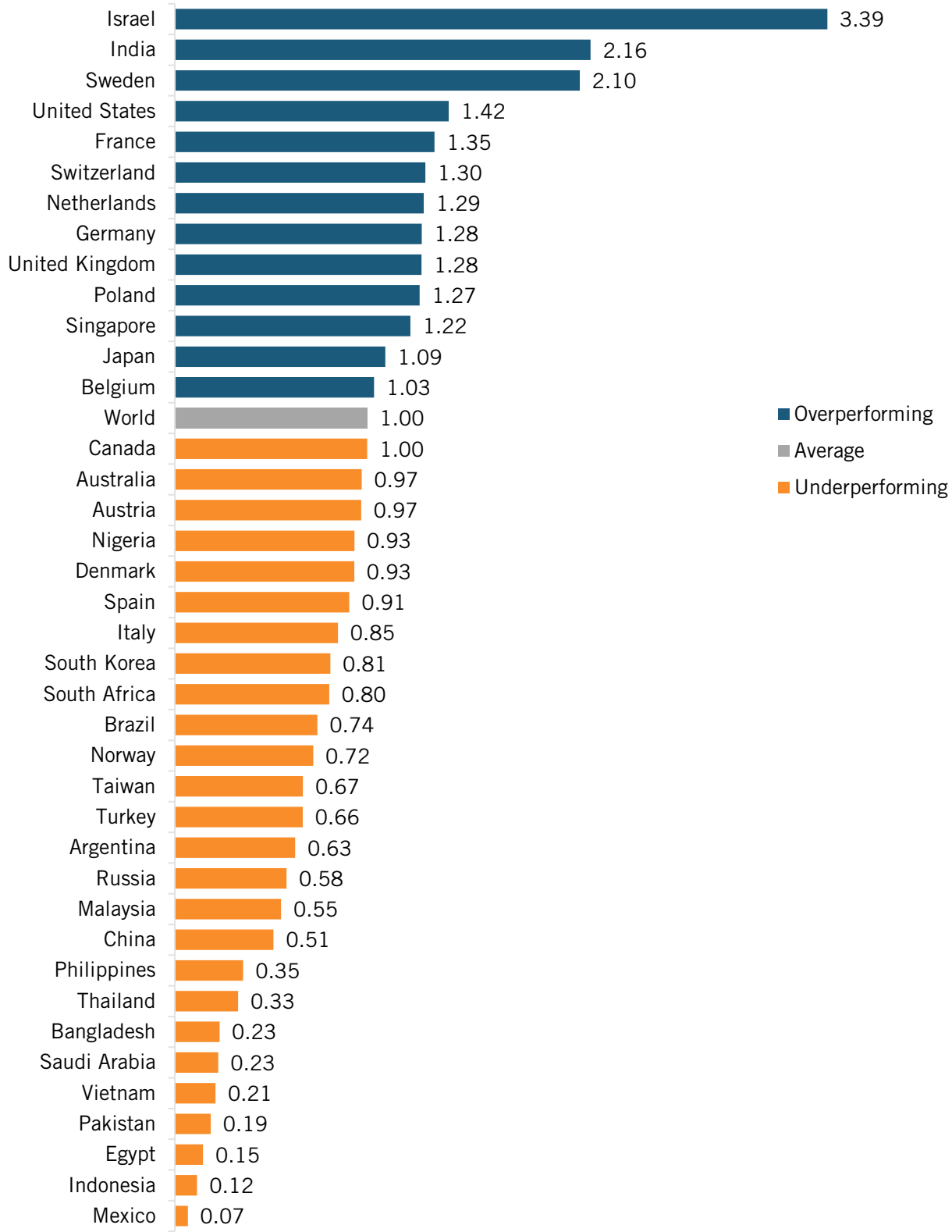
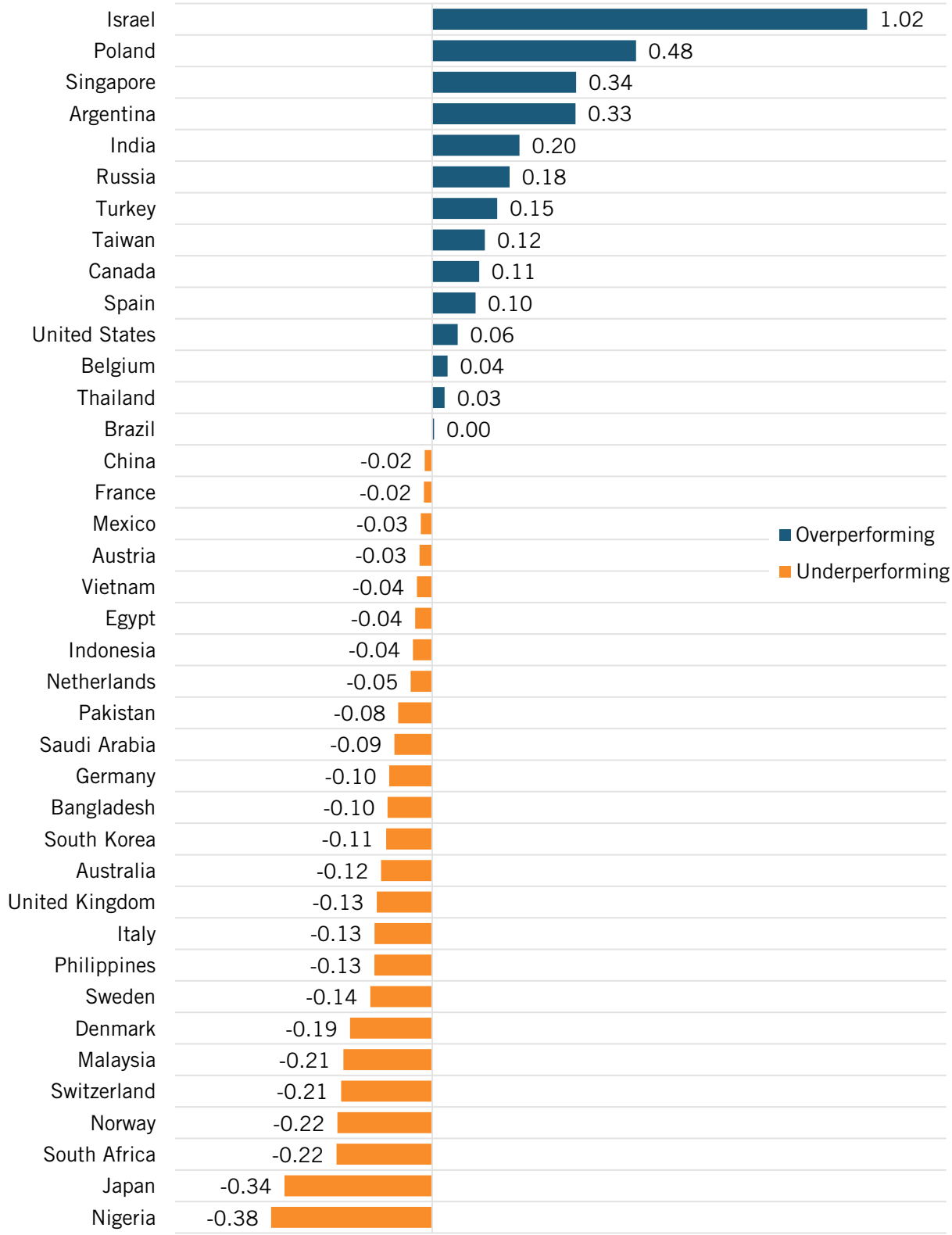


Figure 19: Net change in relative performance in IT and related services (LQ difference, 2013–2022)



Computers, Electronics, and Optical Products

The computers, electronics, and optical products industry includes the production of displays, electronic hardware, and semiconductors. As such, it's a fiercely contested industry today.

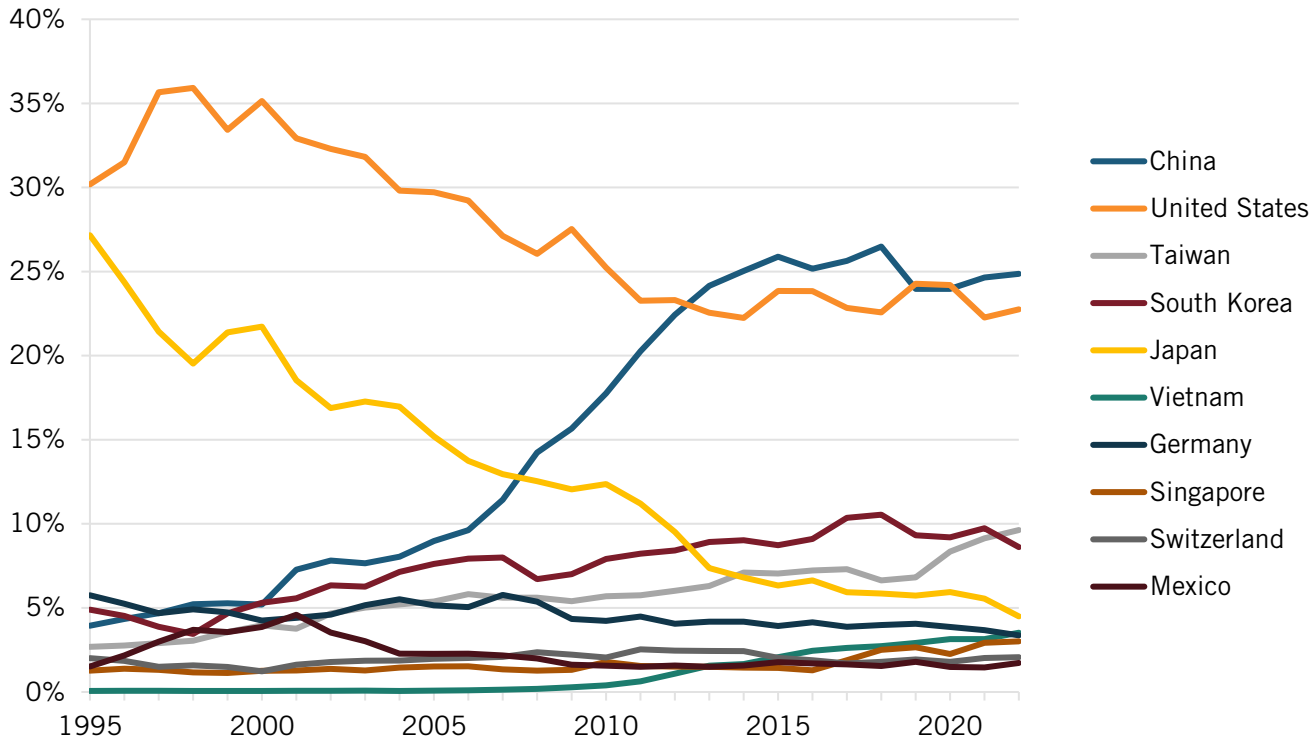
This industry has nearly tripled in output since 1995, growing by 198 percent globally, making it worth over $1.5 trillion. However, this has still been less than the growth of global GDP, which has grown 229 percent. This industry is highly concentrated in South and Southeast Asia, where industry leaders such as Huawei, Taiwan Semiconductor Manufacturing Corporation (TSMC), Samsung, and LG are located, all of which dominate their respective markets. However, China stands out as the clear leader among these countries. Controlling nearly 25 percent of the global market share, China has become the global leader in electronics manufacturing through concerted national development plans designed to empower national leaders, such as Huawei and SMIC, the leading Chinese semiconductor manufacturer. In its "Made in China 2025" Plan, China has provided these firms with substantial subsidies and explicitly pushed for technological sovereignty, encouraging Chinese firms to purchase only domestically produced hardware and capital, thereby further driving China's dominance.

China's rise has been coupled with the United States' fall. The United States has gone from the global leader to second place, declining from 30 percent of global market share to 22.7 percent. Behind the United States are Taiwan (9.6 percent), South Korea (8.9 percent), Japan (4.5 percent), Vietnam (4.5 percent), and Germany (3.5 percent). The EU has also lost significant market share, most of which can be attributed to the EU-17—the original members of the EU that joined before 2004. The EU held 7.8 percent of global market share in 2022, a fall from 15.3 percent in 1995.

Controlling nearly 25 percent of the global market share, China has become the global leader in electronics manufacturing through concerted national development plans.

China's global market share has increased by nearly 21 percentage points since 1995, the most of any country in the Hamilton Index and three times more than the next closest country. Other countries that have experienced high levels of growth include Taiwan (6.9 percentage points), Korea (3.7 percentage points), Vietnam (3.5 percentage points), and Singapore (1.7 percentage points). Non-OECD countries collectively have seen their global market share increase by 34.9 percentage points, while the OECD has declined by the same amount, leaving OECD nations to hold 52.3 percent of global market share. Like IT services, Japan has experienced a sizeable fall from grace, with its global market share falling by 22.7 percentage points.

Figure 20: Top 10 producers' historical shares of global output in computers and electronics, 1995–2022



Taiwan is the leader in relative performance in computer and electronic manufacturing with an LQ of 12.88, meaning its production in this industry is nearly 12 times larger than expected based on the size of its economy. Taiwan is the world's largest manufacturer of advanced logic chips, led by TSMC.[6] Other countries with leading LQs include Vietnam (8.73), Singapore (6.06), South Korea (5.27), Malaysia (3.34), and Israel (2.95). In contrast, the United States is underperforming in this industry with an LQ of 0.90, along with several European nations, including Germany (0.83), Austria (0.77), Denmark (0.50), and the Netherlands (0.46).

Taiwan underwent the most dramatic increase over the past decade. Its LQ in this industry increased by 329 percentage points, a dramatic increase reflective of its transformation into one of the largest electronics exporters in the world.[7] Vietnam also grew significantly over this period (302 percentage points), followed by Singapore (227 points), and Israel (65 points). Both the United States and China LQ fell over this period by 15 and 52 points, respectively.

Geopolitically, the Belt and Road Initiative overperforms in this industry with an LQ of 1.29, a decrease of 8 percentage points since 2013. At the same time, the OECD and the EU have both seen a decline in relative performance in this industry over the same time period, with OECD and the EU declining by 3 percentage points each, giving them LQs of 0.88 and 0.48, respectively, in 2022.

Figure 21: Relative performance in computers and electronics (2022 LQ)

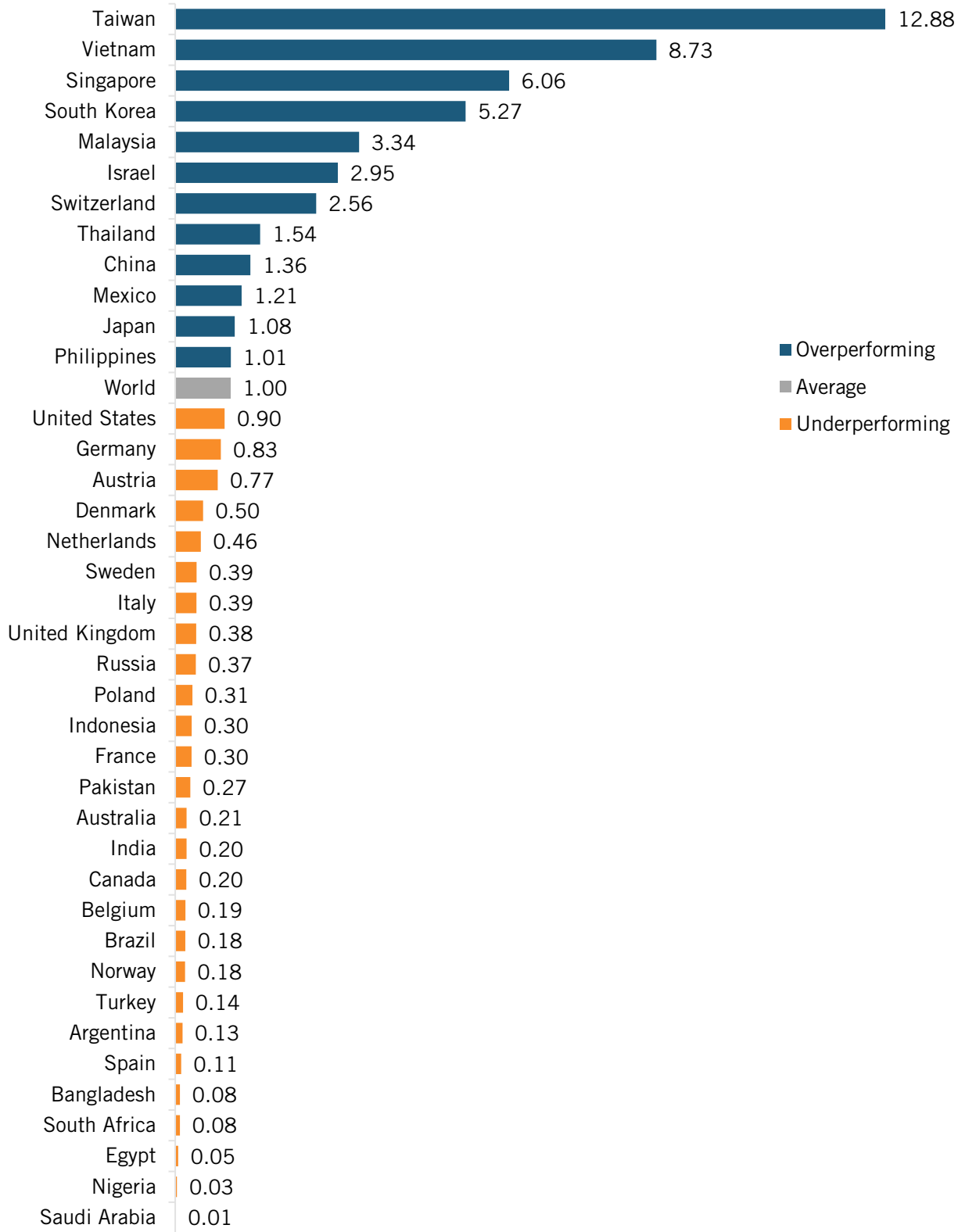
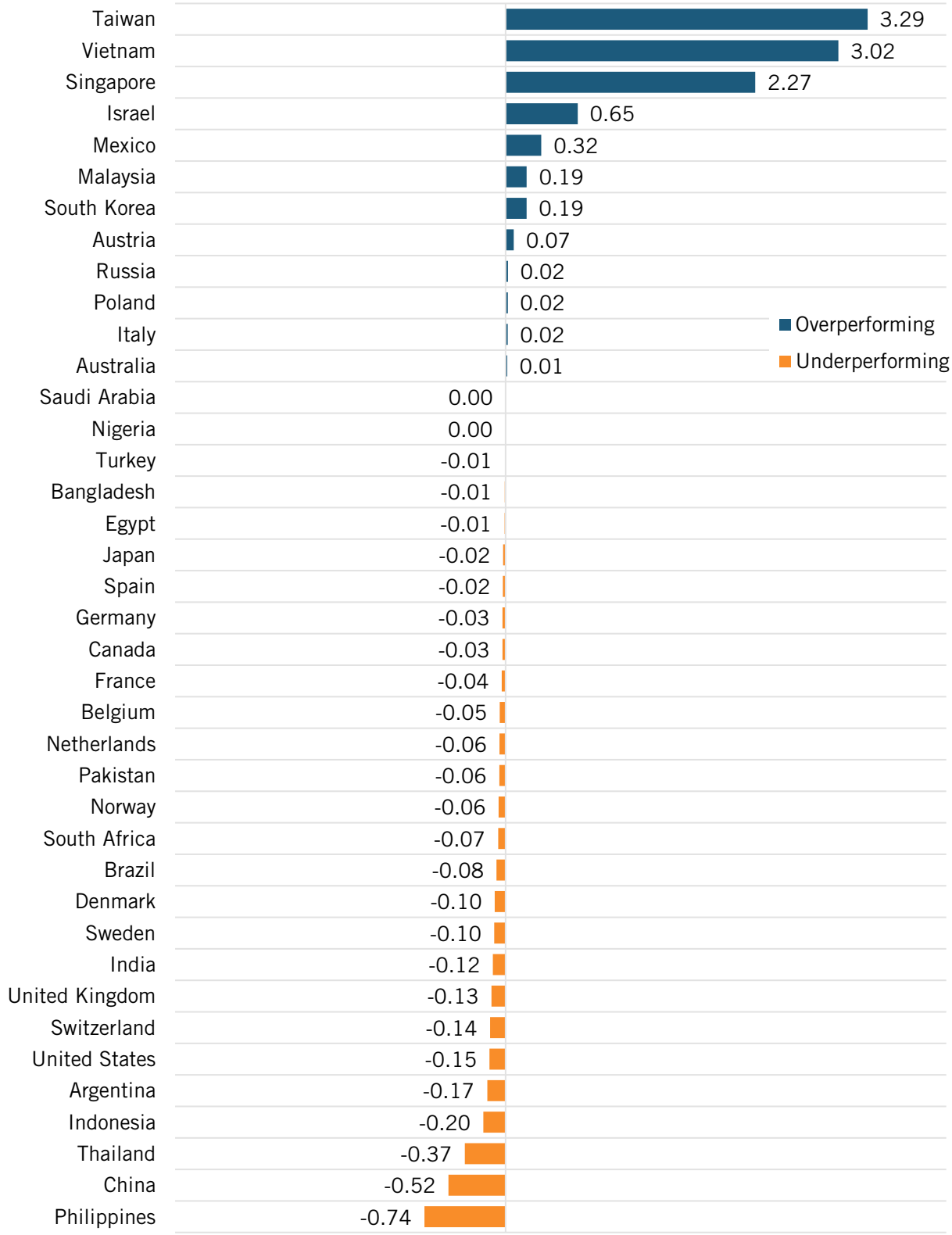


Figure 22: Net change in relative performance in computers and electronics (LQ difference, 2013–2022)



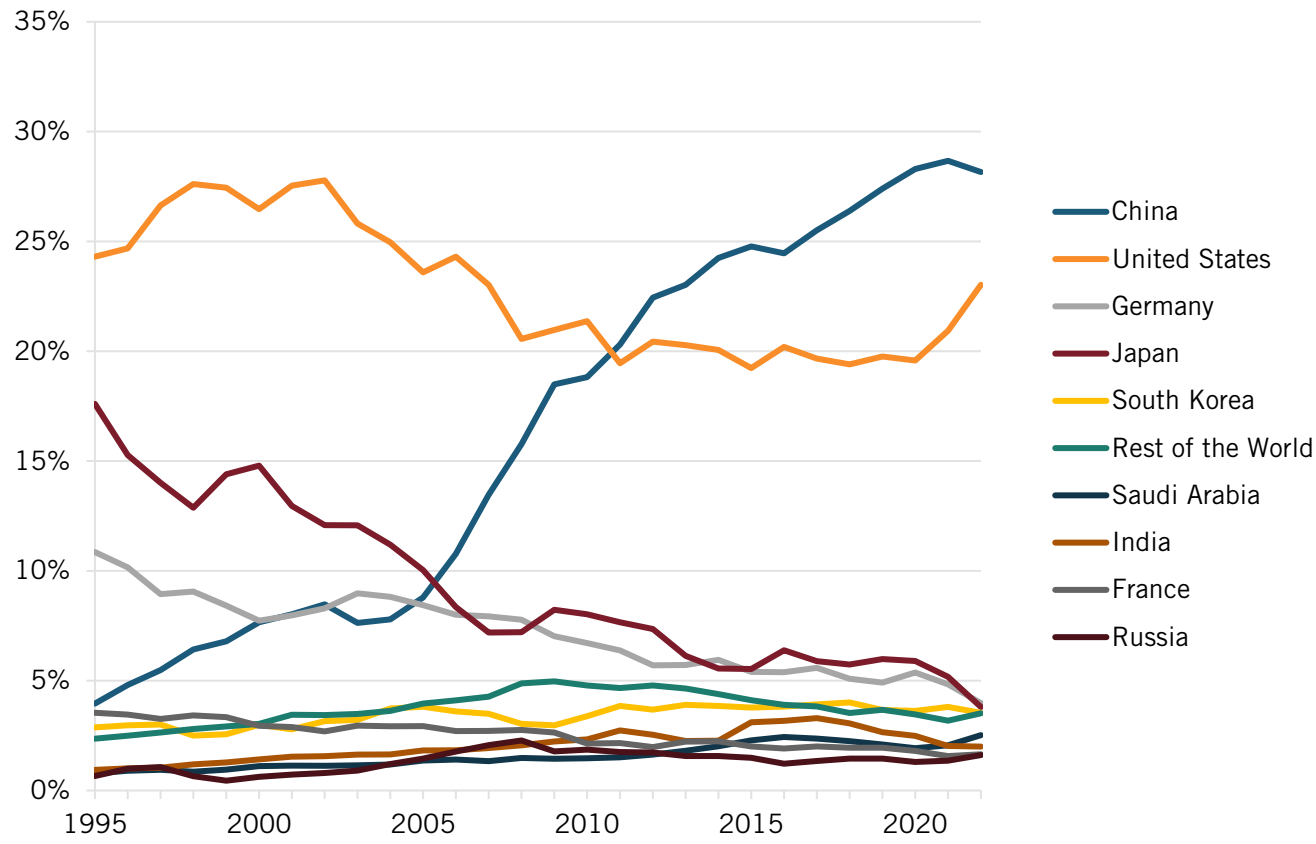
Chemicals

The chemicals industry includes both specialty chemicals and commodity chemicals, though it does not include any products made by the pharmaceutical industry. This sector produces critical inputs to national power industries such as electronics and defense industries.

Globally, this industry has grown by 211 percent in nominal U.S. dollars since 1995, but at a slower pace than global GDP, which has grown by 229 percent. The industry's value-added output in 2022 reached $1.3 trillion. This industry is highly concentrated between the United States and China, with the two countries collectively making up over half the global market. China leads the world with 28 percent of global market share, followed by the United States, which holds 23 percent. However, it was once the United States that led this industry by a large margin, holding 24 percent of global market share while China held just 4 percent. OECD, which once controlled 82 percent of the global market in 1995, held 52 percent as of 2022.

Outside the two leaders, this industry is widely dispersed across other nations, with Germany, the third-largest chemical manufacturer, holding 4 percent of the global market, followed by Japan (3.8 percent) and South Korea (3.5 percent). Japan lost the largest slice of global market share over the 27-year period, losing 13.8 percentage points. The EU and the Quad, which includes Australia, Japan, India, and the United States, both declined by about 14 percentage points, sizable losses largely driven by declines in the United States, Japan, and Germany. Saudi Arabia, India, and Russia all increased their global market share by about 1 percentage point.

Figure 23: Top 10 producers' historical shares of global output in chemicals, 1995–2022



The picture is quite different when it comes to industrial specialization. In 2022, the nation with the highest LQ was South Korea, at 2.16. Other high-ranking countries were Saudi Arabia (2.08), Thailand (1.76), Singapore (1.69), Argentina (1.60), and China (1.54). While it still overperforms, China's LQ has fallen over the past decade from a high of 1.79 in 2013. Similarly, the United States, which underperforms in the chemical industry with an LQ of 0.91, has also seen its LQ decline since 2008, albeit more moderately, falling from 0.94 in 2013.

It was once the United States that led this industry by a large margin, holding 24 percent of global market share while China held just 4 percent.

Looking at the change in relative performance, Singapore saw the largest increase in LQ over the period from 2013 to 2022, rising by 39 percentage points. The Philippines (35 percentage points), Turkey (34 percentage points), Saudi Arabia (25 percentage points), and Brazil (22 percentage points) also experienced significant increases in LQ. By contrast, Israel (76 points), Mexico (47 points), Taiwan (38 points), and India (33 points) all experienced a substantial decline in LQ over the 10-year period.

Geopolitically, both the Belt and Road Initiative and the collective non-OECD nations overperformed in chemical production. On the other hand, the OECD moderately underperforms, with an LQ of 0.87, a marked decline from 1995, when its LQ reached 1. Similarly, the EU has an LQ of 0.73, down from 0.99 in 1995.

Figure 24: Relative performance in chemicals (2022 LQ)

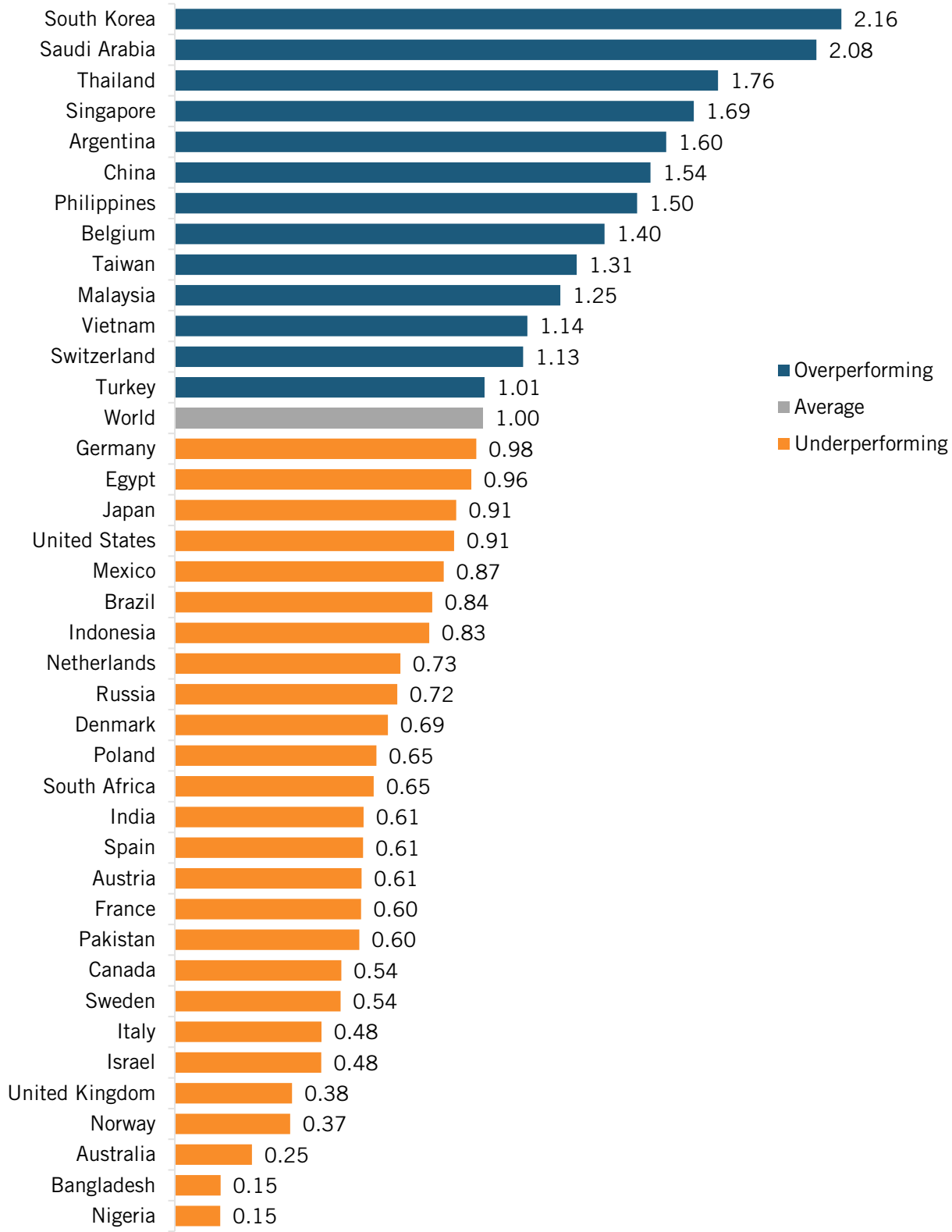
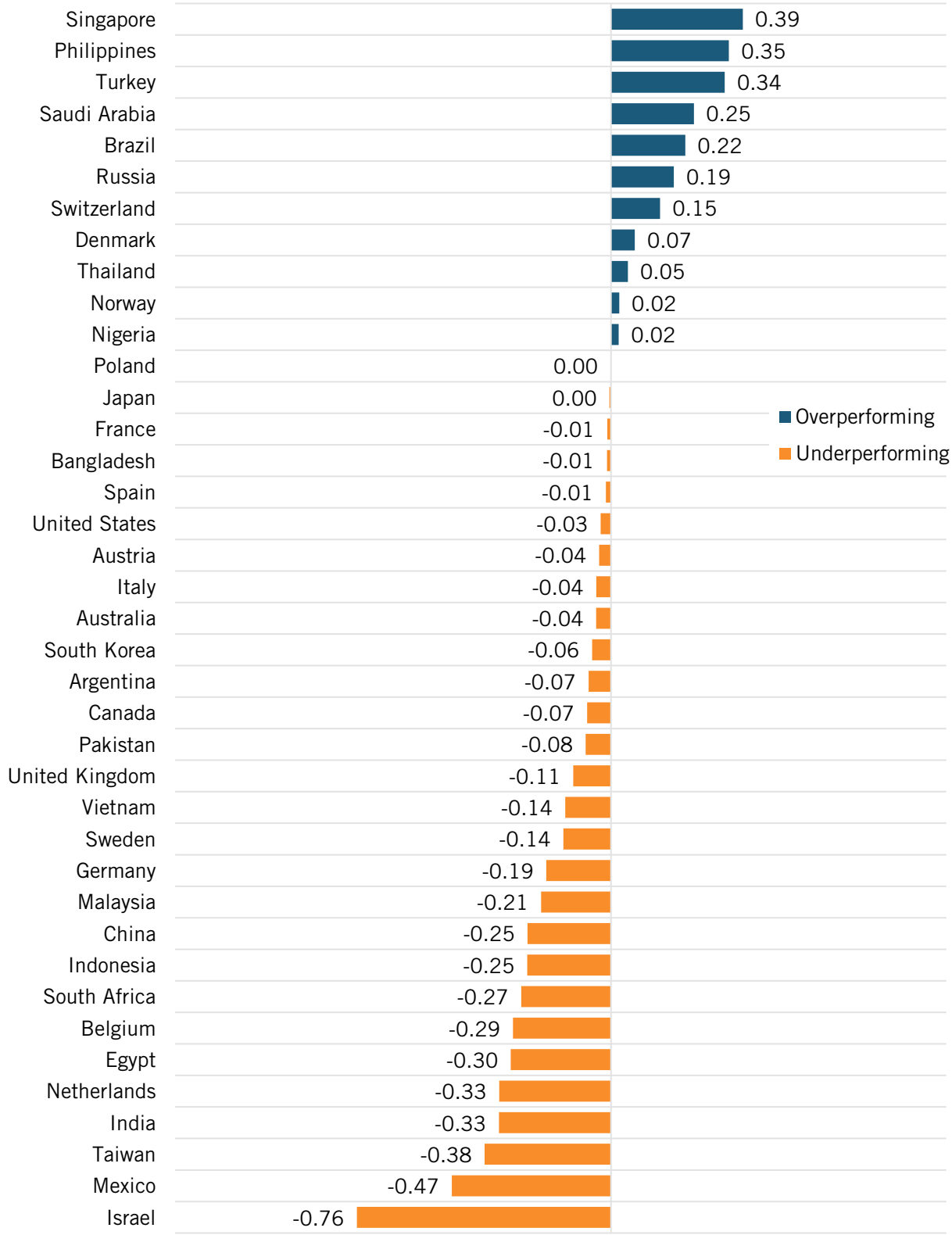


Figure 25: Net change in relative performance in chemicals (LQ difference, 2013–2022)



Machinery and Equipment

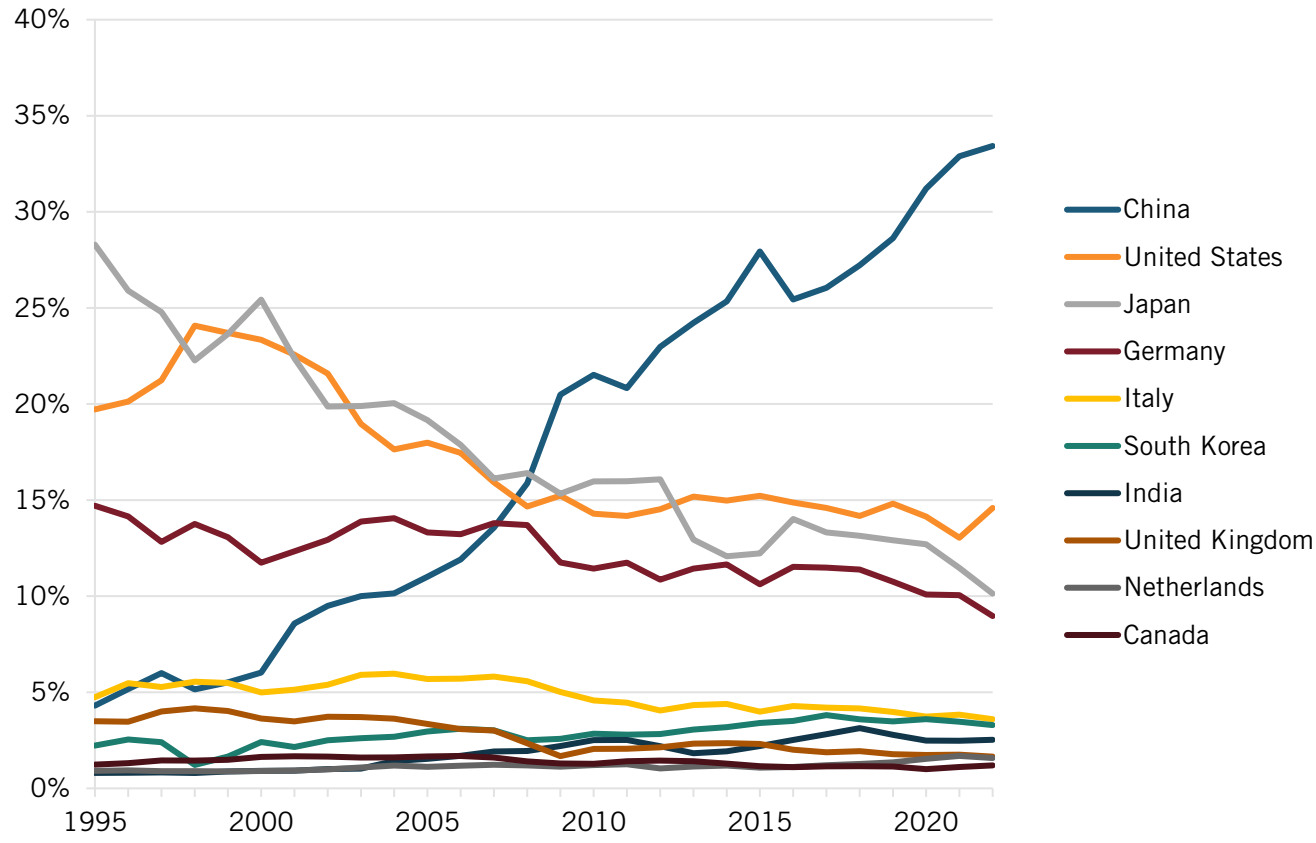
The machinery and equipment industry comprises machine tools and mechanical systems, including agricultural machines, engines, turbines, and industrial machines.

Globally, this sector grew by 157 percent in nominal U.S. dollars, though slower than the rate of global GDP growth—229 percent—while total value added output in this industry reached $1.3 trillion in 2022. OECD nations lost significant market share in this industry, falling from holding 89 percent of the global market in 1995 to just 56 percent in 2022.

Looking at individual countries, China leads the world and has done so for nearly a decade and a half. China holds over one-third of global market share, followed, not closely, by the United States, which holds just 14.6 percent. Other high-ranking nations are Japan (10.1 percent), Germany (9 percent), Italy (3.6 percent), and South Korea (3.3 percent).

China's growth in this industry is unmatched, having captured 29 percentage points of global market share over the past 27 years. This rapid growth has led to a corresponding increase in the Belt and Road Initiative's global market share, of which China is a part. Japan has suffered the greatest decline in market share, losing 18.2 percentage points, while other OECD countries, such as Germany (5.7 percentage points), the United States (5.1 percentage points), the United Kingdom (1.8 percentage points), and France (1.8 percentage points) have also lost market share.

Figure 26: Top 10 producers' historical shares of global output in machinery and equipment, 1995–2022



Despite its loss of substantial market share, Japan leads the world in industrial specialization with an LQ of 2.43. In fact, its LQ has actually increased since 1995, from 1.59, due in part to the decline in Japan's GDP over this period. Germany also exhibits high industrial specialization with an LQ of 2.21, followed by South Korea (2.02), Austria (1.87), China (1.83), and Sweden (1.82). The United States performs poorly in this industry, as much of the heavy manufacturing activity that used to occur in the United States has been offshored. Other developed nations that perform poorly include Belgium (0.62), Canada (0.56), the United Kingdom (0.54), and Australia (0.23).

China leads the world in machinery and equipment, and has done so for nearly a decade and a half.

The Netherlands experienced the largest percentage-point increase in its LQ from 2013 to 2022, rising by 54 percentage points. Other nations that experienced high growth include Sweden (52 percentage points), Japan (50 percentage points), South Korea (27 percentage points), and Vietnam (25 percentage points). The United States and several other developed nations declined over this period, including the aforementioned poor performers, while China's LQ fell by just 5 percentage points.

Looking at this data with a geopolitical lens, the OECD, when excluding the United States, actually overperforms in this industry with an LQ of 1.21, and, relatedly, the EU (excluding Ireland) also overperforms with an LQ of 1.31. Alliances and trade organizations that include the United States, such as the United States-Mexico-Canada Agreement (USMCA), the Quad, and AUKUS (which includes Australia, the United Kingdom, and the United States), all underperform with LQs of 0.80 or lower.

Figure 27: Relative performance in machinery and equipment (2022 LQ)

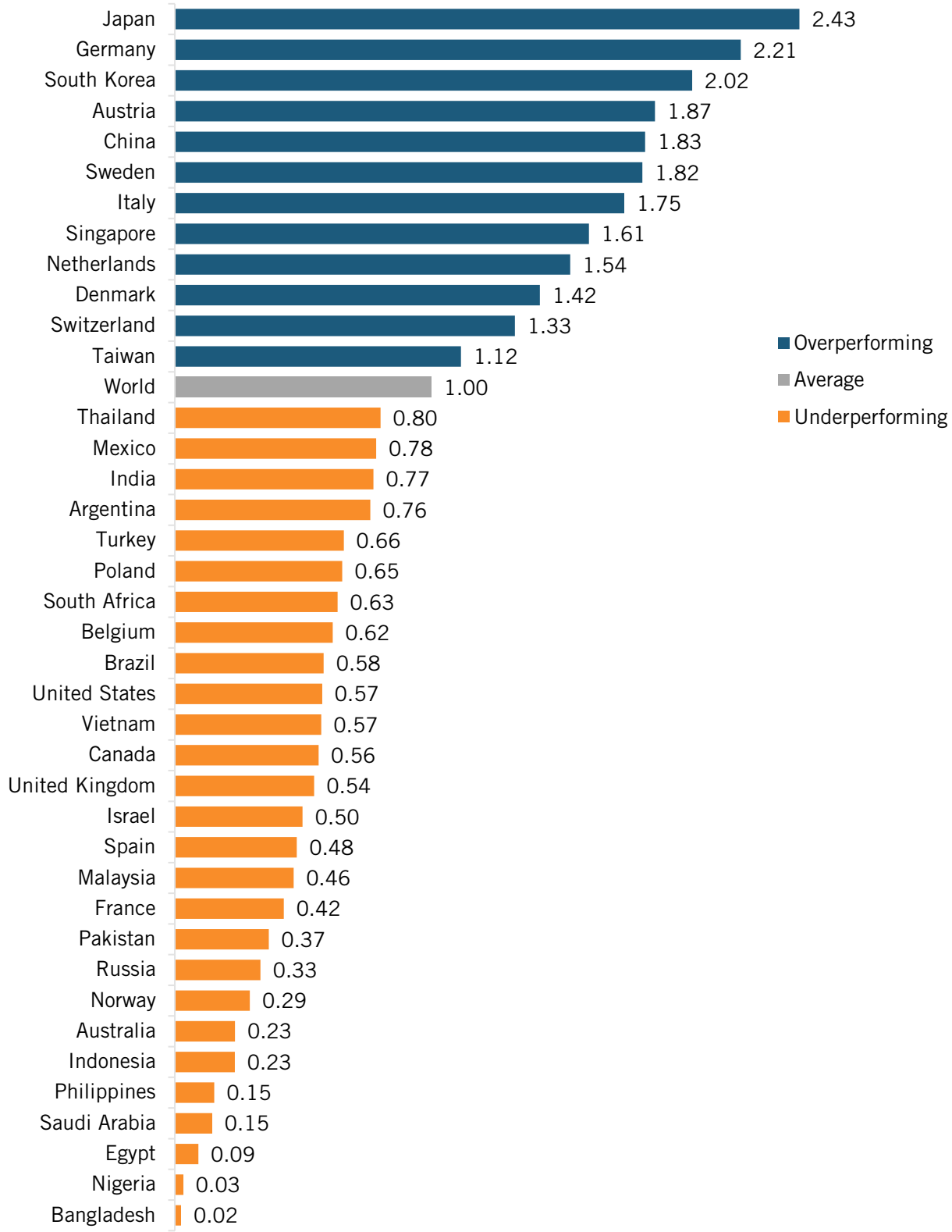
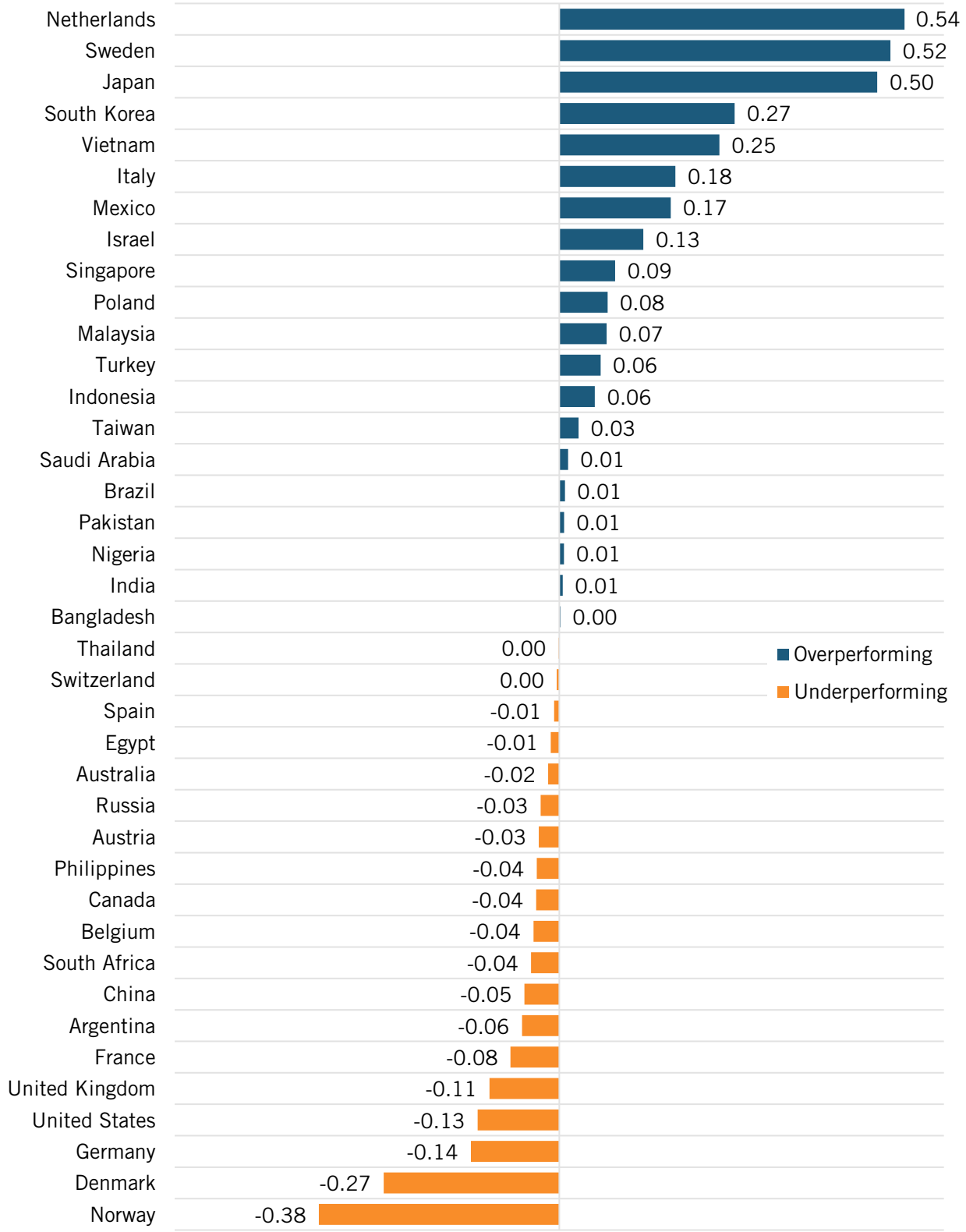


Figure 28: Net change in relative performance in machinery and equipment (LQ difference, 2013–2022)



Basic Metals

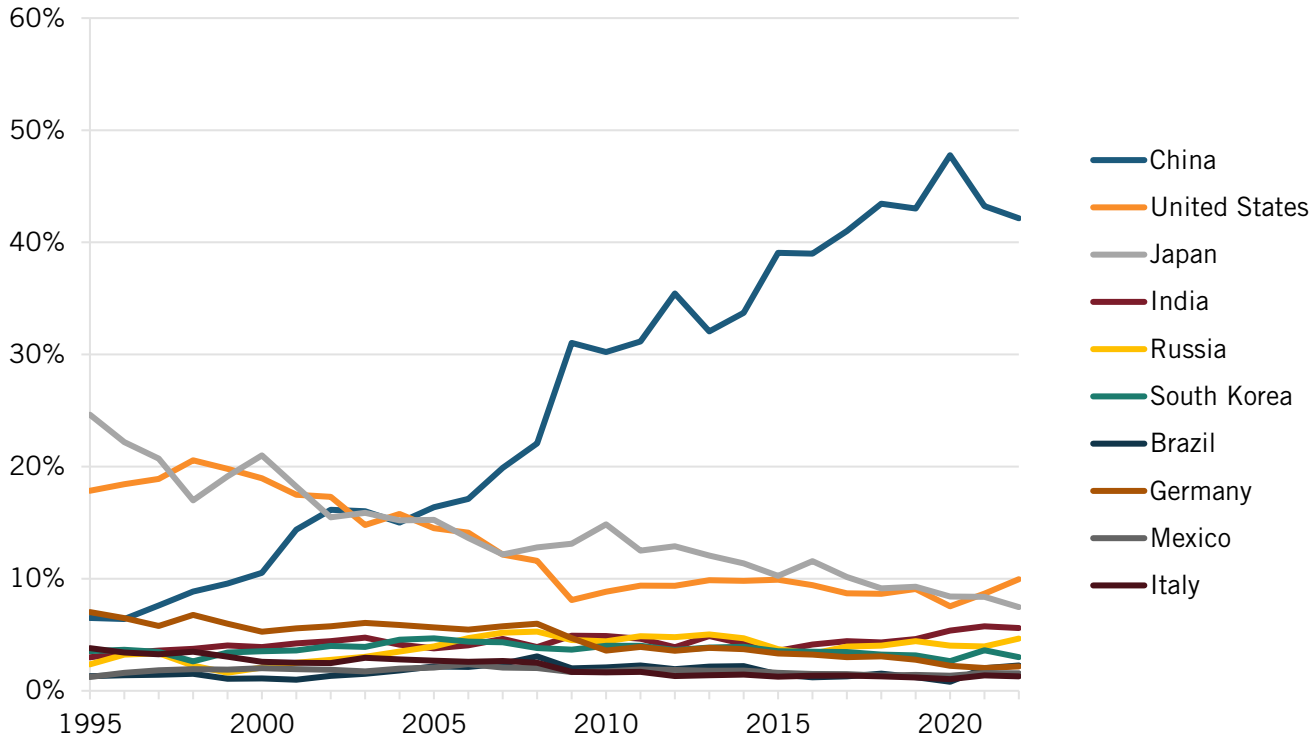
The basic metals industry comprises metals commonly used in industrial production, including copper, aluminum, and iron. The sector is strategically important because of its applications across several downstream power industries.

Globally, this industry grew by 253 percent between 1995 and 2022, faster than global GDP, which grew by 229 percent. Total value-added output in this industry reached $1.2 billion globally. China and other non-OECD nations have become the leading producers of basic metals, controlling 66 percent of the global market share; meanwhile, the market share of OECD nations fell by 44 percentage points over this period, from 78 percent to 34 percent.

Individually, China leads the world in basic metal production by a wide margin, holding 42 percent of the global market share, up from 6.5 percent in 1995. Other leading producers are the United States (10 percent), Japan (7.5 percent), India (5.6 percent), Russia (4.7 percent), and South Korea (3 percent). Lagging nations in this industry largely include developed nations that are concentrated in more high-tech industries, such as Denmark, Israel, Singapore, and Switzerland.

China's growth in this industry, driven by its push for domestic industrialization and increased manufacturing output following its WTO accession, has come at the expense of almost every other nation. U.S. market share in this industry declined by 7.9 percentage points, while Japan (17.2 percentage points), Germany (4.9 percentage points), Italy (2.5 percentage points), and France (1.8 percentage points) also experienced declines. India and Russia each saw their global market share increase by about 2.5 percentage points.

Figure 29: Top 10 producers' historical shares of global output in basic metals, 1995–2022



When it comes to industrial specialization, the trends are quite similar. China leads the world with an LQ of 2.31, once again reflecting its absolute leadership in the industry, followed by Russia (LQ of 2.08), South Korea (1.84), Japan (1.79), and India (1.71). Once again, developed nations tend to underperform in this industry, with Spain, Norway, France, the United States, and Australia among a slew of countries with an LQ of 0.50 or below. However, Nigeria has the lowest LQ of 0.07.

China and other non-OECD nations have become the leading producers of basic metals, controlling 66 percent of the global market share.

Over the decade from 2013 to 2022, Brazil experienced the greatest increase in LQ, with it increasing by 50 percentage points, more than double the next-most-improved nation of Russia (37 percentage points). Very few other nations saw their LQ increase over this decade, with Norway (14 percentage points), Italy (12 percentage points), Canada (7 percentage points), and Spain (6 percentage points) among the select few.

Despite its leading LQ, China actually exhibited one of the largest declines in relative performance, with its LQ falling 19 percentage points. In fact, China's LQ fell 110 percentage points between 2002 and 2022, as the growth of China's economy still outpaced its basic metals industry. South Korea, India, and Taiwan also overperform in this industry but have seen their LQ fall over the past 10 years.

Unsurprisingly, with so many OECD nations underperforming, the OECD collectively underperforms with an LQ of 0.57, having declined by nearly 40 percentage points since 1995. Conversely, non-OECD nations perform far above average, with an LQ of 1.62. The EU has also seen a substantial decline in relative performance, with its LQ declining from 0.84 in 1995 to 0.52 in 2022.

Figure 30: Relative performance in basic metals (2022 LQ)

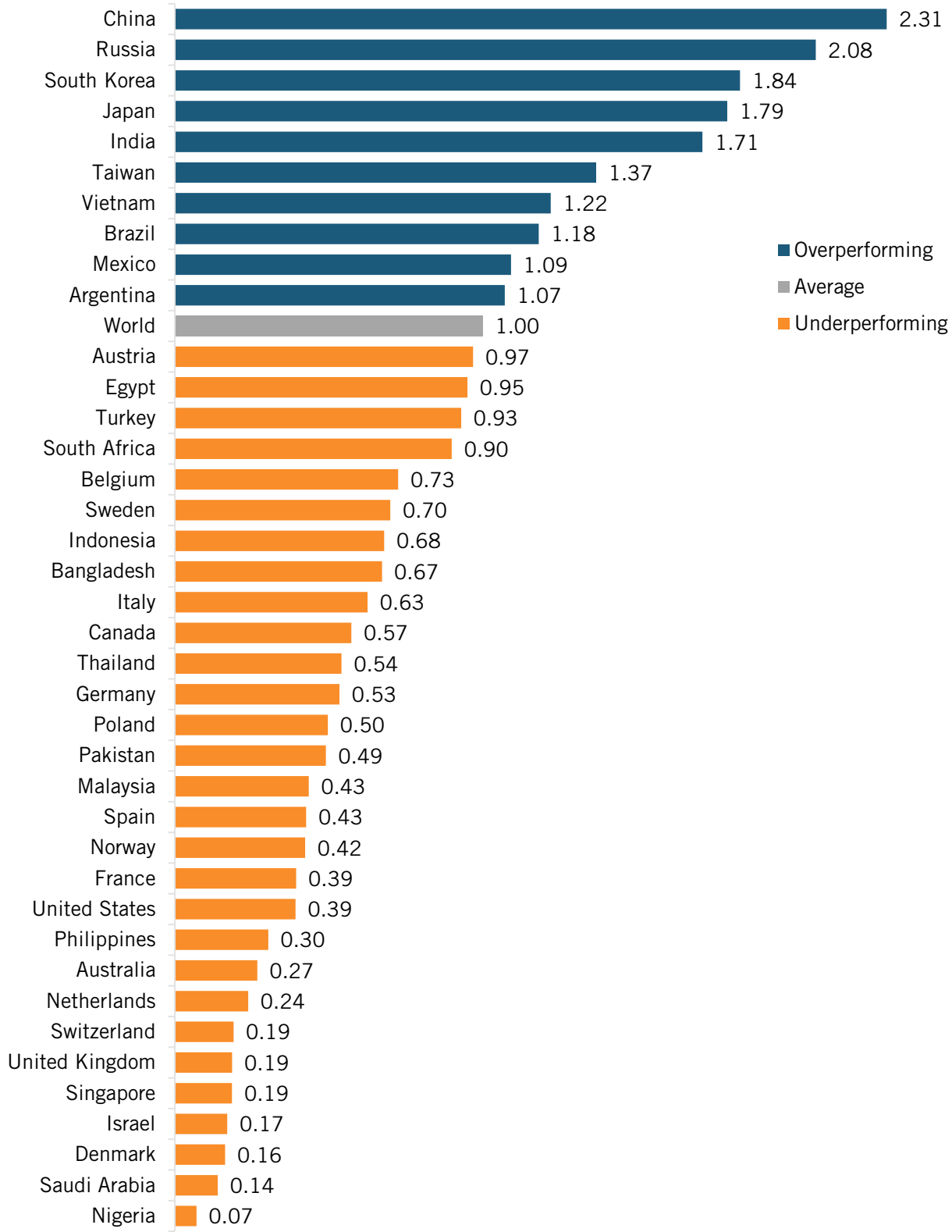
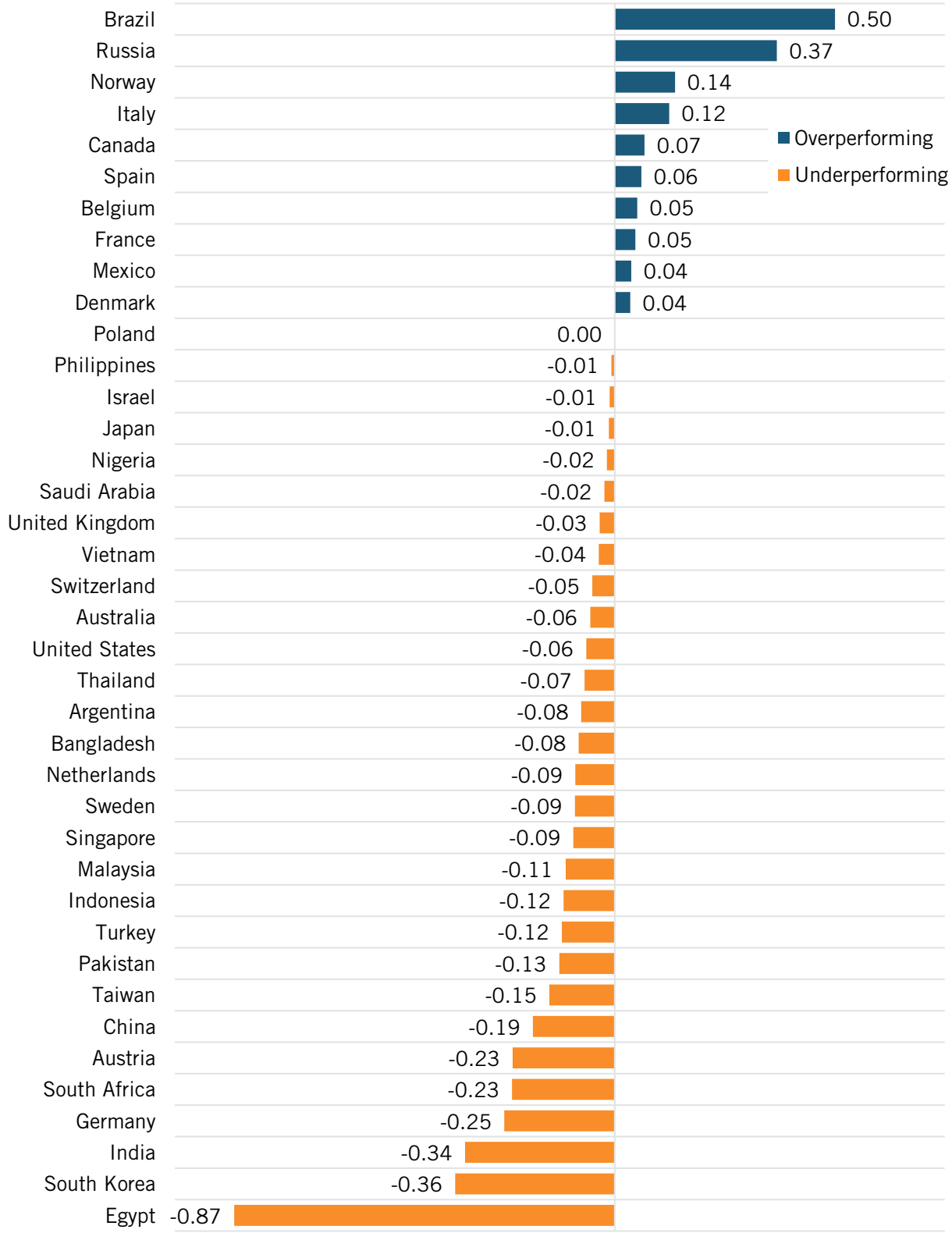


Figure 31: Net change in relative performance in basic metals (LQ difference, 2013–2022)



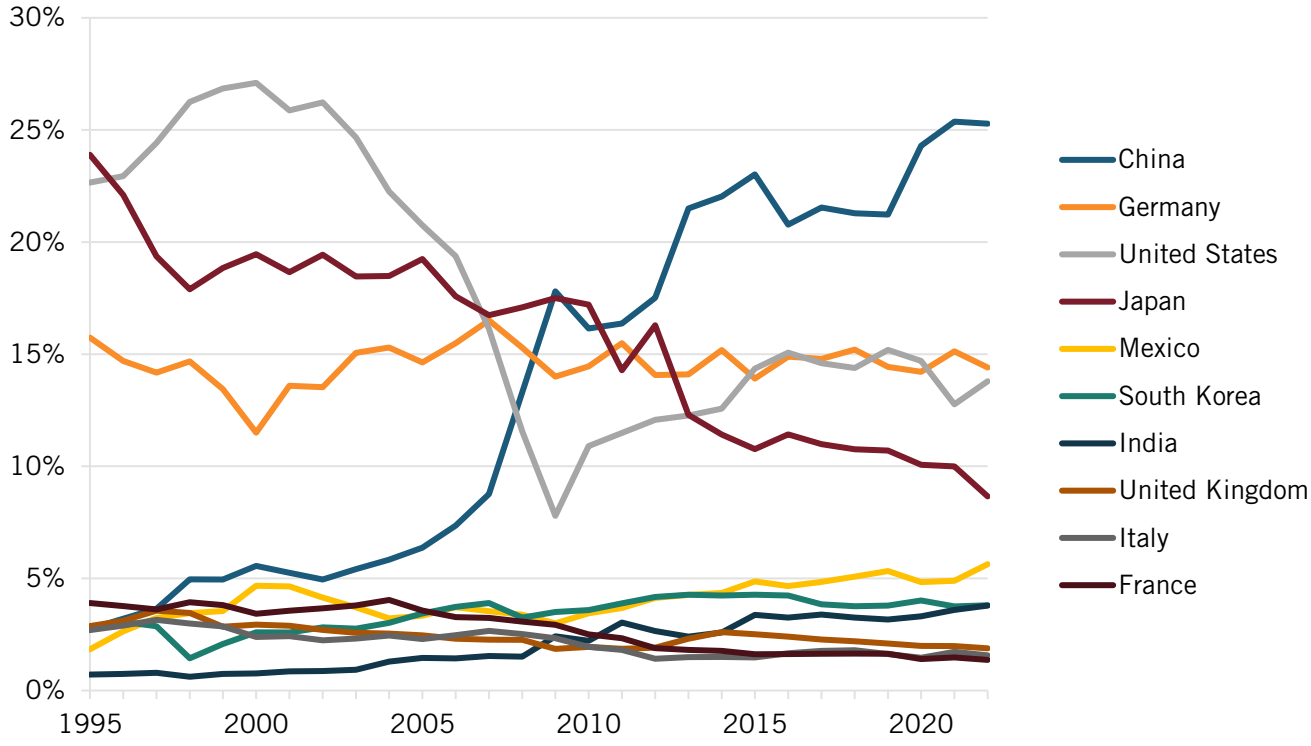
Motor Vehicles

The motor vehicle industry includes car and truck assemblers and suppliers, as well as motor vehicle parts manufacturing. It has become a more innovative sector due to new developments in electric vehicles (EVs), self-driving cars, and software-defined vehicles.

The sector grew more slowly than the nominal global GDP between 1995 and 2022, with value-added output increasing by 161 percent to $1.2 trillion, while global GDP grew by 229 percent. The industry is highly concentrated among a few key car manufacturing nations, including China (25.2 percent), Germany (14.4 percent), the United States (13.8 percent), and Japan (8.7 percent). The latter three nations are home to the largest and most well-known car brands, including Ford and General Motors in the United States, Nissan and Honda in Japan, and BMW and Volkswagen in Germany. China, on the other hand, has become well known in recent years for its collection of EV companies that have come to dominate the global EV industry, including industry giant BYD. It is the growth of China's EV industry, spurred largely by generous subsidies from federal and local governments, that has propelled China to the lead in global market share.

Mexico, which holds 5.6 percent of global market share, ranks fifth. It has seen its global market share triple over this period, despite having no domestic car manufacturing companies; rather, it is a key offshoring location for American brands.

Figure 32: Top 10 producers' historical shares of global output in the motor vehicles industry, 1995–2022



China's global market share has increased by 22.5 percentage points since 1995, with the largest jump occurring in 2009, when the Chinese government began heavily subsidizing its EV industry.[8] Over the same period, Japan's market share declined by 15.2 percentage points, the United States' market share by 8.9 percentage points, and Germany's market share by 1.3 percentage points. South Korea's market share increased by 1 percentage point, while India's,

which has become one of the largest car manufacturers by unit in the world, increased by 3 percentage points. The OECD, which held over 88 percent of the global market share in 1995, has seen its share fall to just 60 percent in response to the growth of China and India.

When it comes to relative performance, Mexico is the leader by a good margin with an LQ of 3.94, meaning Mexico's output of motor vehicles is 294 percent more than would be expected based on the size of its economy. Other nations with high industrial specializations include Germany (3.54), South Korea (2.33), Japan (2.08), and Sweden (1.98), which is home to Volvo. China overperforms in industrial specialization, with an LQ of 1.39, while the United States' LQ of 0.54 highlights its weakness in this industry.

China's booming EV industry, which has received substantial subsidies from federal and local governments, has propelled it to the lead in global market share. It controls over 25 percent of the global market share.

Mexico's LQ increased the most (143 percentage points) over the previous decade due to the growing practice of offshoring American automobile production to Mexico, where labor and capital costs are lower. Germany (65 percentage points), Sweden (61 percentage points), Nigeria (40 percentage points), and Argentina (28 percentage points) experienced the next greatest increases in industrial specialization. The United States' LQ declined by 2 percentage points over this period; however, comparing the U.S.'s 1995 LQ to 2022, the United States' relative performance fell by nearly 40 percentage points, demonstrating the trough the U.S. auto industry found itself in during and after the Great Recession. Conversely, China's LQ declined by 29 points from 2013 to 2022, but increased by 38 percentage points from 1995 to 2022.

Geopolitically, the OECD overperforms in motor vehicle production, with an LQ of 1.02, up 2 percentage points since 2002. The EU-10 (the 10 nations that joined after 2004) is highly specialized in this industry with an LQ of 1.91, while the broader EU-27 has an LQ of 1.53.

Figure 33: Relative performance in motor vehicles (2022 LQ)

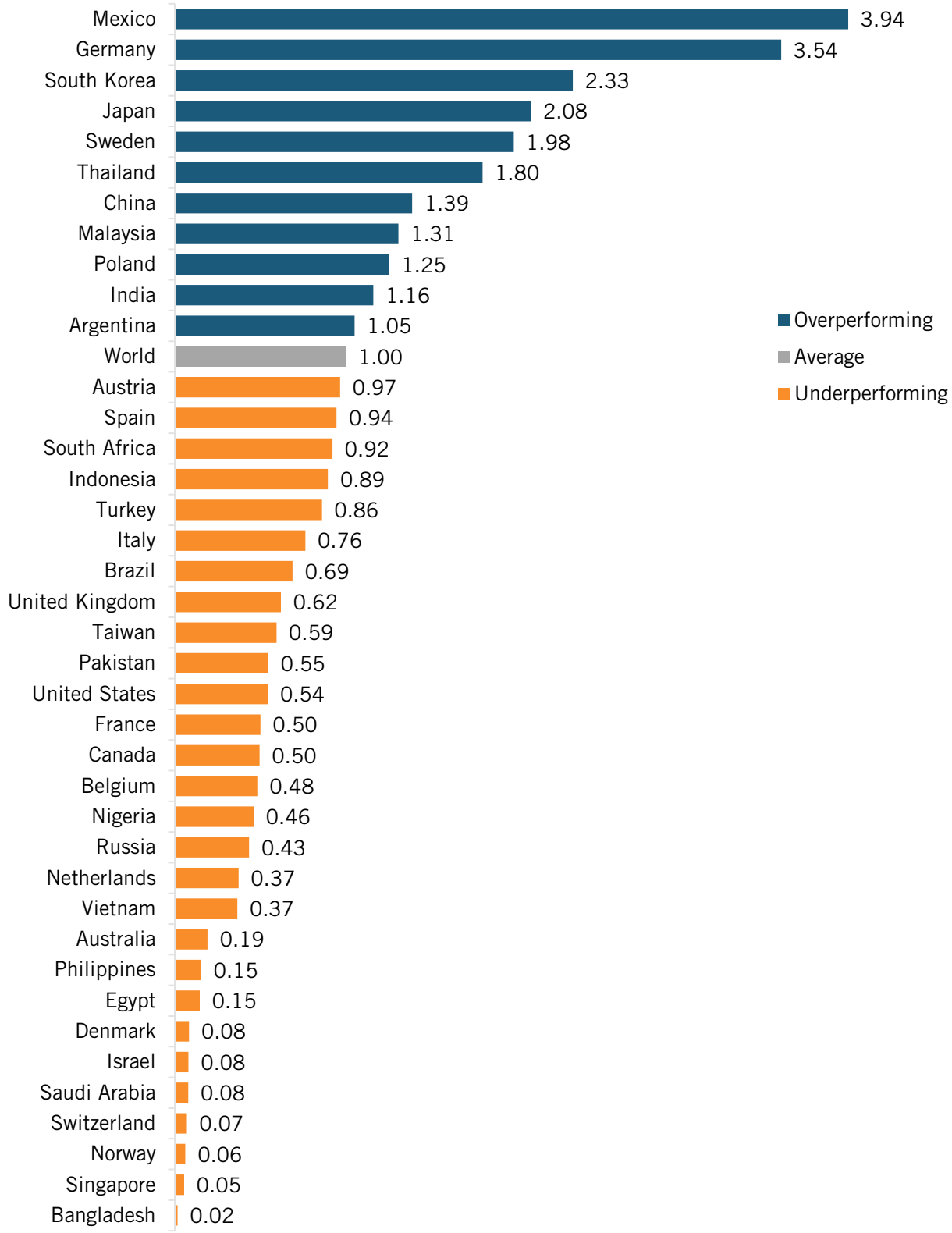
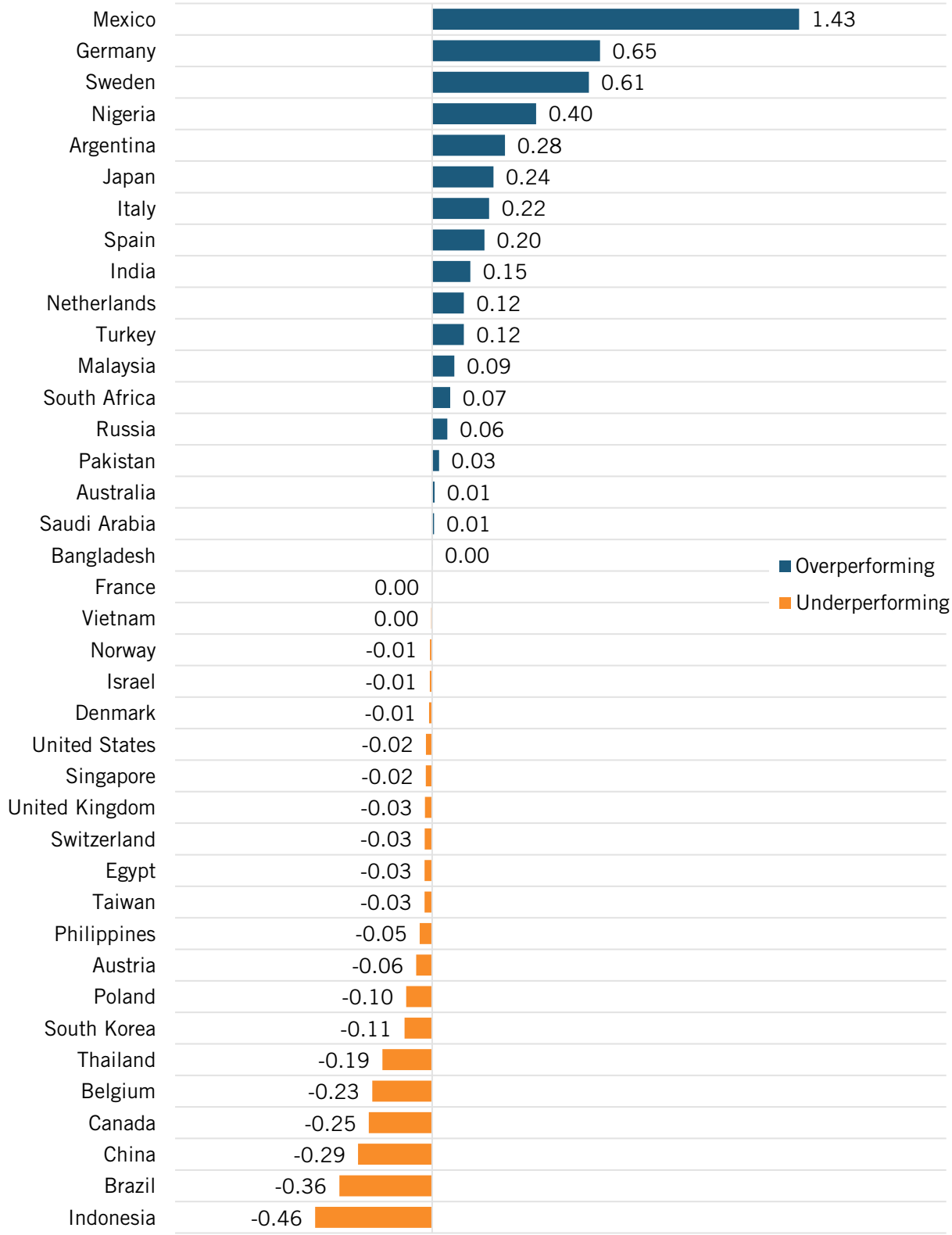


Figure 34: Net change in relative performance in motor vehicles (LQ difference, 2013–2022)



Fabricated Metals

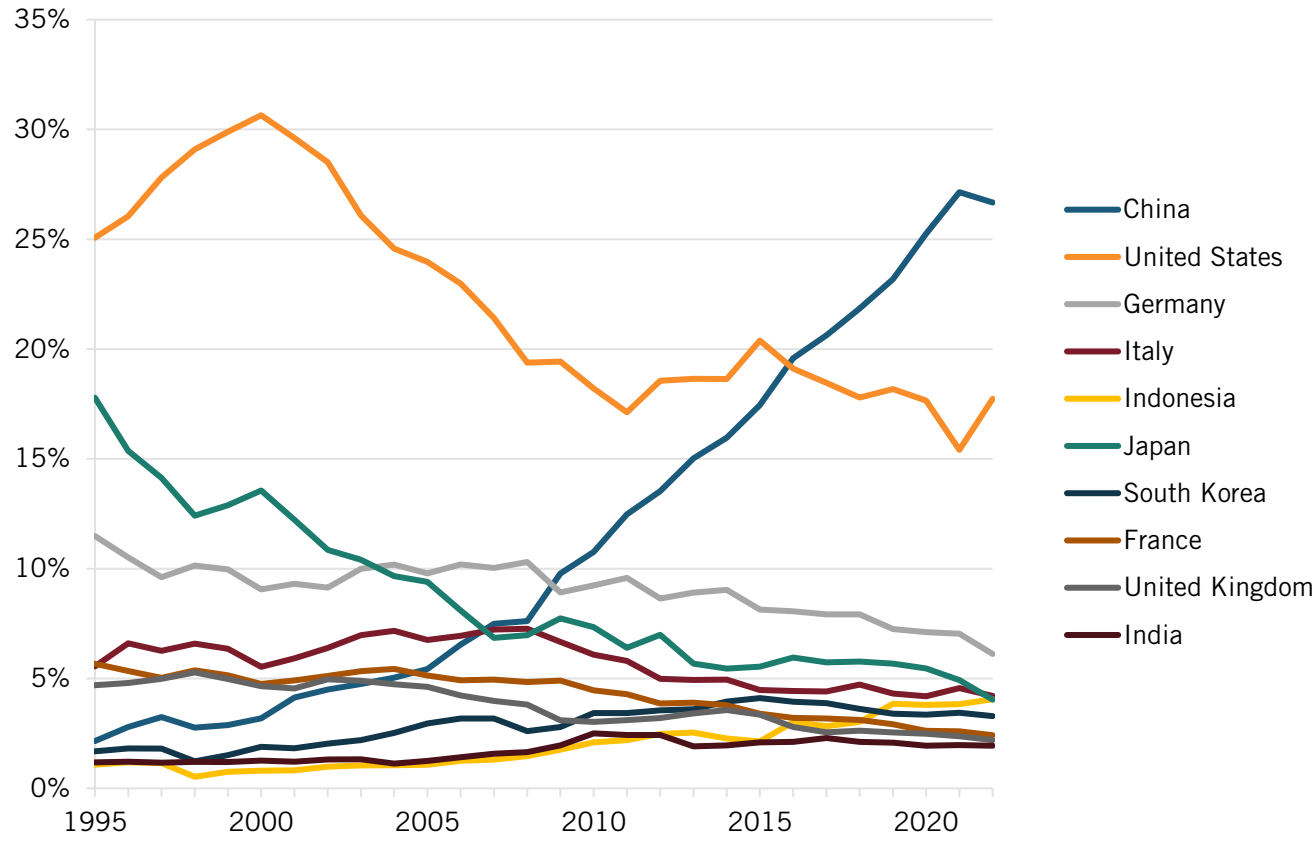
The fabricated metals sector includes the manufacturing of metal parts. It's a strategically important industry, as its products often act as intermediate goods for manufacturers in other advanced and national power industries.

Internationally, this industry grew by 159 percent between 1995 and 2022, slower than global GDP, which grew by 229 percent. In 2022, value-added output in this industry exceeded $1 trillion. China shot to the top of this industry ahead of the United States in 2016 and now holds 26.7 percent of global market share. Conversely, the United States held 17.7 percent of the global market share in 2022, a marked decline from 1995, when the U.S. market share was 25.1 percent. The OECD's share of this industry has also declined considerably, with its global market share falling from 87.9 percent in 1995 to 52.6 percent in 2022.

Behind China and the United States are Germany, with 6.1 percent of the global market; Italy, with 4.2 percent; Indonesia, with 4 percent; and Japan, with 4 percent. Several developed nations lag behind in this industry, with the Netherlands, Austria, Sweden, Israel, and Belgium among those each controlling less than 1 percent of global market share.

Many nations in the top 10 lost market share over the 27-year period, with Germany's market share falling by 5.4 percentage points, Italy's by 1.4 percentage points, Japan's by 13.8 percentage points, and France's by 3.3 percentage points.

Figure 35: Top 10 producers' historical shares of global output in fabricated metals, 1995–2022



With several OECD countries in the top 10, it's unsurprising that the OECD still holds the majority of global market share. However, this share has fallen substantially, from 87.9 percent to 56.2 percent. Conversely, the Belt and Road Initiative saw its global market share increase from 16.8 percent in 1995 to just over 50 percent in 2022, a threefold increase. While much of this growth was driven by China, whose market share increased from 2 percent to nearly 27 percent, Indonesia, Russia, and Poland saw their market shares rise by 3 percentage points, 1.4 percentage points, and 1.2 percentage points, respectively.

China shot to the top of the fabricated metals industry ahead of the United States in 2016 and now holds 26.7 percent of global market share.

The picture looks quite different when considering industrial specialization. Indonesia leads the world with an LQ of 3.16, meaning its output of fabricated metals is 216 percent above what would be expected based on its economy's size. Behind Indonesia are Poland (2.32), Italy (2.04), South Korea (1.97), Austria (1.79), and Taiwan (1.69). China also overperforms in this industry with an LQ of 1.45, while the United States and most European nations underperform. Lagging nations include Singapore, the Philippines, Bangladesh, and Nigeria, all of which have an LQ below 0.25.

Since 2013, Indonesia has experienced the greatest increase in LQ, increasing from 2.17 in 2013 to 3.16 in 2022, a 99 percentage-point increase. Other countries with a large boost to their LQ include Poland (65 points), China (28 points), Italy (26 points), and Russia (25 points). The U.S. LQ declined over this period, falling 16 percentage points.

Looking at industrial specialization from a geopolitical perspective, the EU-10 highly overperforms, with an LQ of 2.11, up 29 points over the previous decade. The broader EU-27 also overperforms, but to a lesser extent, with an LQ of 1.37, down 6 percentage points over the same period. The OECD, dragged down by the United States' low LQ, underperforms with an LQ of 0.95.

Figure 36: Relative performance in fabricated metals (2022 LQ)

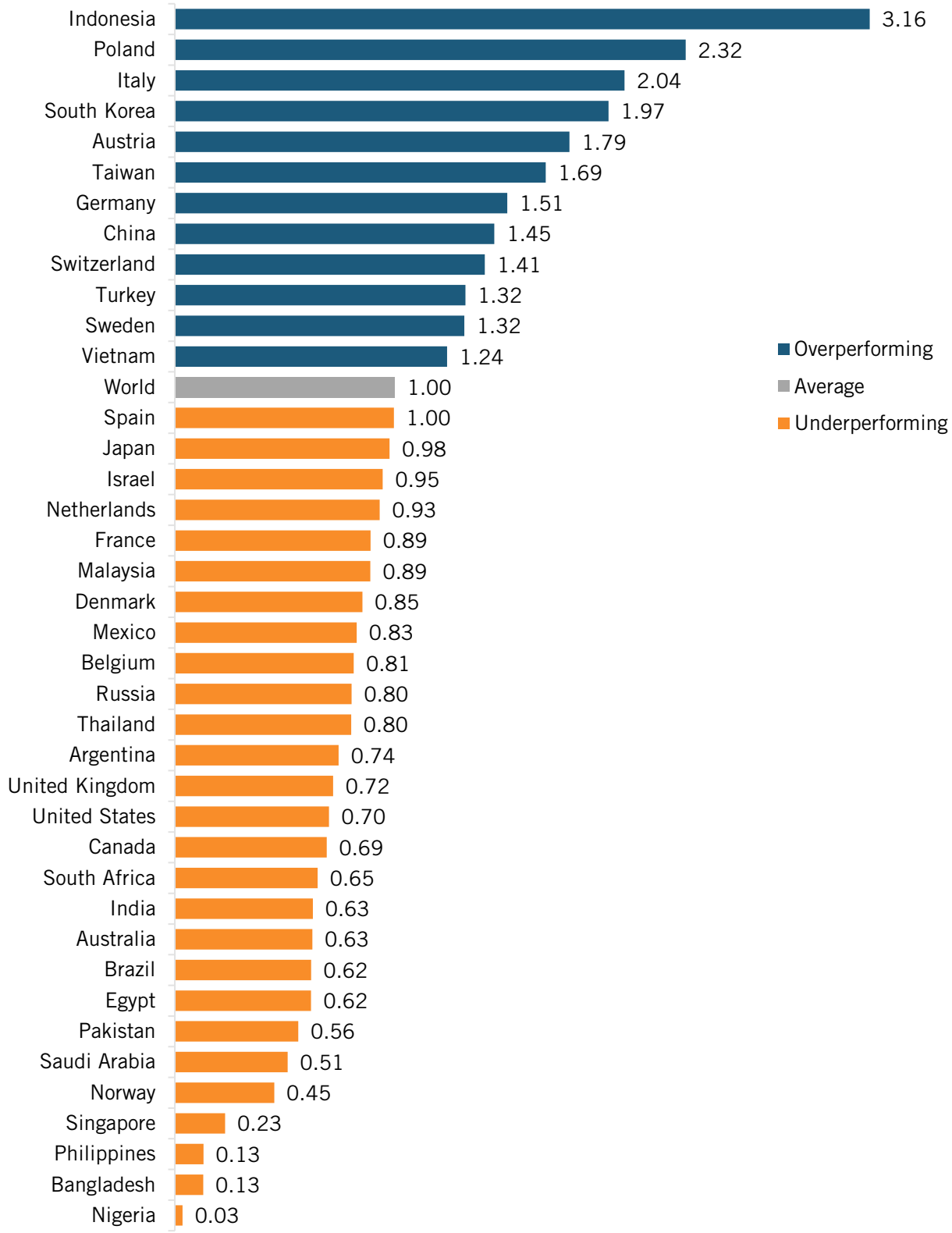
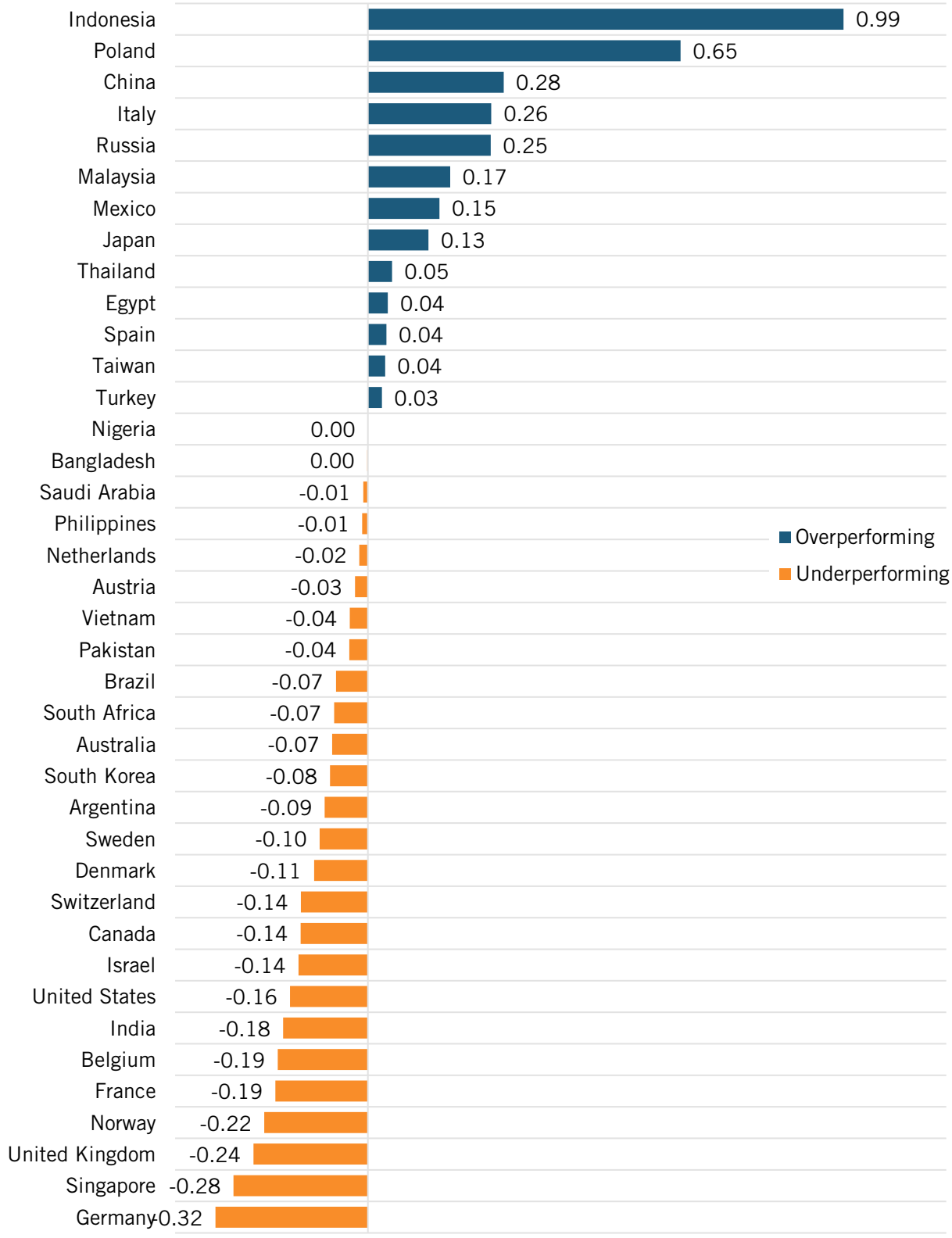


Figure 37: Net change in relative performance in fabricated metals (LQ difference, 2013–2022)



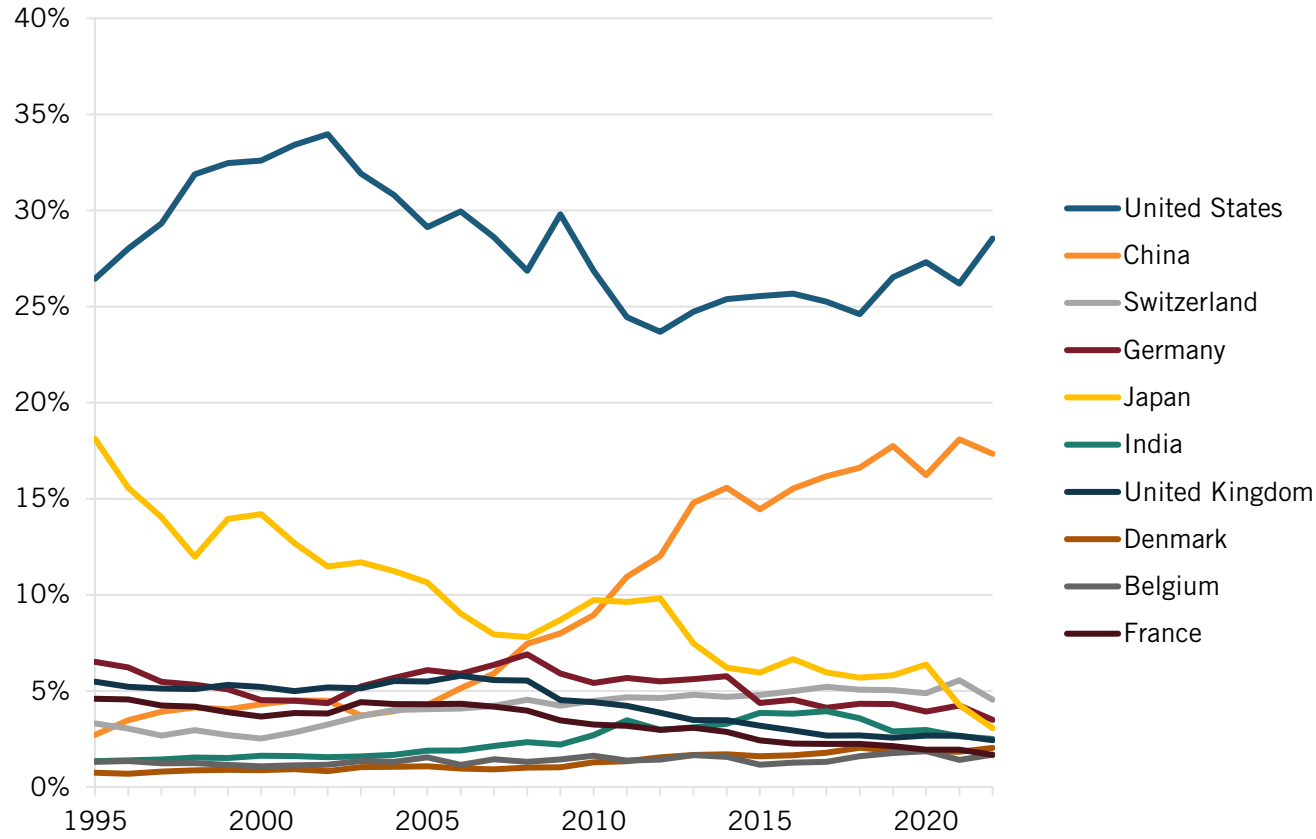
Pharmaceuticals

The pharmaceutical industry includes medicinal chemicals and botanical products. It is a strategically important sector given that much of it is high wage, traded across borders, and a key driver of innovation.

The output of the pharmaceutical industry increased by 312 percent from 1995 to 2022, more than global GDP, which increased by 229 percent over the same period. In 2022, pharmaceutical output was $872 billion. The OECD nations have lost market share, from 84 percent in 1995 to 71 percent in 2022; however, this decline was much more moderate than is apparent in other industries.

The United States is the leader in global market share, led by world-leading companies such as Amgen, Moderna, Pfizer, and Eli Lilly. In 2022, U.S. global market share was 28.6 percent, a moderate increase from 1995, when it was 26.5 percent, although down from a high of 34 percent reached in 2002. China is in second place, holding 17.3 percent of global market share, followed by Switzerland (4.5 percent), Germany (3.5 percent), Japan (3.1 percent), and India (2.5 percent). Lagging nations are nearly all developing countries, such as South Africa, Saudi Arabia, the Philippines, and Malaysia, which all have less than 1 percent of the global market.

Figure 38: Top 10 producers' historical shares of global output in pharmaceuticals, 1995–2022



China has experienced the most dramatic rise in market share in pharmaceuticals, increasing by 14.6 percentage points. This massive increase has been catalyzed by China's concerted effort to become the world leader in pharmaceutical production. In 2025, China conducted about 1,000

more clinical trials for pharmaceuticals than did the United States, demonstrating its increase in not just pharmaceutical manufacturing but also pharmaceutical innovation.[9] Switzerland also increased its global market share in this industry by 1.2 percentage points, while Germany lost 3 percentage points in market share and Japan experienced the greatest decline, seeing its share fall by 15.1 percentage points.

In terms of industrial specialization, the story is different. Switzerland led the world in 2022 with an LQ of 5.62, followed by European nations Denmark (5.20), Belgium (2.92), and Sweden (1.83). Argentina, the United States, and South Korea also overperform with LQs above 1. Notably, the OECD overperforms in this industry with an LQ of 1.20, while non-OECD nations underperform collectively, with an LQ of 0.71. Many of the lagging countries are developing nations, such as the Philippines, Malaysia, Saudi Arabia, and Nigeria, all of which had LQs below 0.2. China had an LQ of 0.95, which, while close to the world average, was still underperforming.

China experienced the most dramatic increase in pharmaceutical market share, rising by 14.6 percentage points. This massive increase has been catalyzed by China's concerted effort to become the world leader in pharmaceutical production.

Looking at the change in industrial specialization, Denmark saw the largest increase in LQ since 2013, rising by 141 percentage points. This is more than triple that of the second-fastest grower, Belgium, which saw its LQ grow by 45 percentage points. By contrast, Singapore saw the largest decline in LQ, falling by 181 percentage points, with the steepest declines occurring between 2018 and 2022. Other nations that saw large declines were India (54 percentage points), Argentina (54 percentage points), and Israel (120 percentage points).

The OECD's LQ increased by 10 percentage points over this same period, unsurprisingly given the growth of several OECD nations. Conversely, the LQ of the Commonwealth Nations of Australia, Canada, New Zealand, and the United Kingdom fell by 12 points, largely driven by the large decline in the United Kingdom. Despite several highly specialized countries, the EU also saw its LQ decline, falling by 12 percentage points over the previous decade.

Figure 39: Relative performance in pharmaceuticals (2022 LQ)

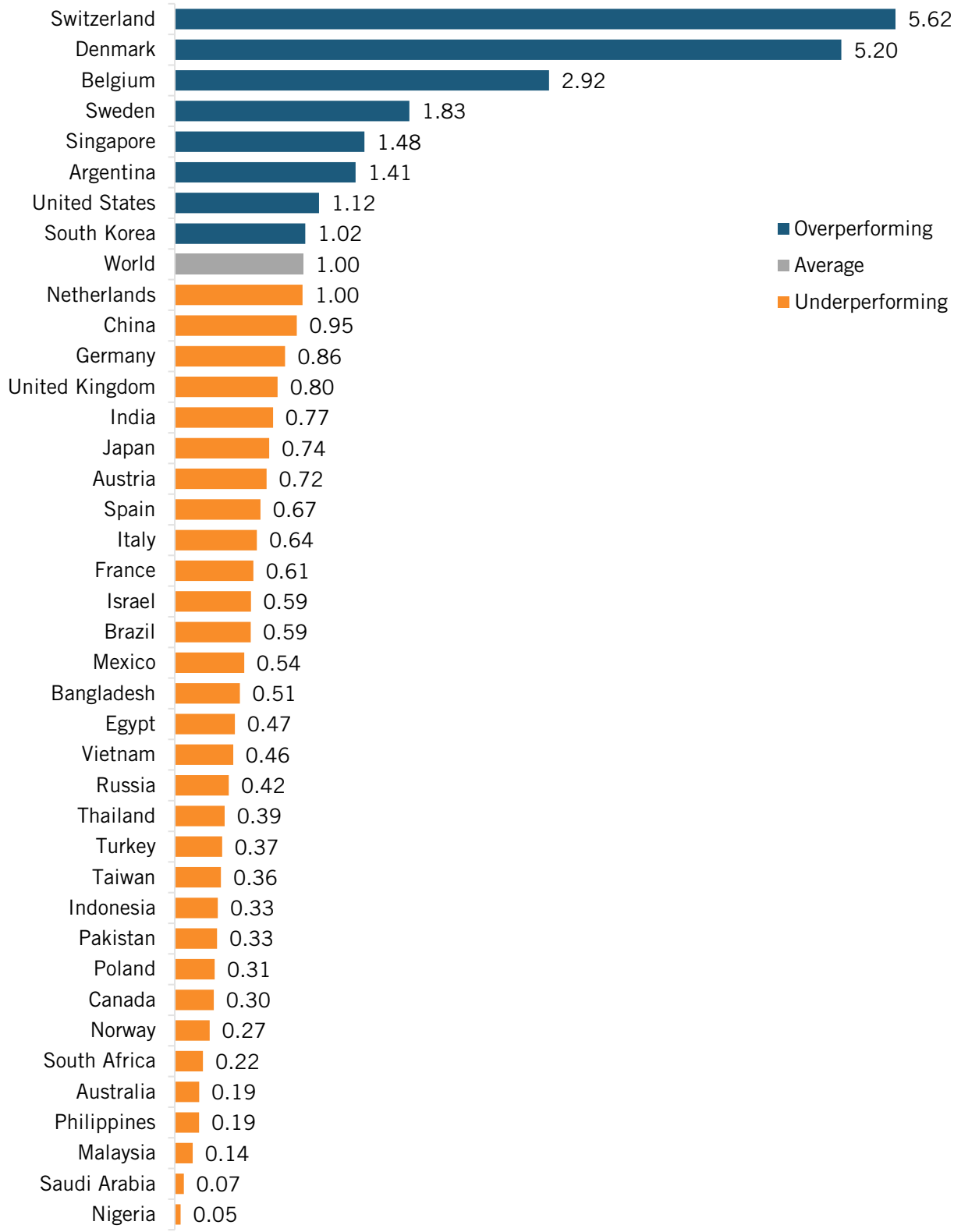
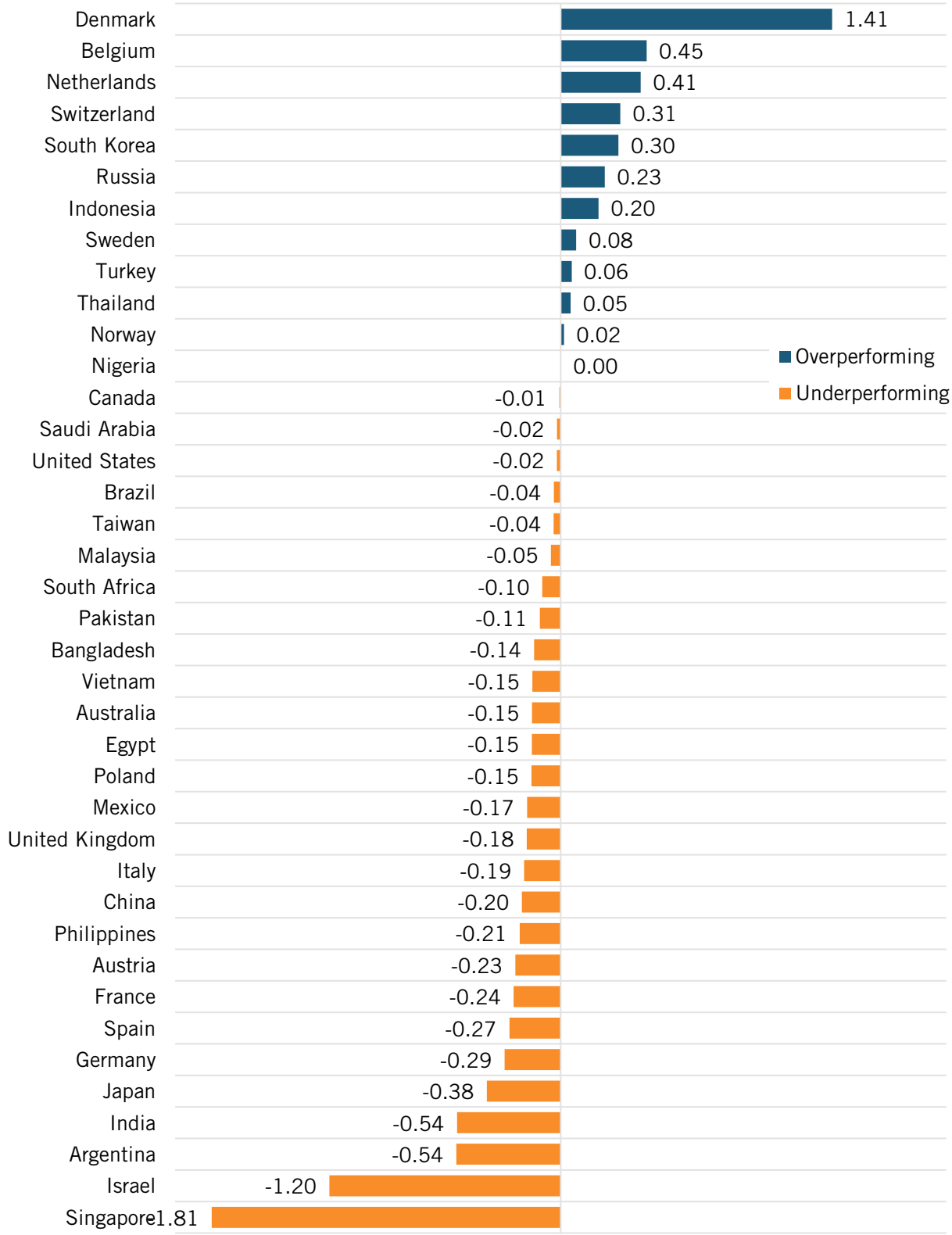


Figure 40: Net change in relative performance in pharmaceuticals (LQ difference, 2013–2022)



Electrical Equipment

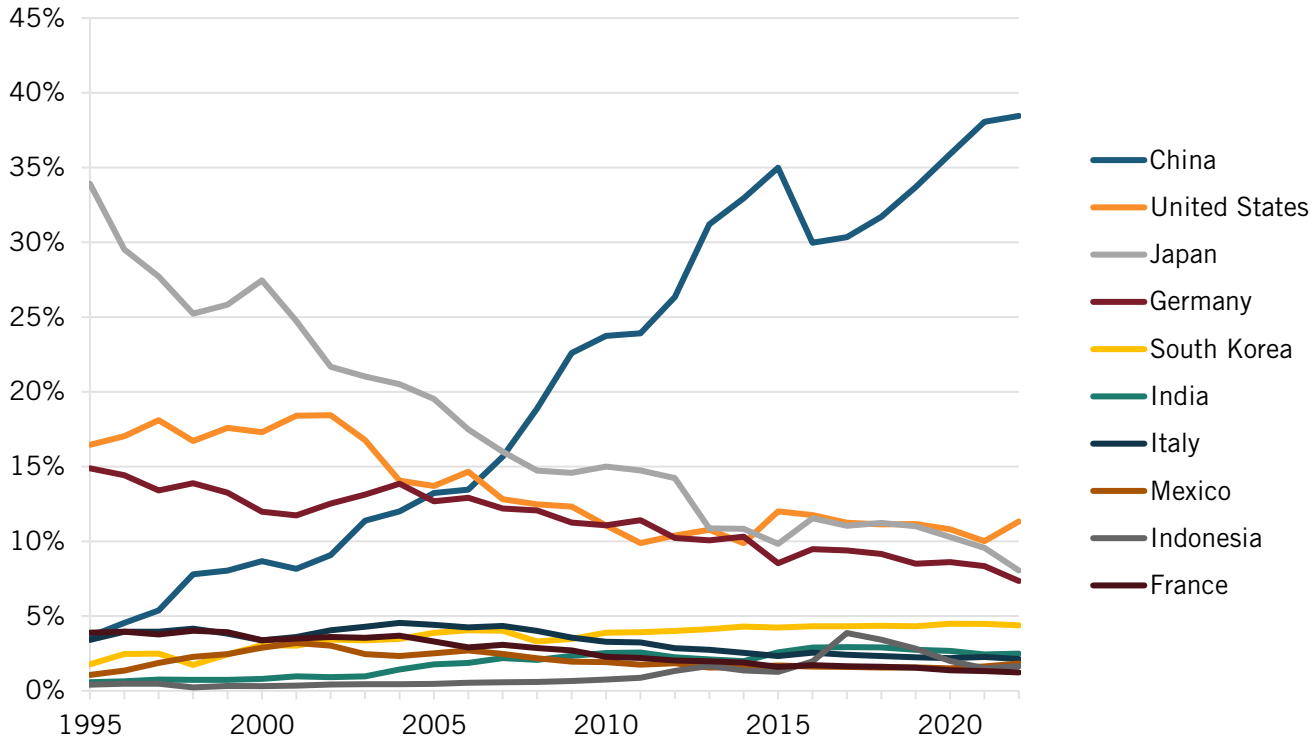
The electrical equipment industry includes an array of electrical products, including batteries, electrical cables, relays, switchgears, and household appliances.

Globally, this sector has grown more slowly than GDP, rising 142 percent in nominal U.S. dollars since 1995, compared with 229 percent over the same period. Still, the sector was valued at $680 billion dollars in 2022. The OECD, which was once the overwhelming leader in this industry and held over 89 percent of the global market share, has seen its dominance decline over the 27-year period. In 2022, the OECD controlled just 46.9 percent of the global market share.

China is the leader in the industry in terms of market share, controlling 38.5 percent. The next closest country to China is the United States, which held only 11.3 percent of the market share in 2022. Japan (8 percent), Germany (7.4 percent), South Korea (4.4 percent), and India (2.5 percent) are also leaders in the industry; however, their market influence pales in comparison with China. The EU-27 (excluding Ireland), which once held nearly 30 percent of the global market share, has seen its share fall to 18 percent.

China has been the leader in this industry since 2007, when it passed Japan to become the largest producer of electrical equipment. Over the period from 1995 to 2022, China's global market share increased from 3.7 percent to 38.5 percent, a total of 34.8 percentage points. Meanwhile, Japan suffered the greatest loss in market share, falling 26 percentage points from the world leader to third place. Though not as dramatic, the German and U.S. market shares also fell by 7.5 and 5.1 percentage points, respectively.

Figure 41: Top 10 producers' historical shares of global output in the electrical equipment industry, 1995–2022



Although not an absolute frontrunner in the industry, South Korea leads in the industrial specialization of electrical equipment, with an LQ of 2.68. Other high relative performers include Vietnam (2.19), China (2.11), Japan (1.93), and Austria (1.93). The United States significantly underperforms in this industry, with an LQ of just 0.45 in 2022, while most lagging nations are developed, less industrialized countries such as Norway (0.23), Singapore (0.22), and Australia (0.20). Nigeria has almost no electrical equipment manufacturing activity.

China is the leader in electrical equipment in terms of market share, controlling 38.5 percent. The next closest country is the United States, which held only 11.3 percent of the market share in 2022.

Vietnam experienced the greatest increase in relative performance, increasing by 109 percentage points since 2013. The other nations with the fastest percentage point growth in their LQs over this period were Poland (77 percentage points), Malaysia (37 percentage points), and Mexico (36 percentage points). In aggregate, OECD nations saw a 7 percentage-point decline in their LQs. Among the nations whose LQs declined are Belgium (22 percentage points), Germany (26 percentage points), China (32 percentage points), Switzerland (36 percentage points), and Austria (42 percentage points).

Geopolitically, the EU-10 saw the greatest increase in industrial specialization, with its LQ increasing by 45 points from 1.33 to 1.78. Conversely, the EU-17, which comprises countries with relatively more jobs in the knowledge economy than in manufacturing, saw its LQ fall by 7 points, from 0.92 to 0.85.

Figure 42: Relative performance in electrical equipment (2022 LQ)

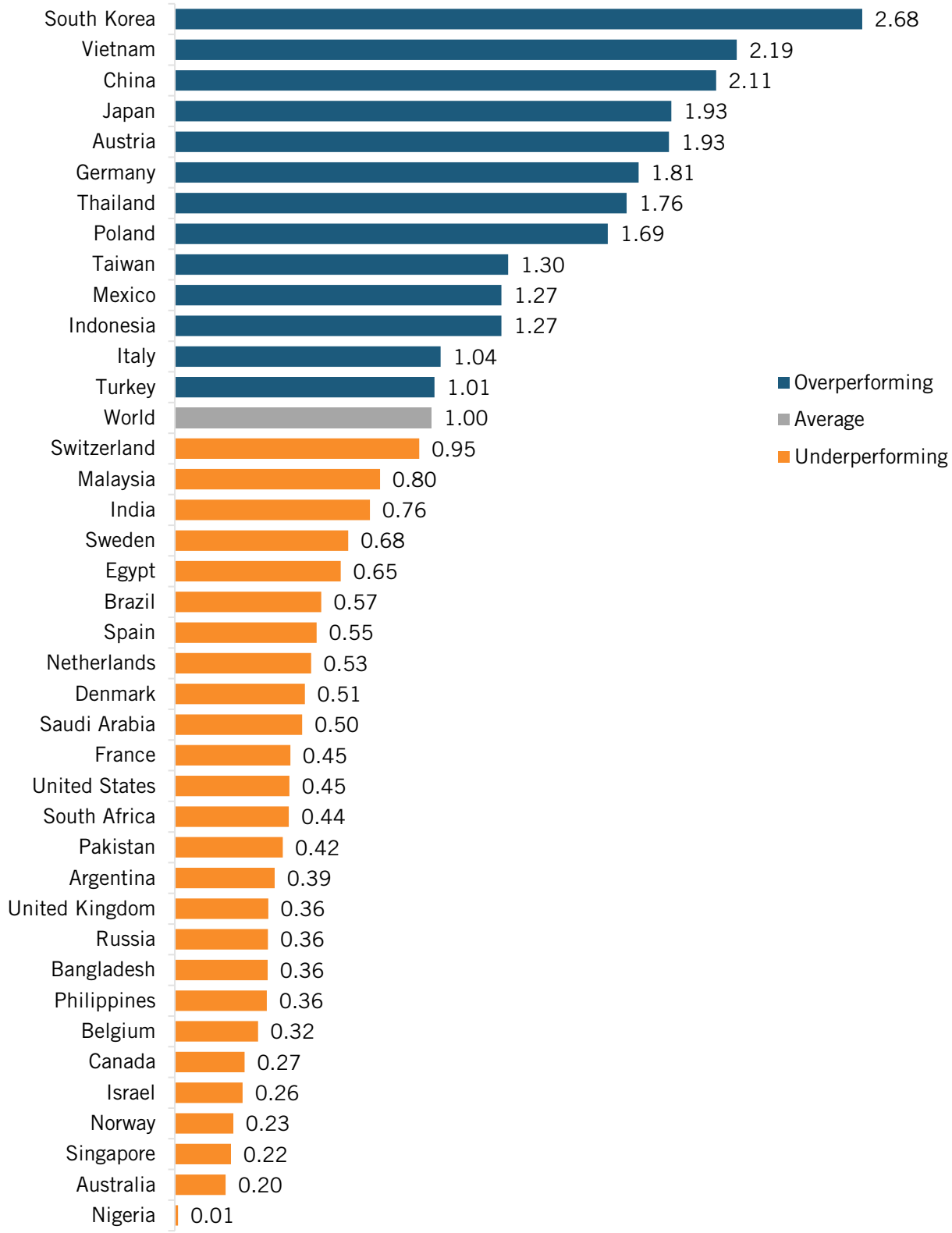
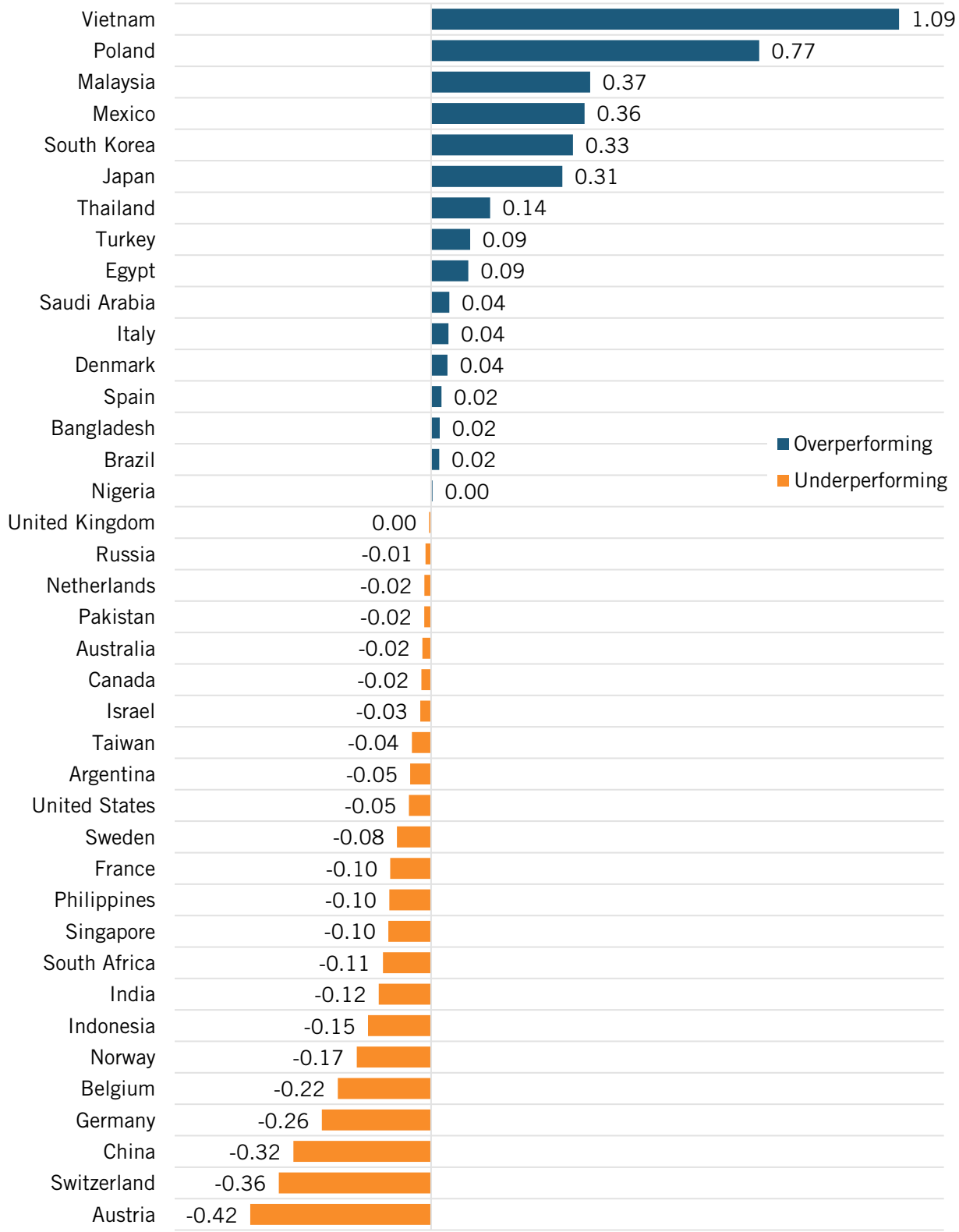


Figure 43: Net change in relative performance in electrical equipment (LQ difference, 2013–2022)



Other Transportation Equipment

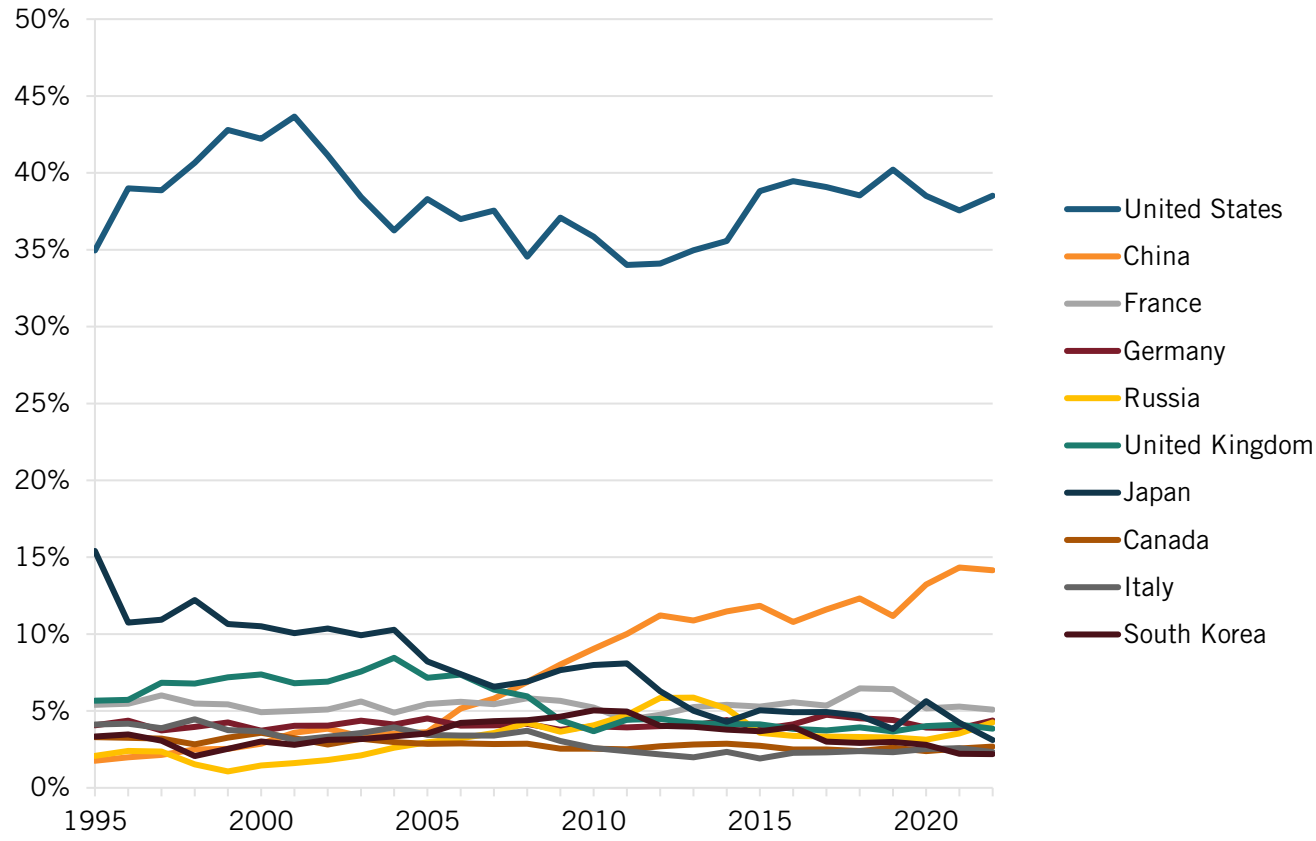
The other transportation sector includes all rail, air, and sea transportation equipment.

Between 1995 and 2022, the global other transportation industry's output increased by 183 percent, reaching $423 billion. However, this growth was slower than the global GDP, which grew by 229 percent. The OECD controlled the vast majority of the global market share in this industry, holding nearly 71 percent.

Other transportation is one of the few industries wherein the United States holds a clear majority over China. Largely due to its dominance in the aviation industry, led by defense and commercial manufacturers such as Boeing, Lockheed Martin, and Pratt & Whitney, the United States controls 37.6 percent of the global market share, more than twice China's 14.2 percent. Other leading nations are France (5.1 percent), Germany (4.4 percent), and Russia (4.3 percent). Japan, which was once second in the world behind the United States, controlled 3.1 percent of global market share, down from 16 percent in 1995.

Though China controls a much smaller share of the global market than the United States, its power in this industry is evident. China's market share has increased from 1.8 percent in 1995 to 14.2 percent, driven by its expansion in high-speed rail and shipping, and its recent push to become a leader in the aerospace industry through its national firm, COMAC. U.S. market share in this industry has increased by 3.6 percentage points since 1995, though it remains far below its peak of 43.7 percent in 2001.

Figure 44: Top 10 producers' historical shares of global output in other transportation equipment, 1995–2022



As a group, the OECD's market share has fallen by nearly 16 points since 1995, from 86.2 percent to 70.2 percent, while the Quad's market share also has declined by over 8 percentage points. In contrast, the Belt and Road Initiative has gained 12 percentage points, a significant share.

The story is much different when it comes to industrial specialization. Taiwan leads the world with the highest LQ of 2.87, followed by Russia (1.90), France (1.86), Singapore (1.78), and the United States (1.52). While China underperforms with an LQ of 0.78, that is still an increase from 1995, when its LQ was just 0.62. Additionally, given China's continued dominance across the three other transportation industries, China's LQ is likely to continue increasing in the coming years.

Led by defense and commercial manufacturers such as Boeing, Lockheed Martin, and Pratt & Whitney, the United States controls 37.6 percent of the global market share in other transportation, more than twice China's 14.2 percent.

Taiwan is also the nation that has experienced the greatest increase in industrial specialization, with its LQ rising by 85 percentage points since 2013. Following Taiwan is Italy (an increase of 42 percentage points), France (40 percentage points), Germany (24 percentage points), and Mexico (24 percentage points). The U.S. LQ has declined moderately over this period, falling by 10 percentage points.

Looking at the industry from a geopolitical perspective, USMCA nations perform well with an LQ of 1.44, driven by the overperformance of the United States and Canada. The Quad also overperforms with an LQ of 1.29. The EU, while not the best-performing relative to other geopolitical groups, has seen the greatest growth, with its LQ rising by 16 percentage points since 2013.

Figure 45: Relative performance in other transportation equipment (2022 LQ)

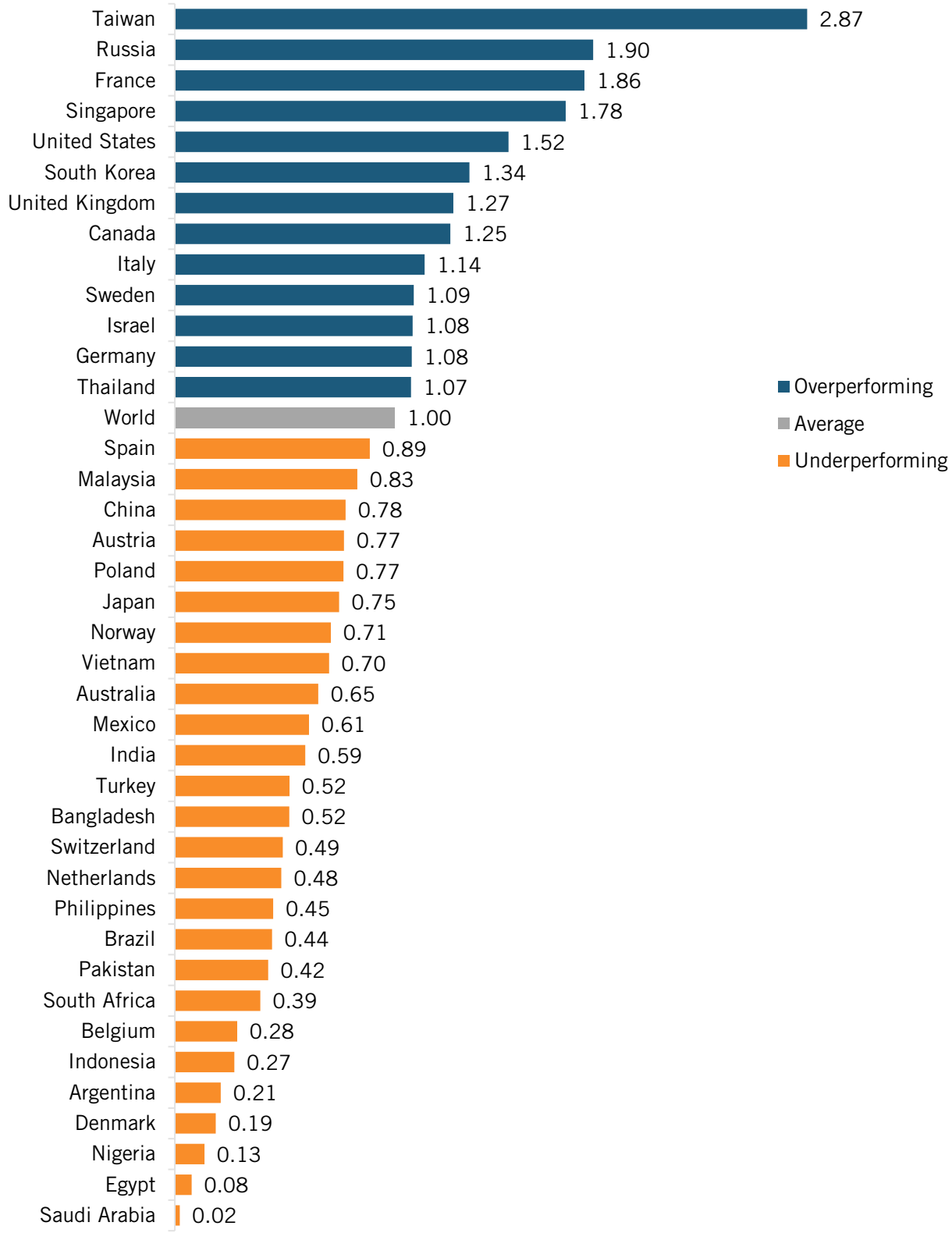
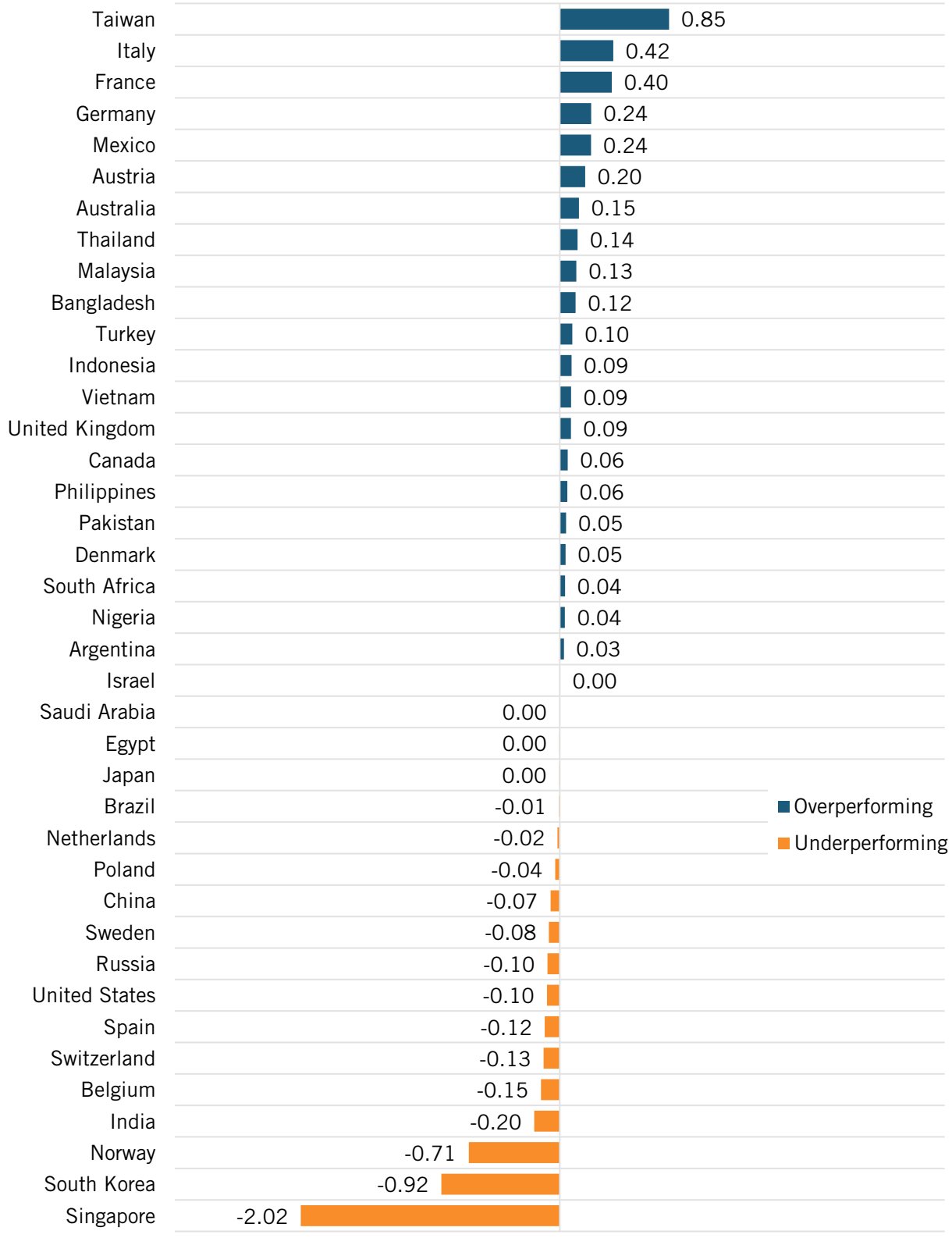


Figure 46: Net change in relative performance in other transportation equipment (LQ difference, 2013–2022)



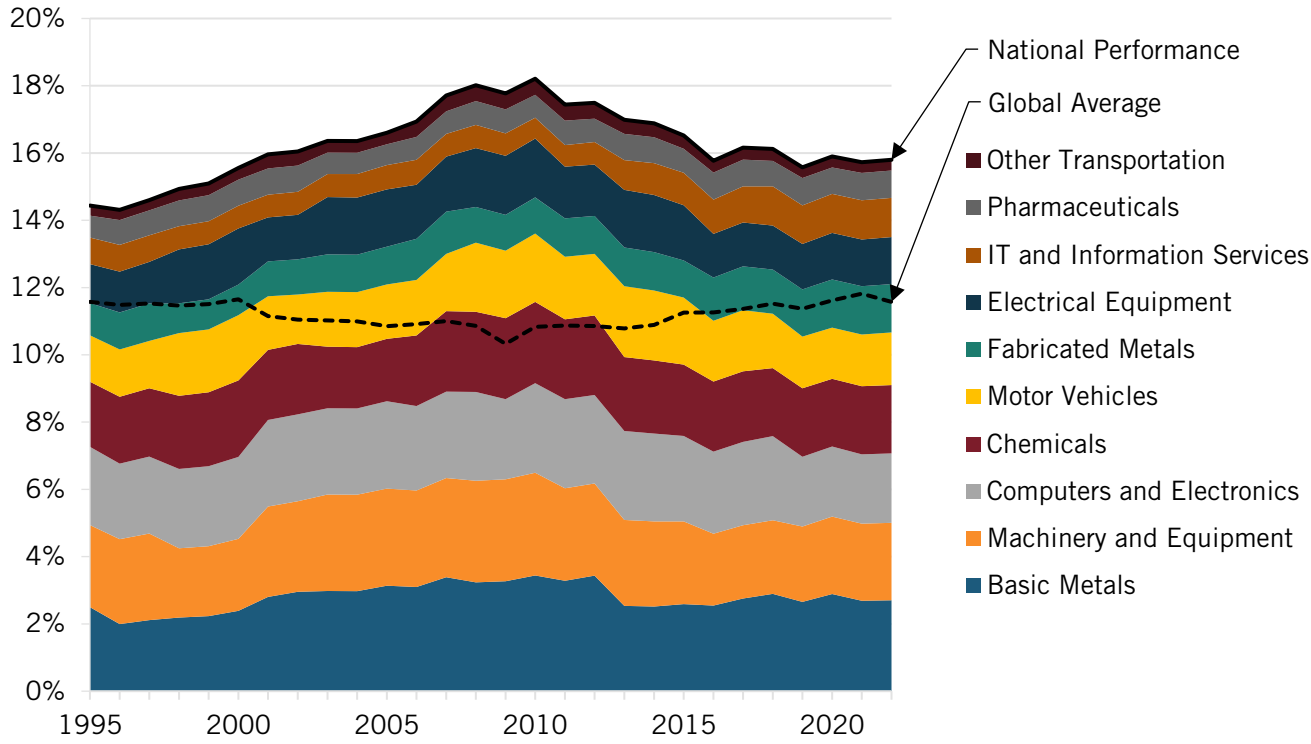
TOP 10 PRODUCER PROFILES

This section assesses the top 10 nations in terms of aggregate advanced industry output in 2022, in order of output.

China

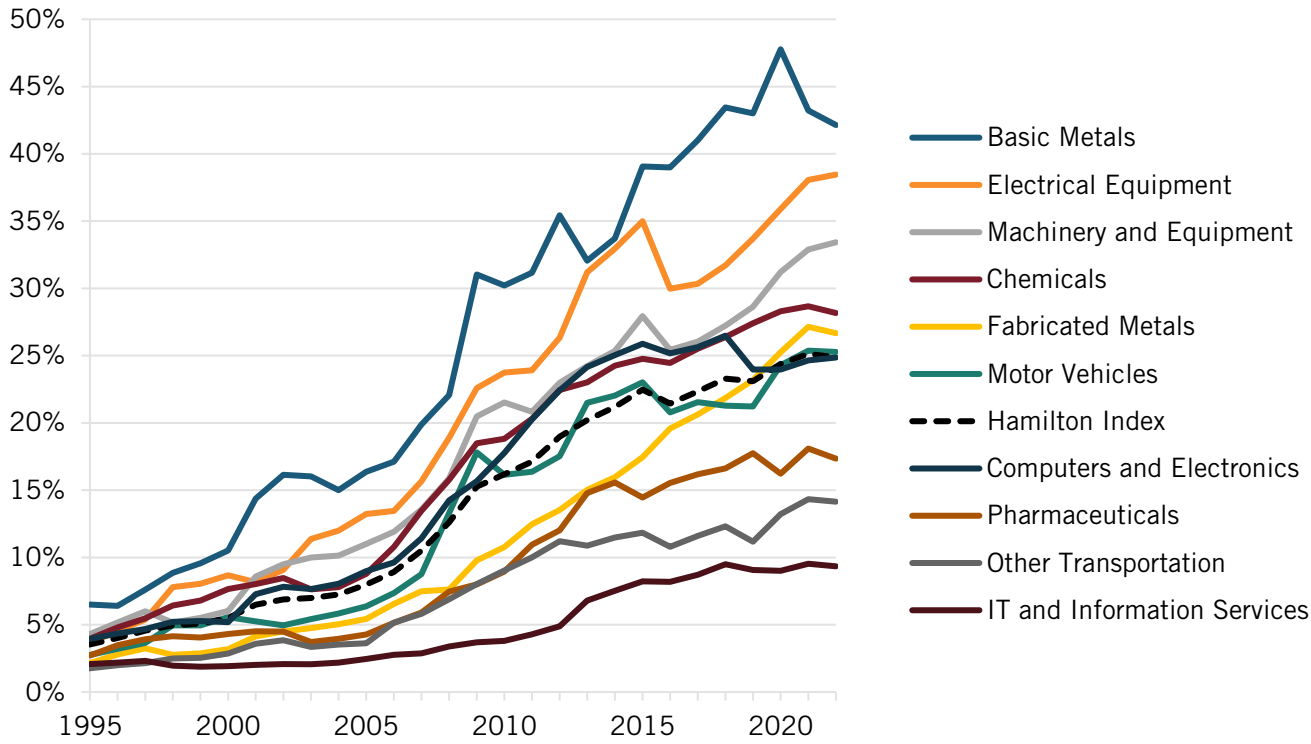
China has been seeking to become the global leader in advanced industries for over two decades and is close to that goal. In 2013, China overtook the United States as the leader in advanced industry output and has continued to increase its lead. As of 2022, Hamilton Index industries accounted for 15.8 percent of China's economy, over 4 percentage points more than the world average. (See figure 47.)

Figure 47: Hamilton industries' shares of China's economy, 1995–2022



China's leadership is further evident when considering global market share. Since 1995, China's advanced industry output has skyrocketed, with every industry undergoing intense growth. Even its smallest industry, IT and information services, has nearly quintupled in size, with China's market share rising from 2.1 percent to 9.3 percent, making it second in the world. China is either the first- or second-most powerful country in every advanced industry by market share, and in almost every industry, its market share looks on track to continue increasing. (See figure 48.)

Figure 48: China's global market shares in Hamilton industries, 1995–2022

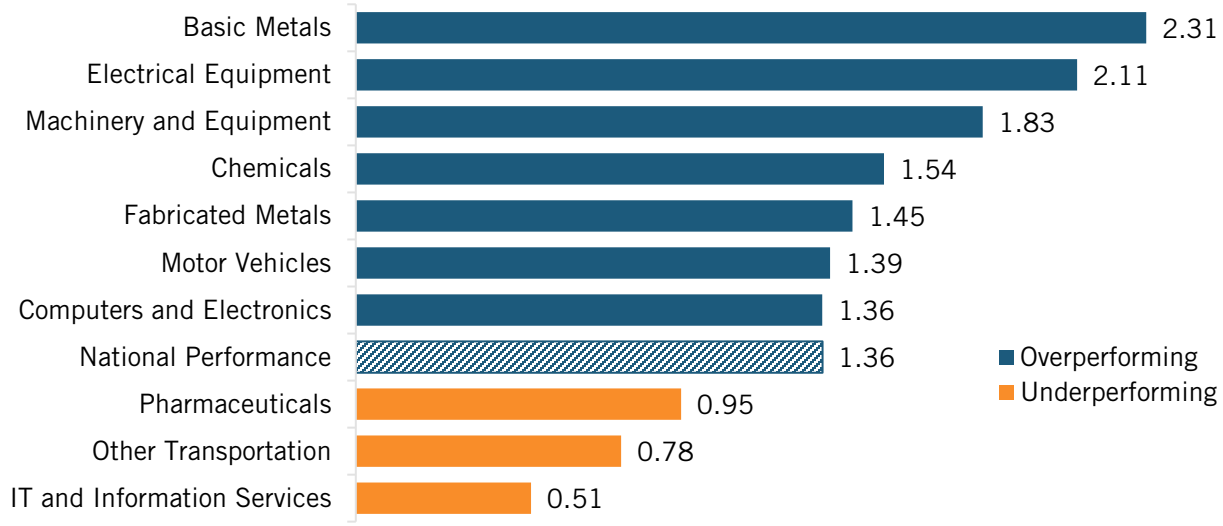


Looking at relative performance, China overperforms in 7 of the 10 Hamilton Industries, with just pharmaceuticals, other transportation, and IT and information services having LQs below one. However, it's not unreasonable to assume that these industries (at the very least, pharmaceuticals and other transportation) will be overperforming in the next few years. China's pharmaceutical industry has grown from a manufacturer to an innovator over the past several years and has shown signs of closing the gap with the United States.[10] Additionally, its other transportation industry is likely to be buoyed by growing federal support and, consequently, by the growth of its state-sponsored aviation firm, COMAC.[11]

China is either the first- or second-most powerful country in every advanced industry by market share, and in almost every industry, its market share looks on track to continue increasing.

China's strongest industry is basic metals (LQ of 2.31), including steel production, an industry the Chinese government has subsidized at roughly five times the rate of comparable economies.[12] China has also shown its prowess in other heavy manufacturing industries, including electrical equipment, which includes home appliances, many of which the U.S. government has placed tariffs on since 2018, and machinery and equipment.[13] (See figure 49.)

Figure 49: China's relative performance in Hamilton Index industries (2022 LQ)



The trends of China's advanced industries LQs loosely follow an upside-down-U shape, with many peaking around the global financial crisis in 2008 and then declining in the years since. As previously stated, the recent decline in China's LQs is not a sign that China's advanced industry output is declining, but rather reflects the fact that its advanced industries are growing more slowly than the overall economy. As evidenced by its across-the-board increase in global market share over the past decade, China's advanced industries are growing at a rapid pace. However, its economy has grown faster, nearly quadrupling since 2008. So although China has become less specialized in advanced industries since the mid 2000s, it is no less of a dominant leader in advanced industries. Additionally, when considering China's LQ trend since 1995, China's LQ has increased significantly, by 12 percentage points, more than the United States or the OECD.

Figure 51 shows the net improvement or regression in the relative performance of China's Hamilton industries since 2013, scaled to their output in 2022. In this figure, each industry can be assessed by its LQ, change in LQ since 2013, and size, measured by output in 2022. Industries in the upper left quadrant are overperforming, but their LQs have regressed; this quadrant houses the majority of China's industries, including its biggest industries: basic metals and machinery and equipment. Industries in the upper right quadrant are overperforming and their LQs have increased; only fabricated metals falls into this category. The bottom right quadrant shows industries that are underperforming and improving; no industry is located in this quadrant. And the bottom left shows industries that are underperforming and regressing; this includes China's pharmaceuticals and other transportation industries, although, as stated previously, these industries are likely to overperform in the next several years.

It's important to note that, although surprising that the Made in China 2025 plan and previous five-year development plans have not led to an increase in relative performance over the past several years, overall, China's LQ has still increased since 1995. And what's more, given China's LQ of 1.36, China's output in advanced industries is 36 percent more than what is expected based on the size of its economy.

Figure 50: China's relative historical performance in Hamilton Index industries (LQ trends, 1995–2022)

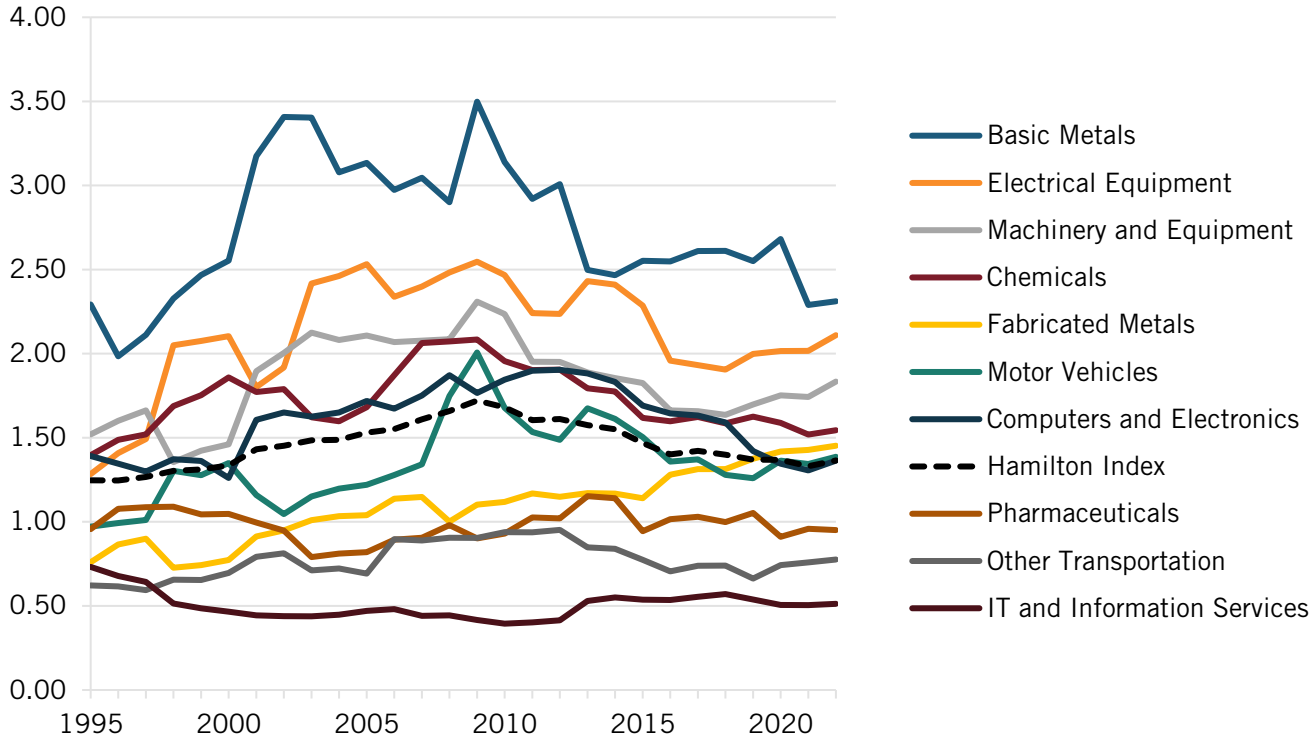
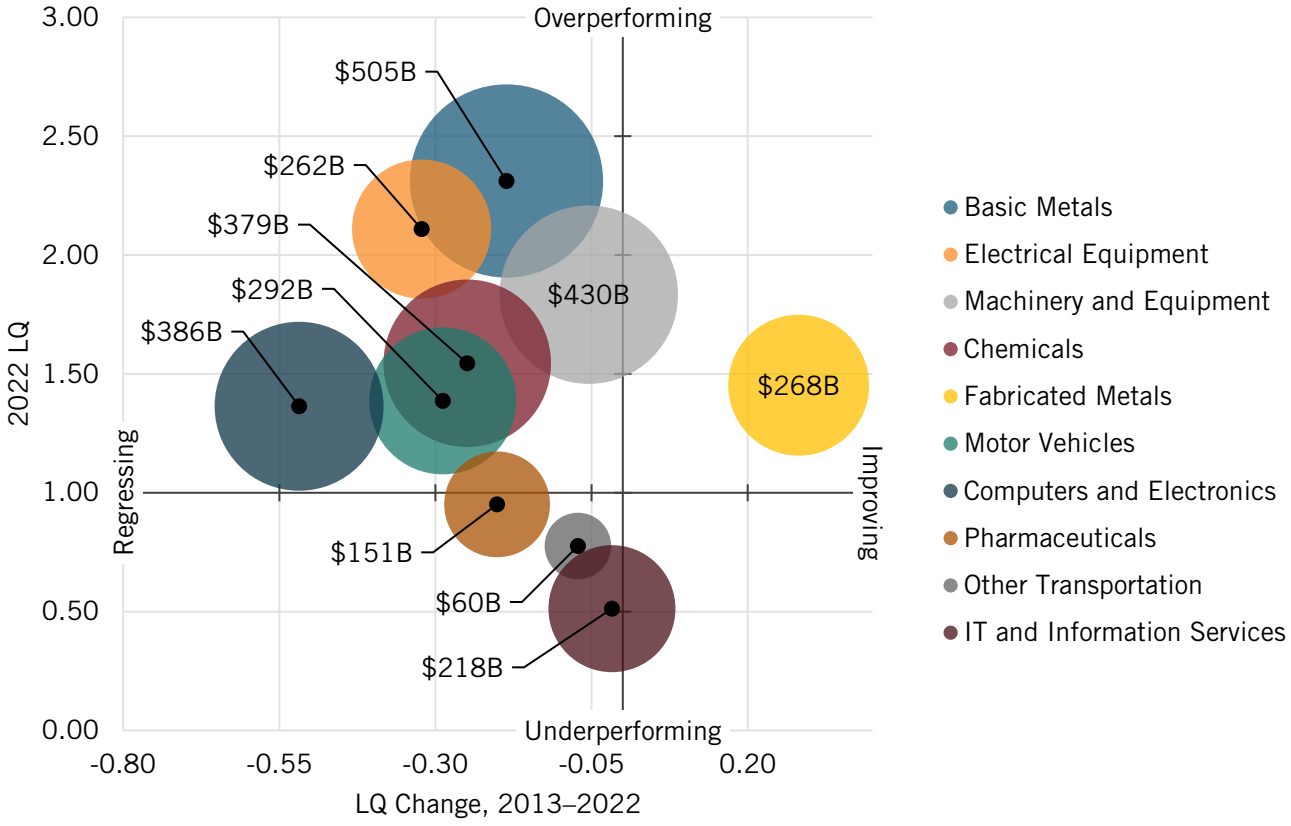


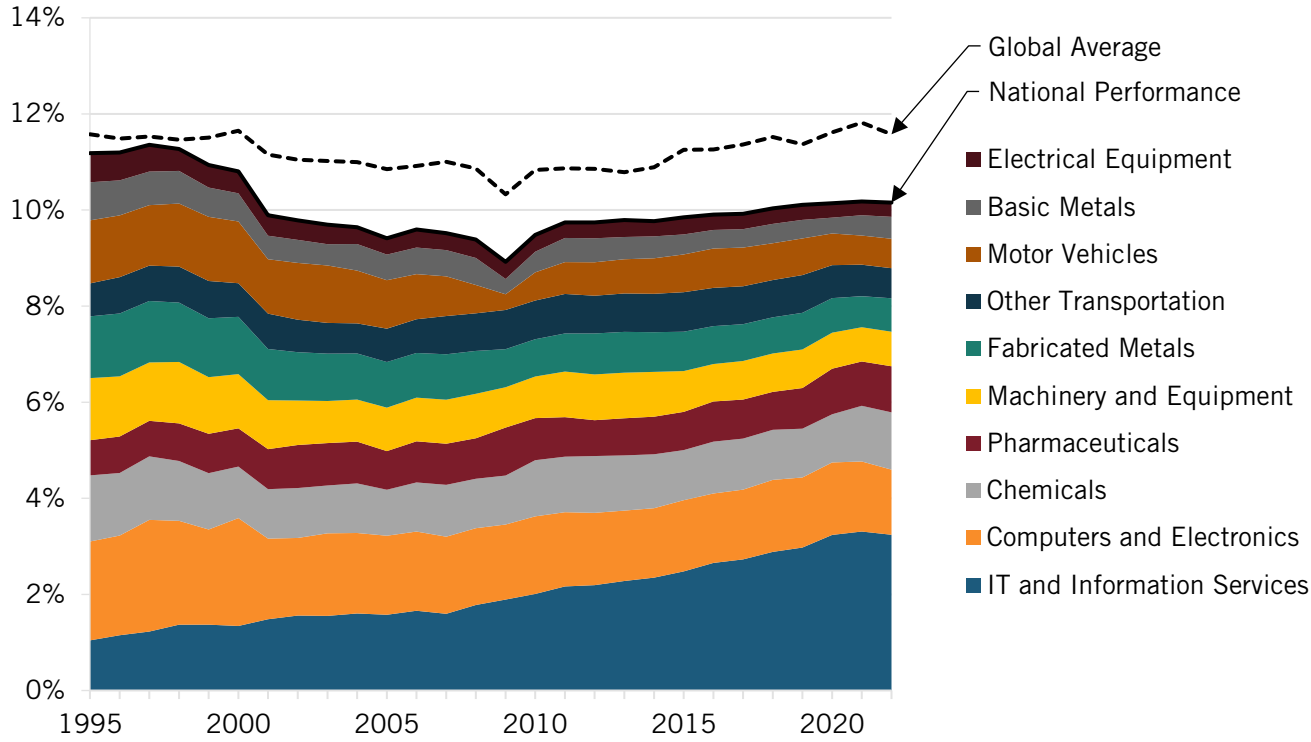
Figure 51: China's net performance in Hamilton industries since 2013 (scaled to 2022 output)



United States

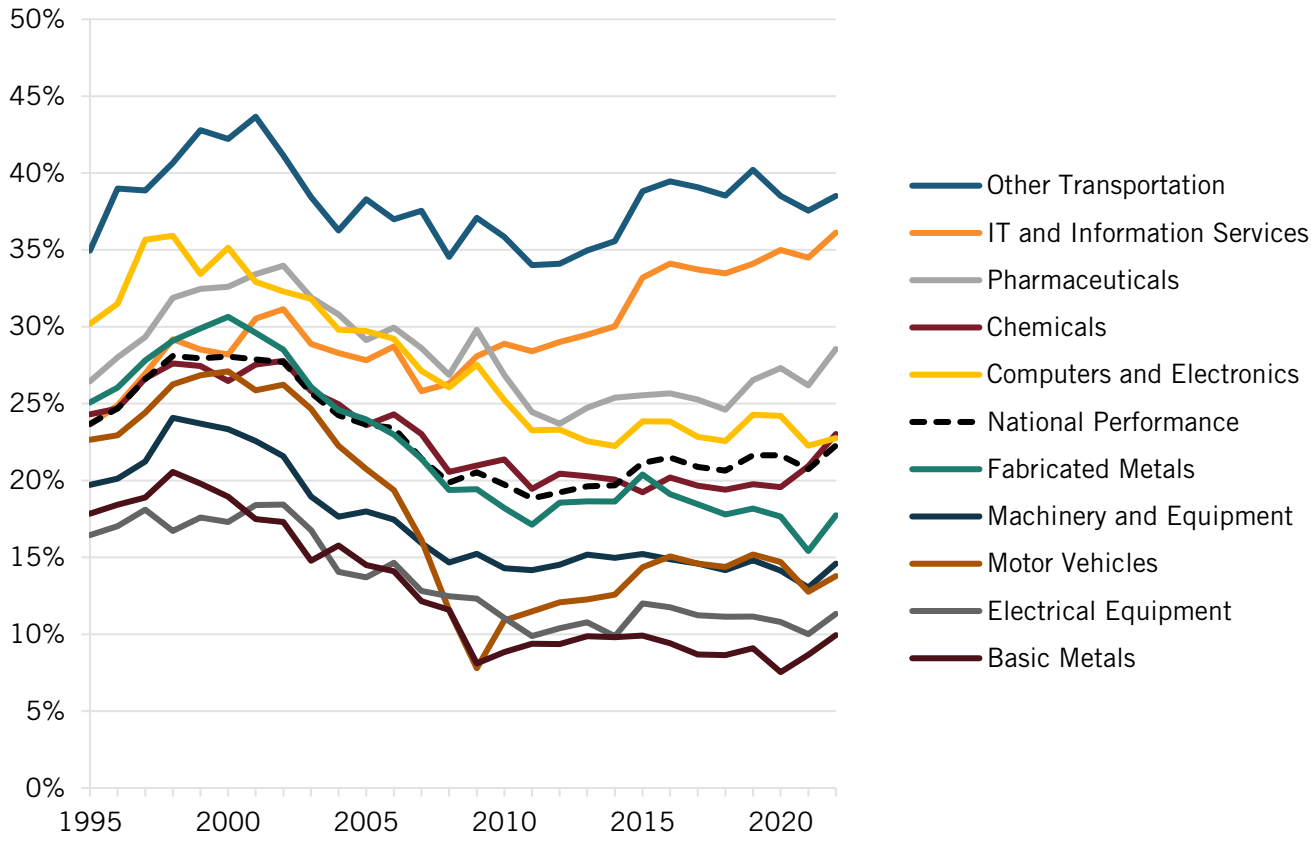
The United States is no longer the world leader it once was. A lack of industrial policy and a shift from a producer to a services-based economy have left the United States weak in advanced industries. The industries in the Hamilton Index together accounted for 10.2 percent of the U.S. economy in 2022, less than the global average of 11.6 percent and a 9 percent decline from 1995, when Hamilton industries accounted for 11.2 percent of the U.S. economy. (See figure 52.) Although Hamilton Industries' share of the U.S. economy has been on a steady rise since 2009, almost all of that increase can be attributed to the IT and information services sector, the industry in which the United States is most dominant. Excluding this share, Hamilton industry output as a share of the U.S. economy fell from 7 percent in 2009 to 6.9 percent in 2022.

Figure 52: Hamilton Index industries' shares of the U.S. economy, 1995–2022



When it comes to global market share, the United States is a story of stagnation, if not decline. Seven of the 10 advanced industries experienced declines, ranging from 1 percentage point (chemicals) to 9 percentage points (motor vehicles). Only IT and information services experienced a marked rise in output and market share, with U.S. global market share in the industry growing nearly 13 percent since 1995.

Figure 53: America's global market shares in Hamilton industries, 1995–2022



To illustrate the outsized impact IT and information services have on the U.S. advanced industry economy, see figure 54. In terms of overall global market share, U.S. output fell from a peak of 28.1 percent in 2000 to 22.3 percent in 2022. However, from 2011 to 2022, that share increased from a nadir of 18.8 percent, but almost all of that growth was driven by the IT services industry. When excluding this sector, U.S. global shares of advanced industries peaked in 2000 at 28.1 percent and then fell steadily, just as American firms began offshoring to China. Without IT, American global market share reached a low of 17.2 percent in 2011 and then rose slightly to 18.9 percent in 2022. Given this, it's evident that the United States' strength in IT services hides a real structural weakness in advanced manufacturing.

A similar trend emerges when examining industrial specialization. The U.S. LQ peaked in 1997 at 0.99 and then gradually declined through 2022, reaching 0.88. However, when IT services were removed from the industries considered, U.S. LQ declined even more sharply. Between 1997 and 2022, the U.S. LQ in advanced industries fell from a high of 0.98 to a low of 0.72 in 2021, before climbing slightly to 0.74 in 2022.

Figure 54: America's global market share of Hamilton industries with and without IT, 1995–2022

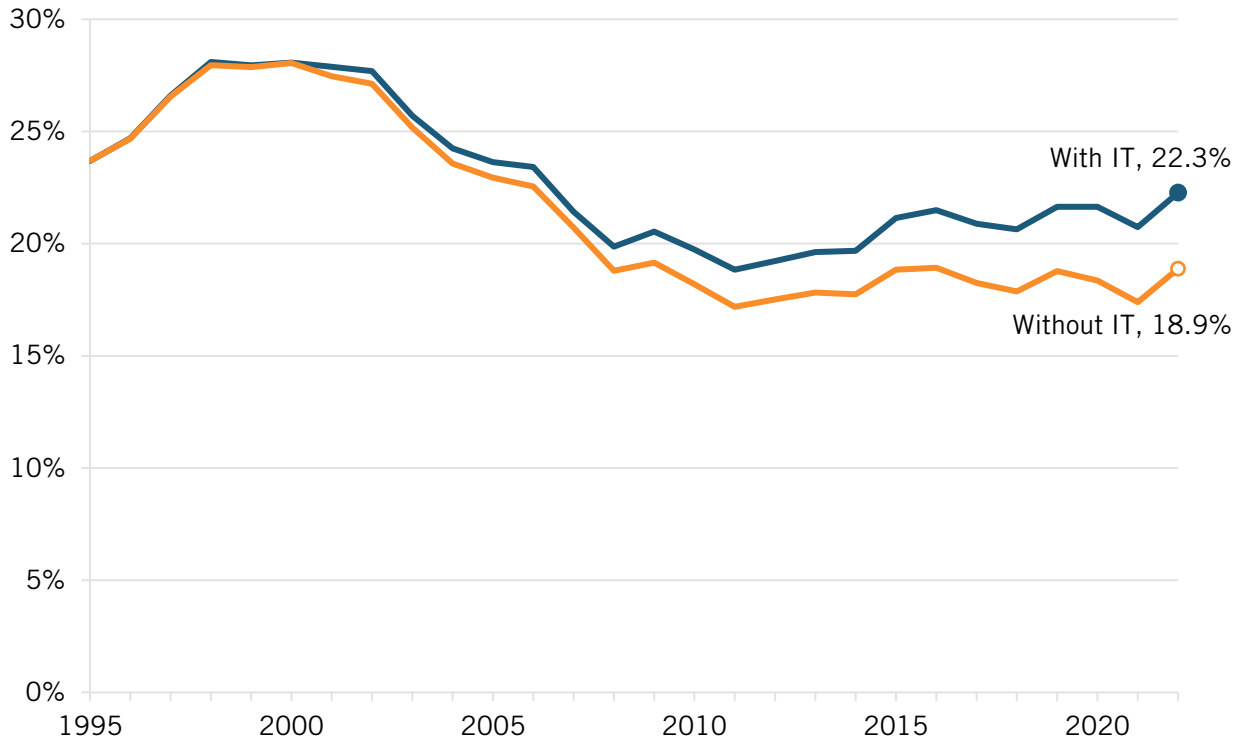
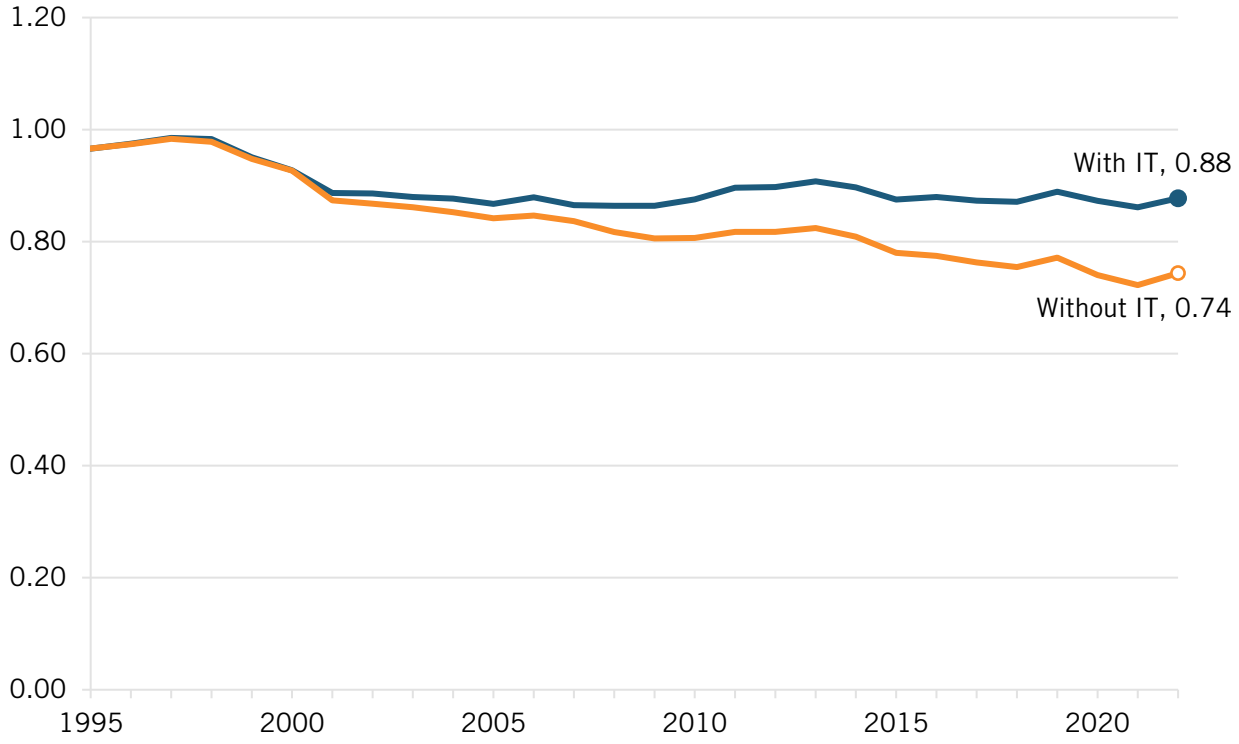
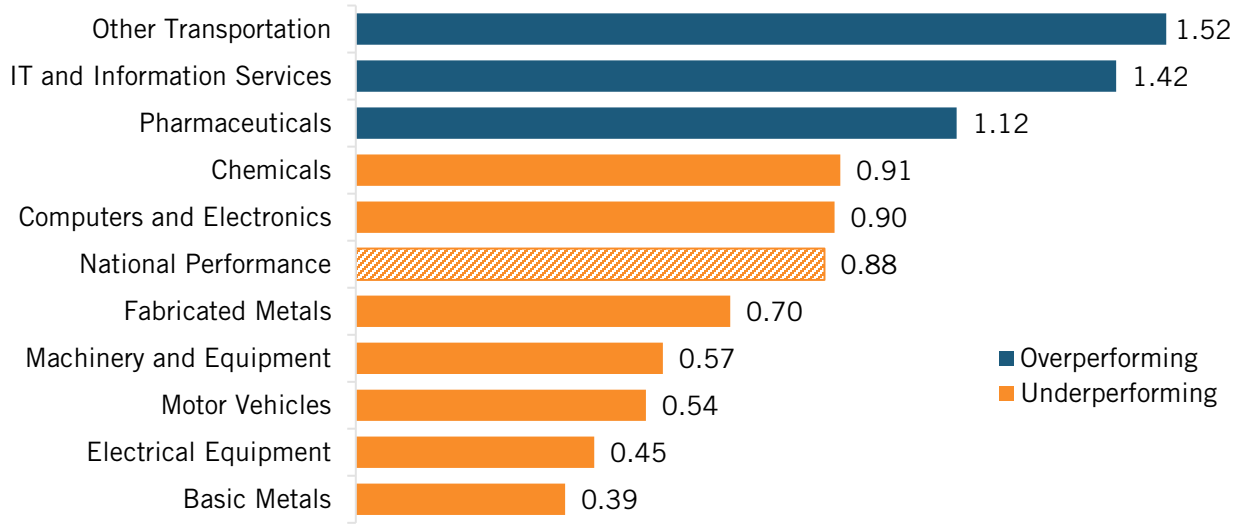


Figure 55: America's LQ in Hamilton industries with and without IT, 1995–2022



The United States' strongest industry in terms of relative performance is other transportation, where it had an LQ of 1.52 in 2022, reflecting its strength in aerospace. The only other two industries that the United States overperforms in are IT and information services (1.42) and pharmaceuticals (1.12). The LQs of the chemicals and computers and electronics industries are both close to 1, at 0.91 and 0.90, respectively, while the other five industries have LQs of 0.70 or lower.

Figure 56: America's relative performance in Hamilton Index industries (2022 LQ)

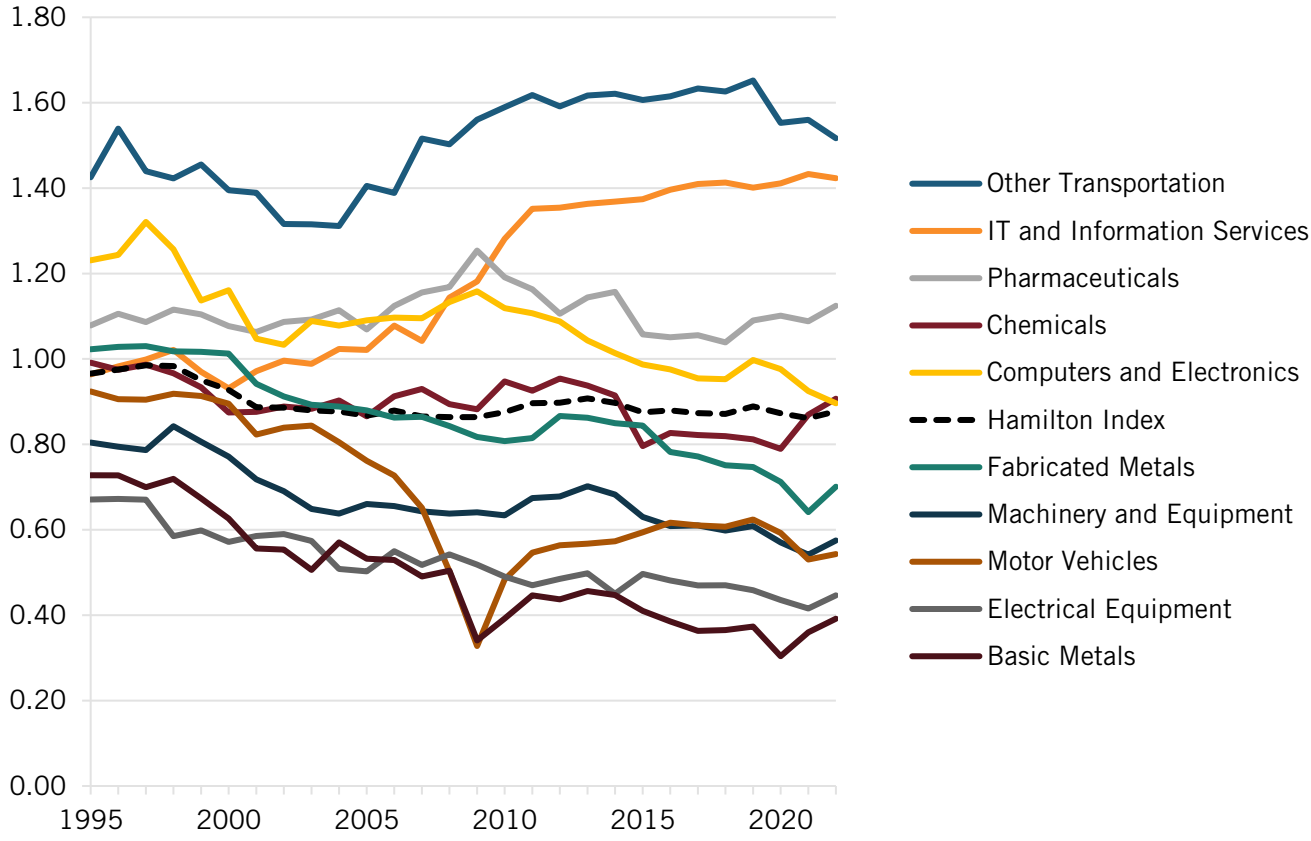


Only one industry saw an increase in its LQ since 2013: IT and information services (6 percentage points. IT and information systems grew in the United States due to the dominance of the U.S. software sector and, more recently, the rapid growth of the AI industry, which is just beginning to be reflected in 2022 data. Should AI continue to be the economic catalyst it has proven to be over the past few years, and should American AI firms continue to lead Chinese competitors, the United States should see continued growth in this industry.

Only one industry in the United States increased its LQ since 2013: IT and information services.

Conversely, the all other advanced industries experienced declines since 2013: fabricated metals (16 percentage points), computers and electronics (15 percentage points), machinery and equipment (13 percentage points), other transportation (10 percentage points), basic metals (6 percentage points), electrical equipment (5 percentage points), chemicals (3 percentage points), pharmaceuticals (2 percentage points), and motor vehicles (2 percentage points) all declined through 2022.

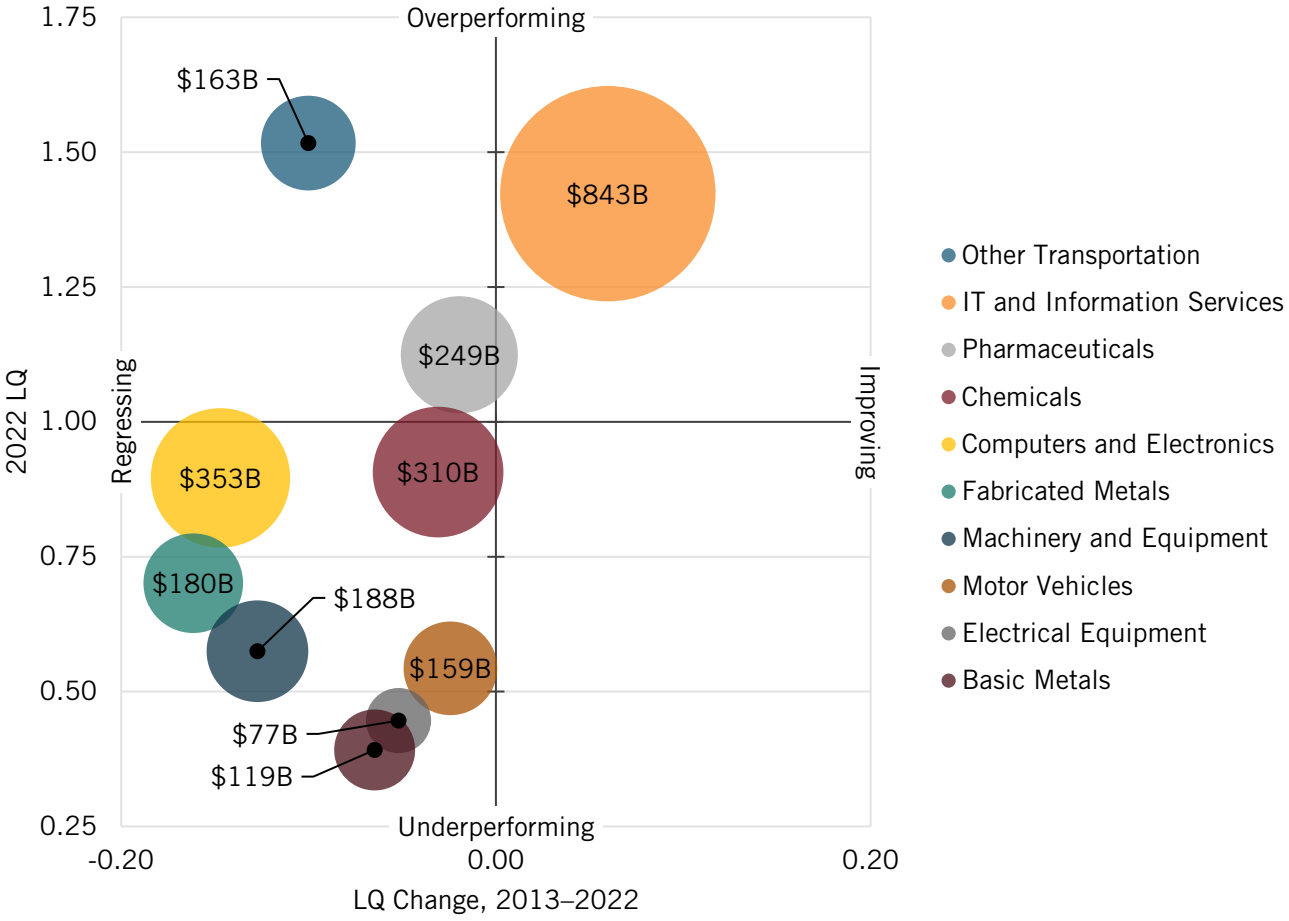
Figure 57: America's relative historical performance in Hamilton Index industries (LQ trends, 1995–2022)



Only IT and information services overperformed in 2022 and experienced an increase in its LQ from 2013 to 2022. (See figure 58.) This industry is the largest in the United States and is subject to intense competition from Chinese competitors, making it critical that it continue to receive public and private support to ensure its continued growth and innovation potential.

Unfortunately, the majority of U.S. industries fall into the underperforming and regressing category. One of those advanced industries, computers and electronics (America's second largest), has regressed the second most over the previous 10 years, largely due to offshoring to East Asia, leaving the U.S. electronic manufacturing ecosystem gutted. The largest attempt to solve this problem, the CHIPS and Science Act, is expected to reinvigorate this industry by the 2030s through the construction of several semiconductor manufacturing plants and research centers throughout the United States. It's likely that some of this revival will show up in data beyond 2022. However, these plans, which have already encountered costly regulatory hurdles, are just one step to reviving one industry.[14] The United States needs a coordinated plan with reforms across science and research, education and workforce, investment, manufacturing broadly, and more in order to truly increase advanced manufacturing output.

Figure 58: America's net performance in Hamilton industries since 2013 (scaled to 2022 output)



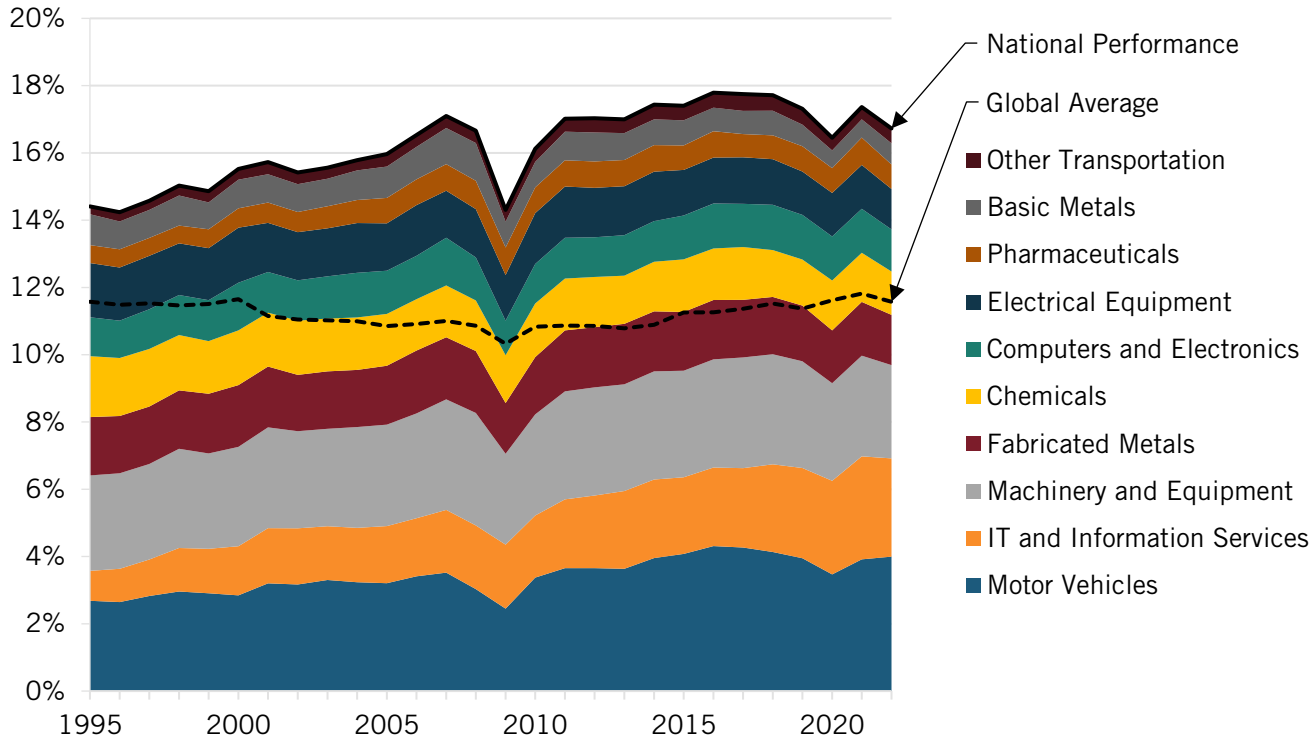
Germany

The story of Germany's output in advanced industries is one of a long and slow decline, and an unwillingness to view China as the economic and industrial threat it is means that Germany's future will likely look a lot like its past. China's growth in advanced industries will soon harm German exports to China, further eroding Germany's global market share in these sectors. Germany's share of the global market fell from 10.4 percent in 1995 to just 5.9 percent in 2022. Also, over that period, Germany went from beating China in advanced industry output from 1995 to 2006 to then falling far behind, with China's output in advanced industries now almost five times higher than Germany's.

Germany's marquee industry, motor vehicles, has seen its market share fall by 1.3 percent, a decline driven in recent years by the boom in Chinese EVs in the Chinese domestic market and the Global South.

However, looking at Germany's domestic economy, advanced industries have become a much more important source of economic activity. Germany's advanced industry output as a share of its total economy increased from 14.4 percent in 1995 to 17.8 percent in 2017, before settling at 16.9 percent in 2022 (figure 59). Compared with the international average, Germany's economy is substantially more concentrated in advanced industries. The motor vehicle industry is the largest advanced industry in the German economy, propelled by the success of world-leading car brands BMW, Volkswagen, Mercedes-Benz, and Audi, accounting for 4 percent of German GDP. The IT and information services industry is the second largest, accounting for 2.9 percent.

Figure 59: Hamilton Index industries' shares of Germany's economy



As shown in figure 60, in the global market, almost every German advanced industry has lost market share since 1995. To highlight the largest declines, Germany's market share in electrical equipment has fallen by 7.5 percentage points, its share of the chemicals industry by 6.9 percentage points, and its machinery and equipment industry by 5.7 percentage points. Even Germany's marquee industry, motor vehicles, has seen its market share fall by 1.3 percent, a decline driven in recent years by the boom in demand for cheap Chinese EVs in the Chinese domestic market and the Global South. Only other transportation experienced an increase in global market share, but by only 0.3 percentage points.

Germany overperforms in the majority of industries in terms of industrial specialization. (See figure 61.) Once again, Germany's top industry is motor vehicles, where it has an LQ of 3.54, one of the highest in the world. It is also strong in machinery and equipment, electrical equipment, and fabricated metals, all of which have LQs of 1.50 or higher. Germany underperforms in chemicals, pharmaceuticals, and computers and electronics, although its worst industry is basic metals, with an LQ of 0.53.

Figure 60: Germany's global market shares in Hamilton industries, 1995–2022

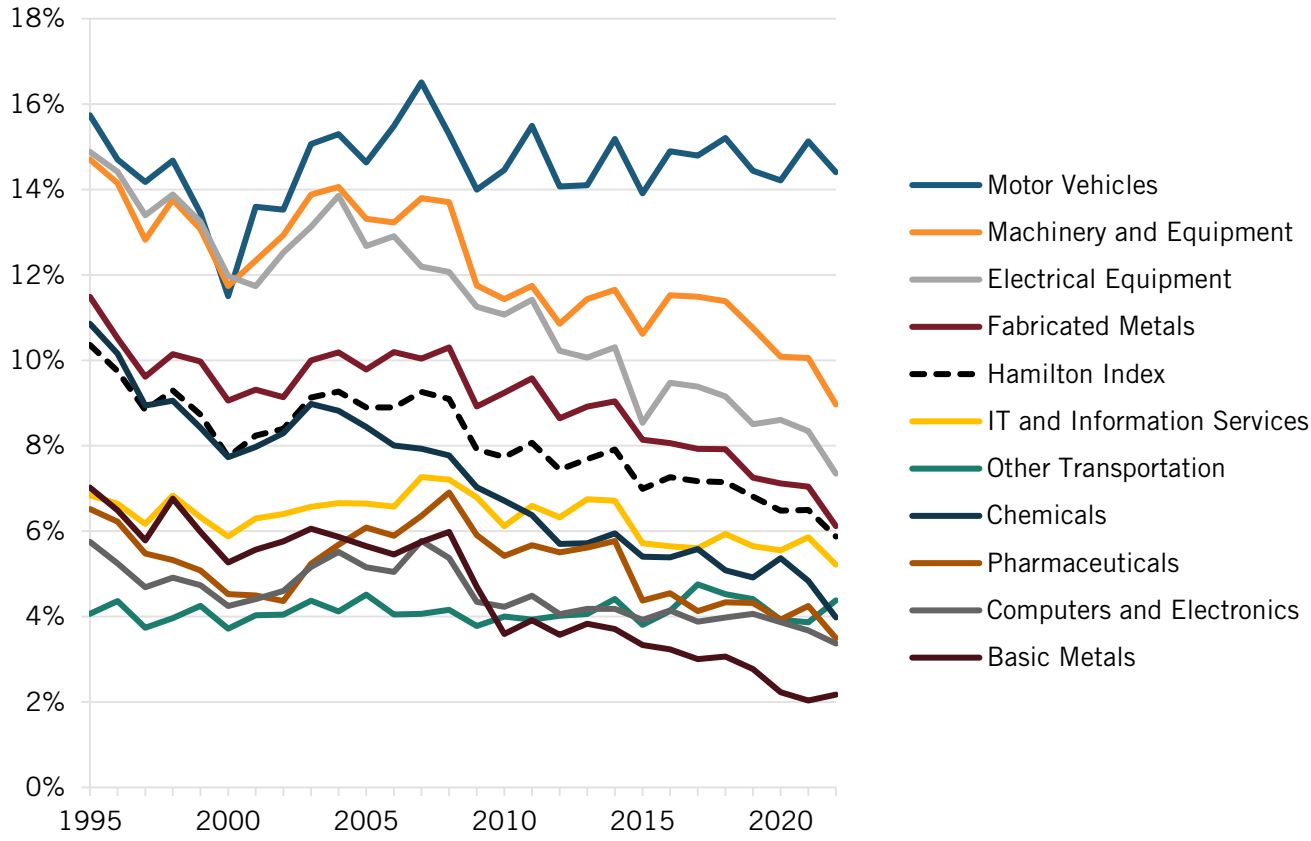
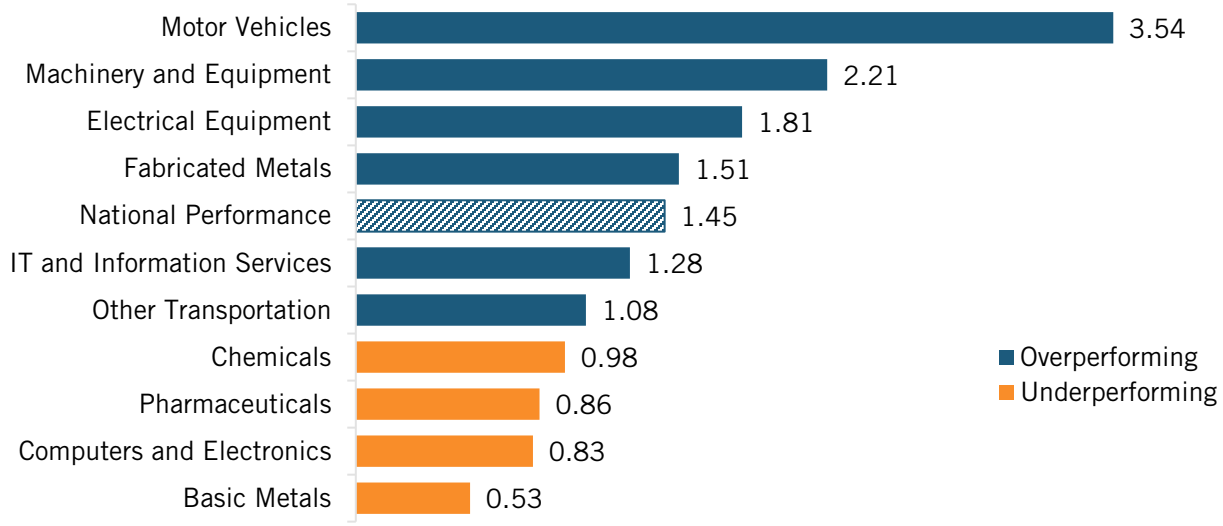
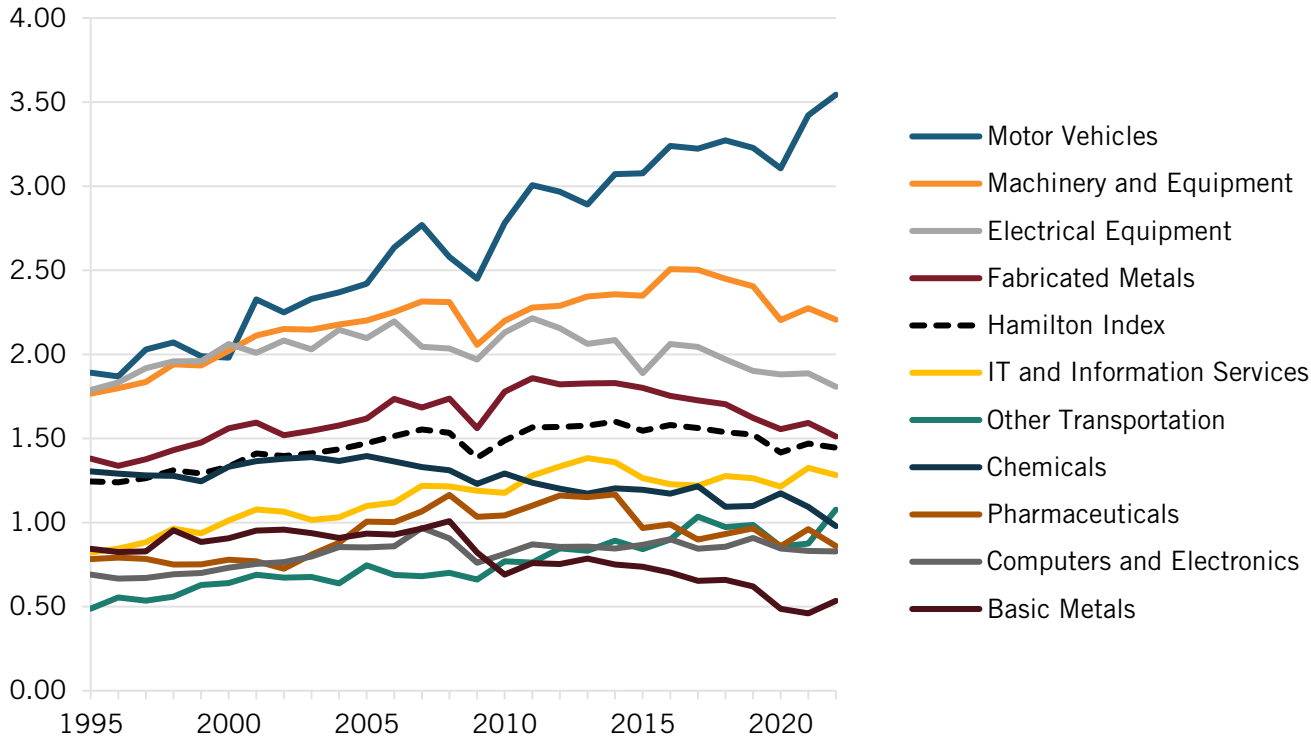


Figure 61: Germany's relative performance in Hamilton Index industries (2022 LQ)



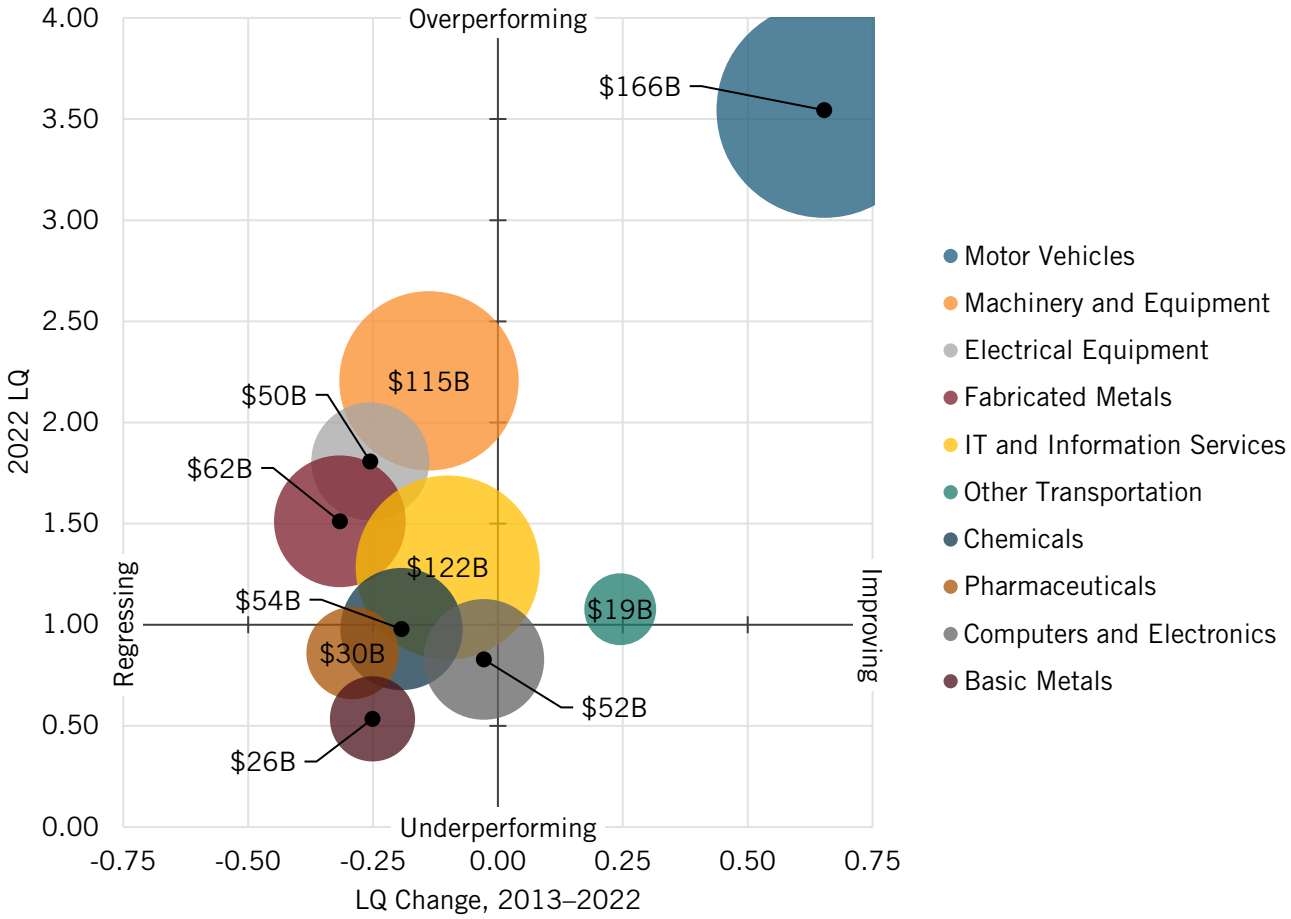
Germany's industrial specialization has declined in most industries since 2013, with its overall LQ falling 13 percentage points. However, had it not been for the relative growth of Germany's automobile industry (its LQ increased by 65 percentage points), Germany's decline would have been even more substantial. Similar to the United States and its IT industry, Germany's economy has been buoyed by its motor vehicle industry, giving the impression of a rosier story, when the reality is grimmer. Aside from motor vehicles and other transportation, every other industry declined in terms of relative performance, with some falling as much as 32 percentage points.

Figure 62: Germany's relative historical performance in Hamilton industries (LQ trends, 1995–2022)



Only the automobile and other transportation industries appear in the top right quadrant of figure 63, demonstrating that they are the only industries in which Germany is both overperforming and has increased its LQ since 2013. Four other industries—machinery and equipment, electrical equipment, fabricated metals, and IT and information services—are also overperforming, but their LQs have declined since 2013. The final four advanced industries—chemicals, pharmaceuticals, computers and electronics, and basic metals—are both underperforming and declining. Though fabricated and basic metals experienced the steepest declines, they are not the sectors that should worry Germany the most, as they are among the smallest advanced industries in the country. Rather, the decline in machinery and equipment (11 percentage points) should be concerning, given the size of the industry and China's expansion in it since 1995.

Figure 63: Germany's net performance in Hamilton industries since 2013 (scaled to 2022 output)



Japan

If Germany's advanced industry story is one of a long and slow decline, Japan's is one of a long and rapid decline, in which global market shares in every industry have fallen, leaving open the question of whether Japan can compete in a world dominated by the United States and China.

In 1995, Japan led the world in advanced industry production, holding 24 percent of global market share and, for the last time, exceeding the United States in value-added output ($864 billion compared with $854 billion). But since then, Japan's global market share has dived, falling 18.2 percentage points to 5.8 percent, the fourth highest in the world. Japan's decline in advanced industries is a symptom of greater problems within the Japanese economy since the 1990s, which have led to reduced investment and consumption, leaving Japan unable to compete with the growing competition from the United States, China, and elsewhere.

Given this decline in the Japanese economy, Japan's concentration of advanced industries and its LQs remained quite stable from 1995 to 2022. Japanese advanced industry output as a share of its total economy actually increased from 15.6 percent to 16 percent between 1995 and 2022. Machinery and equipment accounted for the largest share of advanced industry output (3.1 percent), followed by IT and information services (2.5 percent) and motor vehicles (2.3 percent).

Figure 64: Hamilton Index industries' shares of Japan's economy, 1995–2022

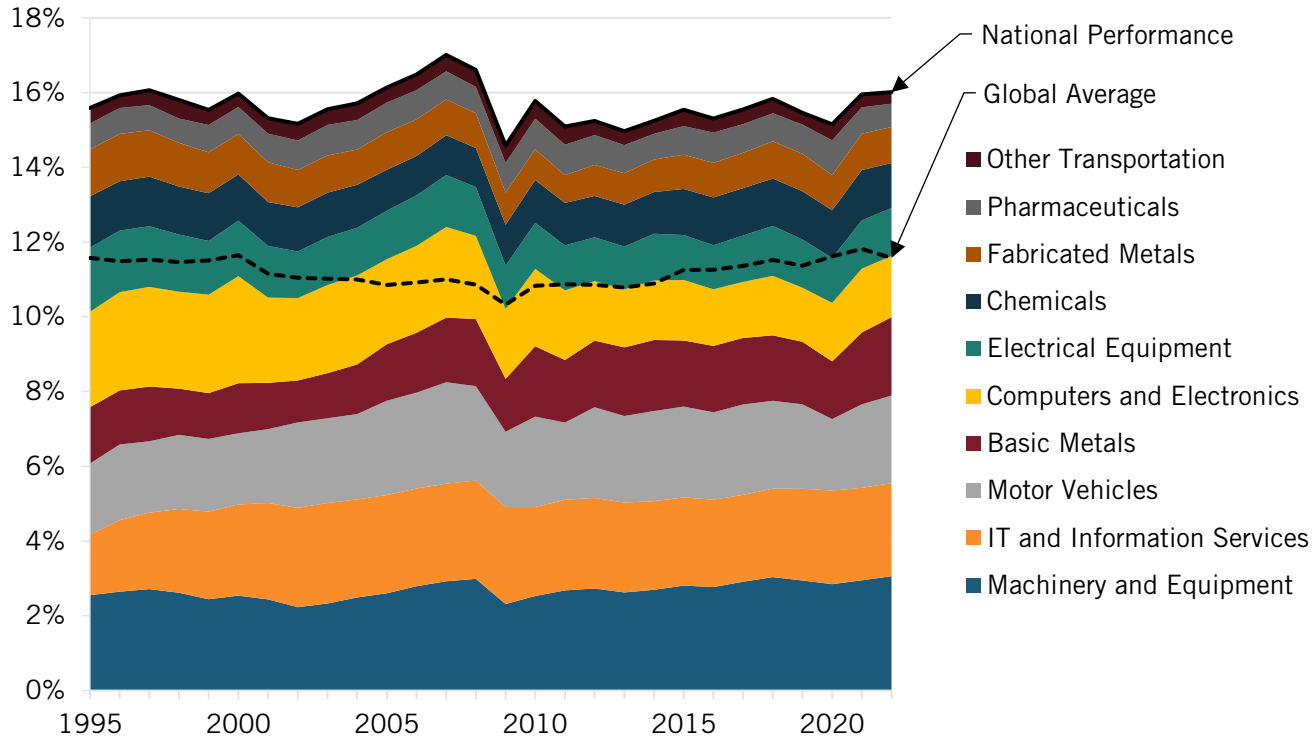
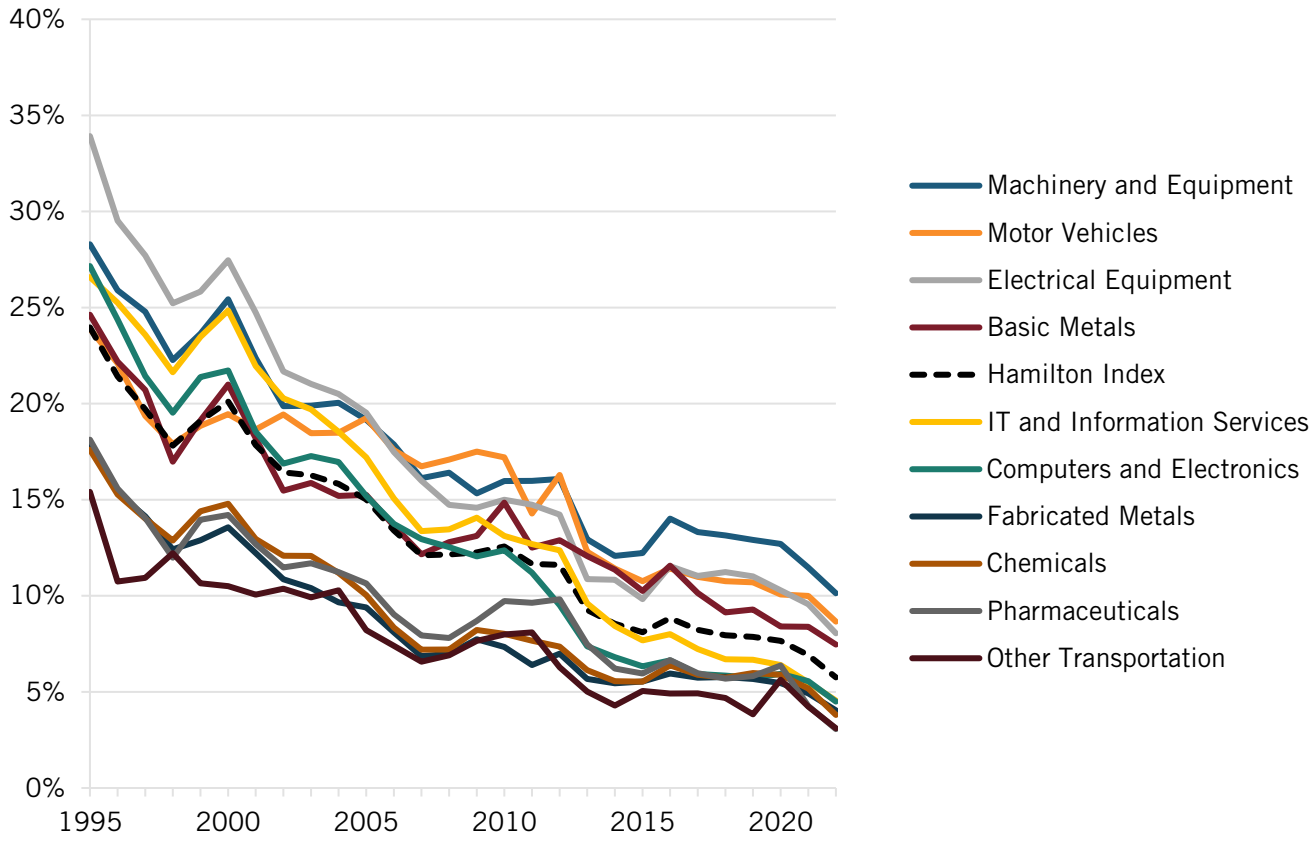


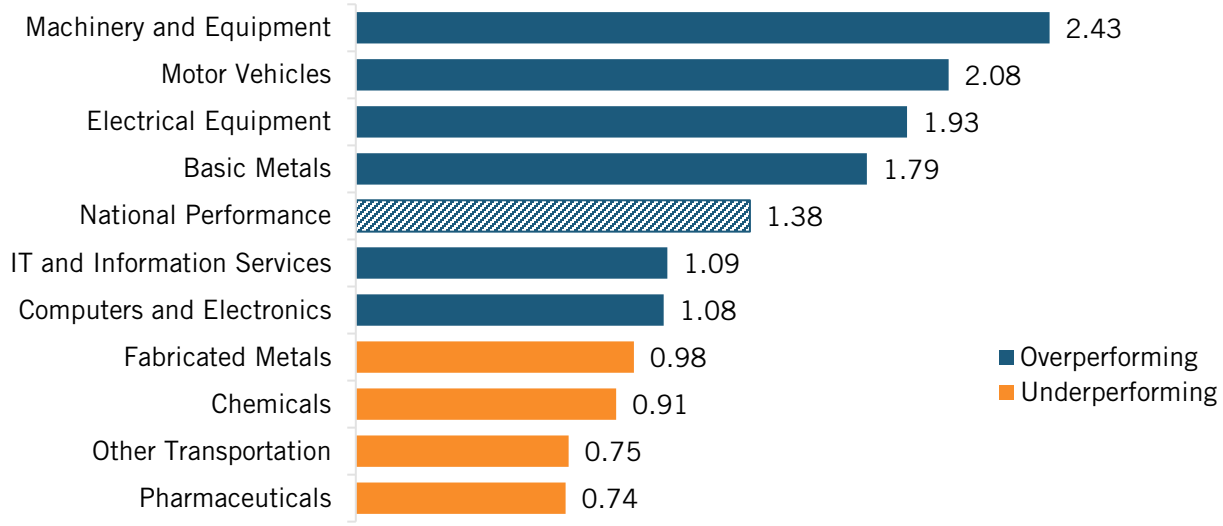
Figure 65: Japan's global market shares in Hamilton industries, 1995–2022



Japan's global market share declined across all advanced industries by 12 to 26 percentage points. Other transportation, supported by Japan's strong high-speed rail and shipbuilding industries, declined the least, followed by the fabricated metals and chemicals industries. Conversely, Japan's electrical equipment industry experienced the starkest decline, falling nearly 26 percentage points from 33.9 percent to 8.1 percent.

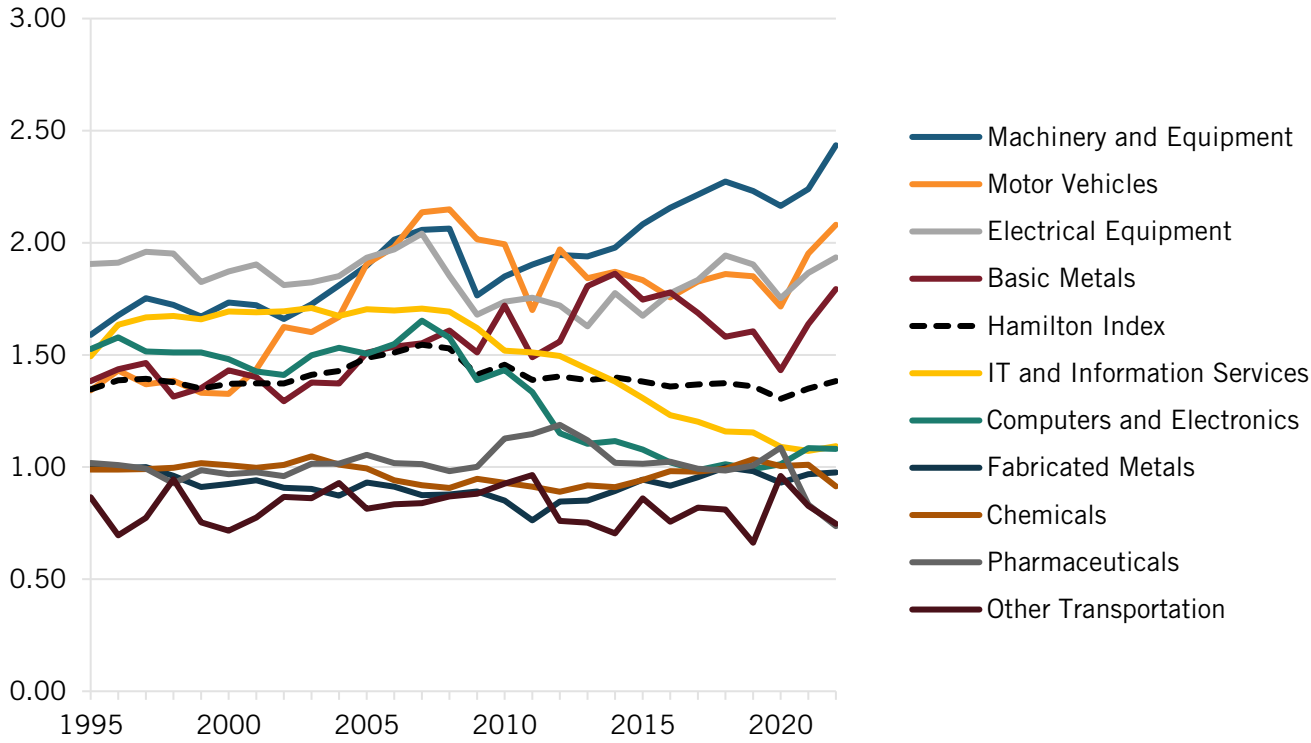
In terms of relative performance, Japan overperforms in machinery and equipment, motor vehicles, electrical equipment, basic metals, IT and information services, and computers and electronics. And among the industries in which Japan underperforms, fabricated metals and chemicals are both close to average, with LQs over 0.90. Other transportation and pharmaceuticals are Japan's weakest industries in terms of relative performance, with LQs of 0.75 and 0.74, respectively. (See figure 66.)

Figure 66: Japan's relative performance in Hamilton Index industries (2022 LQ)



As previously stated, Japan's LQs have not declined at the same rate as its global market shares have. Since 2013, Japan's overall Hamilton Index LQ has declined by just 1 percentage point. Yet, several of Japan's advanced industries have seen an increase in relative performance over this period: machinery and equipment (50 percentage points), electrical equipment (31 percentage points), motor vehicles (24 percentage points), and fabricated metals (13 percentage points) all experienced an increase in LQ.

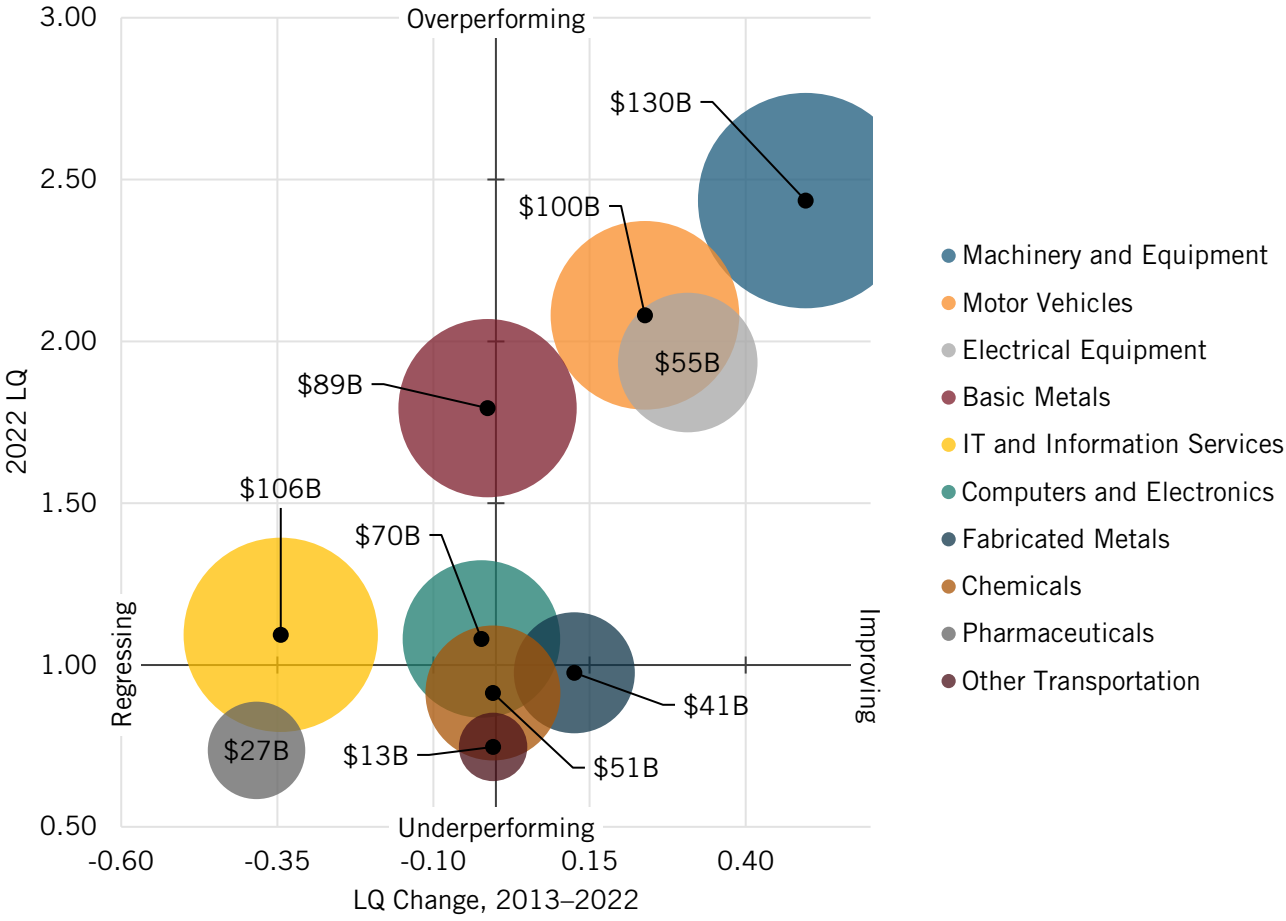
Figure 67: Japan's relative historical performance in Hamilton Index industries (LQ trends, 1995–2022)



Many of Japan's largest industries fall into the top right quadrant of figure 68, demonstrating that they are both performing above average and improving. Among these industries is machinery and equipment, Japan's largest industry by output, valued at $130 billion in 2022, and the motor vehicle industry, which was valued at $100 billion in 2022. Japan's second-largest industry, IT and information services, is also overperforming, but its LQ has declined by 34 percentage points since 2013, placing it in the top left quadrant. Only one industry, pharmaceuticals, underperformed and saw its LQ decline by 38 percentage points over the previous decade.

The decline of Japan's computer and electronics industry is also concerning and surprising, given Japan's historic success in that industry, with firms such as Samsung leading the charge. However, China, South Korea, and Taiwan have proved formidable competitors in recent years, challenging Japan in export markets.

Figure 68: Japan's net performance in Hamilton industries since 2013 (scaled to 2022 output)



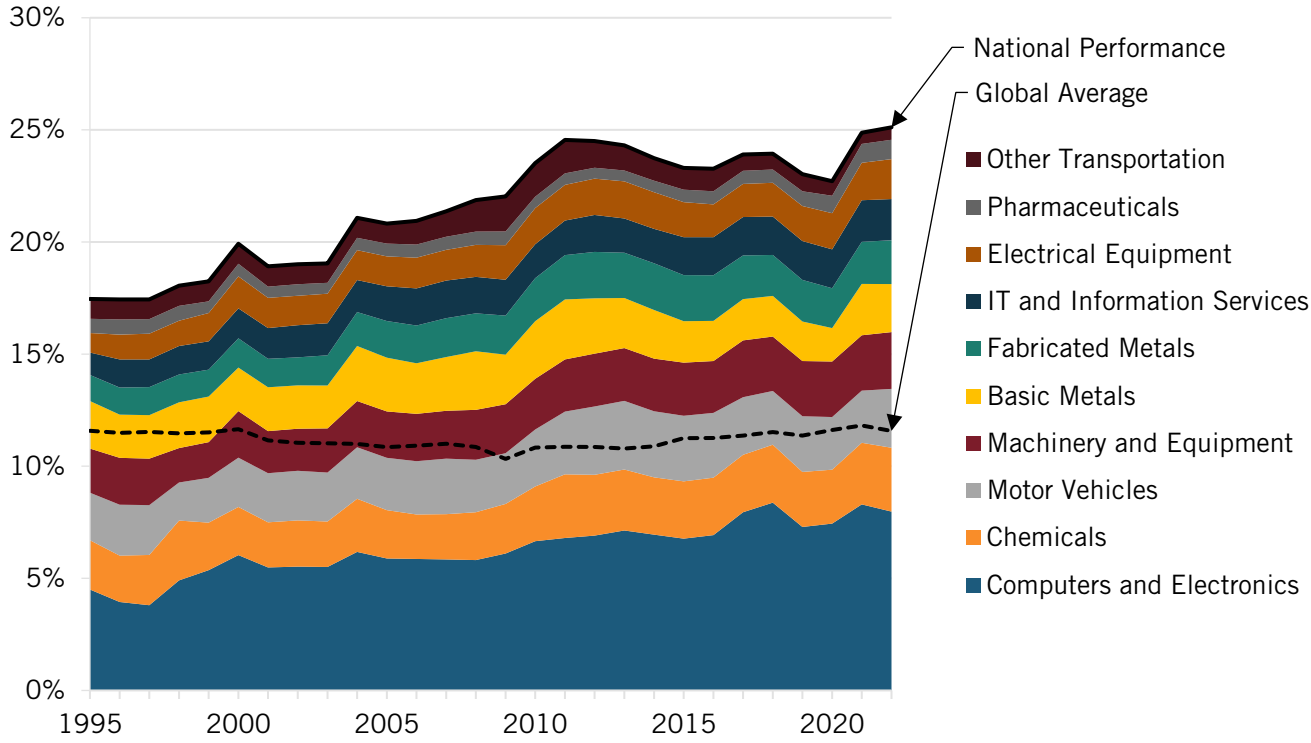
South Korea

After more than two decades of steady increases in output, South Korea's advanced industries have finally begun to flounder in the face of the China Challenge. Between 1995 and 2018, South Korea's global market share in Hamilton Industries steadily increased, driven by the country's outsized strength in computer and electronics manufacturing. But since 2018, South Korea has been in decline, and its ability to properly counter China's expansion and innovation in the computers and electronics industry is being called into question. For instance, between 2018 and 2022, South Korea's output in computers and electronics fell by more than $10 billion, while China's output increased by more than $84 billion.

Notably, Chinese firms have become key competitors with South Korean firms in display technology, an industry once dominated by South Korean firms. China is now the leading global producer of LCD and OLED displays and is a leading innovator in the industry.[15] Additionally, Chinese firm Huawei is in direct competition with Samsung, a Japanese firm with large production operations in South Korea, decreasing South Korea's share of the global market.

But when considering just the domestic South Korean economy, advanced industries play an outsized role. In 2022, the output of advanced industries accounted for 25 percent of South Korea's economy, meaning that one out of every four dollars of output in South Korea was attributable to advanced industries. The computers and electronics industry was the largest of these, with industry leaders such as LG, Samsung, and SK Hynix accounting for 8 percent of the total economy. The chemical industry was the second largest, accounting for 2.8 percent of total output.

Figure 69: Hamilton Index industries' shares of South Korea's economy, 1995–2022



South Korea's trends in global market share are most easily understood when the data is bifurcated into two periods. The first period, from 1995 to 2018, saw broad and continuous growth across almost every industry. South Korea's global market share increased in every industry except basic metals, other transportation, and pharmaceuticals, with the largest increase of 5.6 percentage points in computers and electronics. But the trends took a sharp turn from 2018 to 2022. Over this period, every industry except pharma declined, with the largest change again in computers and electronics, wherein South Korea's global market share fell by 1.9 percentage points.

Despite negative trends in its global market share, South Korea overperforms in almost all Hamilton industries in terms of industrial specialization. South Korea's top industry is computers and electronics, followed by electrical equipment, motor vehicles, chemicals, and machinery and equipment, all of which have an LQ above 2. South Korea only underperforms in IT and information services, where it has an LQ of 0.81. (See figure 71.)

Between 2013 and 2022, South Korea's LQs increased in four industries: computers and electronics, electrical equipment, machinery and equipment, and pharmaceuticals. Otherwise, most industries experienced declines, although most were moderate. The motor vehicle, chemical, fabricated metals, and IT and information services industries saw their LQs fall by 11 percentage points or less over the previous decade. Overall, South Korea has seen its LQ decline over this same period, falling by 8 percentage points.

Figure 70: South Korea's global market shares in Hamilton industries, 1995–2022

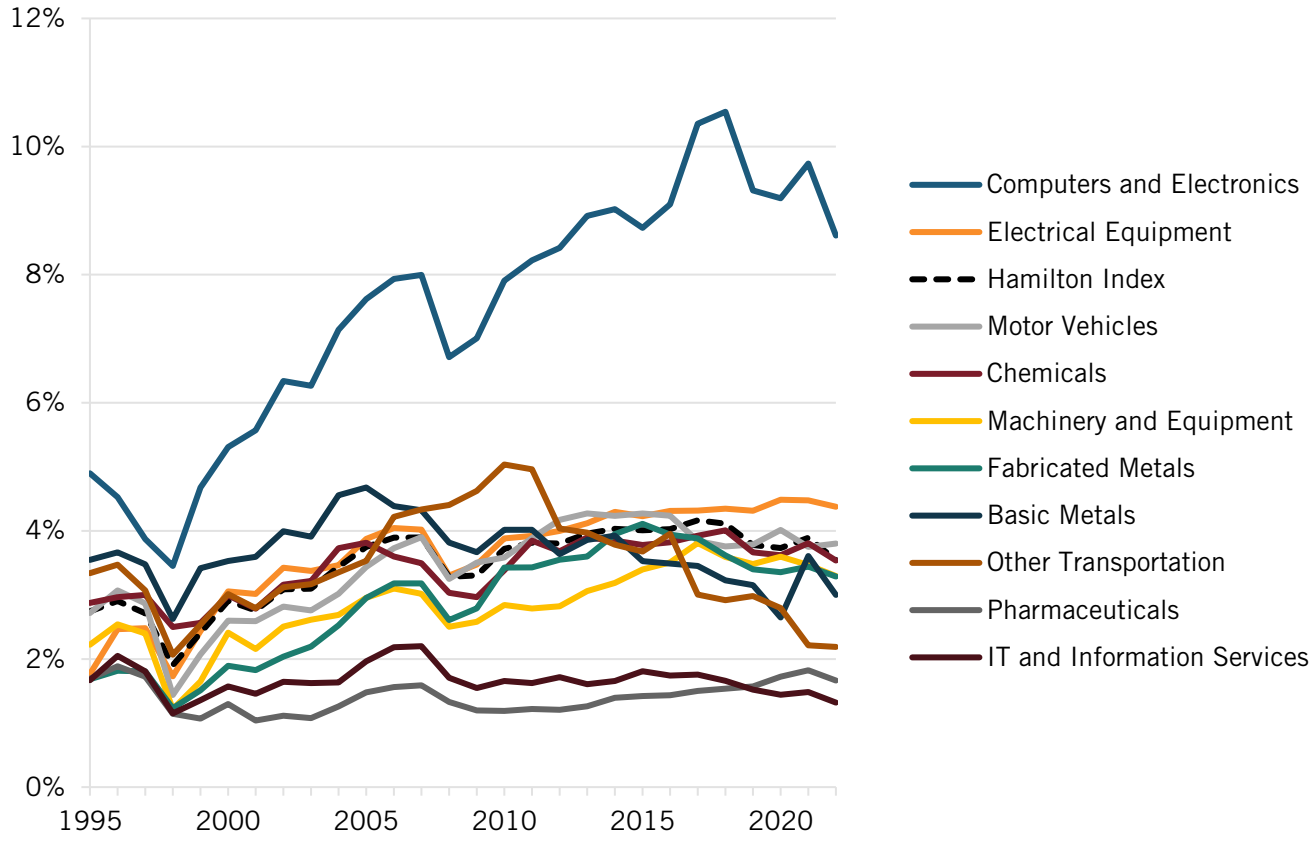
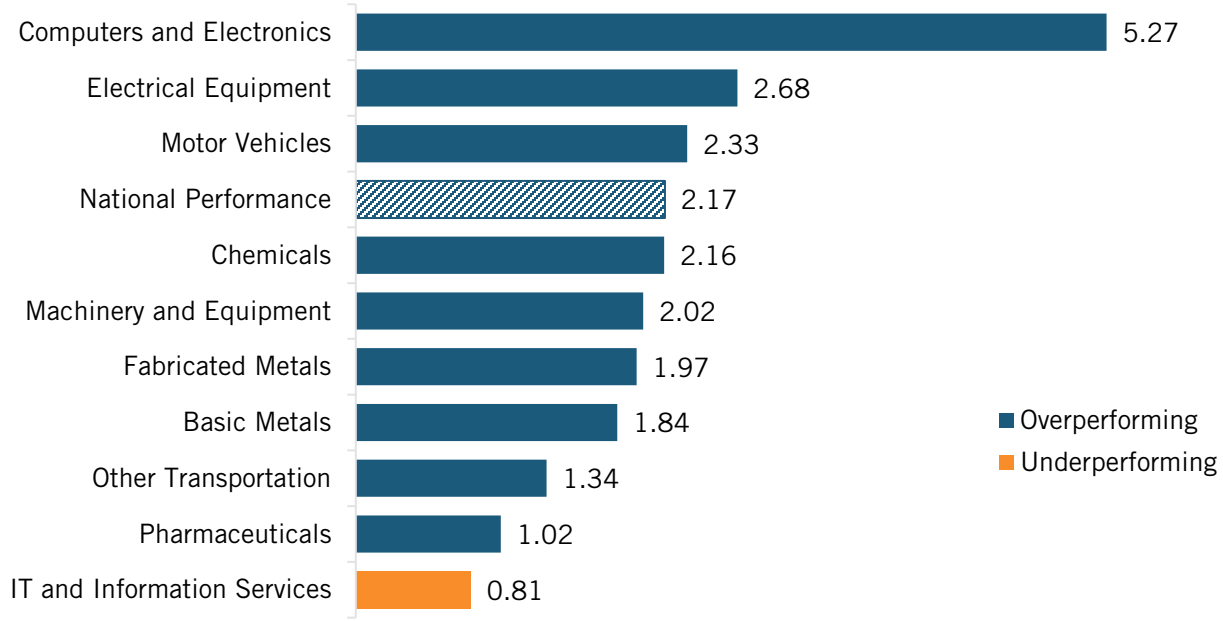
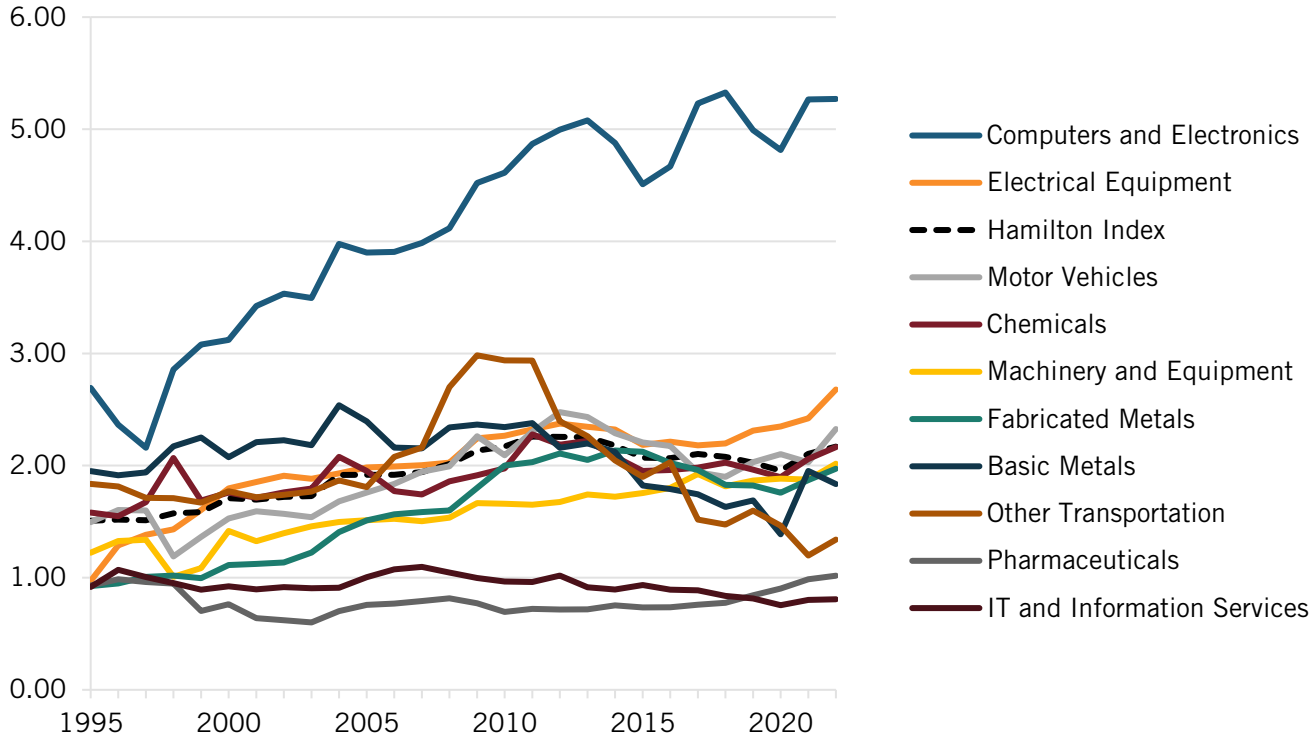


Figure 71: South Korea's relative performance in Hamilton Index industries (2022 LQ)



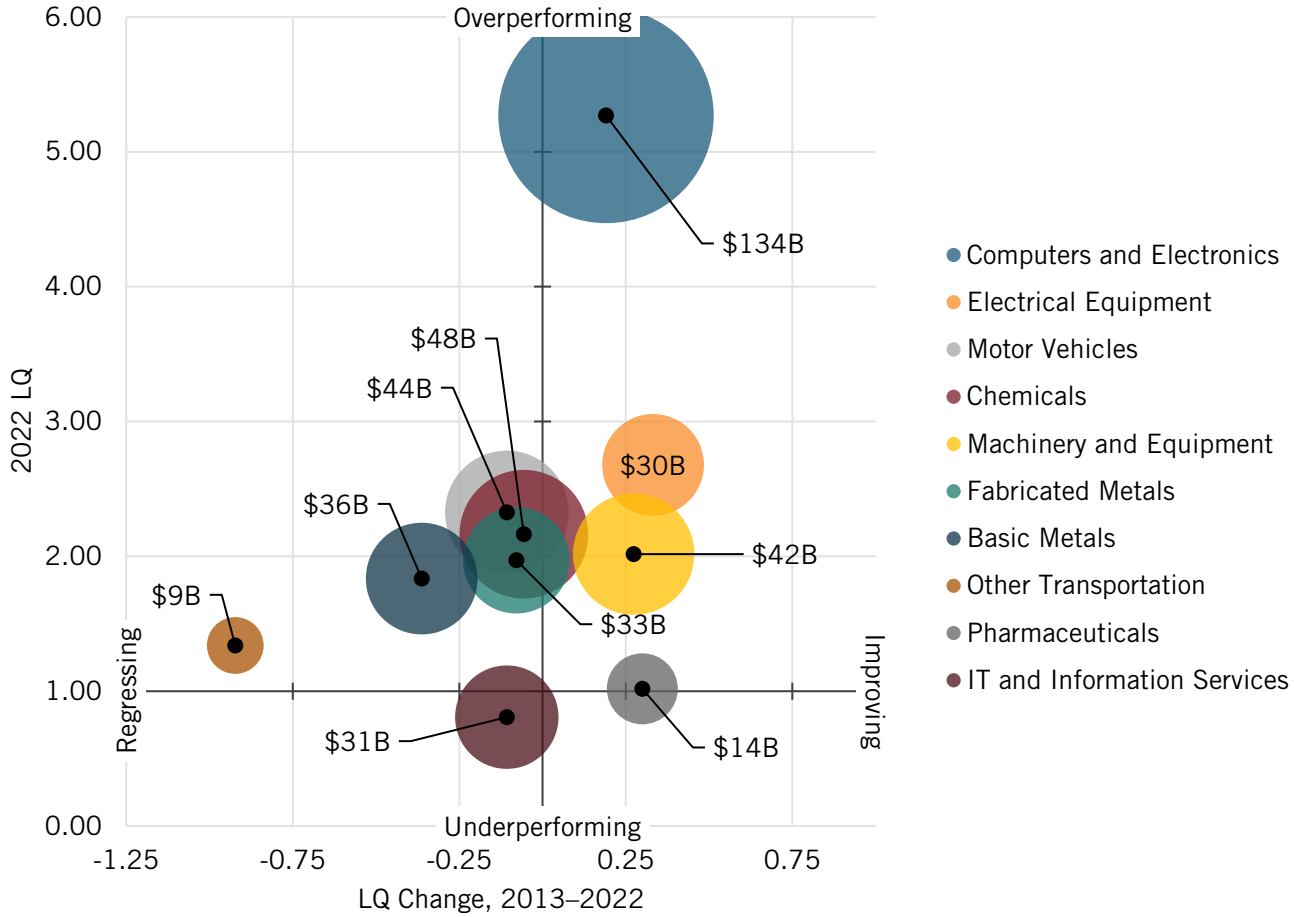
Despite its decline, South Korea is still one of the most specialized nations in the world in advanced industries. With an LQ of 2.17, it is over 100 percent more specialized in advanced industries than would be expected based on the size of its economy.

Figure 72: South Korea's relative historical performance in Hamilton industries (LQ trends)



Three of South Korea's Hamilton Industries can be classified as overperforming and improving, meaning their LQ was above 1 as of 2022, and increased between 2013 and 2022. These industries are located in the top right quadrant of figure 73. Among these industries are two of South Korea's largest industries: computers and electronics and machinery and equipment. Basic metals, chemicals, motor vehicles, fabricated metals, and other transportation are also in the top left quadrant, meaning they are overperforming, but their LQ has declined since 2013, while IT and information services, the only industry in which South Korea underperforms, is in the bottom left quadrant, demonstrating that South Korea's output in the industry is not only below average but also regressing.

Figure 73: South Korea's net performance in Hamilton industries since 2013 (scaled to 2022 output)

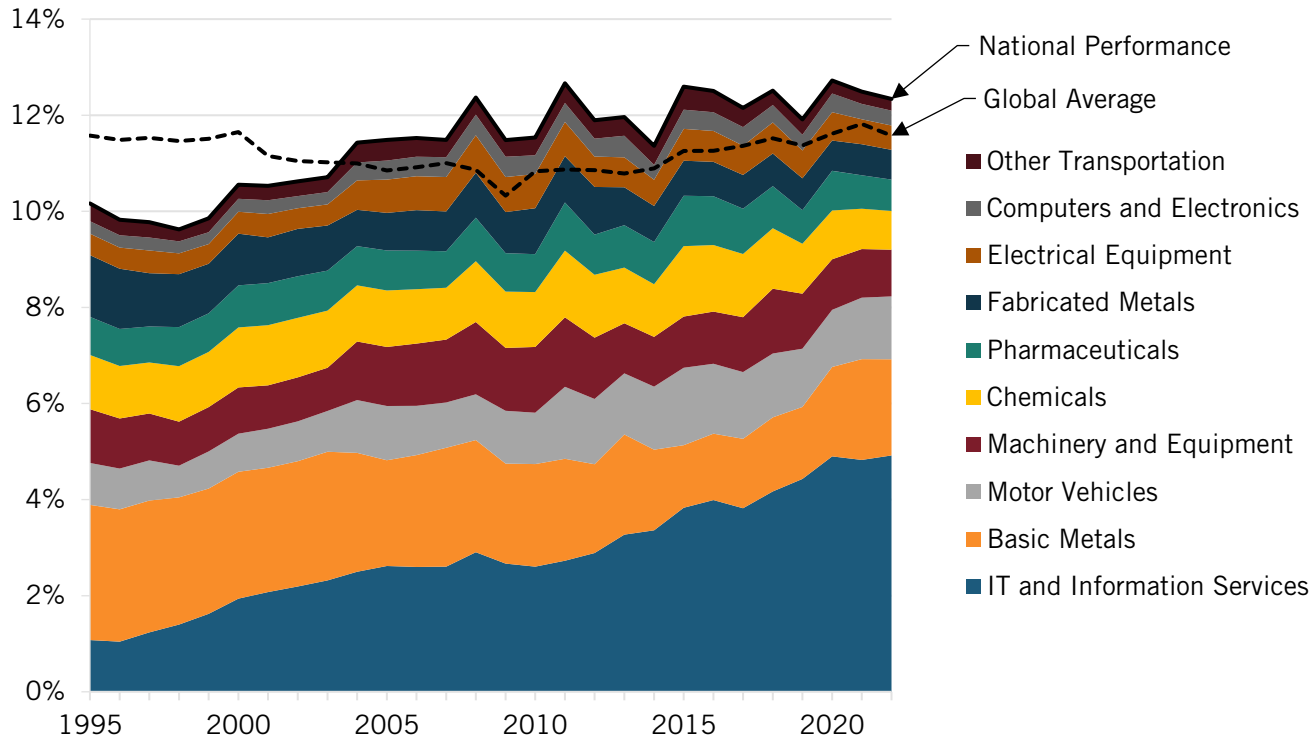


India

India is consistently touted as the next China in terms of industrial production capabilities, but for years, it has failed to meet that high bar. Despite its substantial population, much of which is highly educated, India has failed to become the industrial superstar that policymakers and academics have long expected; instead, it remains a hub for offshored IT services and resource-dependent industries. However, the postulations around India remain, and the nation has shown some progress in recent years toward becoming the industrial giant that it has long wanted to be.

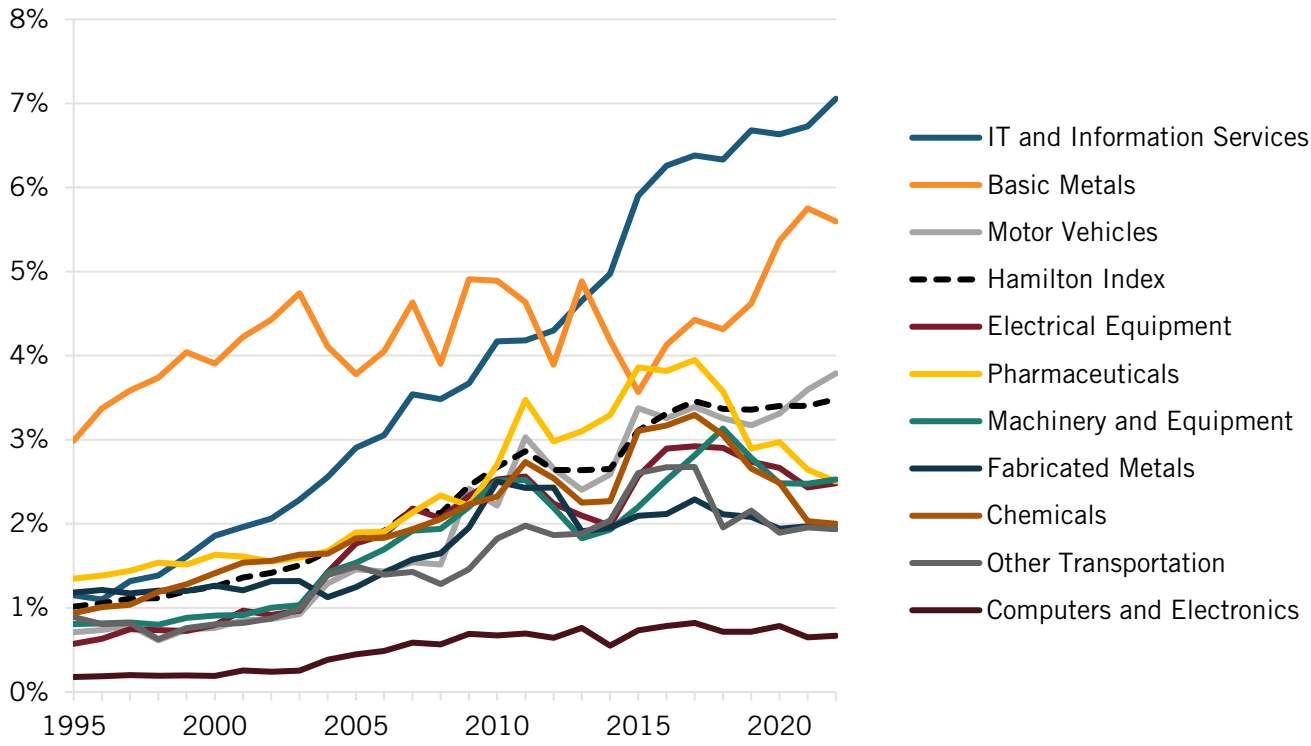
India's output in advanced industries has increased steadily since 1995, while its global market share has more than tripled, albeit from a low level. As of 2022, India held 3.5 percent of the global market share in advanced industries, up from just 1 percent in 1995. Within India, advanced industries account for 12.3 percent of the national economy, more than the global average of 11.6 percent. (See figure 74.)

Figure 74: Hamilton Index industries' shares of India's economy, 1995–2022



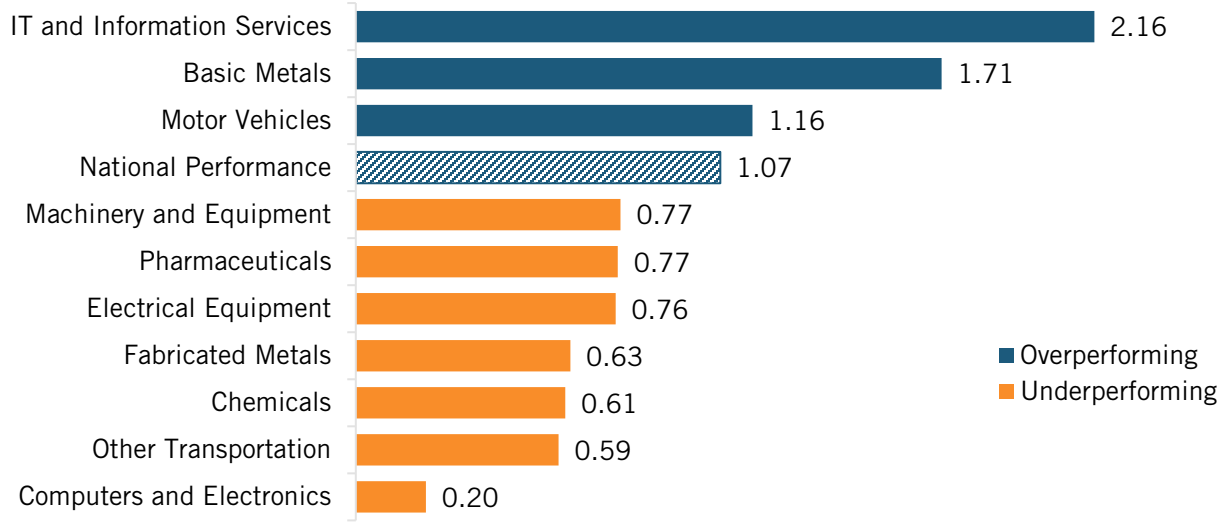
India has also increased its market share in every advanced industry since 1995, with IT and information services seeing the greatest increase of 5.9 percentage points, followed by motor vehicles, basic metals, and electrical equipment. (See figure 75.) Computers and electronics, the industry that includes semiconductors, has experienced the smallest increase (0.8 percentage points). However, given the enormous growth of the global semiconductor industry and the international push to diversify the semiconductor supply chain as Chinese threats to Taiwan's sovereignty intensify, India looks to be a prime location for greater activity in this industry in the near future.

Figure 75: India's global market shares in Hamilton industries, 1995–2022



In terms of industry strength, India's strongest industry is IT and information, where it had an LQ of 2.16 in 2022. India has long been an outsourcing hub for IT services, predominately serving companies headquartered in the United States, Europe, and East Asia. It is also strong in basic metals and motor vehicles, both of which it overperforms in. In contrast, India is below average in the seven other advanced industries, with significant underperformances in fabricated metals, chemicals, other transportation, and computers and electronics, all of which have LQs below 0.65.

Figure 76: India's relative performance in Hamilton Index industries (2022 LQ)



Historically, India's strongest industry was basic metals, with its LQ peaking at 3.06 in 2003. It then fell decisively below IT and information services in 2014. Between 2013 and 2022, most of India's industries declined in terms of LQ, with just the IT, motor vehicle, and machinery and equipment industries seeing their LQs increase. Overall, India's LQ fell 4 percentage points over the past decade.

India has only two industries that both overperformed in 2022 and saw their LQs increase between 2013 and 2022: IT and information services and motor vehicles. These industries are located in the top right quadrant of figure 78. Basic metals, the only other industry in which India overperformed in 2022, saw a decline in LQ, placing it in the top left quadrant. The remainder of India's industries are in the bottom half of the chart, as they all underperformed in 2022. These are machinery and equipment, pharmaceuticals, electrical equipment, fabricated metals, chemicals, other transportation, and computers and electronics.

India must improve the basics—adequate infrastructure, pro-business policies, business-friendly regulation, IP protections, and a not just highly educated but highly skilled workforce—if it wants to become the alternative to China it has been advertised as for years.

India's potential as an advanced industry giant is well known and has been for decades, but unlike other countries, which must fight for investment and attention from world-leading countries, India already has their attention; it just needs to give these companies what they want. India must improve the basics—adequate infrastructure, pro-business policies, business-friendly regulation, IP protections, and a not just highly educated but highly skilled workforce—if it wants to become the alternative to China it has been advertised as for years.

Figure 77: India's relative historical performance in Hamilton industries (LQ trends, 1995–2022)

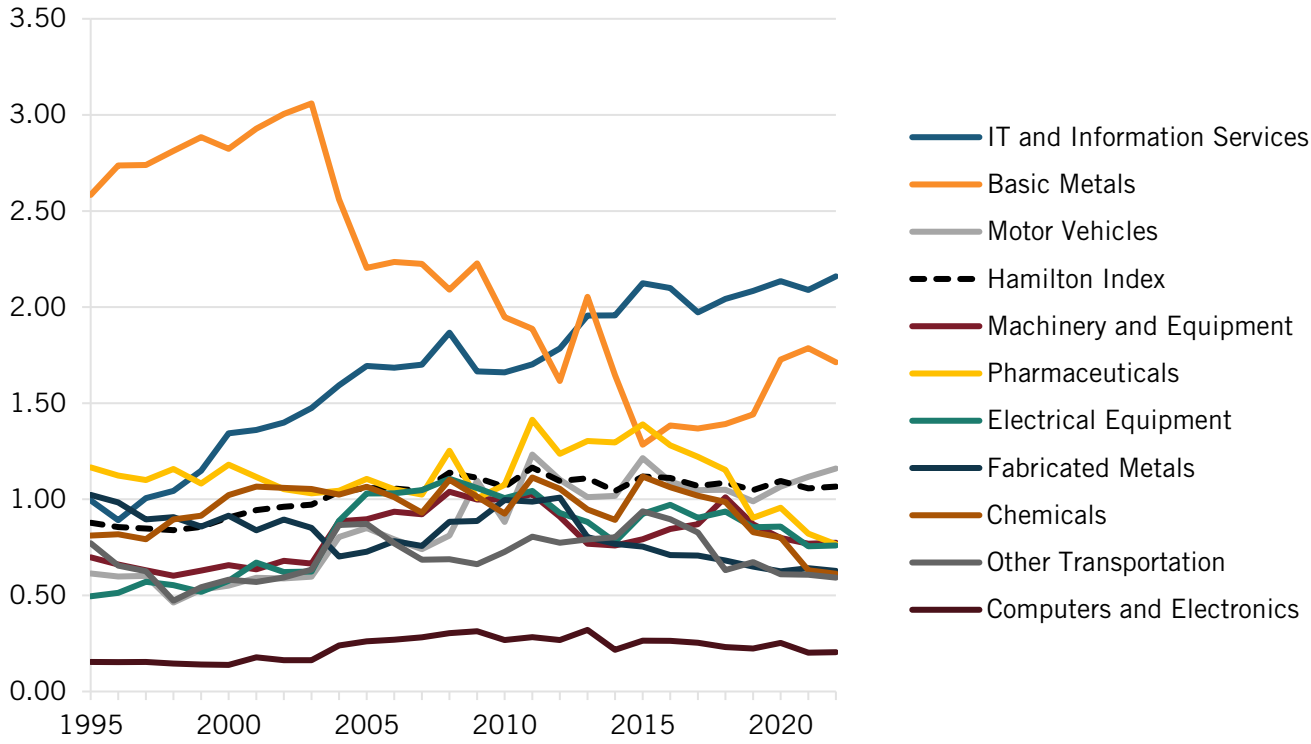
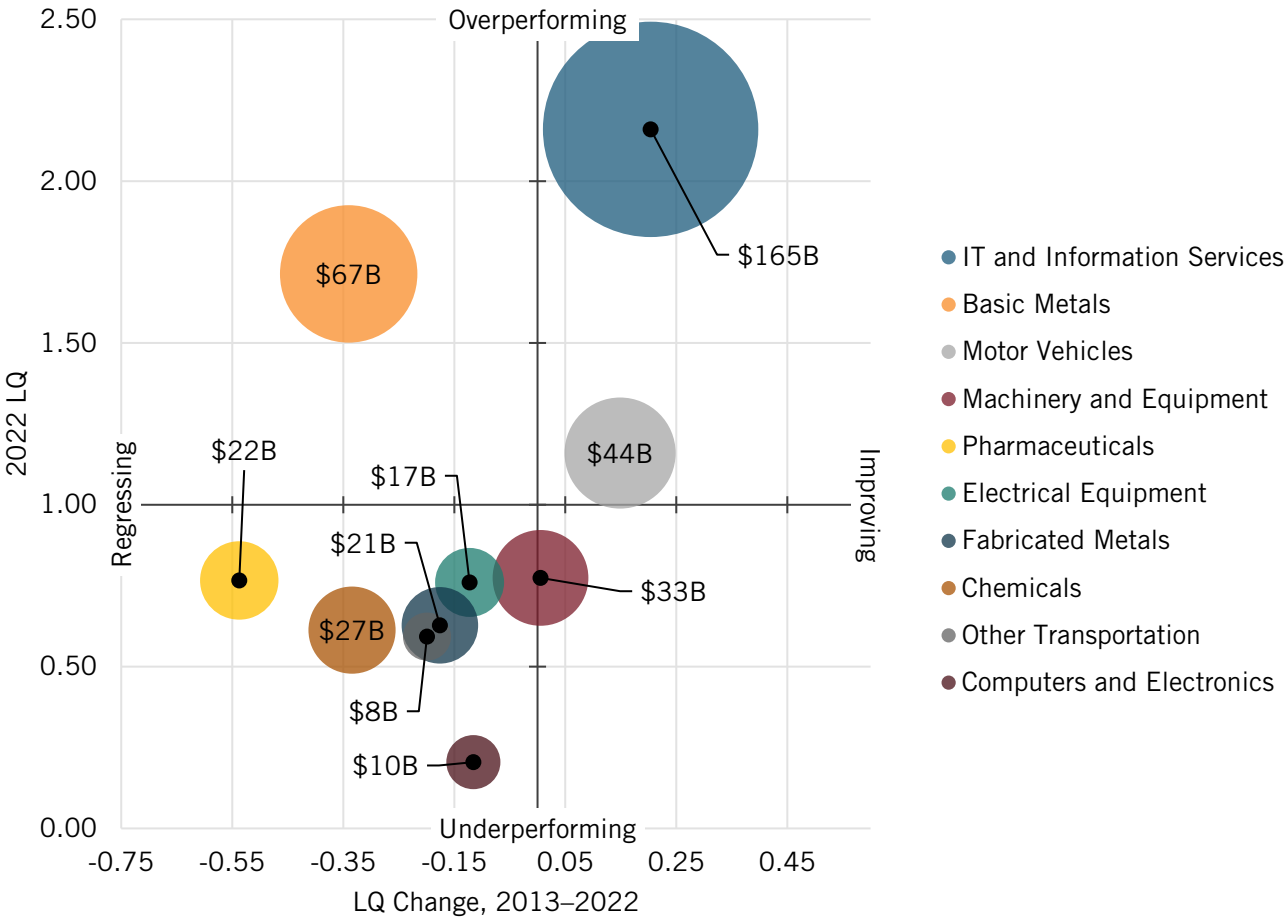


Figure 78: India's net performance in Hamilton industries since 2013 (scaled to 2022 output)

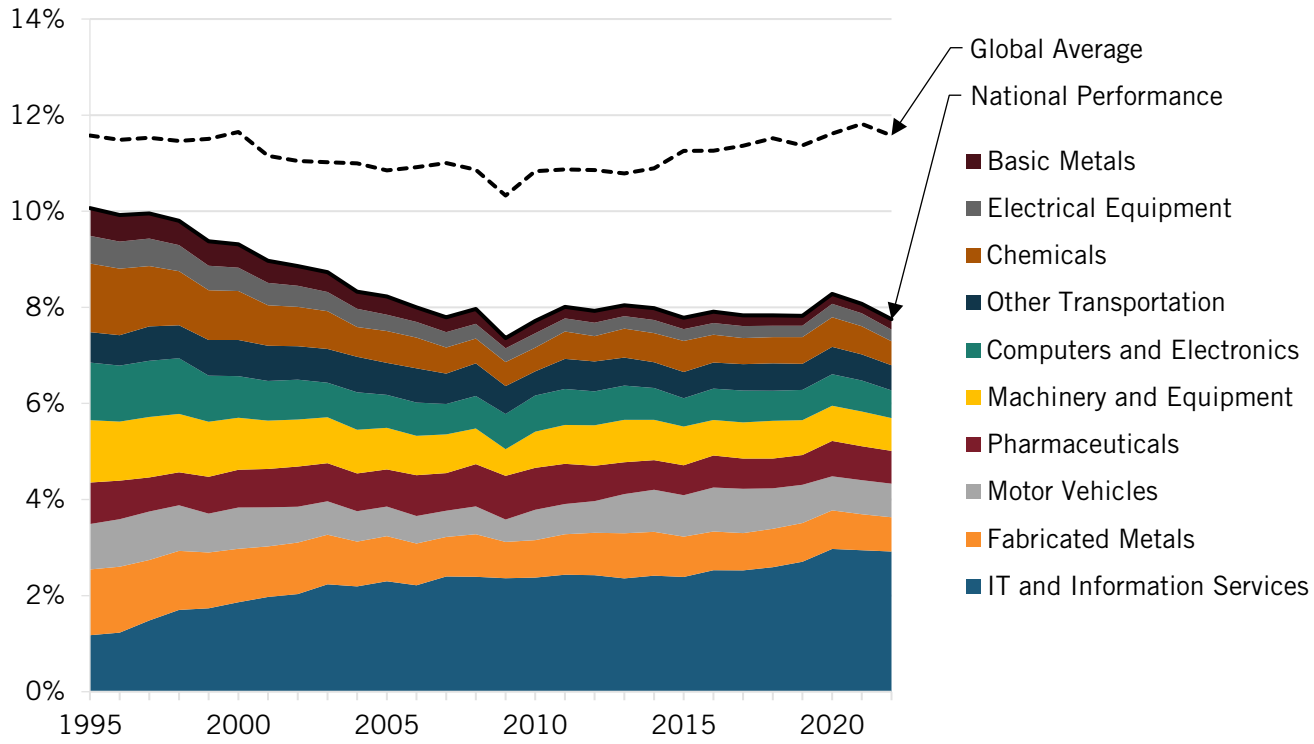


United Kingdom

The United Kingdom was the country that created industrialization, and over the past several decades, it has come to fear it. This fear is evident in the United Kingdom's advanced industries, which have undergone a long and slow decline, leaving the United Kingdom unable (and frankly unwilling) to compete on the global stage. Like the United States, the United Kingdom's strongest industry in terms of output is IT and information services, accounting for more than one-third of all advanced industry output in 2022. In fact, IT and info services are the only industry whose output has actually increased relative to the U.K. economy. (See figure 79.) Collectively, advanced industries account for 7.9 percent of the U.K. economy, less than the global average.

The United Kingdom's global market share in Hamilton industries overall was 2 percent in 2022, down from a high of 4.5 percent in 1998. Additionally, all industries lost market share between 1995 and 2022, with the largest declines in the chemical (3.3 percentage points) and pharmaceutical (3 percentage points) industries. The United Kingdom's IT and information services industry also lost market share, albeit the least, by 0.8 percentage points. (See figure 80.)

Figure 79: Hamilton Index industries' shares of the United Kingdom's economy, 1995–2022



The United Kingdom only performed above average in two industries in 2022: IT and other transportation, with LQs of 1.28 and 1.27, respectively. Its IT sector is a bright spot in the country's advanced industry ecosystem, driven by the largest fintech sector and the most venture capital funding in Europe. Because of this, the United Kingdom's software and IT sector has produced more unicorns than has any other European nation and ranks third globally.[16] The

United Kingdom's other transportation industry is also strong, driven by its aerospace sector, which is the second-largest in the world behind the United States'.[17]

Though underperforming across all other industries, the United Kingdom still performs close to average in the pharmaceutical industry, with an LQ of 0.80. The chemical, computers and electronics, electrical equipment, and basic metals industries are the United Kingdom's weakest, with LQs below 0.4.

Figure 80: The United Kingdom's global market shares in Hamilton industries, 1995–2022

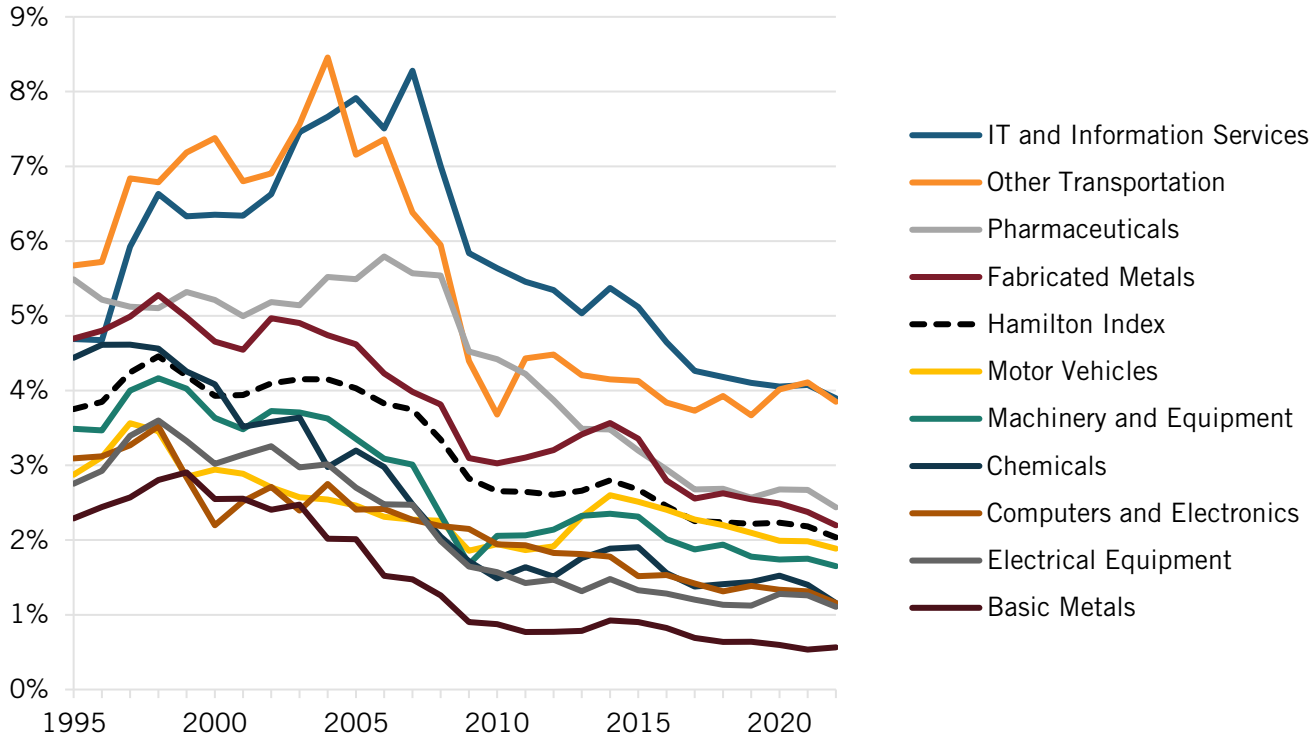
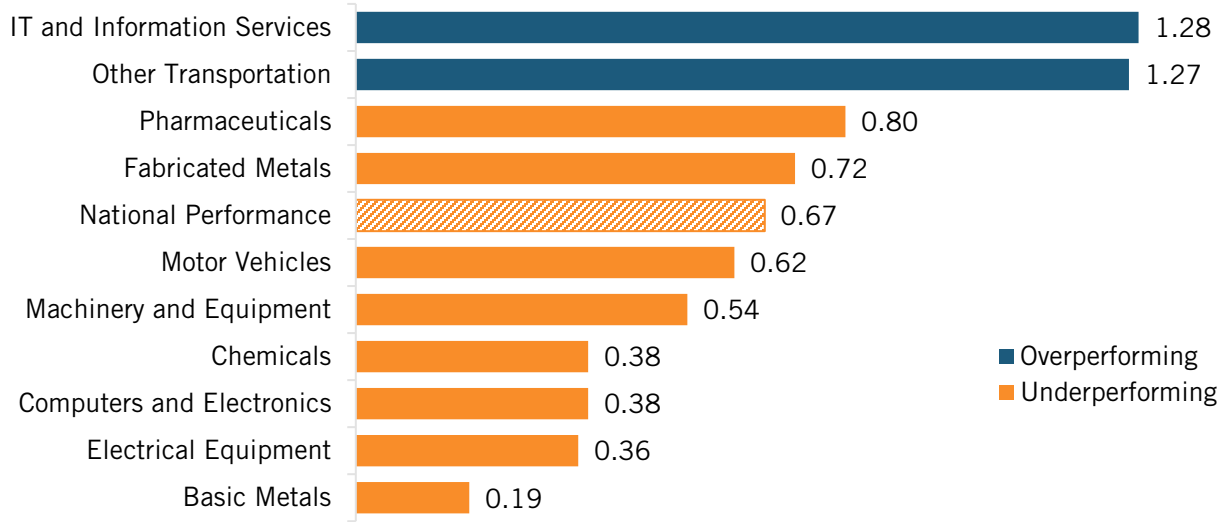
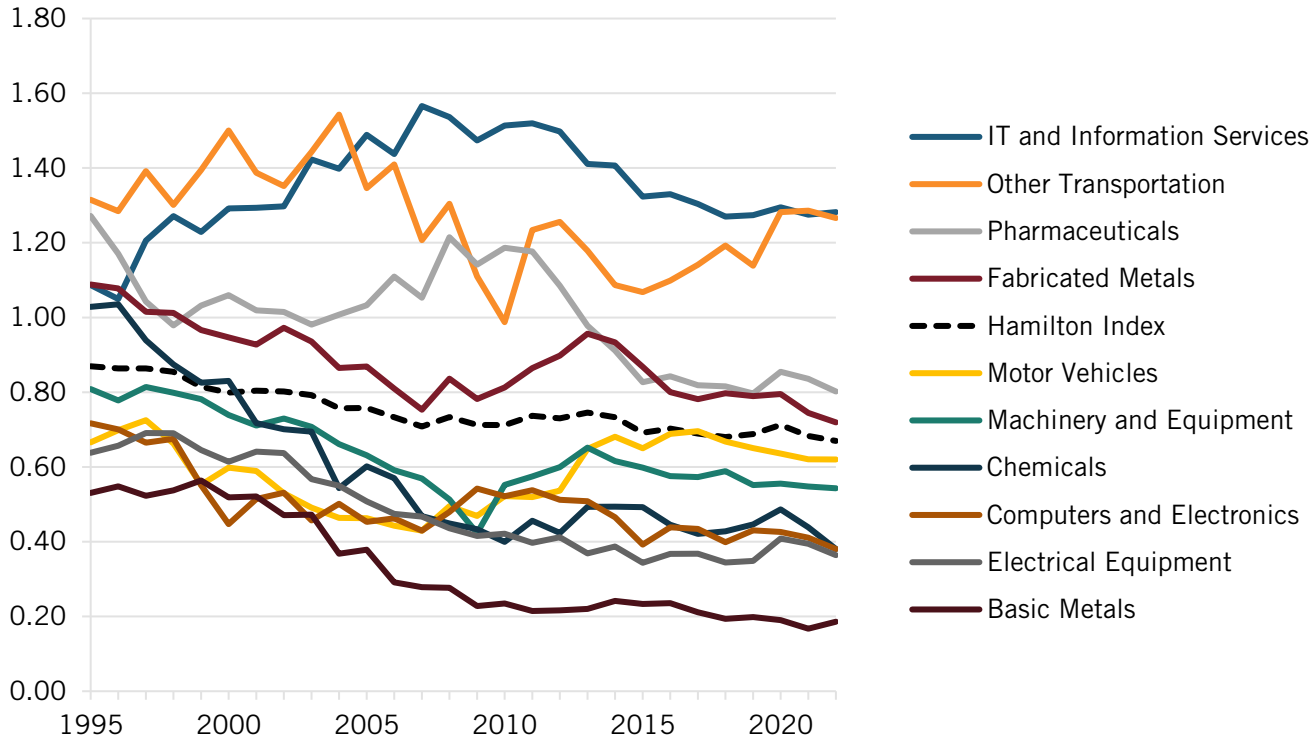


Figure 81: The United Kingdom's relative performance in Hamilton Index industries (2022 LQ, 1995–2022)



From 2013 through 2022, the LQs for all but one industry declined. That industry, other transportation, saw its LQ increase by 9 percentage points. (See figure 82.) The pharmaceutical industry, traditionally a strong point for the United Kingdom in advanced industries, has faced a steep decline over this period, with its LQ falling by 18 percentage points. In the aggregate, the United Kingdom's LQ in the Hamilton Index, 0.67, has declined by 7 percentage points since 2013.

Figure 82: The UK's relative historical performance in Hamilton industries (LQ trends, 1995–2022)



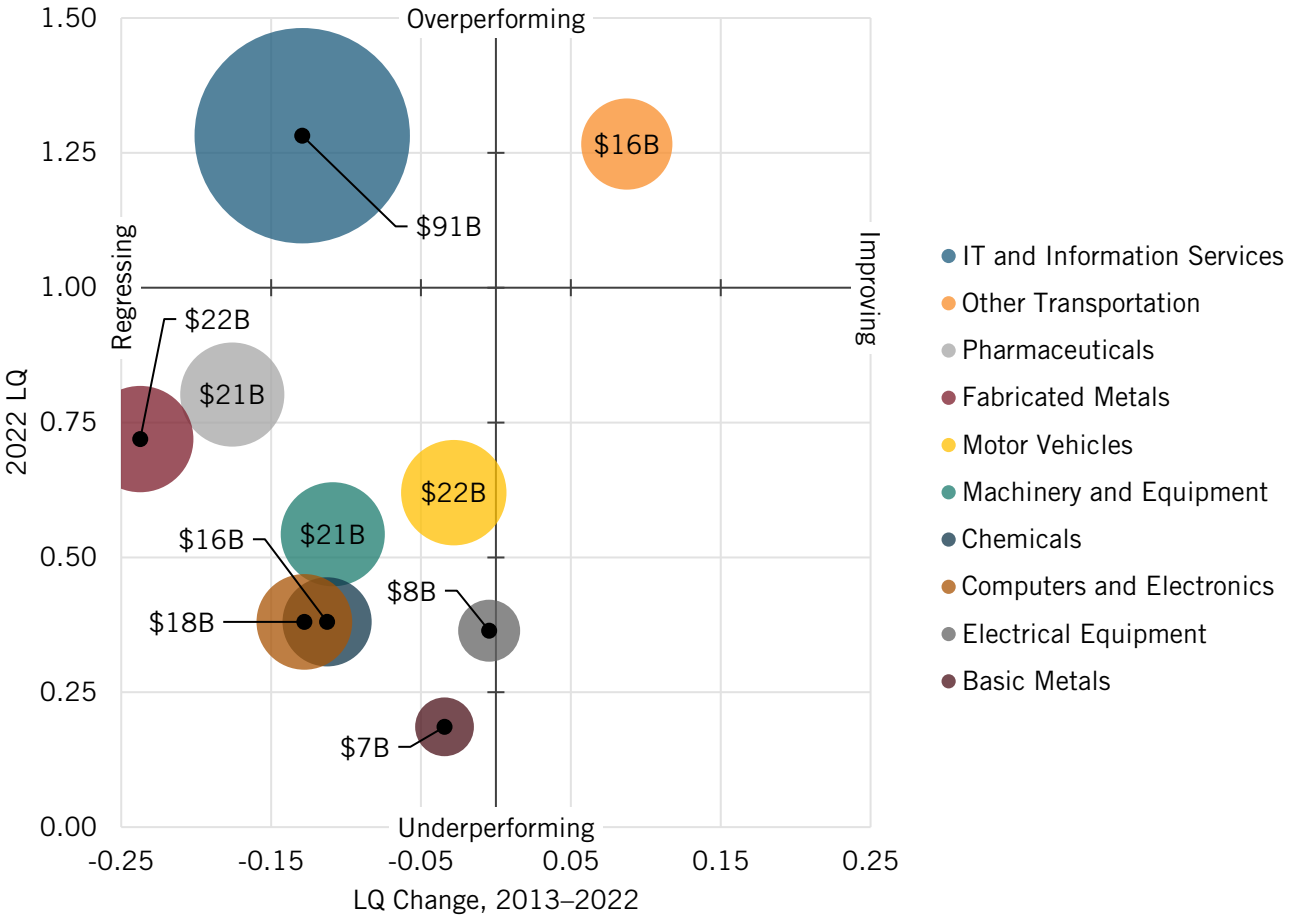
The United Kingdom has gone through a difficult several years in terms of advanced industry development and cultivation, as shown in figure 83. Only one industry was both overperforming in 2022 and has seen its LQ increase since 2013, other transportation, further demonstrating the United Kingdom's weakness in advanced industries. Almost all other industries are located in the bottom left quadrant, demonstrating that their LQs have both declined and were underperforming in 2022. Fabricated metals, the United Kingdom's second largest industry in terms of output, is among these industries.

Anti-innovation policies such as the United Kingdom's Digital Services Tax have made it an unattractive place to do business and have contributed to the 25 percentage-point decline in the its IT and information services LQ.

Perhaps the industry that should be of the greatest concern for the United Kingdom is its IT and information services. The advanced industry, which is the largest in the United Kingdom by a large margin, has seen its LQ fall by 13 percentage points since 2013. The United Kingdom's recent anti-innovation push in the IT and technology sector is likely behind some of this decline, leading firms to offshore operations away from the United Kingdom. A key example of this anti-

innovation policy is the United Kingdom's Digital Services Tax, passed in April 2020, which places a 2 percent tax rate on social media platforms, Internet search engines, and online marketplaces that derive value from U.K. users. This tax places unnecessary and burdensome costs on large technology companies, with particular penalties for those that have invested heavily in the United Kingdom.[18] Policy measures such as this reduce the United Kingdom's attractiveness as a place to do business for technology companies and can contribute to a decline in the its LQ.

Figure 83: The United Kingdom's net performance in Hamilton industries since 2013 (scaled to 2022 output)



France

France, like the rest of the EU, believes it can regulate itself to success, but the opposite has happened. Success in advanced industries has eluded the French economy for some time, and its global market share has fallen as a result. France's strongest industry is IT and information services, which accounts for 3.1 percent of its domestic economy. All other industries in the Hamilton index have a relatively small impact on the French economy, accounting for less than 1 percent of GDP. Altogether, advanced industries account for 8.3 percent of the national economy, down from 9.6 percent in 1995. (See figure 84.)

France's global market share in advanced industries has more than halved since 1995, falling from 4.2 percent to 2 percent, following in the trends of its European neighbors and the EU overall. (See figure 85.) Over this period, every industry in France has declined, losing up to 5.3 percentage points of market share, as has been the case for the IT and information services sector. Other transportation, France's best industry in terms of global market share (due to the success of Airbus, one of the two largest commercial aircraft manufacturers in the world), has declined the least, falling only 0.3 percentage points—not necessarily something to celebrate.

Figure 84: Hamilton Index industries' shares of France's economy, 1995–2022

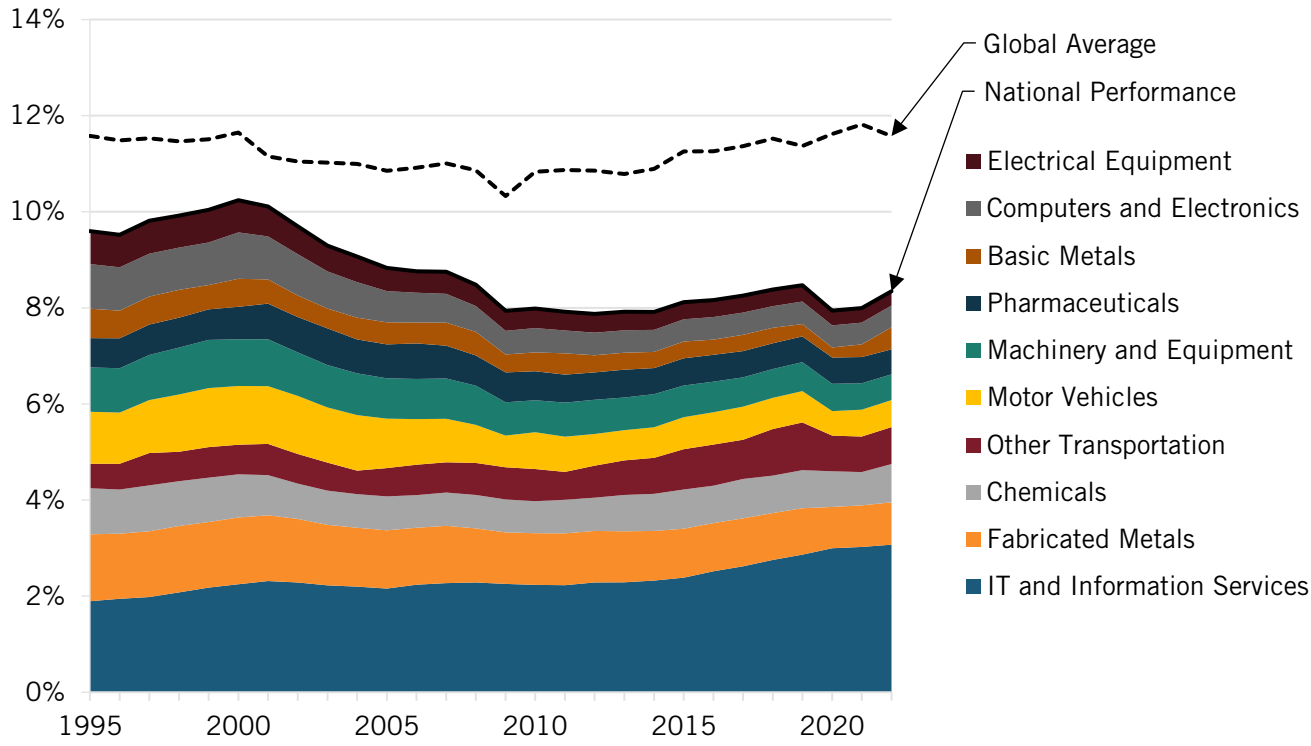
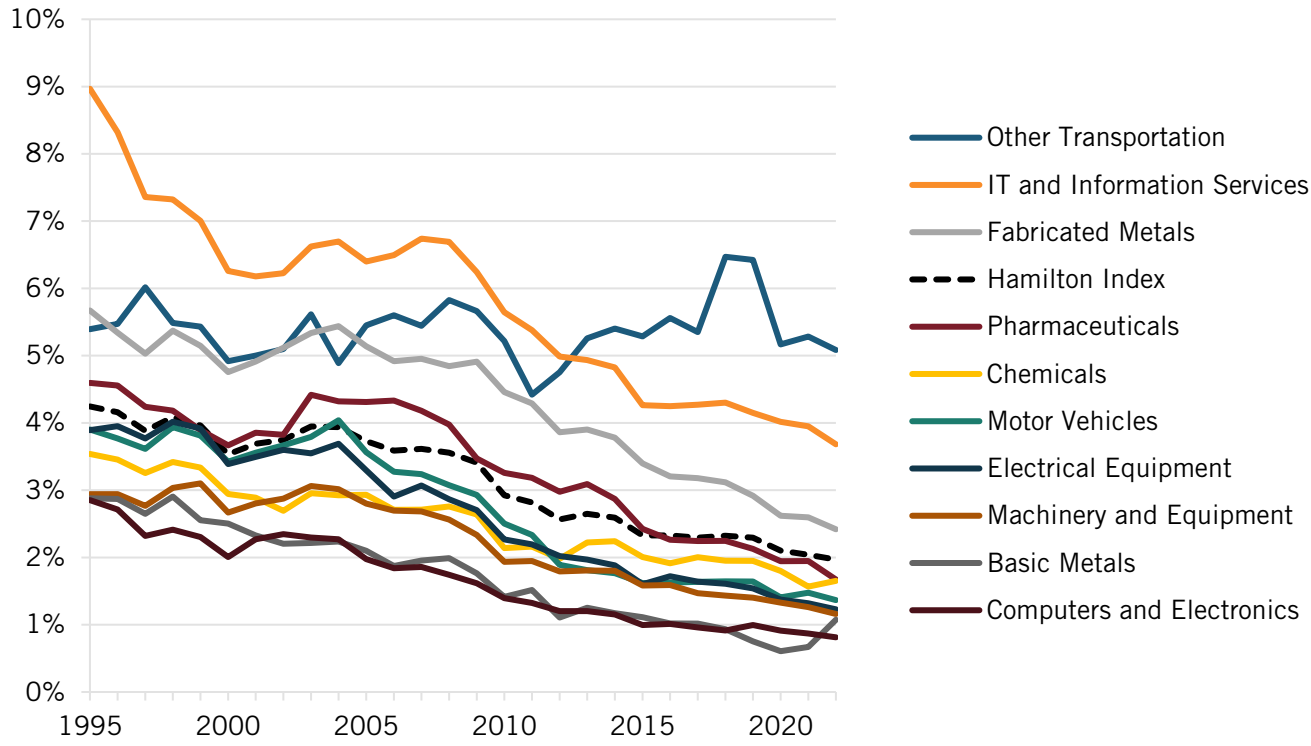
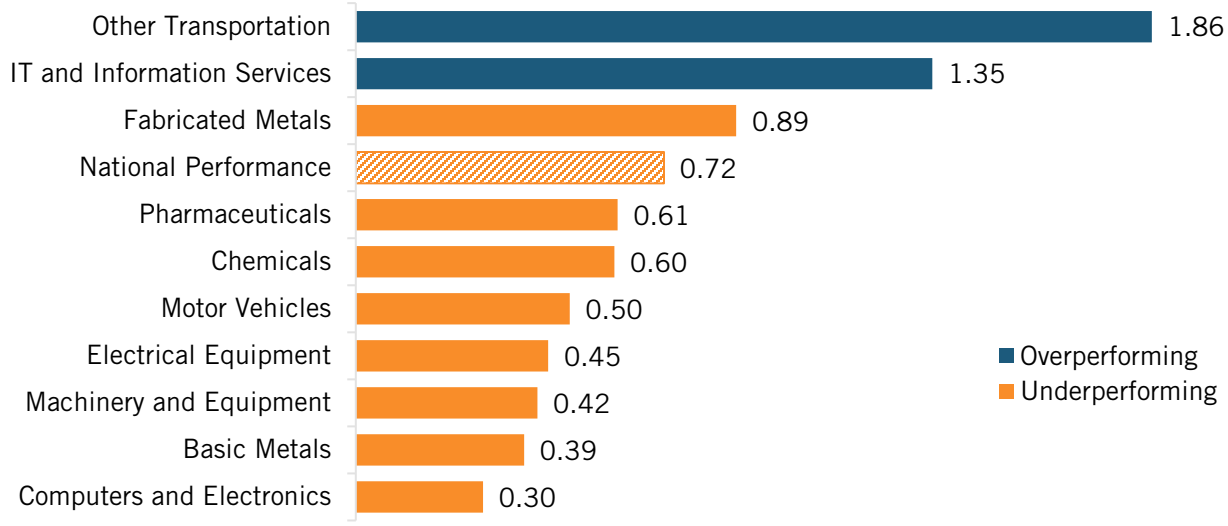


Figure 85: France's global market shares in Hamilton industries, 1995–2022



In terms of industry strength, France is above average in only two industries: other transportation and IT and information services. (See figure 86.) It lags behind the most in basic metals and computers and electronics, which have LQs below 0.4.

Figure 86: France's relative performance in Hamilton Index industries (2022 LQ)



Though its global market share has declined, France's LQ in other transportation has increased by 40 percentage points since 2013, making it the country's top advanced industry in terms of industrial specialization. IT and information services, the second-strongest industry, has,

conversely, seen its LQ decline by 2 percentage points over this period. However, the industry that has regressed the most is pharmaceuticals, where France's LQ fell from 0.86 in 2013 to 0.61 in 2022, a 24-point decline.

Figure 88 assesses France's advanced industries through the size of the industry, the industry's 2022 LQ, and the change in the industry's LQ between 2013 and 2022. Other transportation is the only industry that was both overperforming in 2022 and experienced an increase in its LQ. Almost all of France's other industries, excluding IT and information services and basic metals, fall into the bottom left quadrant of the figure, indicating that they are both underperforming and have declined in the wake of the financial crisis. Excluding fabricated metals, France has failed to overperform in any of those industries since 1995. If France really wants to become a leader in advanced industries, it, along with the rest of the EU, must abandon its strategy of innovating through regulation. Its excessive regulations, including its digital services tax, digital remuneration mandate, and restrictions on cloud services, make operating an advanced industry firm in France unattractive and unaffordable.[19]

Figure 87: France's relative historical performance in Hamilton industries (LQ trends, 1995–2022)

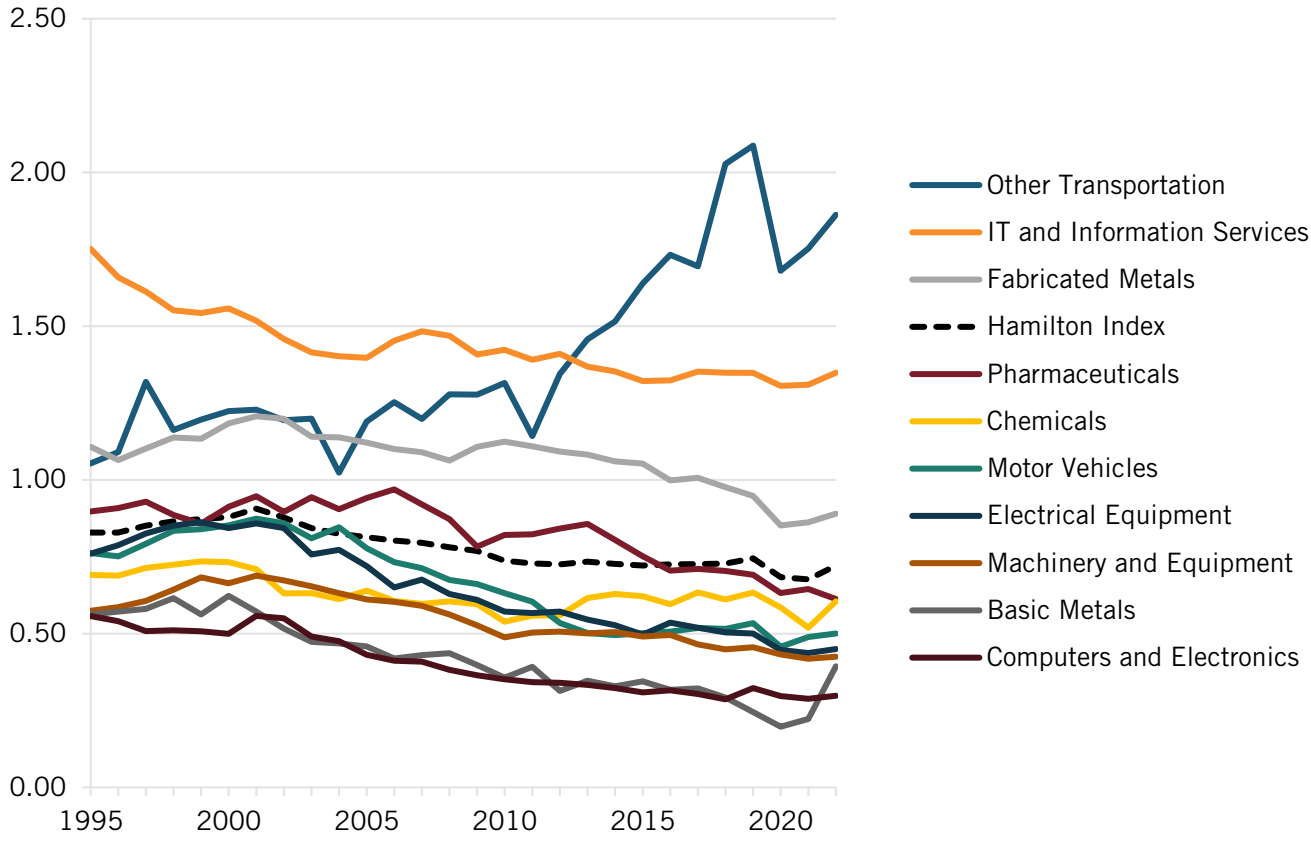
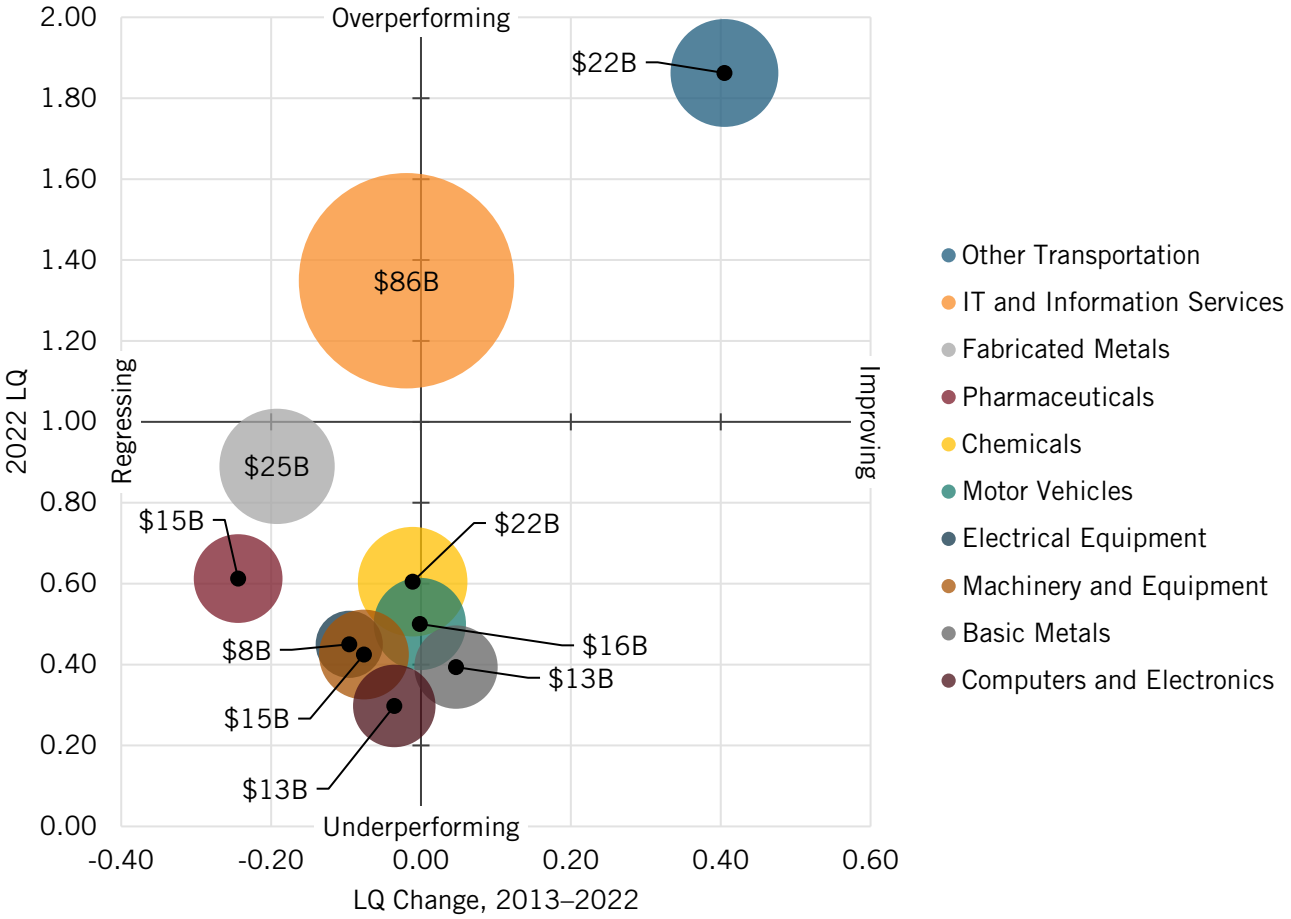


Figure 88: France's net performance in Hamilton industries since 2013 (scaled to 2022 output)

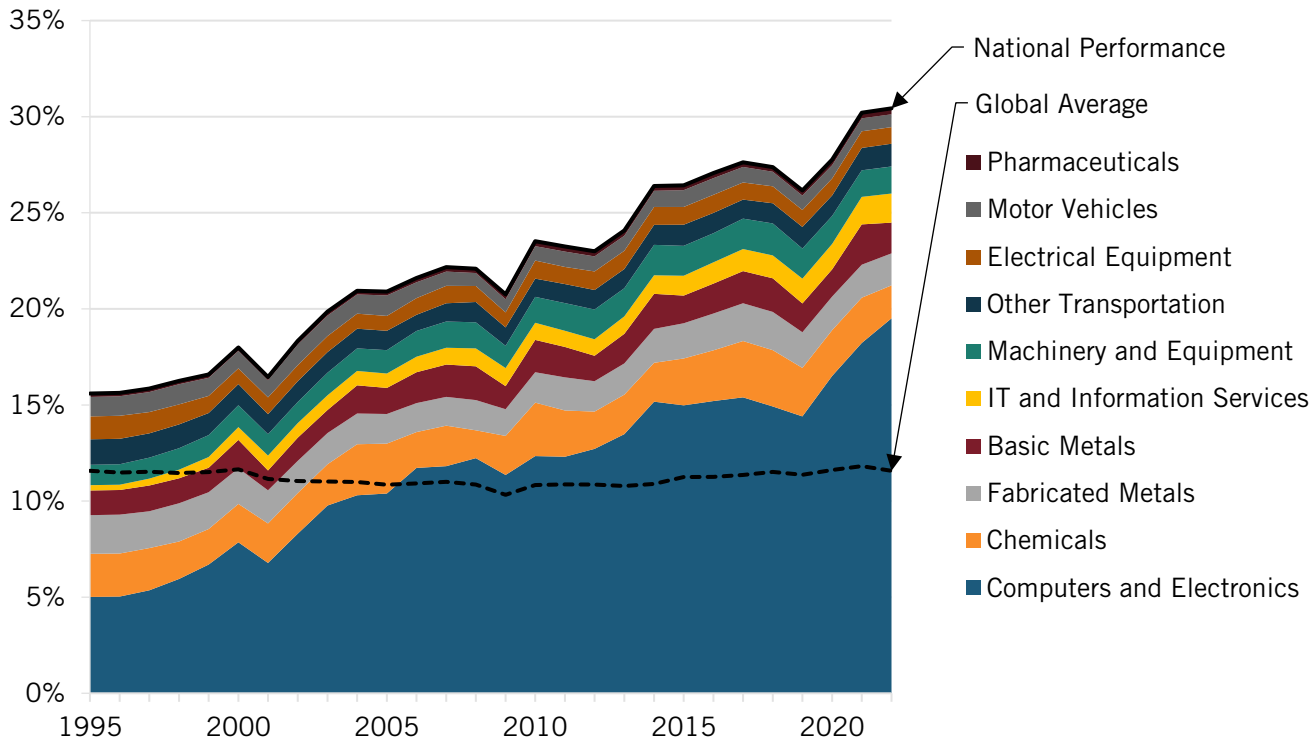


Taiwan

Taiwan is the epitome of a highly specialized nation. The semiconductor giant has the highest LQ in the world, and its lead over China has only grown. Since 2020, Taiwan's LQ has increased from 2.39 to 2.63, while China's has decreased from 1.37 to 1.36. However, Taiwan's formidable industrial strength—especially in computers and electronics—also represents a significant geopolitical vulnerability. Ongoing threats from China to invade Taiwan raise the prospect of severe disruption to the global semiconductor supply chain, with far-reaching consequences for Taiwan's future economic and industrial trajectory.

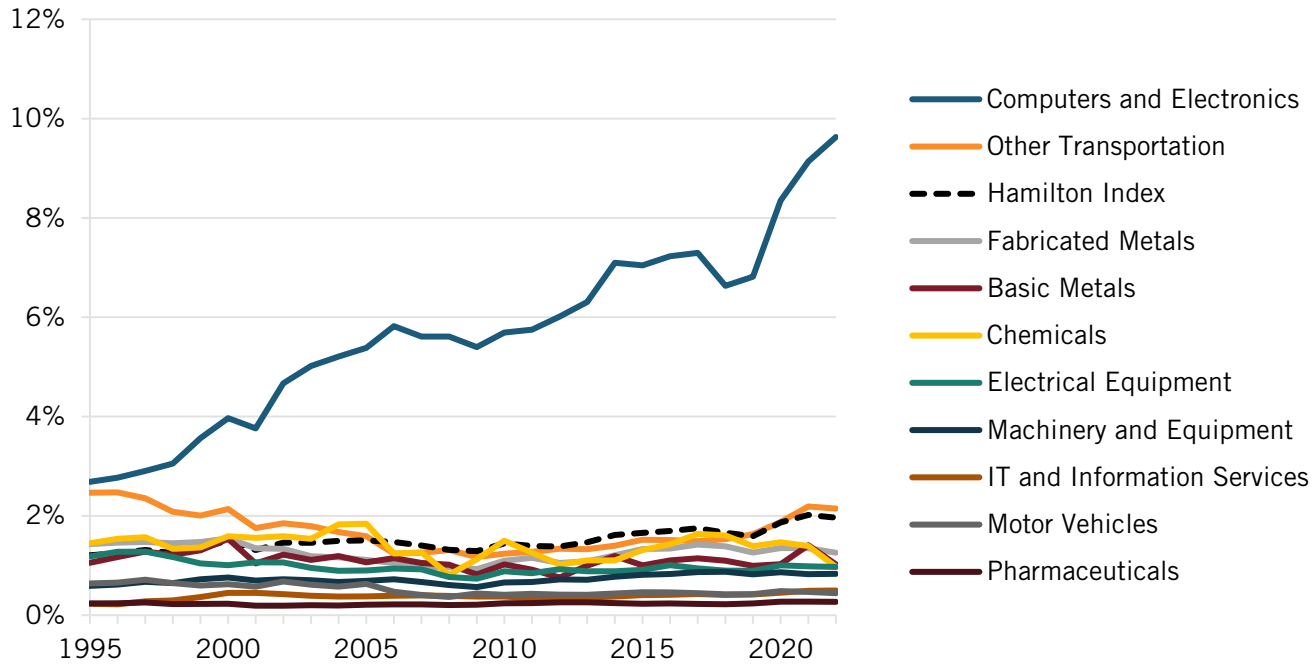
To showcase the importance of advanced industries to Taiwan's economy, one can examine Taiwan's output of advanced industries relative to its overall economy. In 2022, they accounted for 30.4 percent of Taiwan's national economy, nearly twice their relative value in 1995. Computers and electronics alone, which includes the semiconductor industry, is equal to 19.5 percent of Taiwan's domestic economy. (See figure 89.)

Figure 89: Hamilton Index industries' shares of Taiwan's economy, 1995–2022



Taiwan's output in advanced industries is extremely high relative to its economy's size. However, when considering output in absolute terms, Taiwan's performance is less outstanding. It holds 2 percent of Hamilton Industries' global market share, up 0.8 percentage points from 1995. The industry in which it holds the most market share is computers and electronics, where Taiwan holds 9.6 percent, the third most in the world behind China and the United States. Taiwan's semiconductor industry is primarily driven by TSMC, the the world's largest advanced chip manufacturer.

Figure 90: Taiwan's global market shares in Hamilton industries, 1995–2022



In terms of industry strength, Taiwan is above average in most industries. Its highest LQ is in computers and electronics, at 12.88, meaning Taiwan's computers and electronics industry has contributed nearly 13 times more to the Taiwanese economy than the global industry contributed to the global economy.

Since 2013, Taiwan's relative performance in computers and electronics has continued to grow rapidly, rising by 329 percentage points. Other transportation also has experienced a rapid increase in LQ, although significantly smaller in comparison, increasing by 85 percentage points. Aside from these industries, most of Taiwan's other advanced industries have remained relatively stagnant. Chemicals is the only one of Taiwan's industries to experience a substantial decline, falling by 38 percentage points between 2013 and 2022.

Figure 91: Taiwan's relative performance in Hamilton Index industries (2022 LQ)

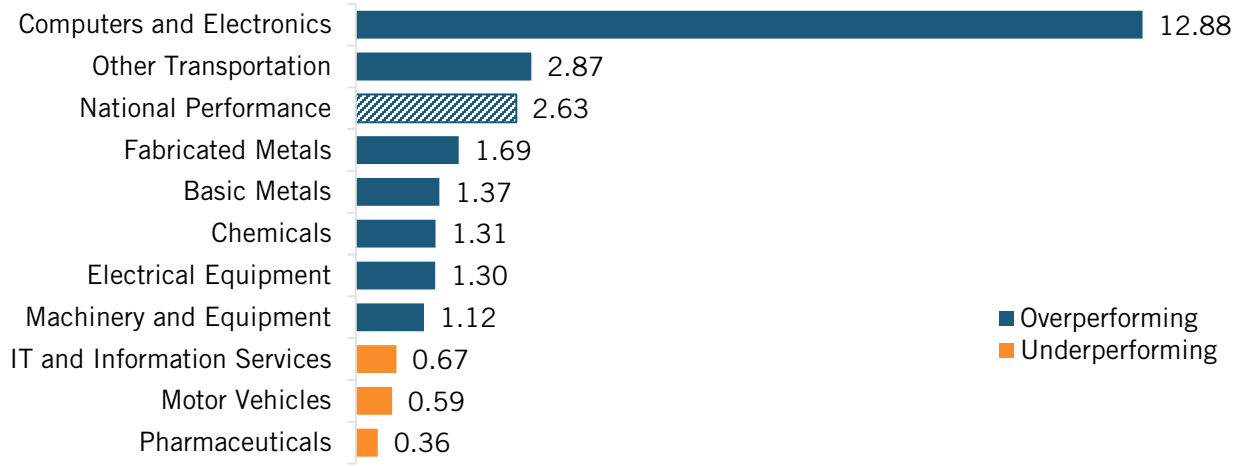
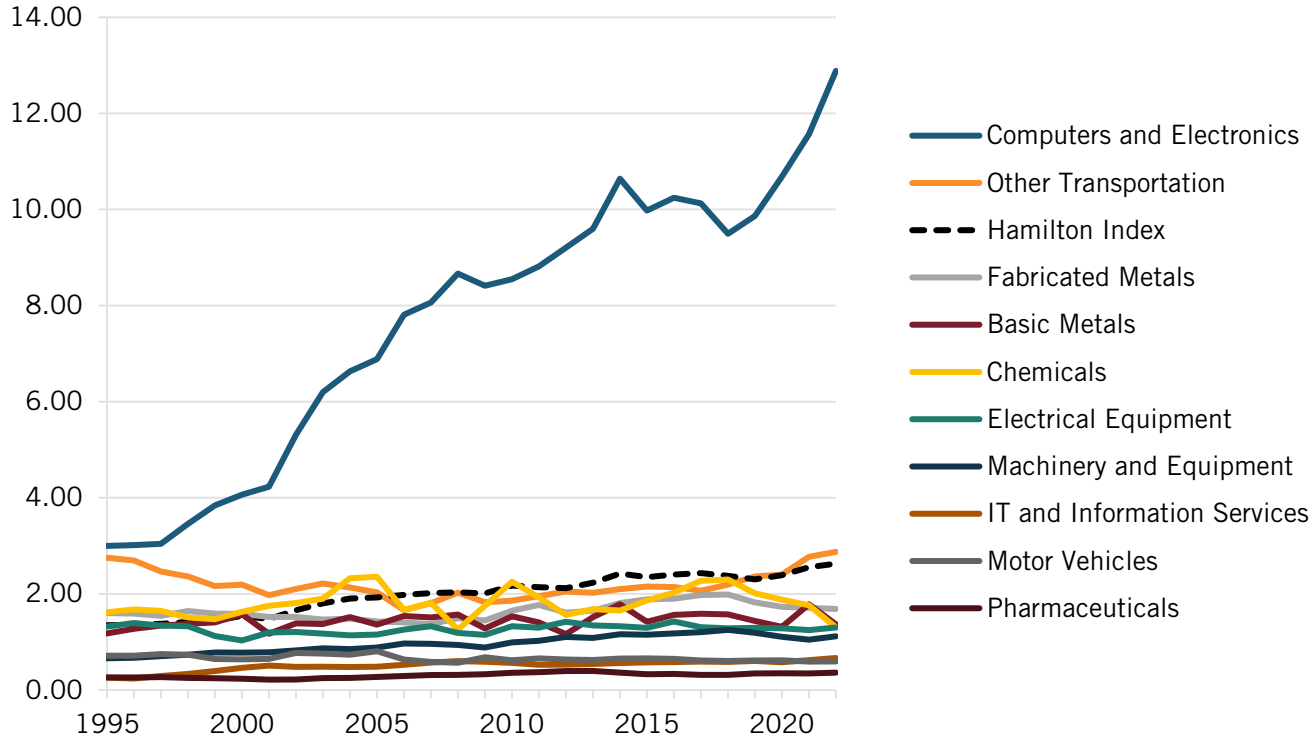
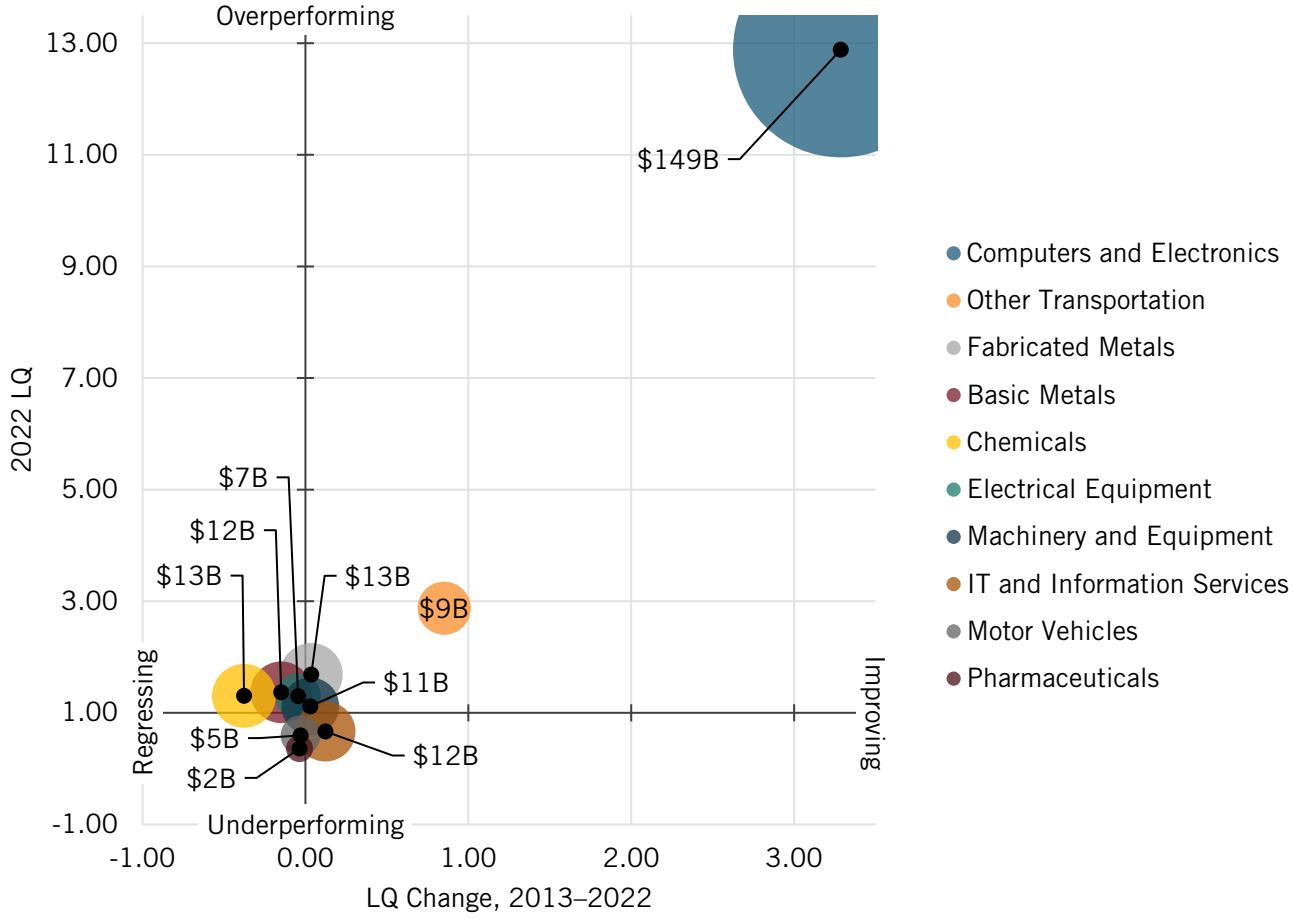


Figure 92: Taiwan's relative historical performance in Hamilton industries (LQ trends, 1995–2022)



Taiwan has four industries that both experienced an increase in LQ from 2013 to 2022 and overperformed in 2022, placing them in the top right quadrant of figure 93. Of these, computers and electronics is the obvious outlier, with its LQ more than four times larger than the next closest industry (other transportation). Other industries in that quadrant are fabricated metals and machinery and equipment. The basic metals, chemicals, and electrical equipment industries fall in the top left quadrant because they overperformed in 2022 and their LQ declined between 2013 and 2022. Finally, the motor vehicles and pharmaceutical industries are in the bottom left quadrant, as they underperformed in 2022 and saw their LQs decline, while the IT and information services sector, which underperformed in 2022 but saw its LQ increase, is in the bottom right quadrant.

Figure 93: Taiwan's net performance in Hamilton industries since 2013 (scaled to 2022 output)



Italy

Italy remains a major manufacturing economy, with longstanding strengths in machinery and metals manufacturing. However, its advanced manufacturing base has failed to generate much growth over the past several years and, as such, has seen its output stagnate. Since 2008, Italy has failed to meaningfully increase output in its advanced industries, and its global market share has fallen as a result.

In Italy's economy, advanced industries consistently made up 10 to 11 percent of domestic output between 1995 and 2022. Machinery and equipment, fabricated metals, and IT and information services were the three largest advanced industries in the economy, accounting for about 2 percent of domestic output each. (See figure 94.)

After experiencing a boost in output and market share in the early to mid-2000s, most of Italy's advanced industries have taken a severe hit. Its fabricated metals industry, which held over 7 percent of the global market as recently as 2008, fell to just 4.2 percent in 2022 (figure 95). Similarly, its machinery and equipment industry, which used to control about 6 percent of the global market in the mid-2000s, now controls just 3.6 percent. Overall, Italy's global market share in advanced industries fell from a high of 3.7 percent in 2004 to 1.9 percent in 2022.

Figure 94: Hamilton Index industries' shares of Italy's economy, 1995–2022

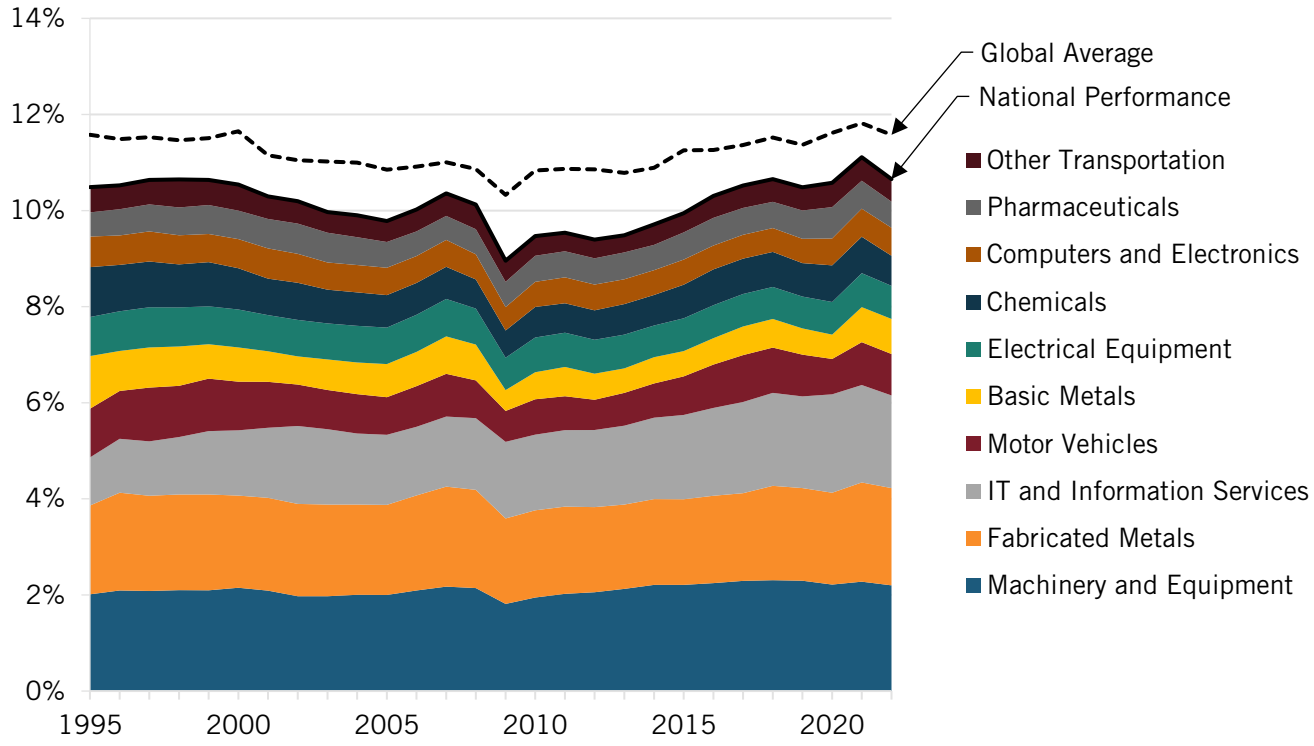
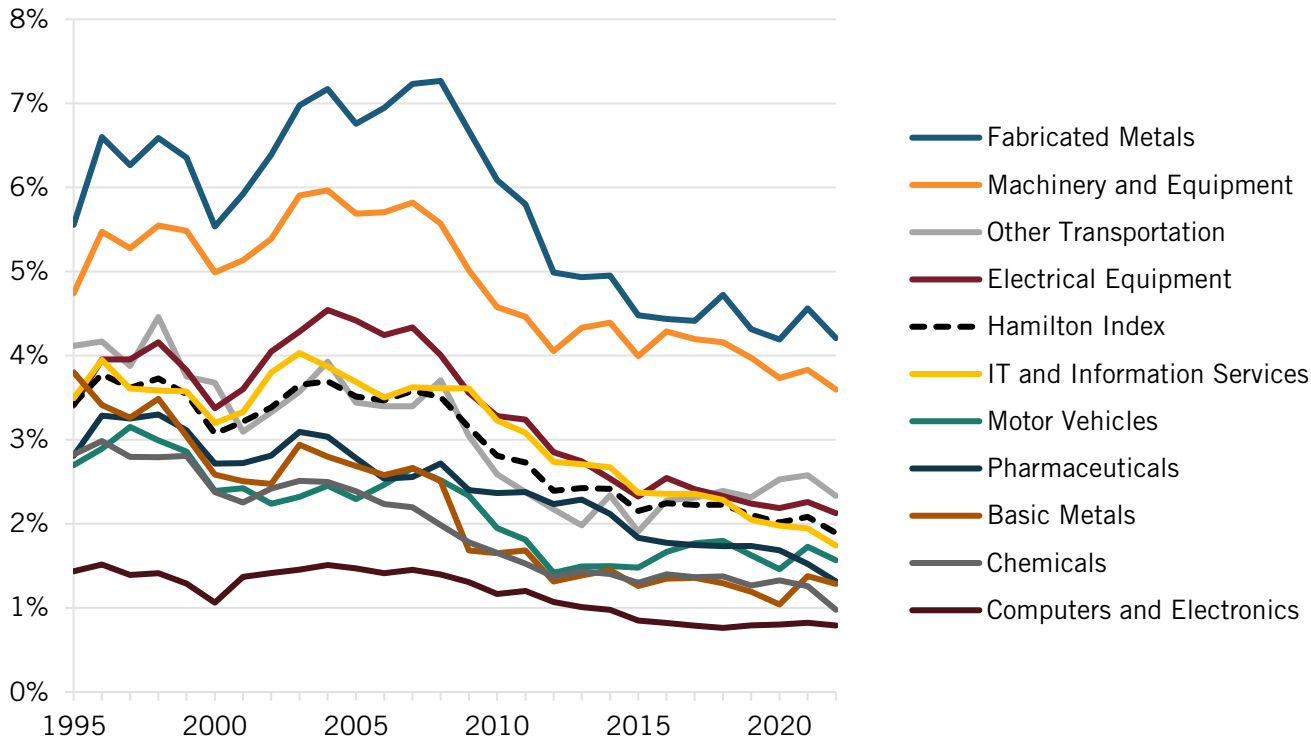
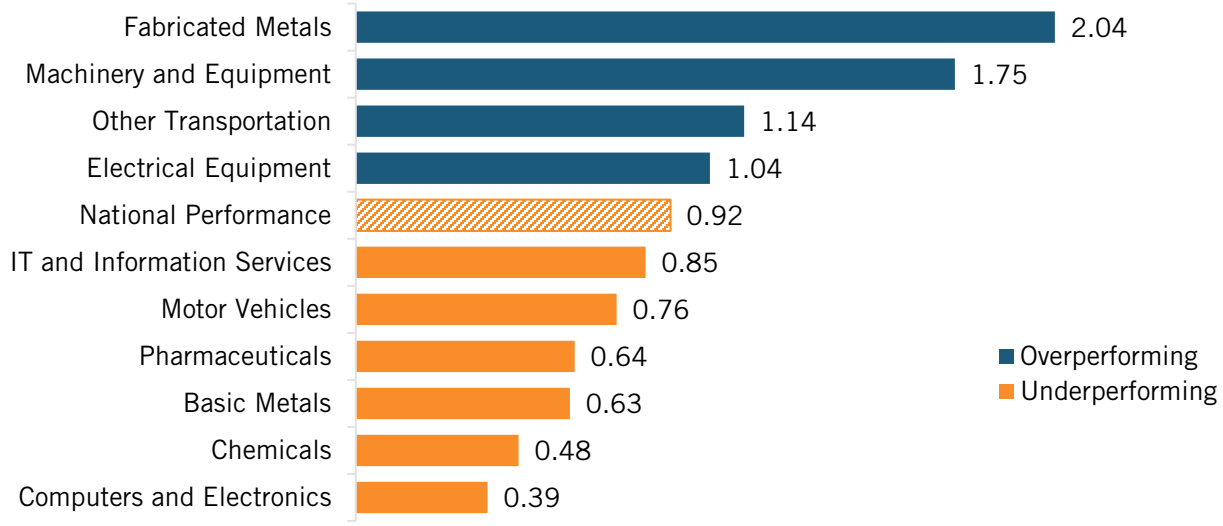


Figure 95: Italy's global market shares in Hamilton industries, 1995–2022



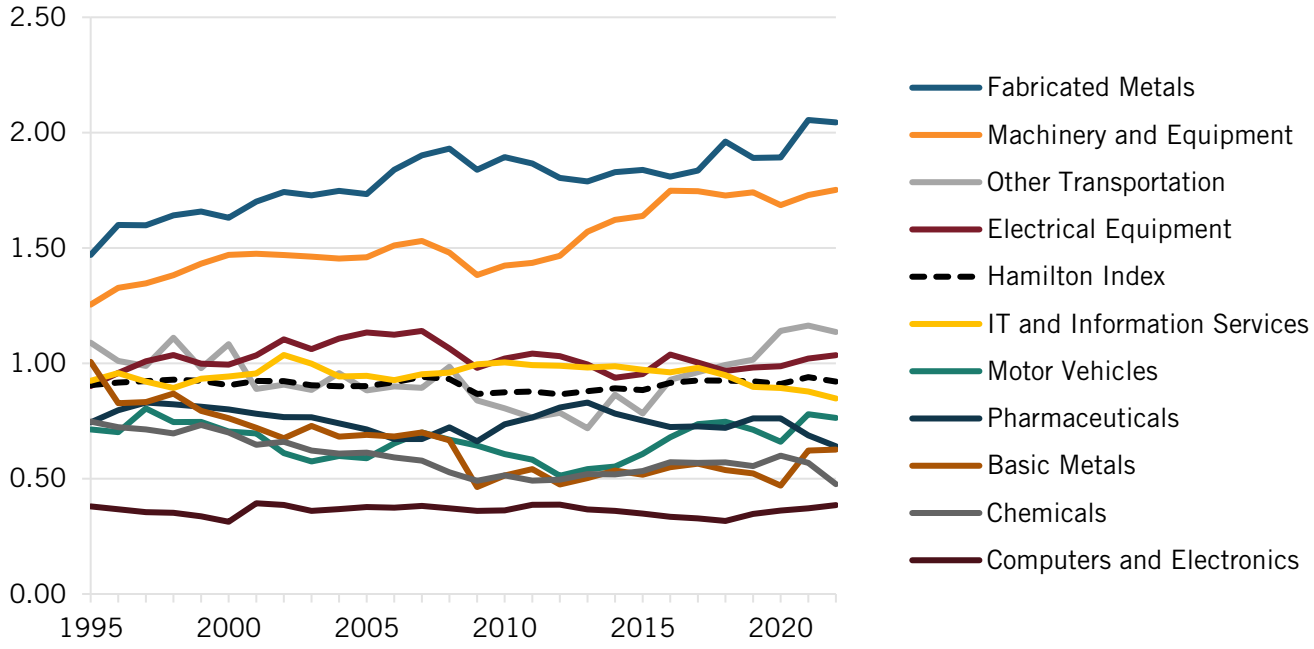
Looking at industrial specialization, Italy is above average in four industries: fabricated metals, machinery and equipment, other transportation, and electrical equipment. (See figure 96.)

Figure 96: Italy's relative performance in Hamilton Index industries (2022 LQ)



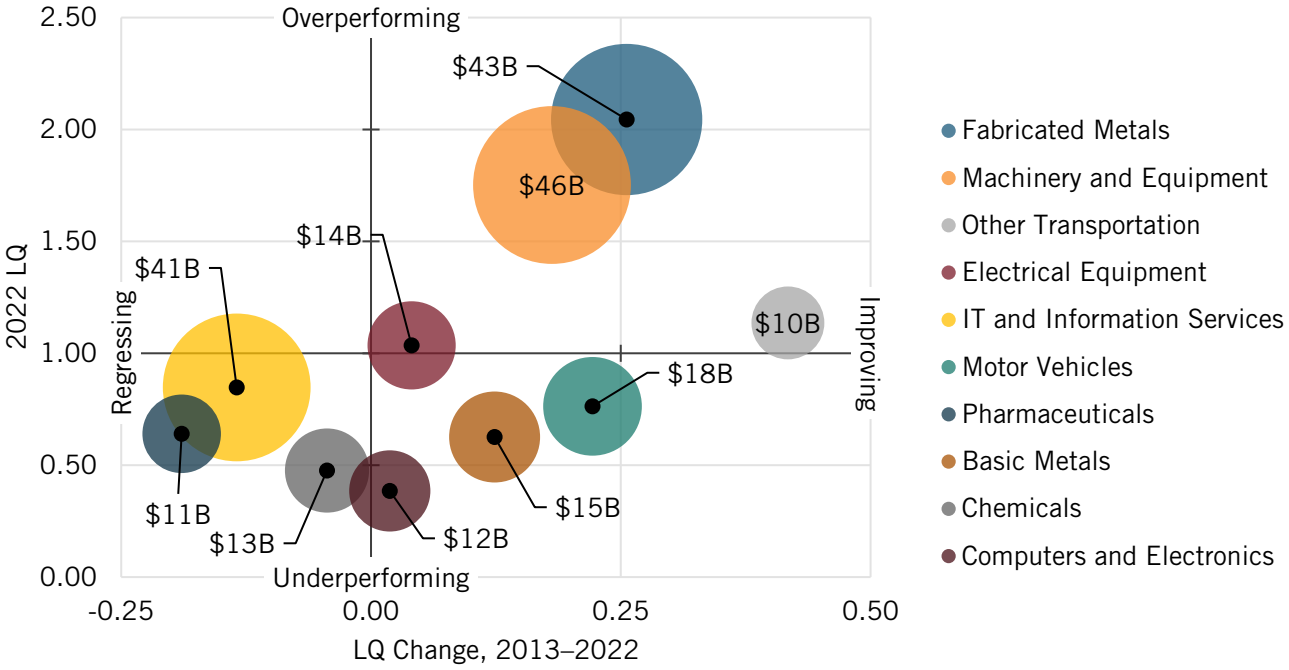
In contrast to its global market share, Italy has seen its LQs increase in many of its largest industries since 2013. Italy's LQ in the fabricated metals industry increased by 26 percentage points, while in Italy's second largest industry, machinery and equipment, it increased by 18 percentage points.

Figure 97: Italy's relative historical performance in Hamilton industries (LQ trends, 1995–2022)



Four of Italy's advanced industries saw their LQs increase between 2013 and 2022 and overperform in 2022, demonstrating a strong and growing industrial specialization in fabricated metals, machinery and equipment, electrical equipment, and other transportation. These industries are located in the top right quadrant of figure 98. Conversely, three industries saw their LQs decline over this period and underperform in 2022, placing them in the bottom left quadrant.

Figure 98: Italy's net performance in Hamilton industries since 2013 (scaled to 2022 output)



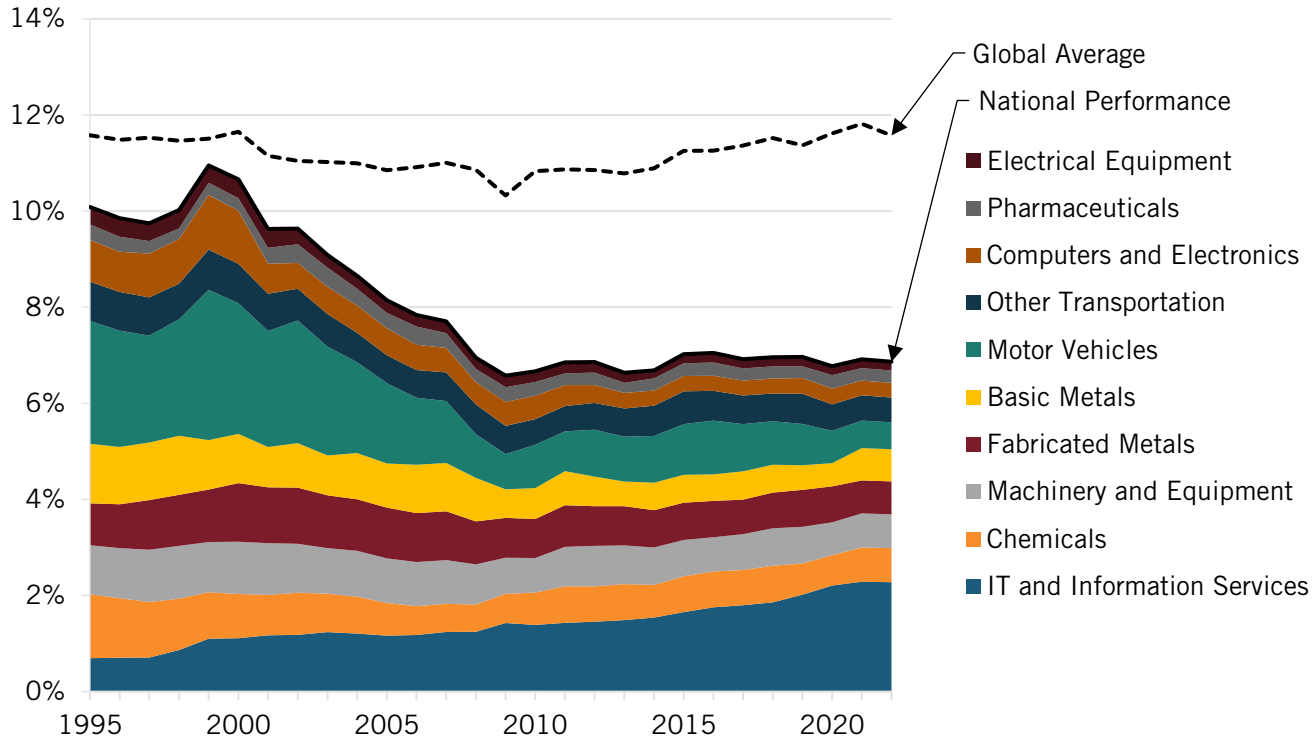
OTHER PRODUCERS

Although the following countries are not among the top 10 global producers, they represent important trade partners, specialized manufacturers, and rapidly developing nations with key roles to play in the global advanced industry ecosystem. The following section examines Canada, Mexico, and Vietnam.

Canada

Canada is the United States' closest trading partner, but its economy relies on natural resources rather than advanced industries. Canada has, in fact, consistently underperformed relative to the world and continues to lose ground. Between 1995 and 2022, the value of advanced industries as a share of the total Canadian economy declined from 10 percent to just 6.9 percent. Motor vehicles, once Canada's strongest industry, is now the country's sixth largest in terms of output. (See figure 99.)

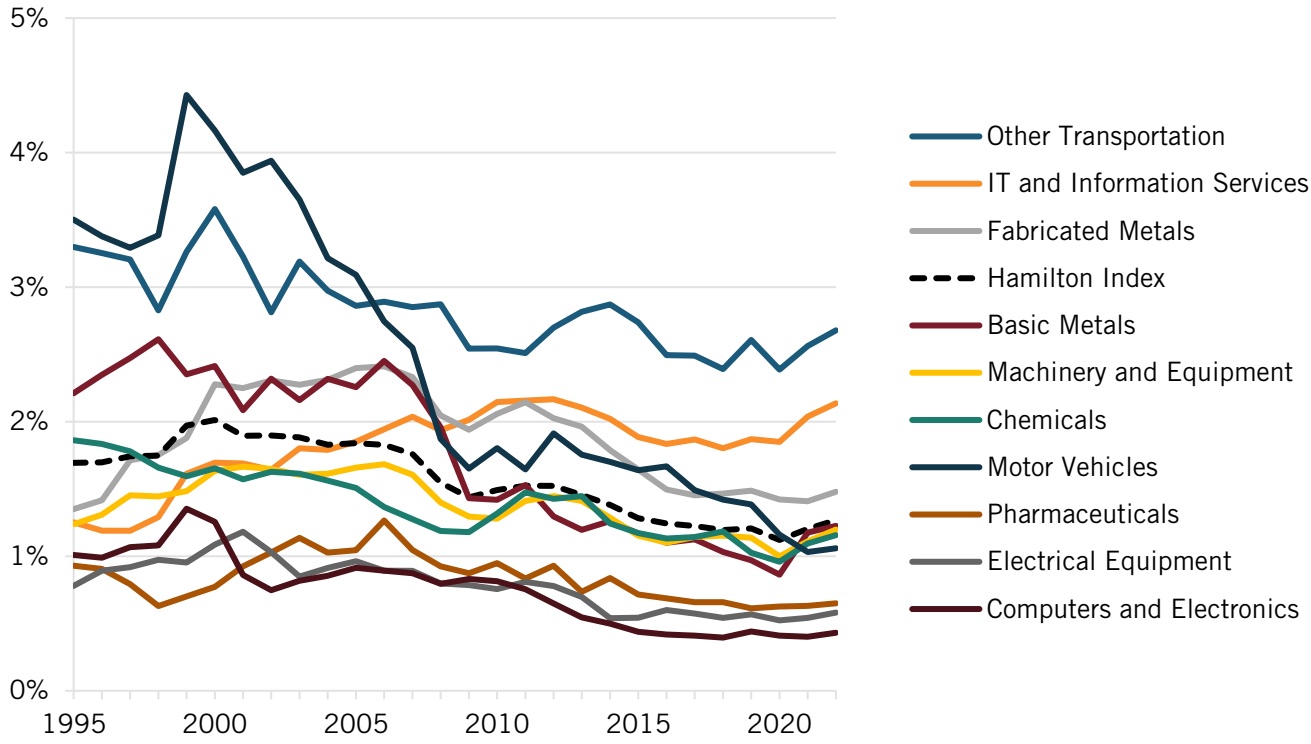
Figure 99: Hamilton Index industries' shares of Canada's economy, 1995–2022



Canada's global market share in almost every advanced industry declined between 1995 and 2022, with the largest occurring in the motor vehicle industry. Canada had the fifth-highest share of the global motor vehicle market in 1995, at 3.5 percent, but as the integration of the North American economy deepened through the North American Free Trade Agreement (NAFTA), more manufacturing moved to Mexico, and the Canadian auto industry weakened. By 2007, Canada's global market share had dropped to 2.5 percent, while Mexico's had increased to 3.5 percent. By 2022, Canada held just 1 percent of the global market, while Mexico held 5.6 percent.

The only industry in which Canada's global market share meaningfully increased was the IT and information services industry, which gained 0.9 percentage points of global market share between 1995 and 2022.

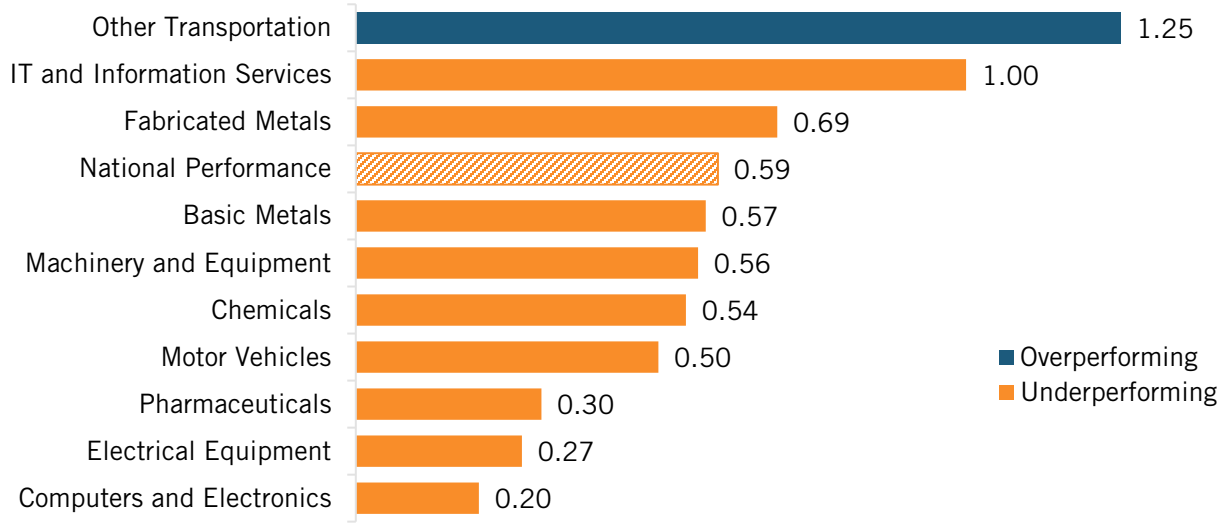
Figure 100: Canada's global market shares in Hamilton Industries, 1995–2022



Canada had the fifth-highest share of the global motor vehicle market in 1995, but as the integration of the North American economy deepened through NAFTA, more manufacturing moved to Mexico, and the Canadian auto industry weakened.

In terms of industrial specialization, Canada is above average in only one industry, other transportation, with an LQ of 1.25, likely due to the strength of the Canadian plane manufacturer Bombardier. (See figure 101.) Canada is barely below average in IT and information services, although it has demonstrated that it is willing to follow in the footsteps of European countries in regulating itself away from success in this industry. Although Canada's digital services tax was rescinded in 2025 under pressure from the Trump administration, Canada has imposed a series of other detrimental digital policies, including a digital remuneration mandate and cross-border data transfer regulations.[20]

Figure 101: Canada's relative performance in Hamilton Index industries (2022 LQ)



Since 2013, few Canadian industries—IT and information services, other transportation, and basic metals—have increased their LQ (figure 102). Other transportation and IT and information services are the only two industries in Canada that have both overperformed and improved over the previous decade. Most other industries are in the bottom left quadrant of figure 103, indicating that they underperform and their LQs have declined.

Figure 102: Canada's relative historical performance in Hamilton industries (LQ trends, 1995–2022)

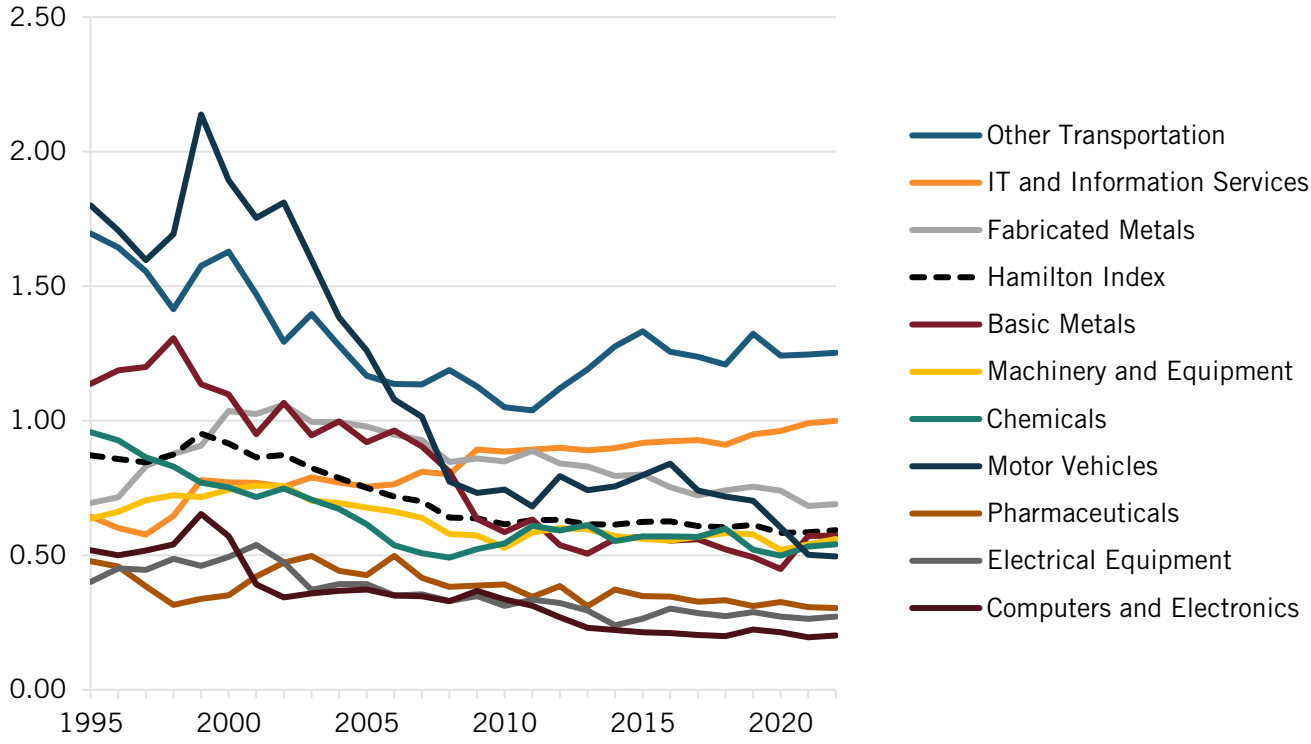
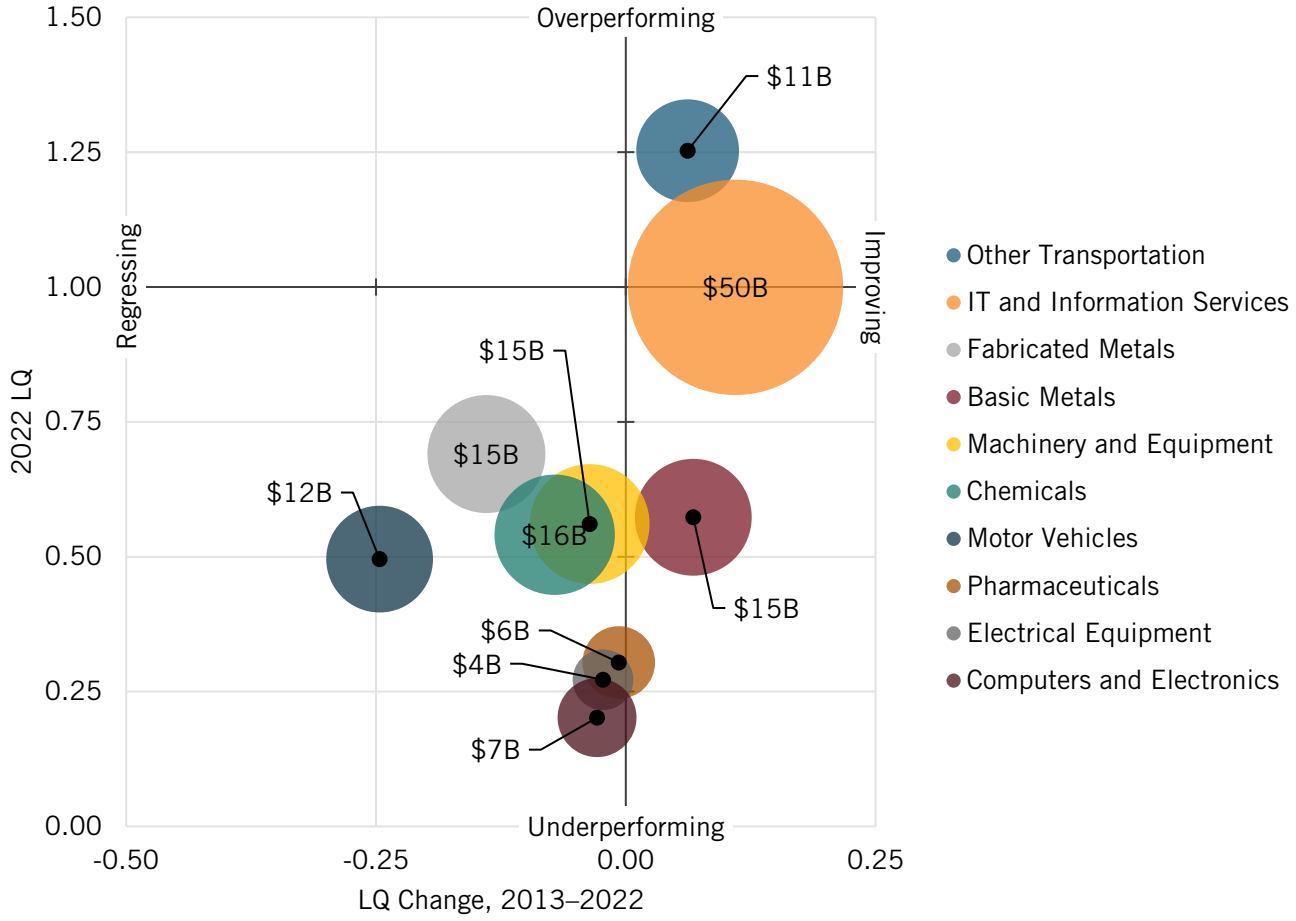


Figure 103: Canada's net performance in Hamilton industries since 2013 (scaled to 2022 output)

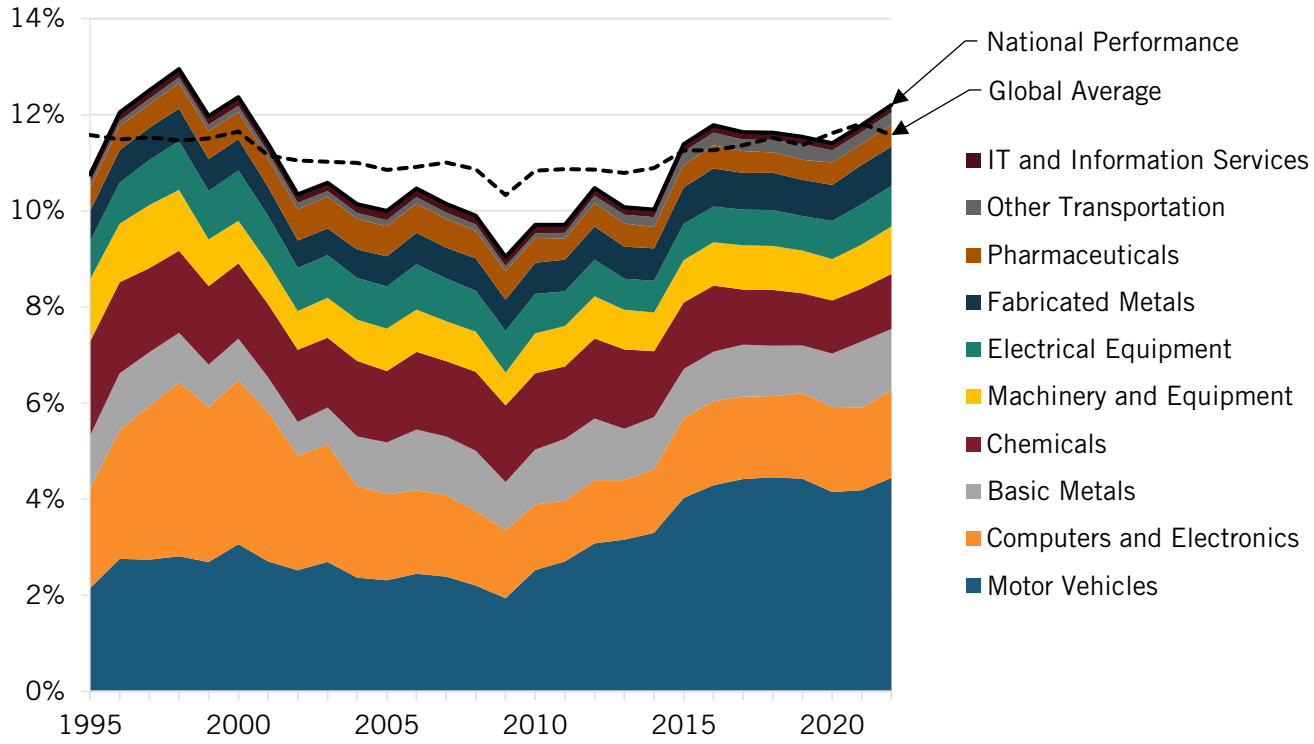


Mexico

Mexico has continued to show its capabilities as having an advanced industrial economy. Although it is highly reliant on its motor vehicle industry, Mexico overperforms in several advanced industries and has continued to increase its LQ, albeit gradually, since the mid-2000s. Its overall LQ of 1.05 in 2022 puts it ahead of the United States, France, the United Kingdom, and Canada, and just slightly behind India.

Advanced industries accounted for about 12.2 percent of Mexico's economy in 2022, higher than the global average. (See figure 104.) Motor vehicles were the largest industry, accounting for 4.4 percent of the broader economy (the largest of any economy in the world), followed by the computer and electronics industry with 1.8 percent. Mexico has become a hub for offshore manufacturing over the past two decades due to its low labor costs, attracting firms such as Ford, Toyota, and Apple. However, Mexico has few of its own major firms, with no major international electronics or automobile companies headquartered there.

Figure 104: Hamilton Index industries' shares of Mexico's economy, 1995–2022



Mexico was the fifth-largest motor vehicle manufacturer in the world by value-added output as of 2022, with 5.6 percent of global market share, up 3.8 percentage points since 1995. (See figure 105.) This is by far Mexico's strongest industry and the one that has grown the most due to NAFTA, which has led to the relocation of production from the United States and Canada. All other industries either lost market share or saw it increase by less than 1 percentage point. The chemicals, pharmaceuticals, and IT and information services industries lost global market share over this period, while all other industries increased their market share.

In terms of industrial strength, Mexico is above average in four industries: motor vehicles, electrical equipment, computers and electronics, and basic metals. (See figure 106.) Conversely,

Mexico is below average in all other industries. Pharmaceuticals and IT are the worst-performing industries, with LQs of only 0.54 and 0.07, respectively.

Figure 105: Mexico's global market shares in Hamilton Industries, 1995–2022

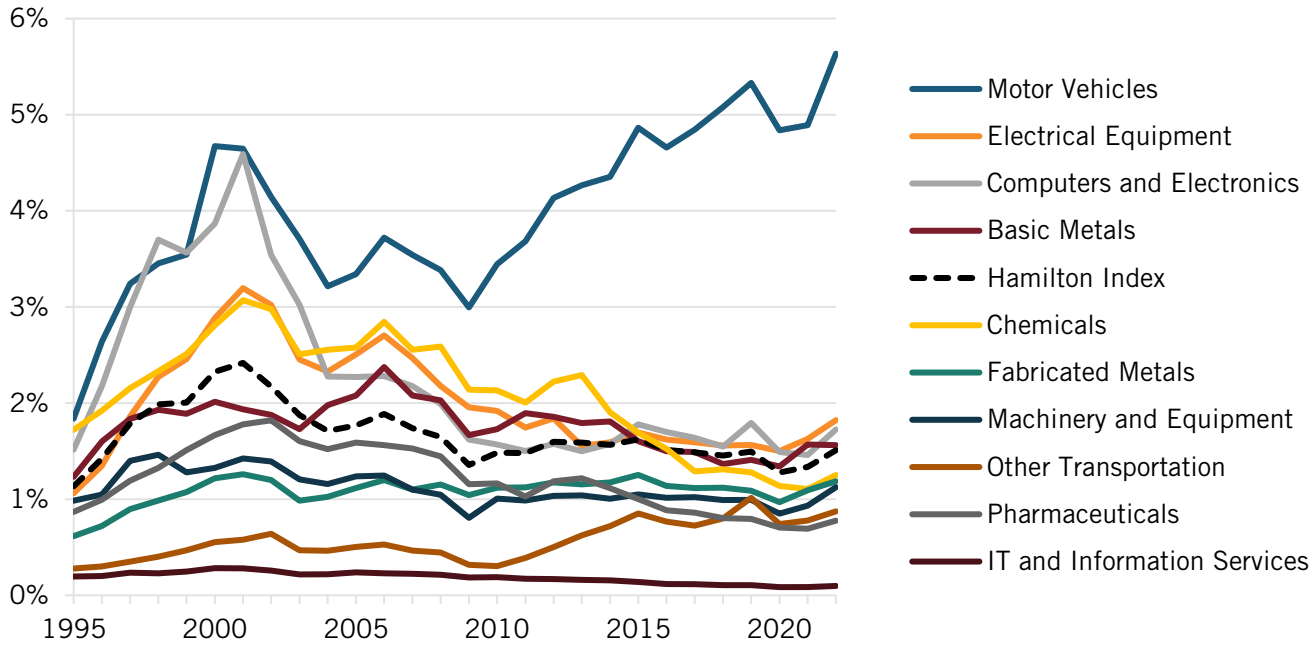
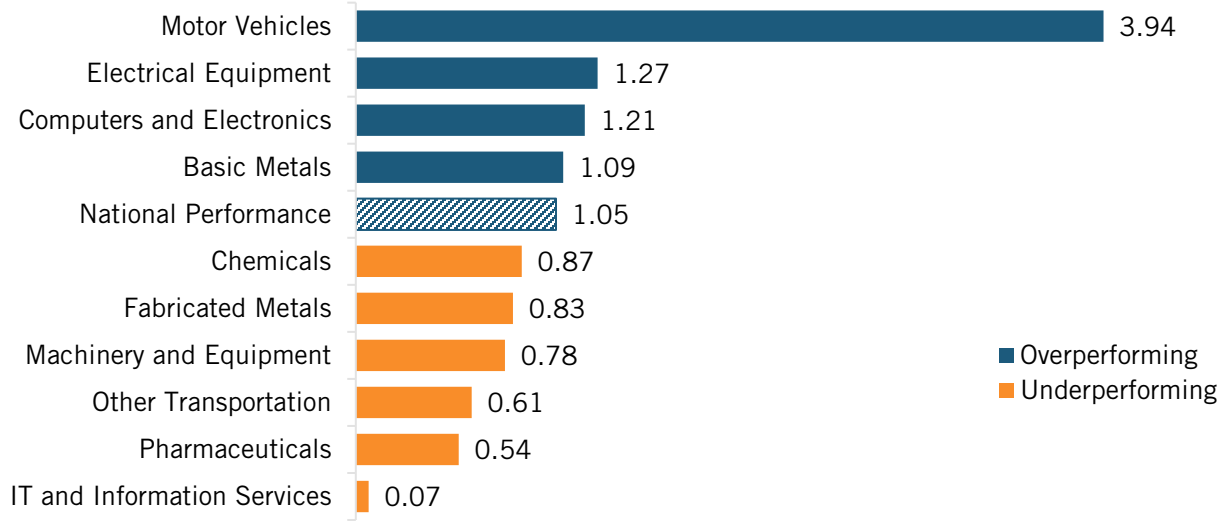


Figure 106: Mexico's relative performance in Hamilton Index industries (2022 LQ)



The industry with the largest growth in LQ was also motor vehicles, which saw its LQ increase from 2.51 in 2013 to 3.94 in 2022. Three of Mexico's other advanced industries—electrical equipment, computers and electronics, and basic metals—saw their LQs increase and overperform, placing them in the top-right quadrant. (See figure 108.). Conversely, chemicals, pharmaceuticals, and IT both underperformed and saw their LQs decline over this same period, placing them in the bottom left quadrant of the figure.

Figure 107: Mexico's relative historical performance in Hamilton industries (LQ trends, 1995–2022)

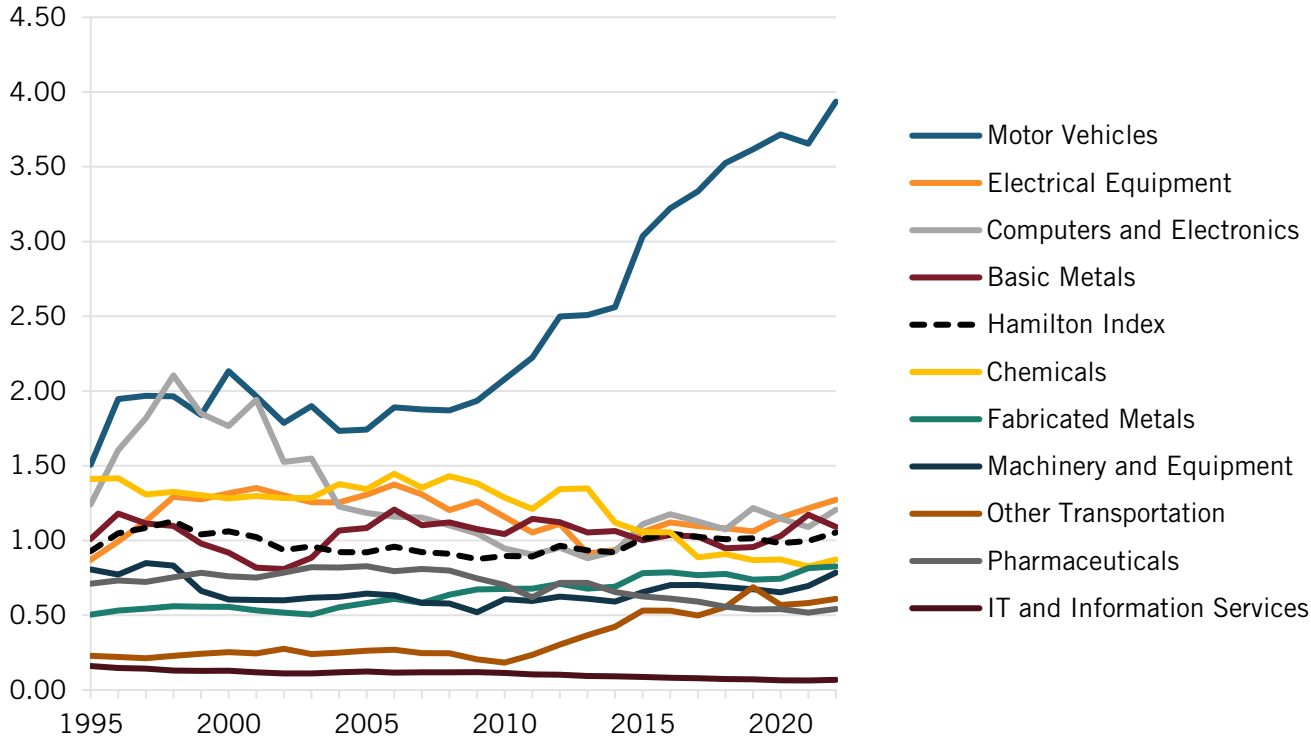
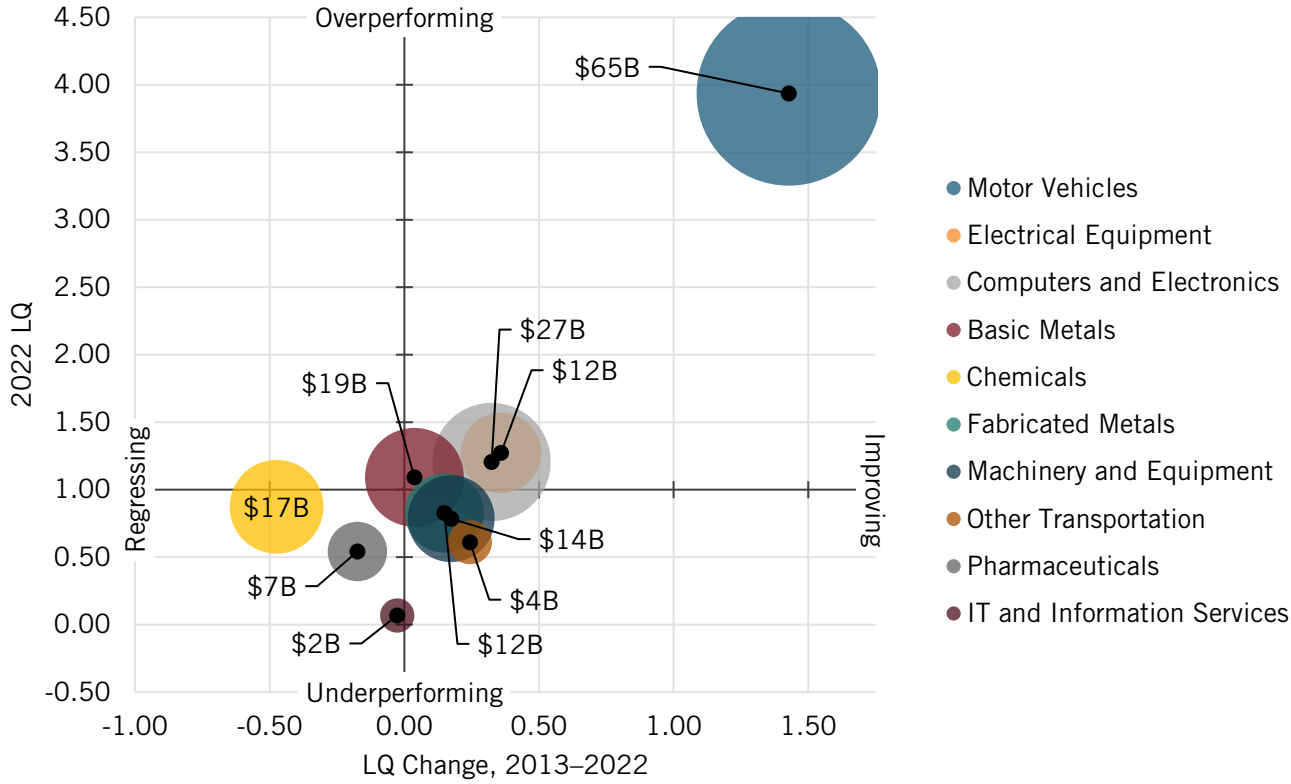


Figure 108: Mexico's net performance in Hamilton industries since 2013 (scaled to 2022 output)



Vietnam

Vietnam's emergence as a hub for advanced manufacturing, particularly in computers and electronics, is the result of a deliberate, multidecade strategy to court foreign direct investment and integrate into global supply chains. Specifically, Vietnam has attracted investment from some of the largest computer and electronics firms in the world, including Samsung, Intel, and LG. Samsung specifically has transformed the Vietnamese economy, making it its largest global production base for smartphones.[21]

Vietnam has also benefited significantly from China's economic development, as rising operating costs in Chinese cities have driven a large share of manufacturing to cheaper countries in Southeast Asia, including Vietnam.

Computer and electronics manufacturing alone accounts for over 13 percent of the Vietnamese economy, while advanced industries collectively account for 21.1 percent of economic output. (See figure 109.) This is nearly double the global average.

Vietnam's global market share in the computers and electronics manufacturing industry was relatively stagnant for the late 1990s and the first half of the 2000s, hovering around 0.1 percent. However, by 2012, its share had increased to over 1 percent, and 10 years later, Vietnam held 3.5 percent of the global market share in the industry. Its next-largest industry, electrical equipment, is comparatively small, accounting for just 0.9 percent of the global market. (See figure 110.)

Figure 109: Hamilton Index industries' shares of Vietnam's economy, 1995–2022

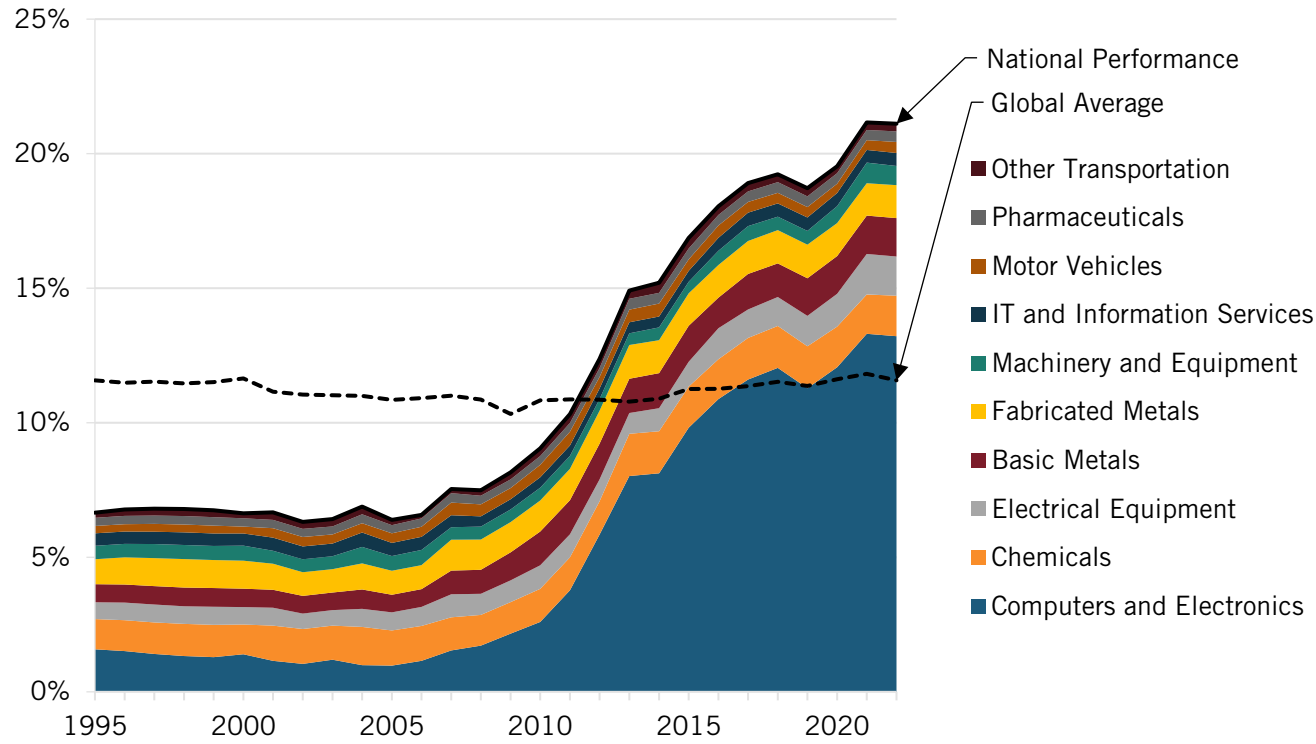
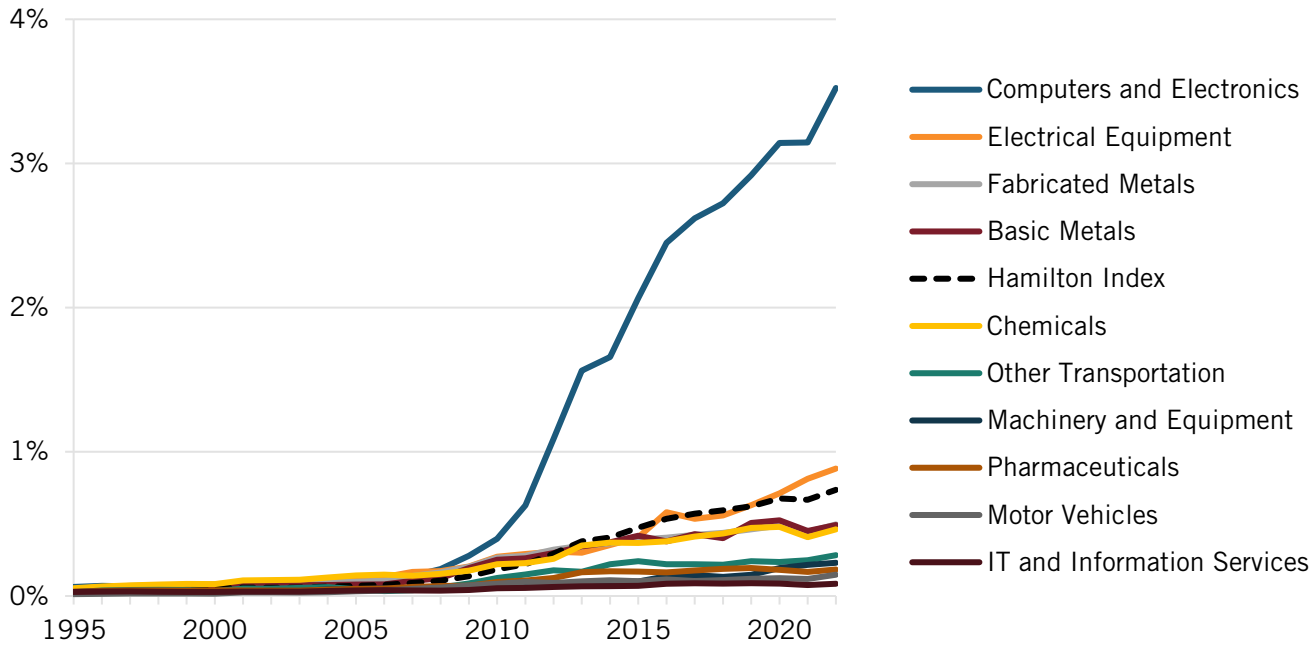
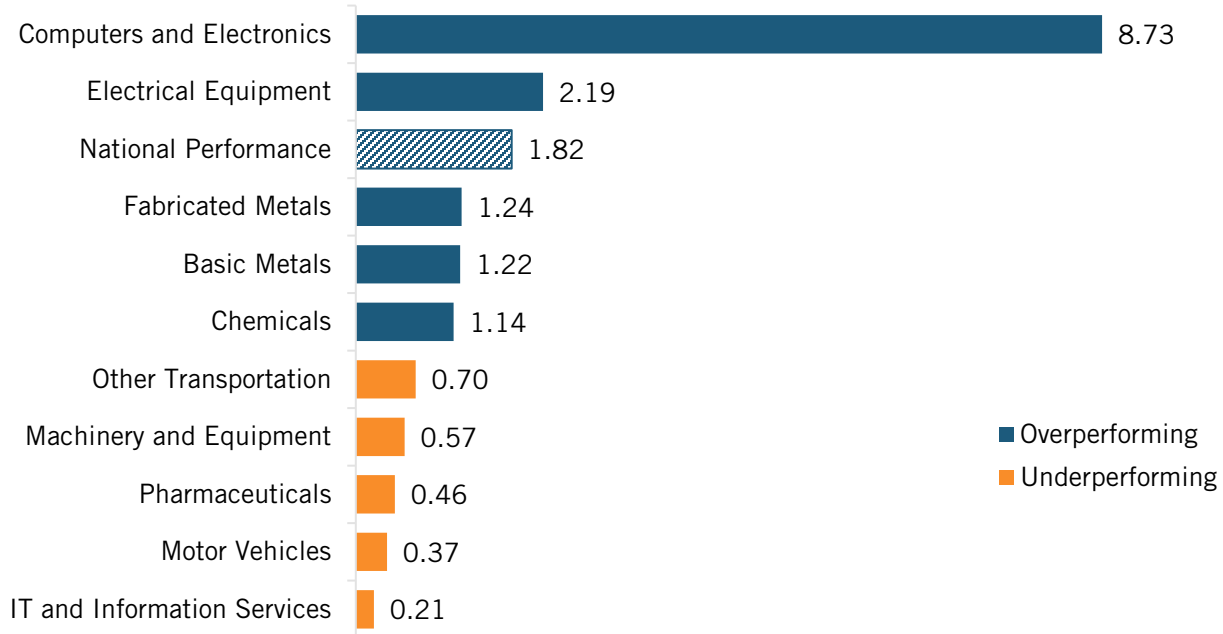


Figure 110: Vietnam's global market shares in Hamilton Industries, 1995–2022



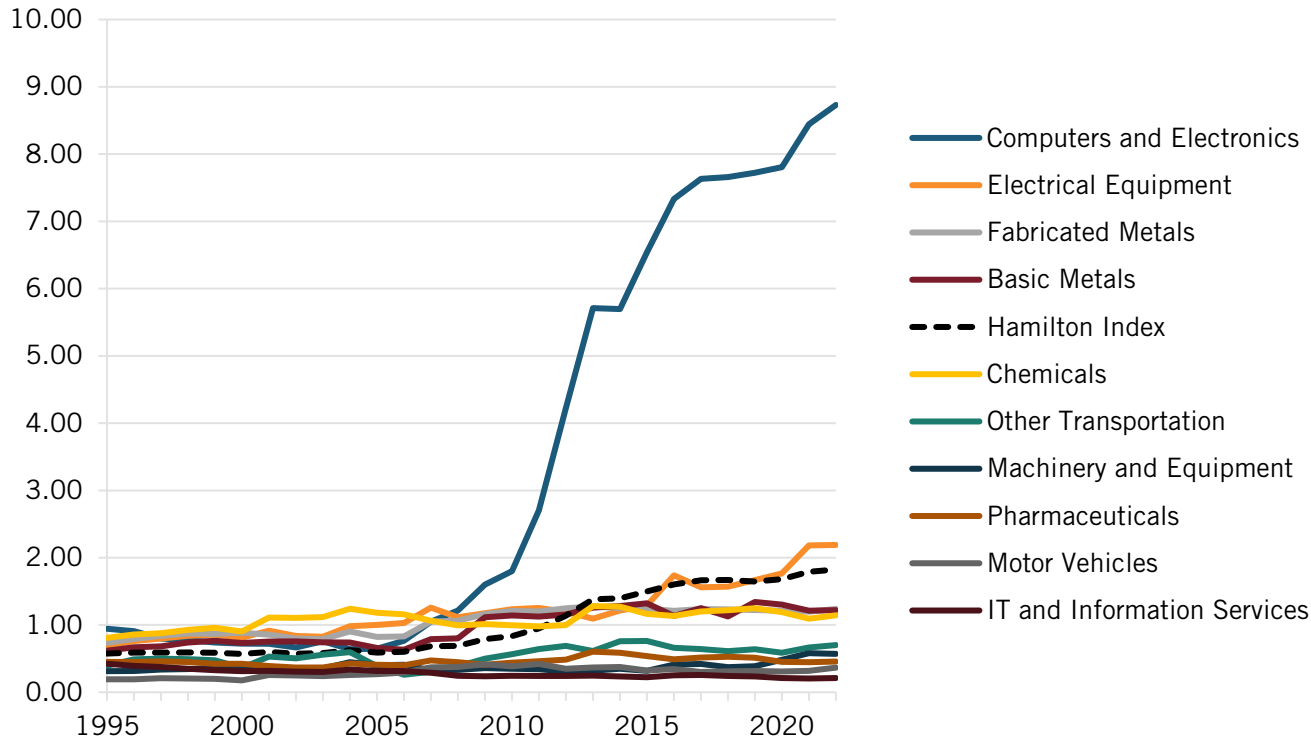
Looking at industrial specialization, Vietnam performs above average in five industries: computers and electronics, electrical equipment, fabricated metals, basic metals, and chemicals. (See figure 111.) Its LQ in computers and electronics, 8.73, is the second highest in the world, behind Taiwan, a semiconductor manufacturing giant. Conversely, Vietnam lags behind in pharmaceuticals, motor vehicles, and IT and information services, all of which have LQs below 0.5.

Figure 111: Vietnam's relative performance in Hamilton Index industries (2022 LQ)



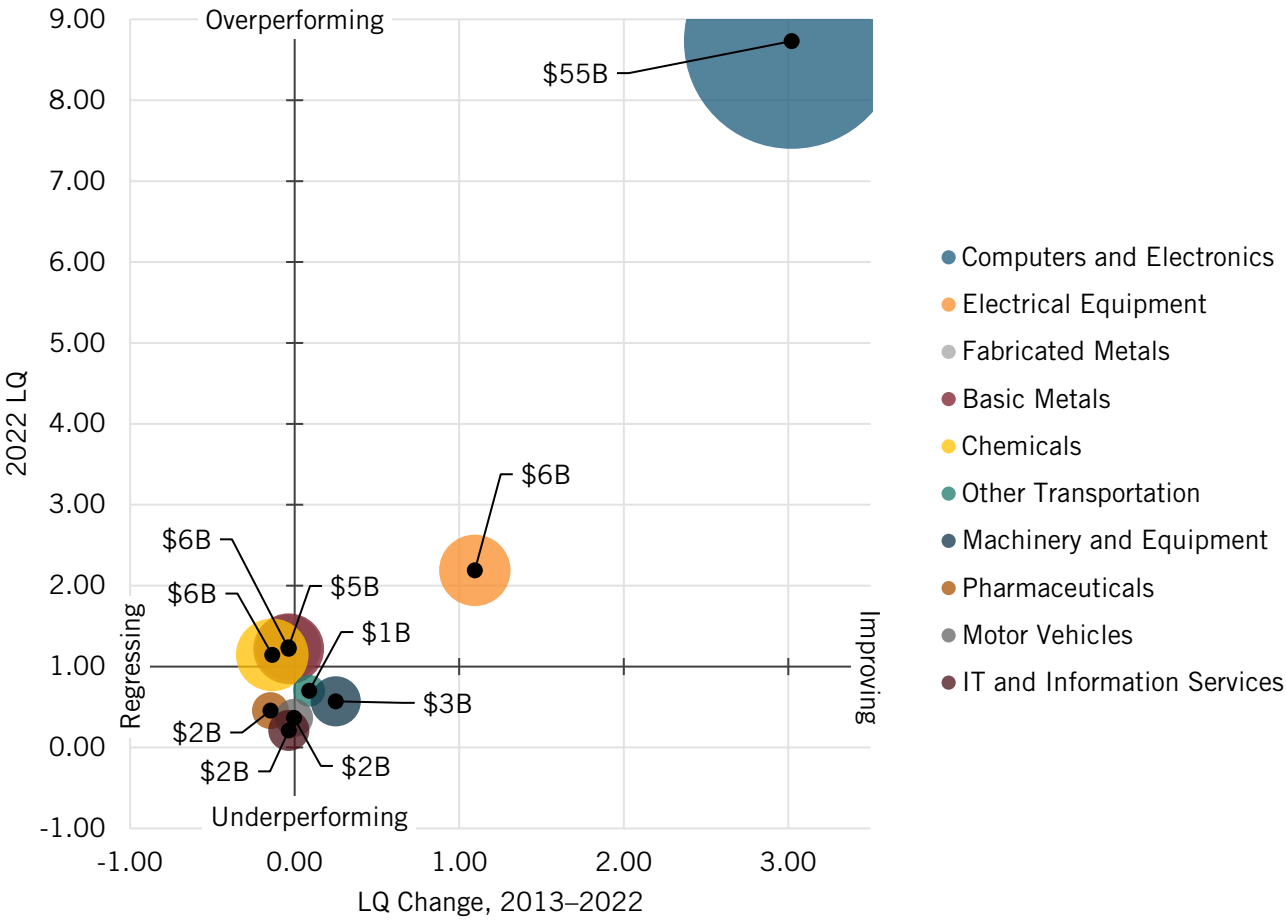
Similar to global market share, the industry that has experienced the greatest growth in LQ is computers and electronics, which saw its LQ increase from 5.71 in 2013 to 8.73 in 2022. Vietnam's overall LQ also increased rapidly over this time, from 1.38 in 2013 to 1.82 in 2022. (See figure 112.)

Figure 112: Vietnam's relative historical performance in Hamilton industries (LQ trends, 1995–2022)



Computers and electronics along with electrical equipment are the only two industries that have seen their LQs increase over the past decade and overperform in 2022 in Vietnam, placing them in the top right quadrant of figure 113. Conversely, three of Vietnam's advanced industries—pharmaceuticals, motor vehicles, and IT and information services—underperform and have seen their LQs decline. These industries are located in the bottom left quadrant of the figure.

Figure 113: Vietnam's net performance in Hamilton industries since 2013 (scaled to 2022 output)

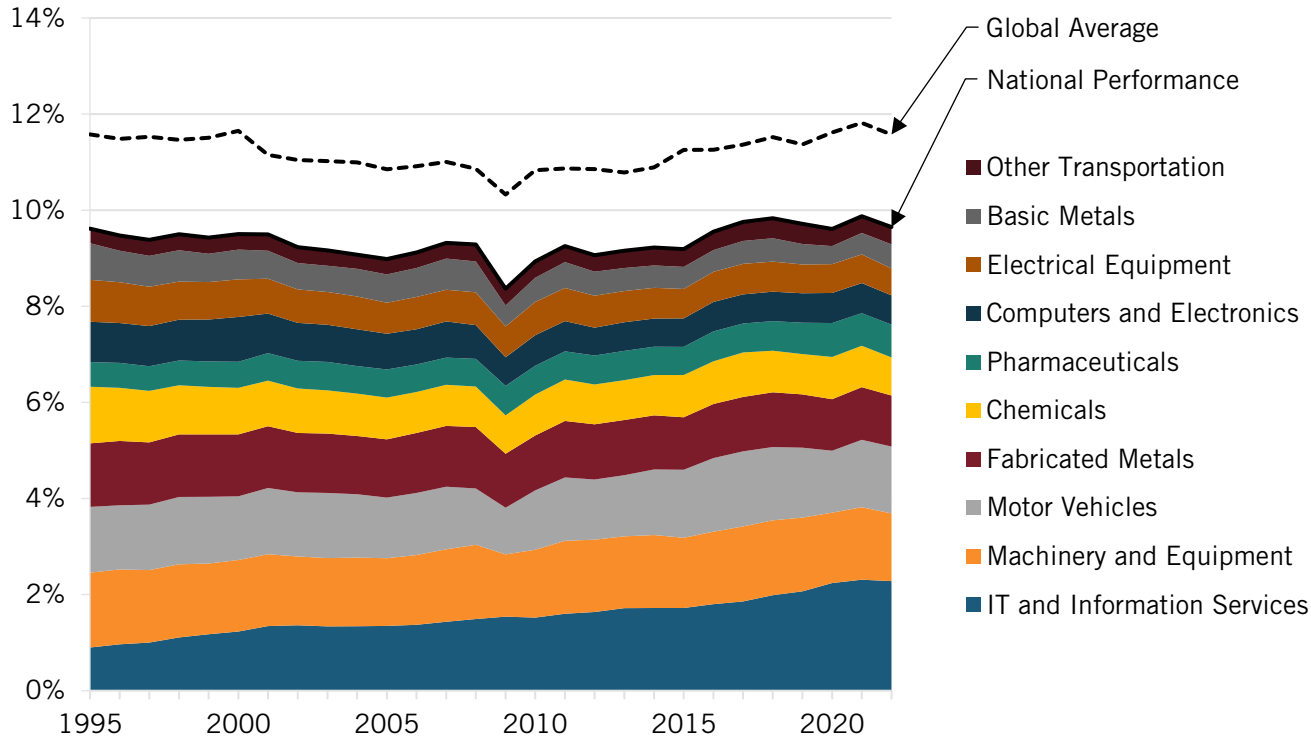


SELECT REGIONAL GROUPINGS

EU-17

The EU-17 (countries that were EU members prior to 2004) have consistently underperformed in advanced industries compared with the rest of the world and even the EU as a whole. Its overall LQ was 0.83 in 2022, the exact same as in 1995 and only a slight decline from its high of 0.86 in 2017, demonstrating a continued mediocrity among some of Europe's most developed nations. Advanced industries constitute only 9.7 percent of the EU-17's economy, below the global average of 11.6 percent.

Figure 114: Hamilton Index industries' share of EU-17 economies, 1995–2022



Looking at industry strength, the EU-17 is above average in four industries. (See figure 115.) Driven by Germany, the strongest industry in the EU-17 is motor vehicles, with an LQ of 1.24. Machinery and equipment and fabricated metals are next at 1.12 and 1.07, respectively, followed by the IT and information services sector, which has suffered from protectionist policies in the EU designed to promote "digital sovereignty." In contrast, the EU-17 is below average in all other advanced industries, with basic metals and computers and electronics being the worst-performing industries.

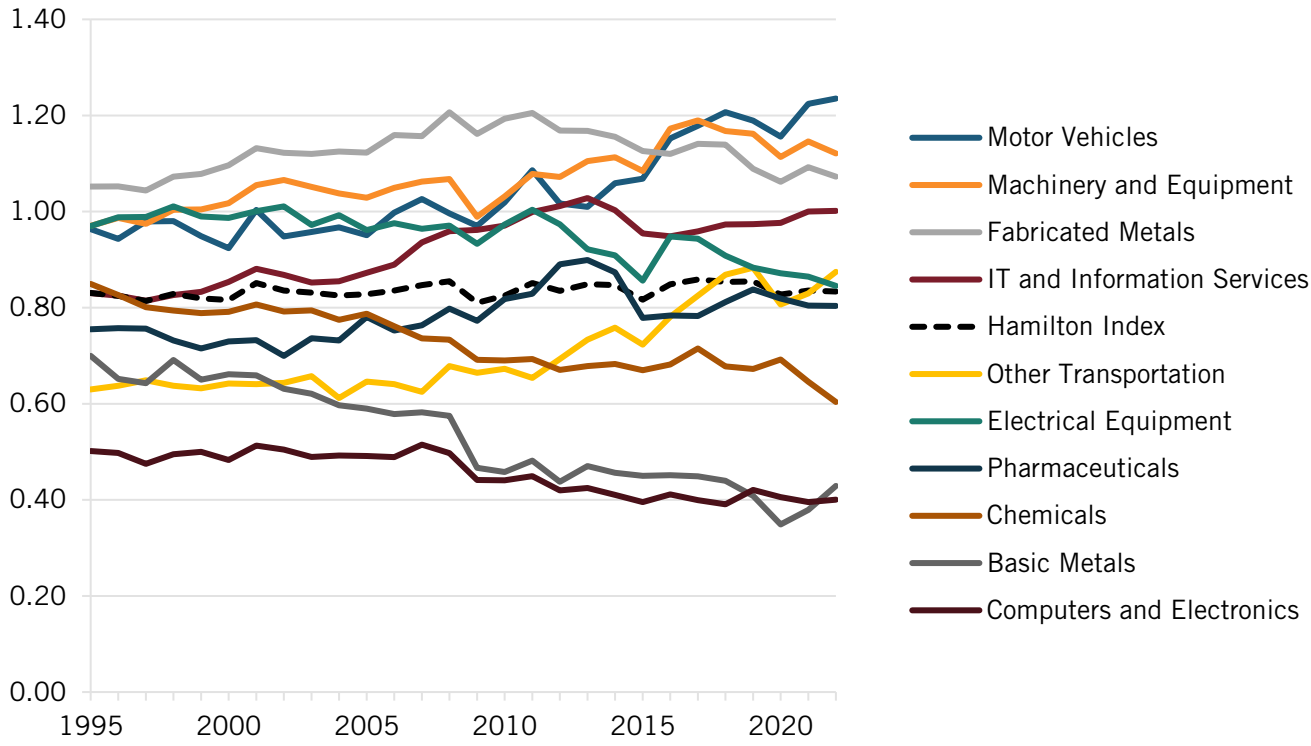
The EU-17's overall LQ was 0.83 in 2022, the same as in 1995 and only a slight decline from its high of 0.86 in 2017, showing a continued mediocrity among some of Europe's most developed nations.

The EU-17 has three industries that both overperformed in 2022 and improved between 2013 and 2022: motor vehicles, machinery and equipment, and other transportation. Motor vehicles

experienced the greatest increase of 23 percentage points. The EU-17 overperformed in fabricated metals in 2022 but saw its LQ decline by 10 percentage points.

Five of the EU-17's advanced industries underperformed and declined between 2013 and 2022. These industries include electrical equipment, pharmaceuticals, chemicals, basic metals, and computers and electronics.

Figure 115: EU-17's relative historical performance in Hamilton industries, 1995–2022

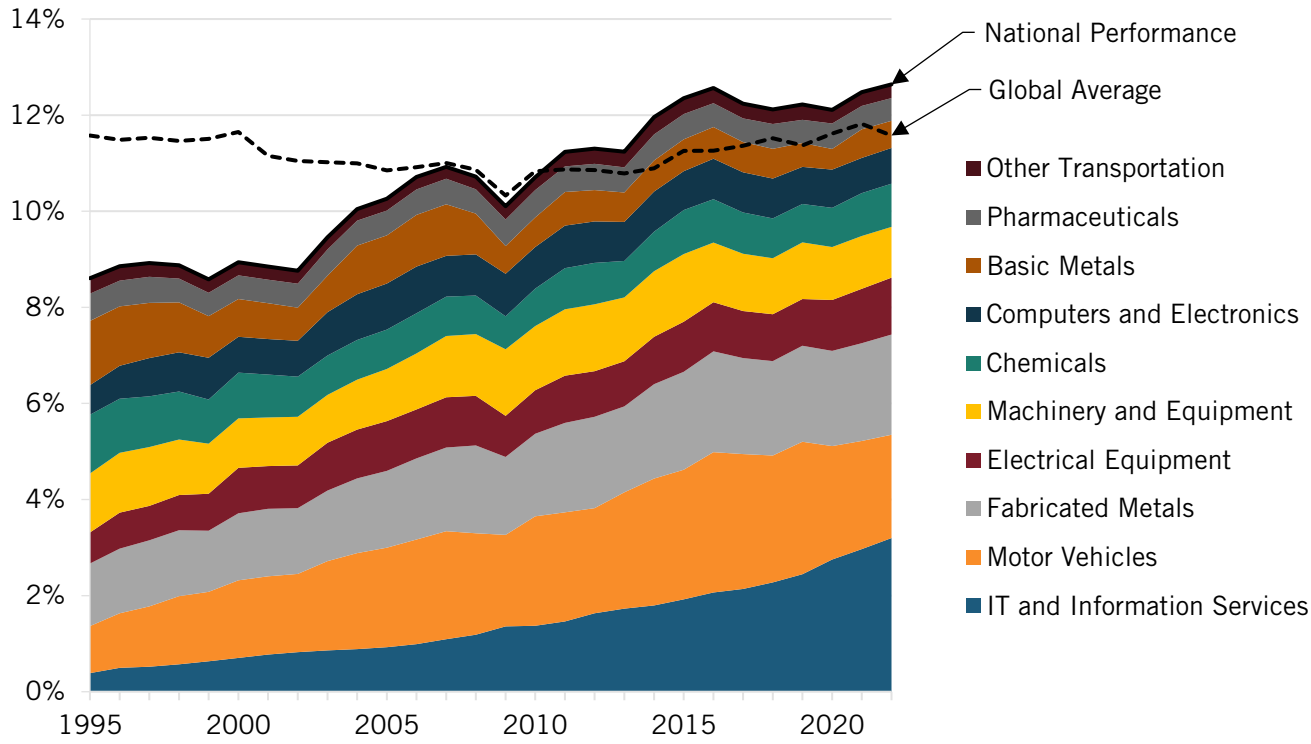


EU-10

The EU-10 (which includes EU members that joined in 2004) previously underperformed relative to the world and to the EU-17. However, it saw significant and sustained improvement between 1995 and 2022. In 1995, its LQ was 0.74, but it increased steadily over the next 27 years, reaching a peak of 1.12 in 2016 before falling slightly to 1.09 in 2022. Still, this is greater than the LQ of the EU-17 and the LQ of the EU-27 (the whole EU excluding Ireland), which stands at 1.02. The EU 10 nations have been able to combine integration into the EU with relatively low business costs and strong workforce skills to gain an advantage in advanced industries. The largest industry for the EU-10 is the IT and information service industry, which accounts for 3.2 percent of the EU-10's economy. (See figure 116.)

Looking at industrial specialization, the EU-10 is above average in four industries. Its strongest industry is the fabricated metals industry, in which it has an LQ of 2.11, followed by the motor vehicles, electrical equipment, and IT and information services industries, which have LQs of 1.91, 1.78, and 1.40, respectively. In contrast, the EU-10 has failed to get a foothold in the other advanced industries, specifically basic metals and computers and electronics, which both have LQs below 0.5.

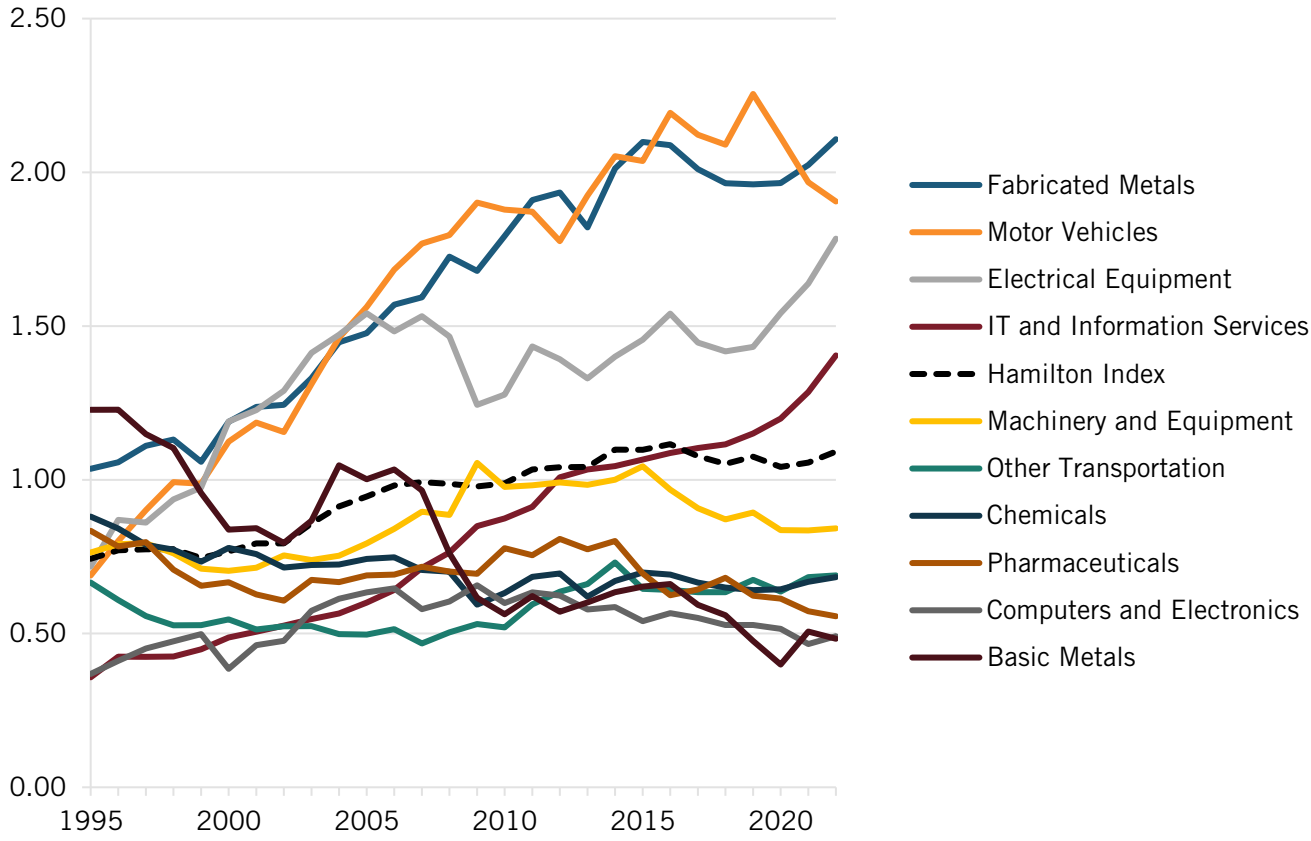
Figure 116: Hamilton Index industries' share of EU-10 economies, 1995–2022



Three industries in the EU-10 both overperformed in 2022 and improved in their LQ between 2013 and 2022: fabricated metals, electrical equipment, and IT and information services. Electrical equipment experienced the greatest increase, with its LQ growing by 45 percentage points. The EU-10 also overperformed in the motor vehicles industry, but its LQ declined by 2 percentage points over the past decade. Meanwhile, two industries—other transportation and

chemicals—underperformed in 2022 but improved on their LQ since 2013. All other industries underperformed and saw their LQ decline.

Figure 117: EU-10's relative historical performance in Hamilton industries, 1995–2022

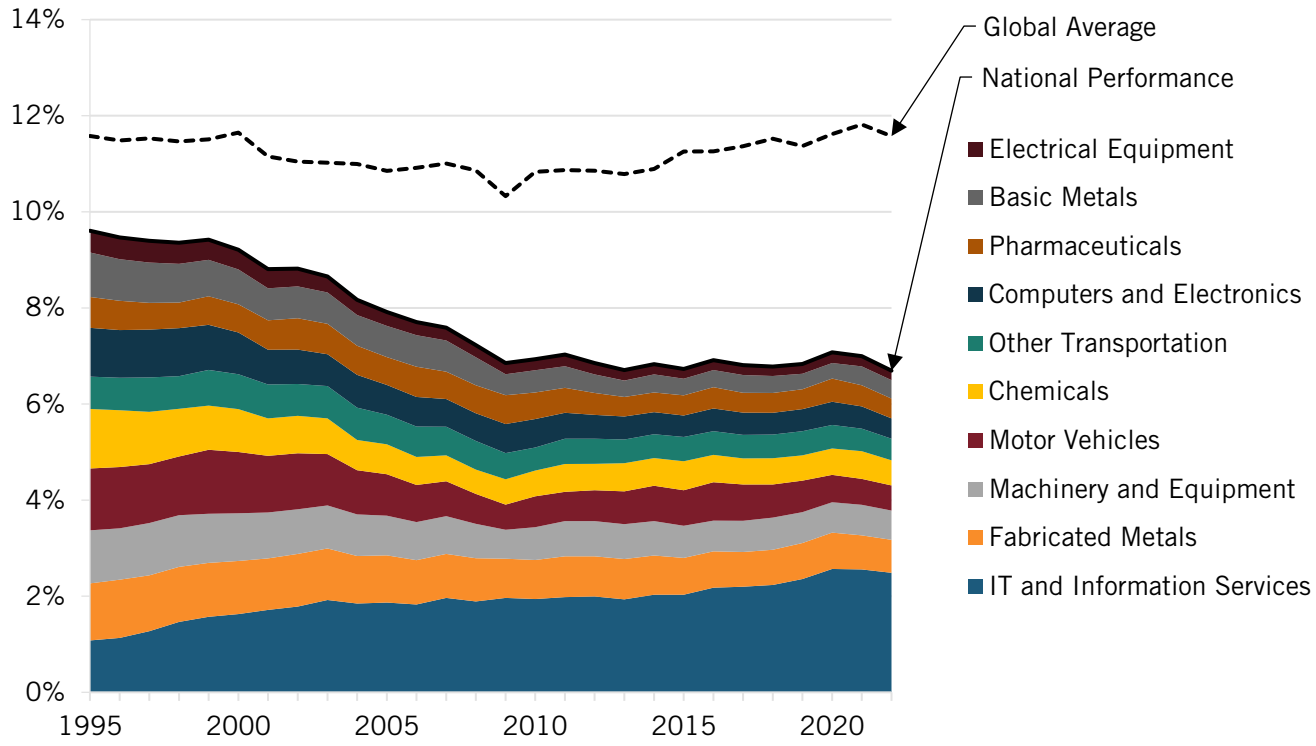


The Commonwealth

The Commonwealth countries of Australia, Canada, New Zealand, and the United Kingdom have consistently underperformed in advanced industries and have only continued to lose ground. The Commonwealth's overall LQ fell from 0.83 in 1995 to 0.58 in 2022, putting the group behind the EU, OECD, the Belt and Road, and the Quad. None of these countries has pushed to adopt a national industry strategy, relying instead on the invisible hand of neoclassical economics to drive them toward the industries that will promote the most economic prosperity. This, of course, has not driven any of these countries toward industrially strong economies.

The largest advanced industry in the Commonwealth is IT and information services, which accounts for 37 percent of all advanced industry output in these countries. It also accounts for 2.5 percent of the Commonwealth's GDP. (See figure 118.)

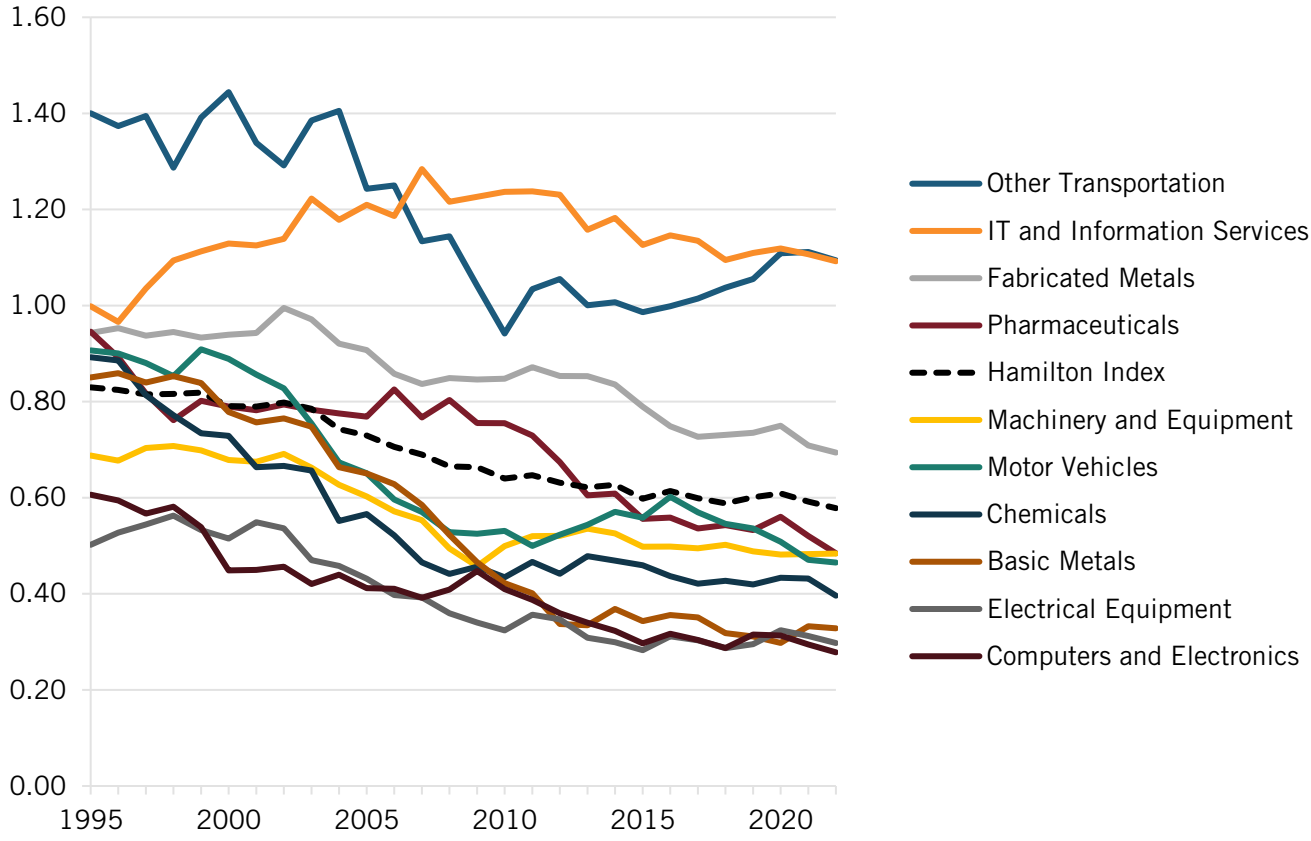
Figure 118: Hamilton Index industries' share of Commonwealth economies, 1995–2022



In terms of industry strength, the Commonwealth is above average in only two industries—other transportation and IT services—both of which have an LQ of 1.09. (See figure 119.) Conversely, all other industries are below average. Electrical equipment and computers and electronics are the two weakest industries, each of which have LQs below 0.3.

Looking at the previous 10 years, it's evident that the Commonwealth has been in a state of decline. Nine advanced industries saw their LQs decline between 2013 and 2022, with the largest drop in the fabricated metals industry. That LQ fell by 16 percentage points. This is not to say that advanced industries in the Commonwealth are not growing in absolute terms, but rather that they are not growing as fast as the overall Commonwealth economy. Only the other transportation industry has seen its LQ increase since 2013.

Figure 119: Commonwealth nations' relative historical performance in Hamilton industries, 1995–2022

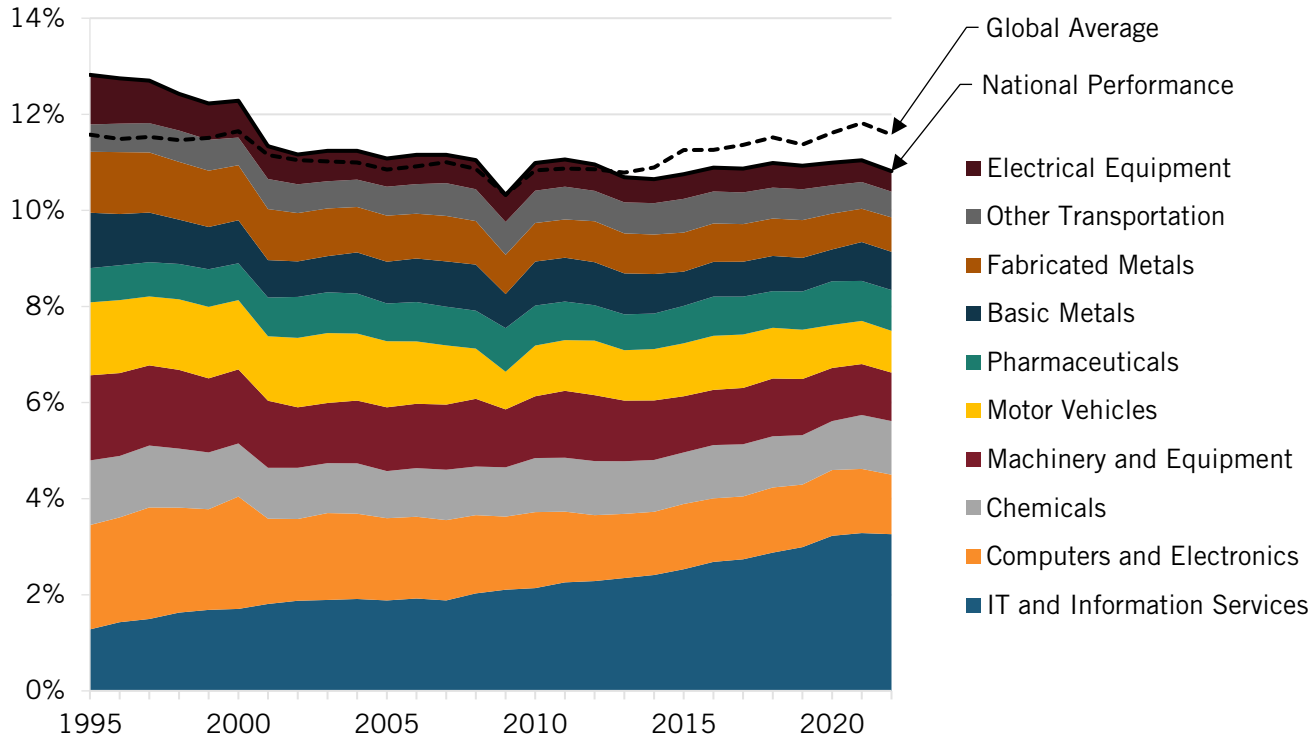


The Quad

The Quad (which includes Australia, India, Japan, and the United States) overperformed in advanced industries between 1995 and 2012, but has since underperformed, with its LQ falling to an all-time low of 0.93 in 2022. This LQ is above that of the Commonwealth and EU-17 but below that of the Belt and Road and the OECD.

IT and information services is the largest industry in the Quad in terms of output, largely driven by the United States' dominance in the industry. It accounts for nearly one-third of advanced industry output and 3.3 percent of total economic output in the group. (See figure 120.)

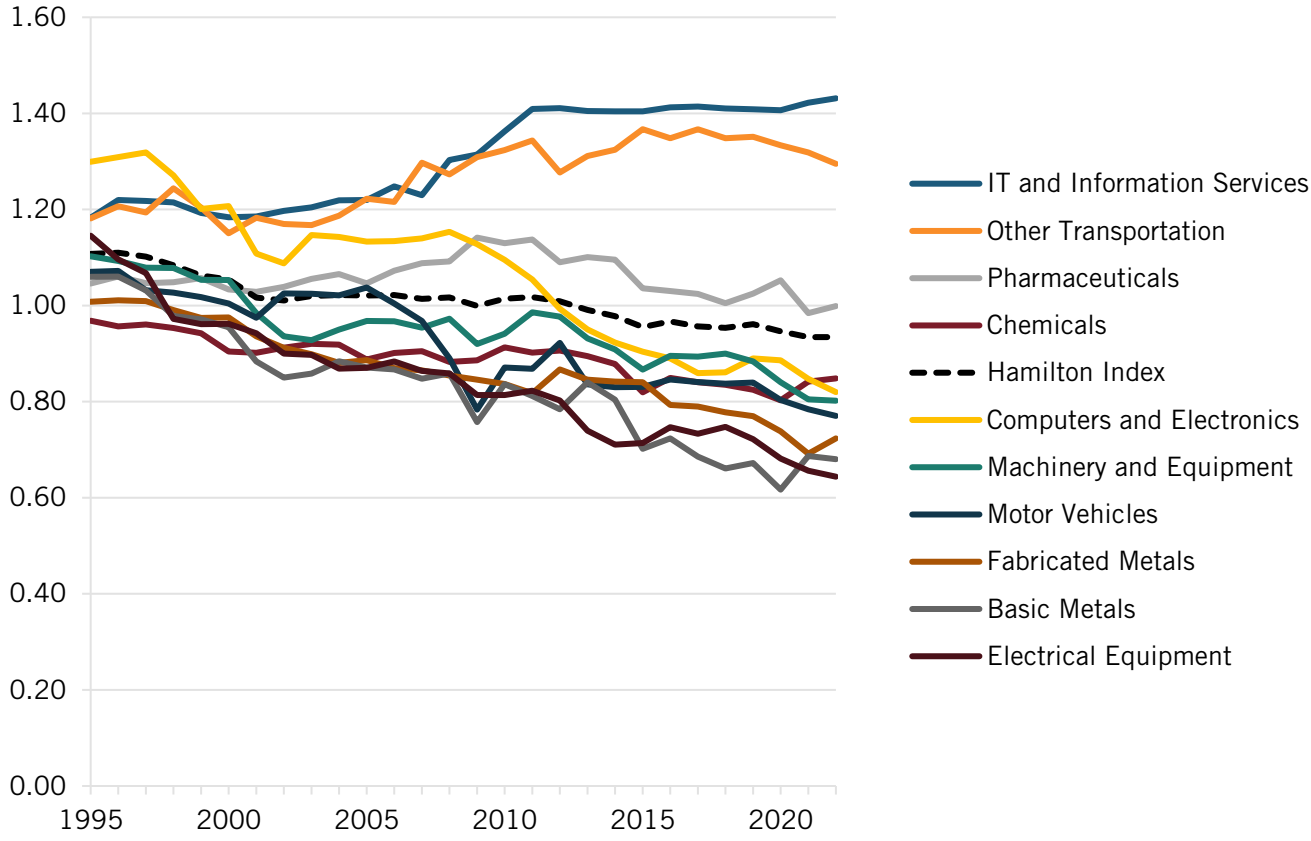
Figure 120: Hamilton Index industries' share of Quad economies, 1995–2022



In terms of industry strength, the Quad is above average in only two industries: IT and information services and also other transportation. (See figure 121.) The pharmaceutical industry also just barely underperforms, with an LQ that rounds up to 1.00. The industries that the Quad underperforms in are more heavy manufacturing industries such as fabricated metals, basic metals, and electrical equipment.

The Quad has only improved its LQ in one industry since 2013, IT, which has increased by 3 percentage points. Conversely, the Quad's LQ has declined in every other industry. Prior to 2008, the Quad actually overperformed in every industry except chemicals, but its persistent decline in industrial strength has left the group underperforming in all but two industries.

Figure 121: Quad nations' relative historical performance in Hamilton industries, 1995–2022



Belt & Road Members

The Belt and Road members previously underperformed relative to the world but have improved to the point that they now collectively overperform compared with the rest of the world, the EU, and OECD. A complete list of countries in the Belt and Road can be found in appendix B. The group's overall LQ increased from 0.90 in 1995 to 1.14 in 2022. Its strongest industry in terms of absolute output is computers and electronics, which accounted for 2 percent of the group's overall economic output in 2022. (See figure 122.)

Looking at industrial specialization, the Belt and Road is above average in all but three industries—other transportation, pharmaceuticals, and IT and information services—which have LQs of 0.81, 0.72, and 0.60, respectively. Its strongest industry, basic metals, had an LQ of 1.63 in 2022, followed by the electrical equipment industry, which had an LQ of 1.58. (See figure 123.)

The Belt and Road members previously underperformed relative to the world but now collectively overperform compared with the world, the EU, and OECD.

Five industries in which the Belt and Road has overperformed also saw their LQs improve since 2013; the only industries that overperformed and declined were the computers and electronics industry and the motor vehicles industry. Its largest grower, fabricated metals, saw its LQ increase by 21 percentage points over this period. All industries in which the Belt and Road Initiative underperformed in 2022 also experienced a decline in LQ.

Figure 122: Hamilton Index industries' share of Belt and Road economies, 1995–2022

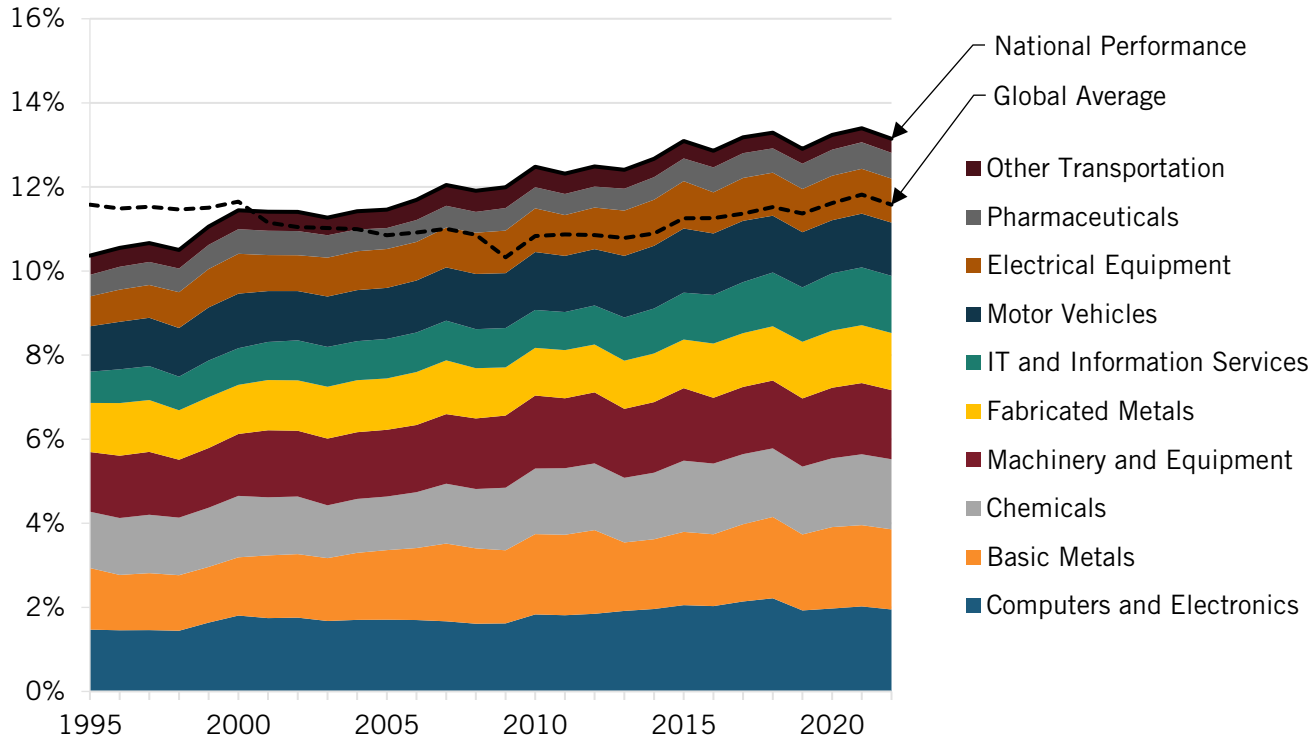
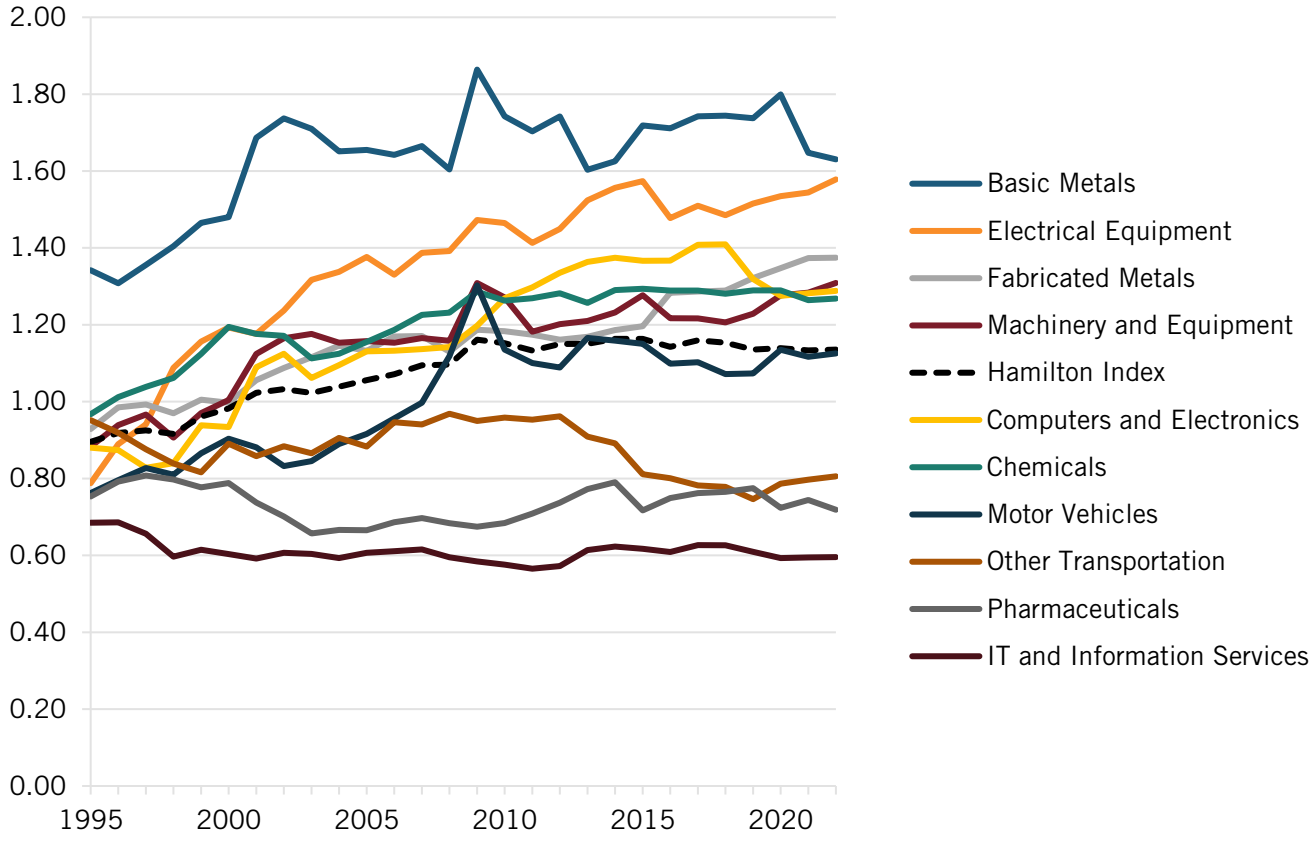


Figure 123: Belt and Road nations' relative historical performance in Hamilton industries, 1995–2022



APPENDICES

Appendix A: Hamilton Index Industries

- **Pharmaceuticals:** Consists of medicinal and botanical products
- **Electrical equipment:** Includes products that generate, distribute, and use electrical power, such as electrical lighting, signaling equipment, and electric household appliances
- **Machinery and equipment:** Includes fixed and mobile or hand-held devices for use in industrial, building and civil engineering, agricultural, or home use; also includes the manufacturing of engines, turbines, and other special-purpose machinery
- **Motor vehicles:** Includes motor vehicles for transporting passengers and freight and the manufacturing of various parts and accessories
- **Other transportation:** Includes aerospace, sea, and rail transportation
- **Computer, electronic, and optical products**: Includes all electronic computers and computer peripheral equipment; specific goods include semiconductors, laptops, smartphones, and consumer electronics (e.g., TVs, virtual reality headsets)
- **IT and information services:** Includes computer programming, software, data processing, and web search portal companies
- **Chemicals:** Includes industrial chemicals, such as those used in agriculture, plastics, and explosives production, and consumer chemicals, such as printing ink, detergents, and perfumes
- **Basic metals:** Includes smelting, refining metals, or both—such as iron, steel, and aluminum—to be used in industrial activities
- **Fabricated metals:** Includes "pure" metal products made from shaping or assembling processes

Appendix B: Country Groupings

This report and the accompanying data visualizations include profiles of selected regional groupings of countries.[22] The members of each of the listed groups is shown as follows:

- **EU-17:** Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom, Bulgaria, Croatia, Romania
- **EU-10:** Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia
- **Quad:** Australia, India, Japan, United States
- **Commonwealth:** Australia, Canada, New Zealand, United Kingdom
- **Belt & Road:** Austria, Bangladesh, Belarus, Brunei Darussalam, Bulgaria, Cambodia, Cameroon, Chile, China, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Egypt, Estonia, Greece, Hungary, Indonesia, Italy, Kazakhstan, Laos, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Morocco, Myanmar, New Zealand, Nigeria, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Senegal, Singapore, Slovakia, Slovenia, South Africa, South Korea, Thailand, Tunisia, Turkey, Ukraine, Vietnam

Appendix C: Hamilton Index Calculations

				Example			
#	Metric	Source	Calculation	Country	Sector	Year	Finding
A	National GDP	World Bank; IMF	=(#)	South Korea	GDP	2022	$1.7T
B	Global GDP	World Bank; IMF	=(#)	World	GDP	2022	$102.4T
C	National Output, Single Sector	OECD	=(#)	South Korea	Computers, Electronics	2022	$133.6B
D	Global Output, Single Sector	OECD	=(#)	World	Computers, Electronics	2022	$1.6T
E	National Output, Advanced Total	ITIF	=SUM(#:#)	South Korea	All Advanced	2022	$420.4B
F	Global Output, Advanced Total	ITIF	=SUM(#:#)	World	All Advanced	2022	$11.9T
G	"Global Mkt Share"	ITIF	=(C/D)	South Korea	Computers, Electronics	2022	8.61%
H	"Domestic Mkt Share"	ITIF	=(C/A)	South Korea	Computers, Electronics	2022	7.98%
I	"Global GDP Share"	ITIF	=(D/B)	World	Computers, Electronics	2022	1.51%
J	"Relative Share" (LQ)	ITIF	=(H/I)	South Korea	Computers, Electronics	2022	5.27

Appendix D: Specialization Index Calculations

The specialization index is calculated using a normalized Herfindahl-Hirschman Index (HHI), which is traditionally used to measure the size of companies relative to the size of the industry they are in. For the specialization index, this formula was applied to measure the size of an advanced industry in another country relative to a country's total advanced industry output. The HHI for a country was calculated by first finding each industry's share of advanced output, then squaring these market shares and summing the resulting numbers.

Mathematically, the HHI of a country is calculated as:

$$HHI = \sum (s_i)^2$$

Wherein s_i denotes the market share of firm i as a decimal.

The HHI is then normalized to output a value between 0 and 1 using the following formula:

$$Specialization\ Index = \frac{HHI - 0.1}{0.9}$$

Through the normalization of traditional HHI benchmarks, we conclude that a country with a specialization index score below 0.06 has output broadly distributed across industries, a score of 0.06 to 0.17 indicates moderate specialization, and a score above 0.17 indicates strong specialization.

Targeted Pressure: How Chinese Manufacturing Competition Impacts US States

TRELYSA LONG AND MEGHAN OSTERTAG

Chinese industrial policy is reshaping global manufacturing and impacting every U.S. state. The result is growing risk to American industry, jobs, and national security.

KEY TAKEAWAYS

- Unfair Chinese policies and practices, not market-based competition, are reducing foreign manufacturing capabilities, including America's.
- Overcapacity and below-cost pricing are central competitive tools. In many sectors, Chinese firms expand output beyond global demand, driving down prices and squeezing more U.S. firms out of both domestic and third-country markets.
- Erosion of U.S. industrial capacity poses national security risks. Many affected industries are critical to defense and infrastructure, increasing U.S. vulnerability to supply chain disruptions and economic coercion.
- Every U.S. state is harmed by unfair Chinese competition, with negative implications for companies, economic output, and well-paying jobs.
- This report examines a leading industry for each U.S. state and the current and potential future negative impact from Chinese unfair competition.

INTRODUCTION

China is engaged in an intensifying techno-economic war to dominate a select group of advanced, globally traded industries that are the bedrock of technological leadership and economic power in the 21st century. The Information Technology and Innovation Foundation (ITIF) calls these industries "national power industries." China's gains in national power industries are coming at the expense of U.S. and allied global market share and production capabilities, which puts at risk not just America's global competitiveness, but also its national security.[1] That's because becoming dependent on Chinese firms in the "enabling," "dual-use," and defense industries that together comprise the larger class of national power industries leaves the United States open and vulnerable to coercion from China—an unacceptable risk amid rising tensions between the two countries.[2]

Importantly, this techno-economic battle is taking place not just in high-tech industries that are clustered in places like Silicon Valley and Harvard Square, but also in many other strategically important industries that are spread across the entire country. Every state relies on these industries, ranging from agricultural machinery to medical instrument manufacturing, to employ hundreds or thousands of workers and contribute to its economy—and most of these industries are facing increasing competition from China.

However, China and its firms are not normal competitors. Unlike American firms, those in China benefit from high levels of government subsidies, artificially inflated demand, tax incentives, favorable financing, reduced energy prices, and many more policy instruments used to strengthen Chinese competitiveness. In this way, U.S. firms can no longer compete on innovativeness and productivity alone, and many have seen declines in sales, employment, and market share as a result. These firms are no longer competing just against other firms, but also against the might of the Chinese government.

Every state relies on national power industries—and most of these industries are facing increasing competition from China.

Despite the abundance of information on the risks posed by unfair Chinese competition in these industries, there is a significant lack of data to support a causational techno-economic analysis, particularly at the state level, on how Chinese firms may have contributed to the decline of American industries. This data gap limits policymakers' ability to assess where and how Chinese competition is affecting U.S. industries and regions. To address this, policymakers should consider a dedicated effort to systematically collect and analyze global and state-level market share data across manufacturing industries. Such an initiative would enable a more precise identification of which state industries face the greatest competitive pressures from China, as well as when and how these pressures emerge.

This report draws on the best available industry-wide data on employment, exports, and global market share to assess a single national power industry in each state in the context of the U.S.-China competition in that industry. In doing so, it examines the relationship between U.S. firms in these industries and the potential competitive pressures posed by China.

STATE ANALYSES

All industries analyzed in this report are national power industries, or industries that enable a strong military or give the United States leverage over other nations. The specific industry for each state was selected using a location quotient (LQ), which measures an industry's specialization relative to a state's economy. The LQ is calculated as an industry's share of a state's economy divided by the national industry's share of the U.S. economy or as a state's share of domestic output in an industry divided by the state's overall share of the national economy. In this report, the industry's share of output is calculated using the number of employees in that industry. Each selected industry had a high LQ in its state in 2023.

The state analyses use data from the U.S. Census Bureau's County Business Patterns to measure employment in each industry at the state level, supplemented by anecdotal evidence on investment and major firms, where available. To examine the relationship between these state industries and Chinese competition, the analyses incorporate data on U.S. and Chinese global market shares, where available; when such data is unavailable, U.S. and Chinese exports as a share of global exports are used as proxies. This approach is supported by Saltarelli et al., who found that "export [data] mirrors remarkably well domestic production for manufacturing sectors or sectors related to physical goods."[3] Additionally, where applicable, export data was used to assess how the United States and China compete in key third-country markets. Industry exports are calculated using the appropriate Harmonized System (HS) codes and Standard International Trade Classification (SITC) codes.

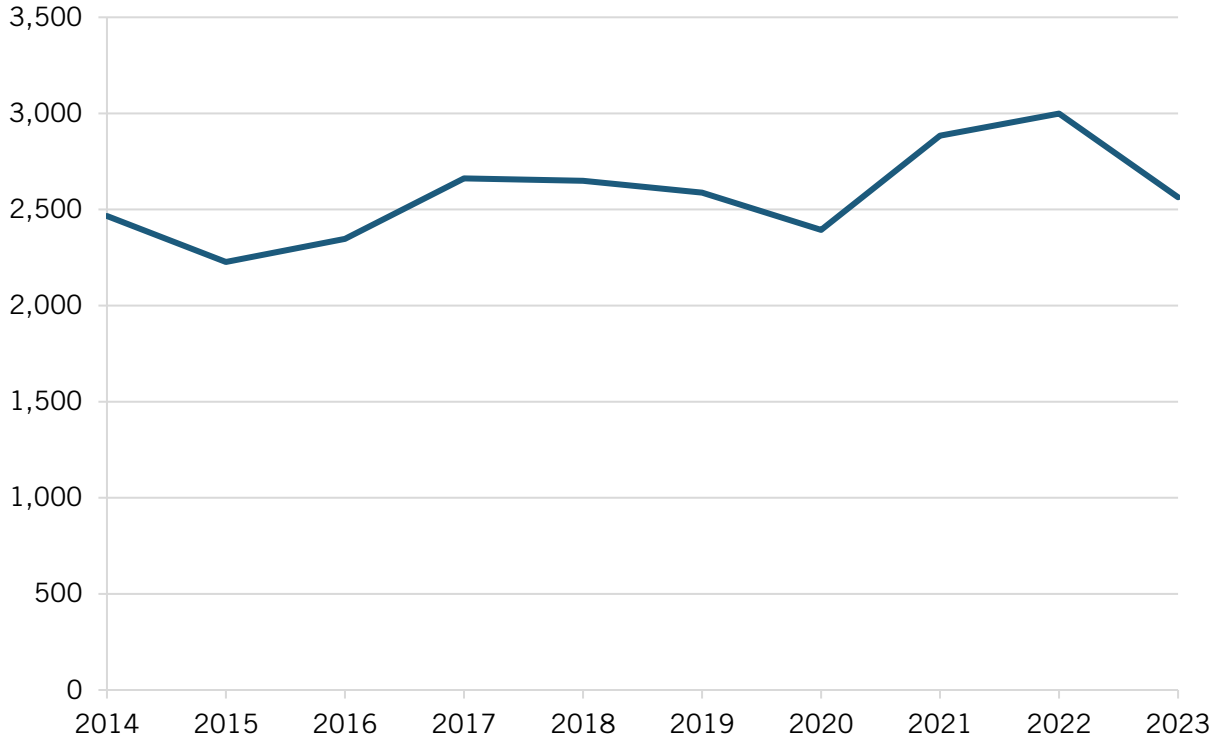
It should be noted that export data depicts the value of exports from the two countries, not necessarily from U.S. or Chinese firms. For instance, a Tesla facility operating in and exporting products from China will be counted as producing Chinese exports even though Tesla is an American company.

Alabama: Artificial and Synthetic Fibers and Filaments Manufacturing (NAICS 325220)

Alabama is one of the largest producers of artificial and synthetic fibers and filaments in the country, employing 20 percent of the industry's workforce. However, the United States is no longer as strong in this industry as it once was. China's emergence as a low-cost producer has significantly increased competition for American manufacturers and at least partially contributed to the decline of this industry in the United States.

The artificial and synthetic fibers and filaments industry produces several types of man-made fibers, including polyester, nylon, and acrylic, which have industrial uses in addition to their well-known textile uses, such as industrial-strength cables, medical equipment, and personal protective equipment.[4] Alabama is a relatively strong producer of artificial and synthetic fibers in the United States, although employment in the industry has fluctuated over the past decade. From 2013 to 2023, employment fell from 2,500 to as low as 2,200 in the late 2010s, before rising again to a peak of 3,000. As of 2023, Alabama's artificial and synthetic fibers and filaments industry employed just over 2,500 workers.[5] (See figure 1.)

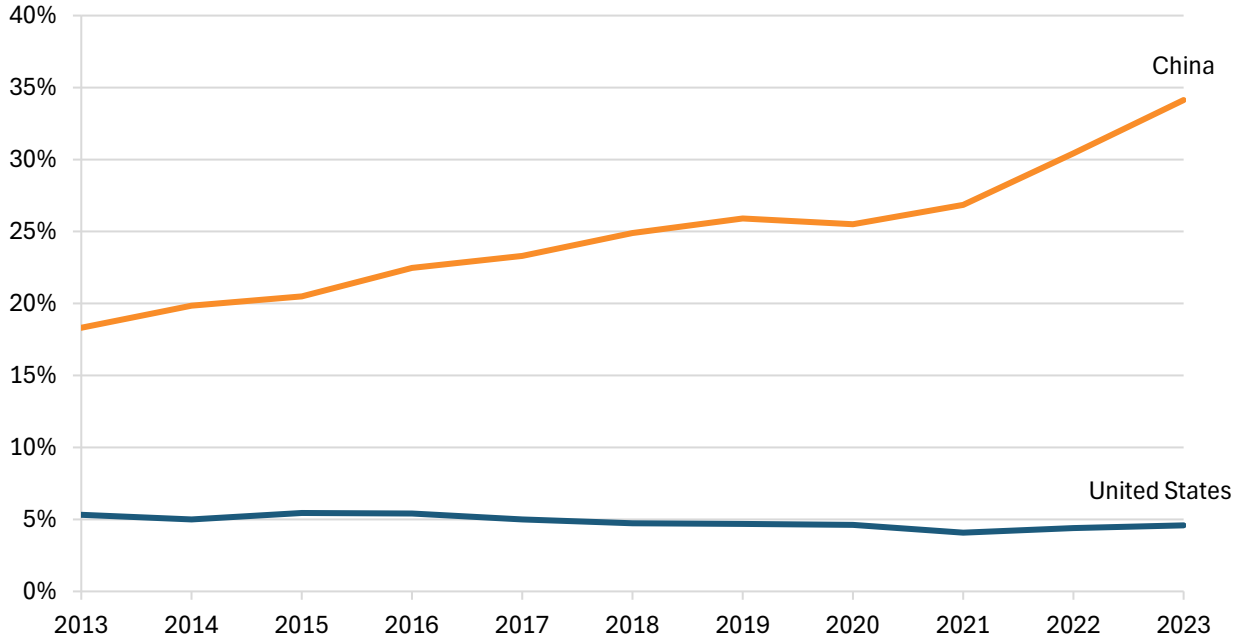
Figure 1: Employment in the artificial and synthetic fibers and filaments industry in Alabama



The United States used to be one of the largest producers of man-made fibers. An analysis of HS code 5402, synthetic filament yarn, one of the major exports of firms in these industries, demonstrates that from 1996 to 2000, the United States commanded 11 percent of the global market share in this industry, less than Germany (14 percent) but more than similarly advanced economies such as South Korea and Italy (10 percent each). China maintained less than 1 percent of the global market share. However, China's accession to the World Trade Organization (WTO) changed this reality. In 2023, China held 48 percent of this growing industry, while U.S. market share more than halved to just 5 percent.[6]

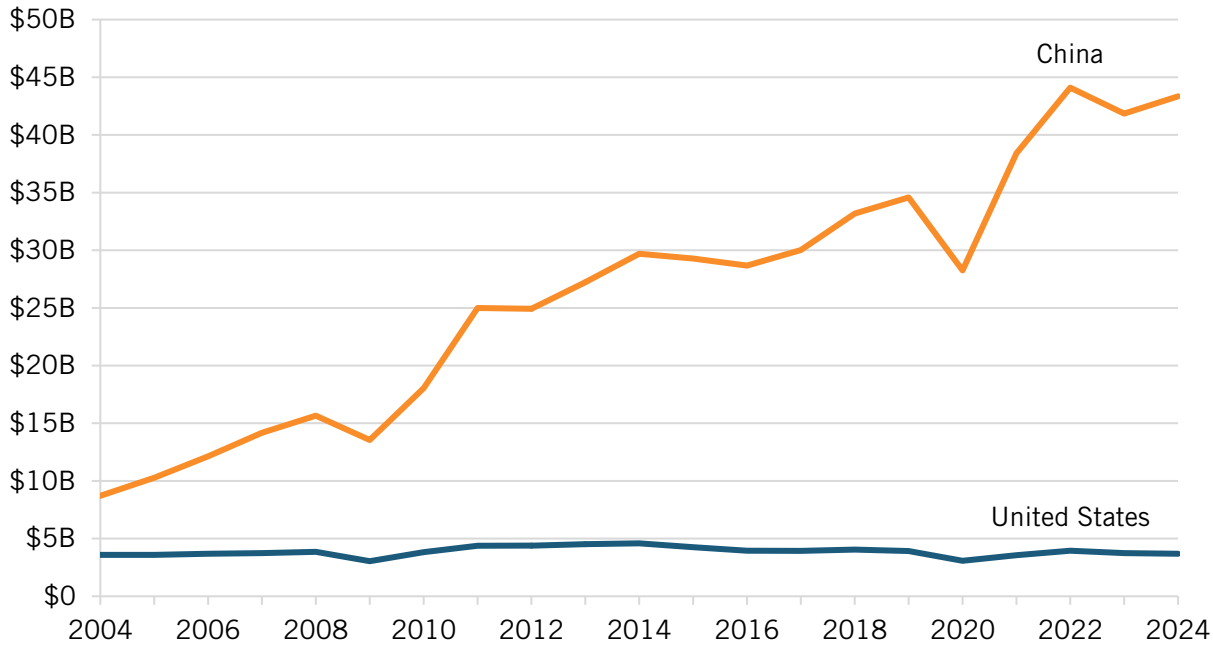
Chinese firms were able to rapidly increase exports and market share through low production pricing and high production levels, both of which reduced the market price of synthetic fibers and squeezed U.S. producers. Today, U.S. production of synthetic fibers has declined by 74 percent since its peak in 1996.[7] China holds over one-third of global market share across all goods produced by the synthetic fiber industry (HS 54 and 55), an increase of 86 percent from 2013 to 2023. At the same time, the United States has seen its global market share fall to just 4.6 percent.[8] (See figure 2.)

Figure 2: Global market share of synthetic fiber exports



The market for synthetic fibers has grown steadily since the late 1990s, more than doubling since 1996.[9] However, this growth has not been distributed evenly. Chinese exports in the synthetic fiber industry (HS 54 and 55) were only about $4 billion greater than U.S. exports in 2004. By 2024, Chinese exports had surged, with exports increasing by 398 percent to over $40 billion. For the United States, exports have remained stagnant or declined every year since the early 2000s, with exports increasing just 3 percent.[10] (See figure 3.)

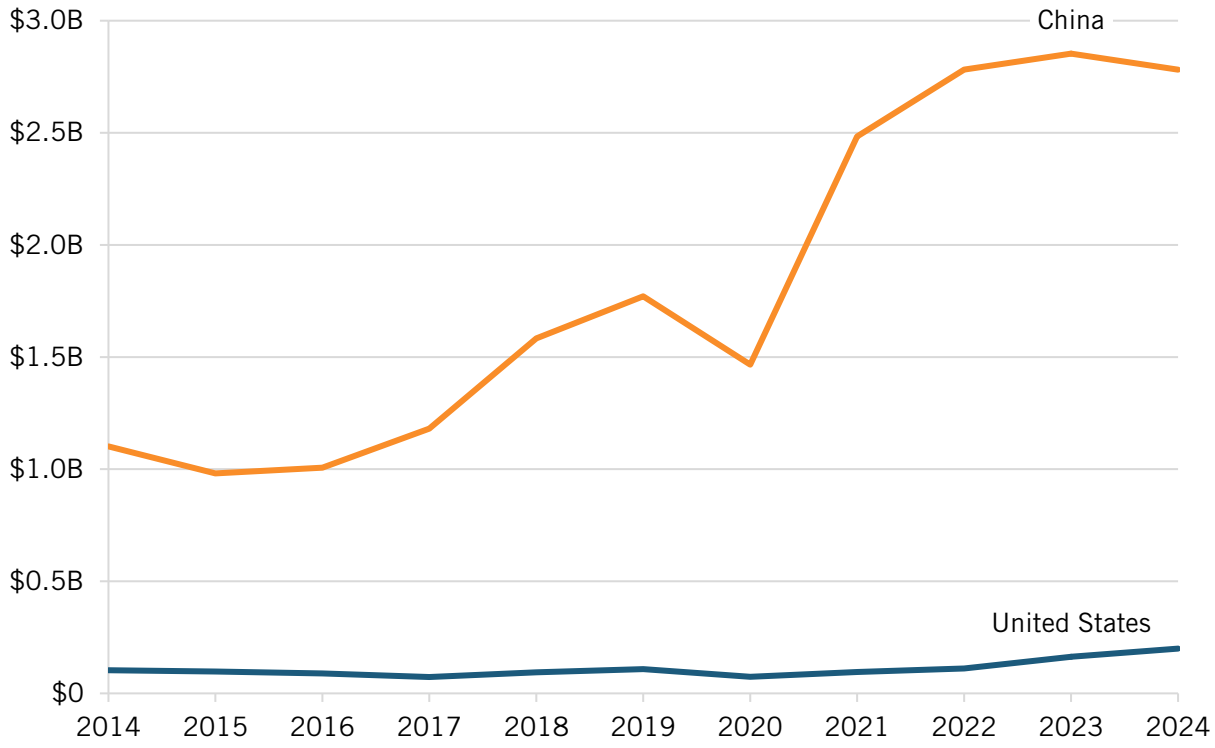
Figure 3: Artificial and synthetic fiber (HS 54 and 55) exports



China's rapid growth in global market share is only possible through the domination of third-party markets. Large textile-exporting countries are importers of synthetic fibers, making them key markets for firms in that industry. Exports to Bangladesh, India, Italy, and Vietnam—four of the five largest exporters of textiles in the world—were dominated by China.[11] China exported $2.8 billion worth of synthetic fibers to these countries in 2024, while U.S. exports totaled just 7 percent of that, or $199 million.[12] (See figure 4.)

China's rise as one of the top exporters of synthetic fibers in the world correlates with the subsequent decline in the U.S. synthetic fiber industry. The industry in the United States has seen its workforce, which used to be over 17,500 workers, fall by 25 percent and output decline steeply, leaving U.S. firms insignificant in the global market, far overshadowed by Chinese competitors.[13] The evidence indicates that China's accession to the WTO, and the free trade protections that came with it, allowed Chinese firms to overproduce and underprice goods, enabling them to gain global market share at the expense of the United States and making it a contributor to the decline of the synthetic fibers industry in Alabama.

Figure 4: Synthetic fiber exports to Bangladesh, India, Italy, and Vietnam

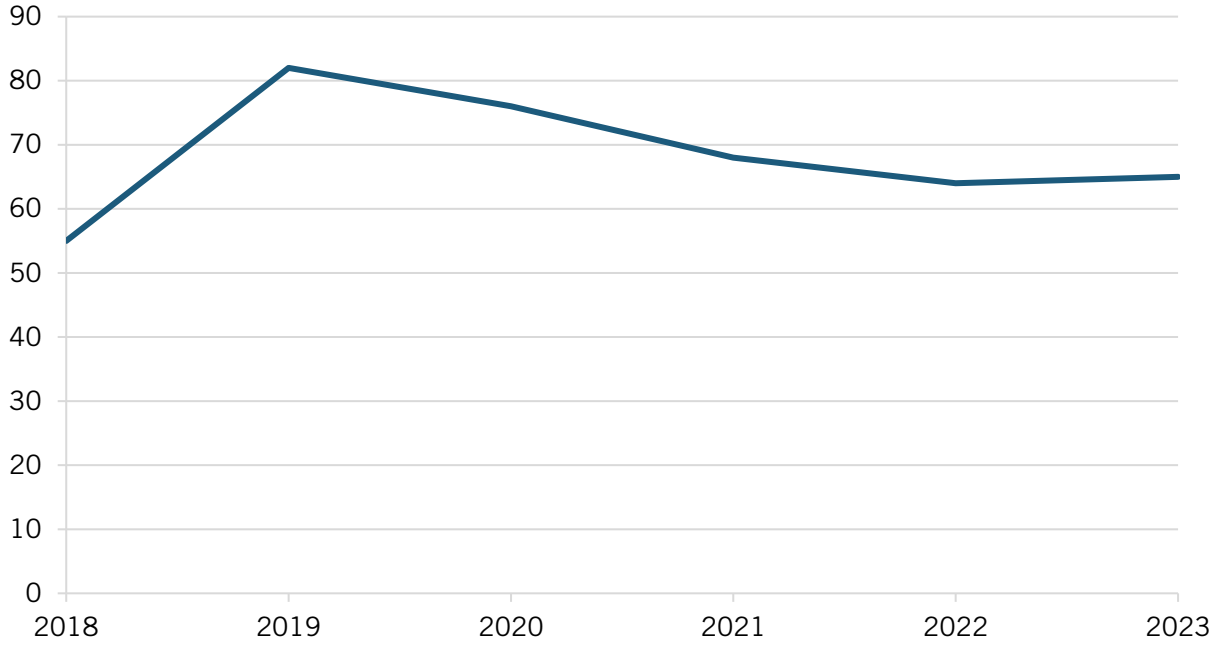


Alaska: Metal Tank (Heavy Gauge) Manufacturing (NAICS 332420)

Alaska's metal tank (heavy gauge) manufacturing industry plays a small but important role in supporting the state's energy, mining, and infrastructure sectors. These tanks—used for storing petroleum, chemicals, and water—are critical inputs for Alaska's resource-based economy. However, like many U.S. fabricated metal product industries, the sector operates in an increasingly competitive global market wherein China's rapid expansion, supported by state-backed industrial policies, presents a growing challenge.

While Alaska is not a large manufacturing state, its metal tank industry is closely tied to oil and gas activity and broader industrial demand. Employment in the industry has fluctuated over the past several years, rising from roughly 55 workers in 2018 to a peak of over 80 in 2019 before declining and stabilizing around the mid-60s by 2023.[14] (See figure 5.)

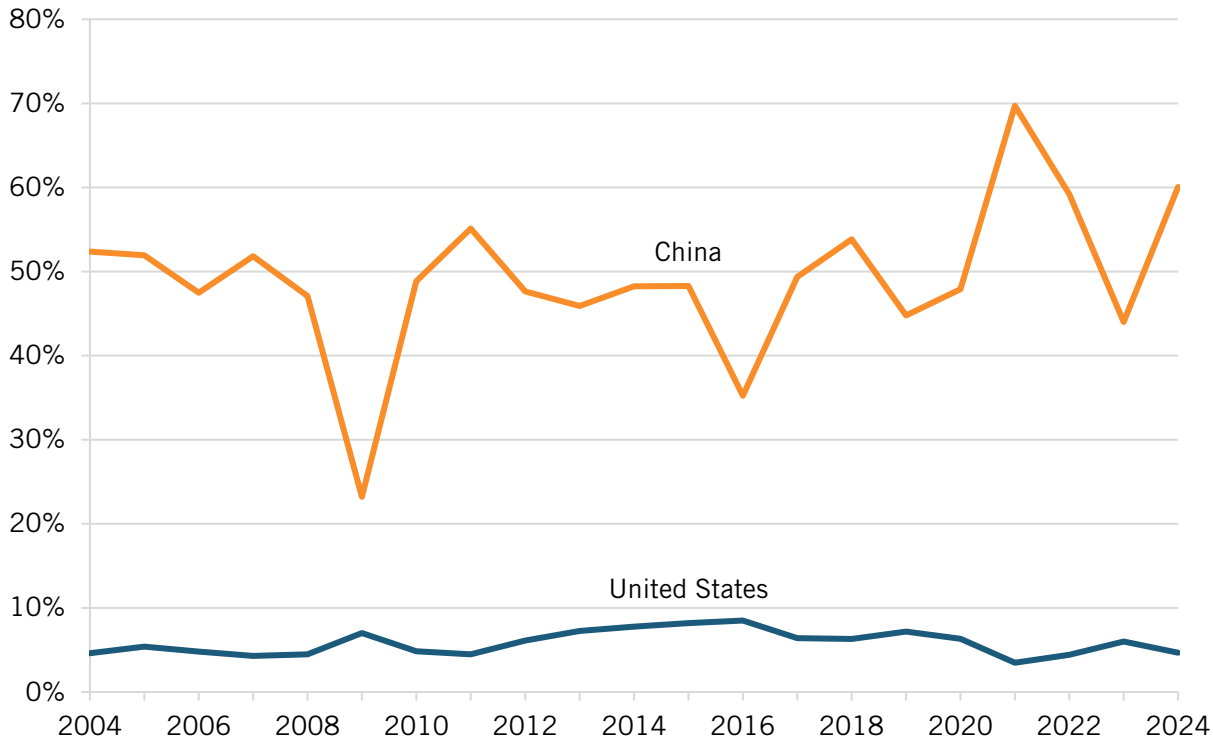
Figure 5: Number of jobs in metal tank (heavy gauge) manufacturing in Alaska



Despite its localized importance, the U.S. metal tank manufacturing industry remains a relatively small player globally compared with China. Fabricated metal products, including storage tanks (HS codes 7309, 7311, 7611, 7613, 8609), have seen China emerge as a dominant exporter over the past two decades. Chinese firms benefit from economies of scale, vertically integrated steel supply chains, and extensive government support, allowing them to produce tanks and related fabricated metal products at lower cost than U.S. competitors.[15]

China's rise is particularly evident in export market share. Since the early 2000s, China has consistently captured a significantly larger share of global exports of metal tanks than the United States has. While China's export share has fluctuated largely between roughly 40 and 70 percent over the past two decades, the United States has remained in the single digits, typically below 10 percent.[16] (See figure 6.) These trends also largely correspond to Alaska's employment trends over the past several years, with employment remaining relatively stagnant, similar to U.S. exports.

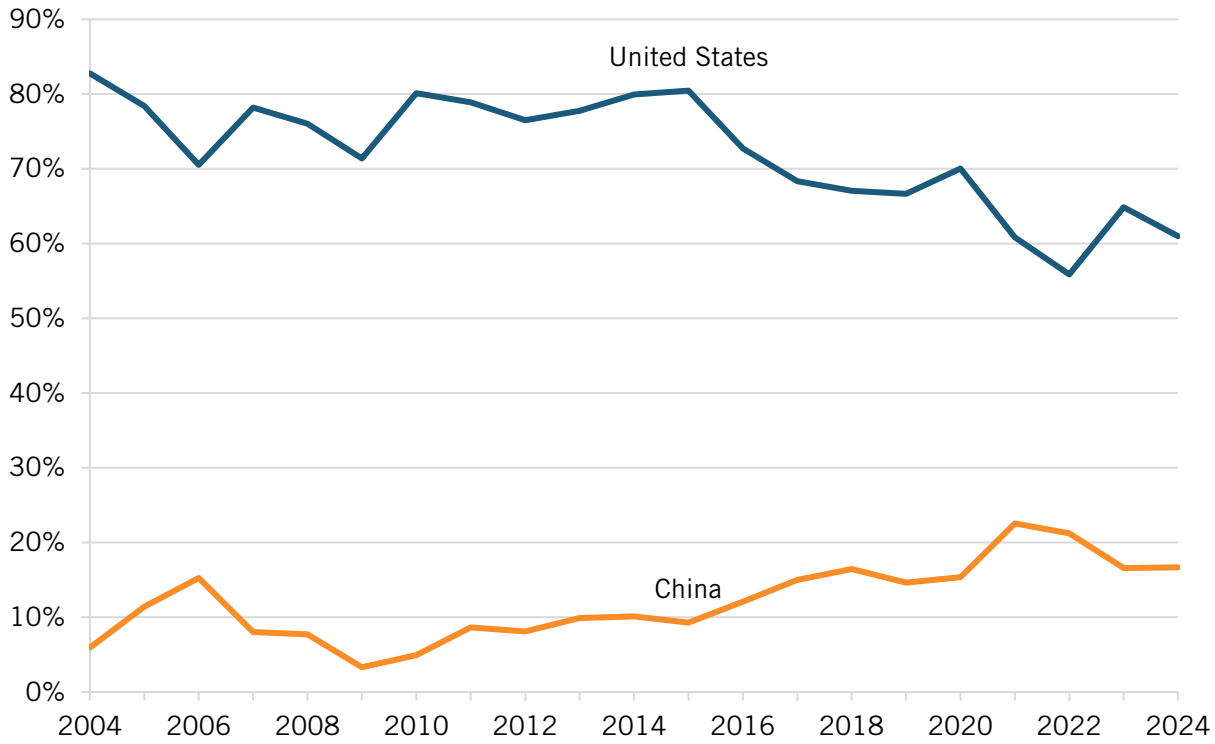
Figure 6: United States' and China's shares of global exports of heavy-gauge metal tank manufacturing



China's global dominance in fabricated metal products is closely tied to state support. Under industrial strategies such as Made in China 2025, the Chinese government has prioritized advanced manufacturing sectors, including metals and industrial equipment. Chinese metal producers benefit from a range of subsidies, including below-market financing from state-owned banks, discounted land and energy, export tax rebates, and direct fiscal support. According to the Organization for Economic Cooperation and Development (OECD), government support for Chinese metal producers is significantly higher than for firms in market economies, contributing to persistent global overcapacity and downward pressure on prices.[17] This allows Chinese firms to undercut international competitors, sometimes selling products at or near cost.

The competitive pressure from China is also visible in key export markets. The United States has traditionally exported metal tanks primarily to neighboring countries, particularly Canada and Mexico. Over the past two decades, however, China has steadily increased its presence in these markets. While the United States still maintains a dominant share—often accounting for 60 to 80 percent of exports to these countries—China's share has risen from less than 6 percent to the mid-teens and, in some years, above 20 percent, suggesting that U.S. firms are facing growing competition from lower-cost Chinese competitors.[18] (See figure 3.)

Figure 7: United States' and China's shares of heavy-gauge metal tank exports to Mexico and Canada



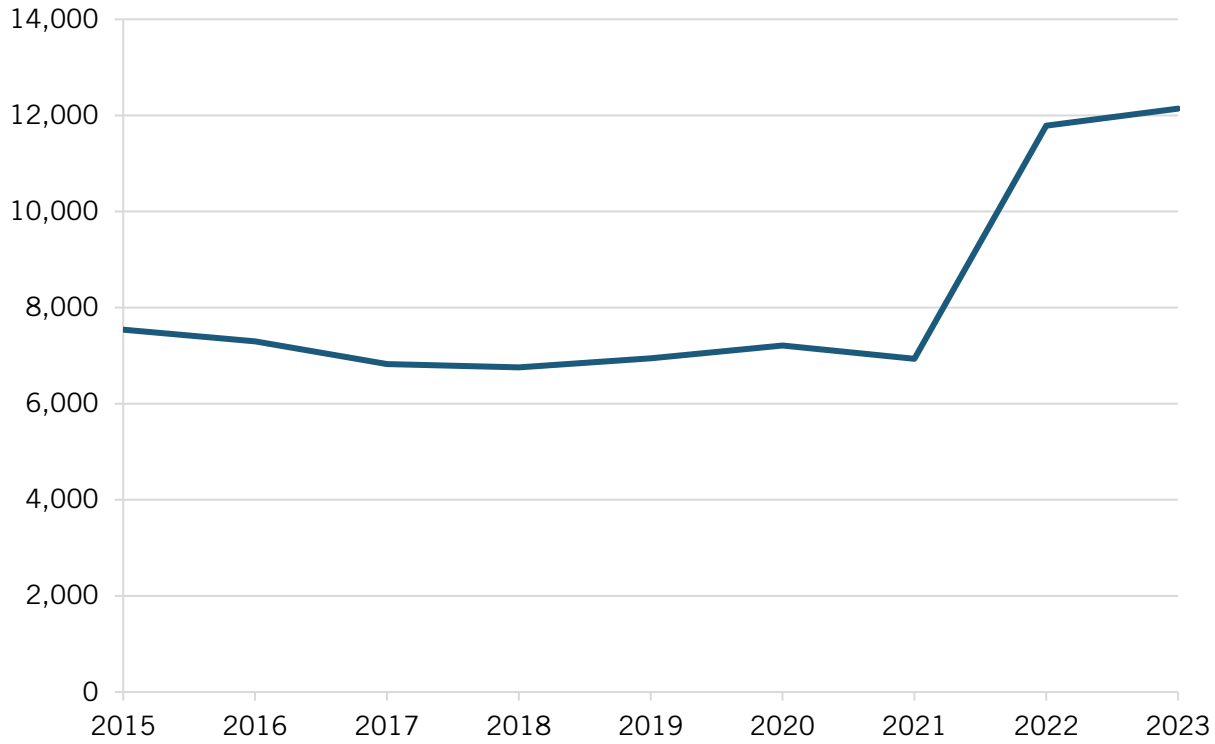
Overall, while Alaska's metal tank manufacturing industry is relatively small, it remains exposed to global competitive pressures. China's continued expansion in fabricated metal products—fueled by subsidies, overcapacity, and export-oriented industrial policy—poses a long-term risk to U.S. producers. For Alaska, where the industry supports critical energy and infrastructure activities, sustained competition from lower-cost imports could limit growth, reduce margins, and constrain job creation. Ensuring the resilience of this niche-yet-essential manufacturing sector will depend on maintaining domestic industrial capabilities amid intensifying global competition.

Arizona: Semiconductor and Related Device Manufacturing (NAICS 334413)

Arizona is specialized in and dependent on the semiconductor industry, which operates in a highly competitive global market. China's extensive subsidies and continued rapid expansion of manufacturing capacity pose a challenge to the sector's future success.

The semiconductor industry is the second-largest traded industry in Arizona, behind the aerospace sector, contributing over $3.5 billion in exports.[19] Employment in this industry has surged in recent years due to sizeable investments in the greater Phoenix area from some of the largest semiconductor firms in the world, such as Intel and Taiwan Semiconductor Manufacturing Corporation (TSMC). These investments contributed to a 61 percent increase in employment between 2015 and 2023, with the largest jump occurring in 2022, the year the CHIPS and Science Act was passed.[20] (See figure 8.) These investments have also made Arizona one of the largest hubs for semiconductor manufacturing in the United States.

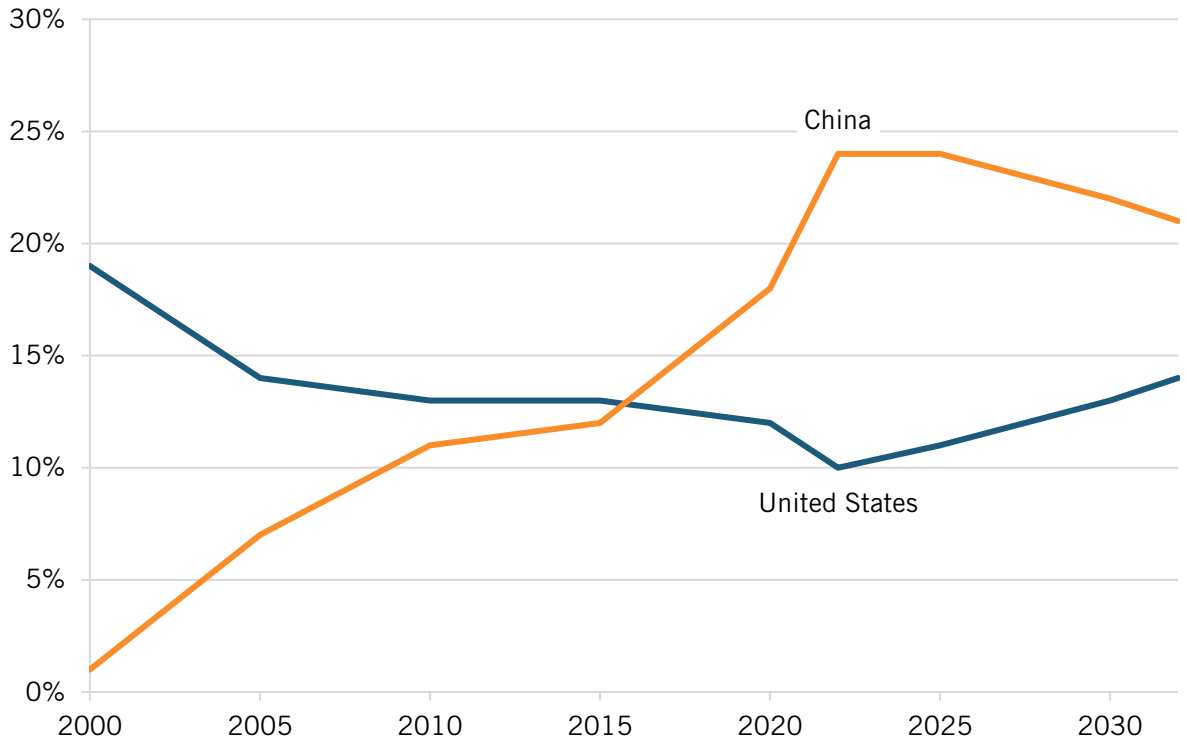
Figure 8: Employment in semiconductor manufacturing in Arizona



However, while investment in the Arizona semiconductor industry has been significant, the Chinese government has invested even more, threatening to take global market share from American producers. Through substantial subsidies and overproduction, Chinese firms are suppressing semiconductor prices, gaining global market share, and potentially harming the future success of Arizona fabs. Overall, the Chinese government plans to invest over $150 billion in the industry by 2030, nearly three times the $52 billion invested by the United States in the CHIPS and Science Act in 2022.[21] In the first half of 2025 alone, the government invested $63.3 billion in the industry.[22]

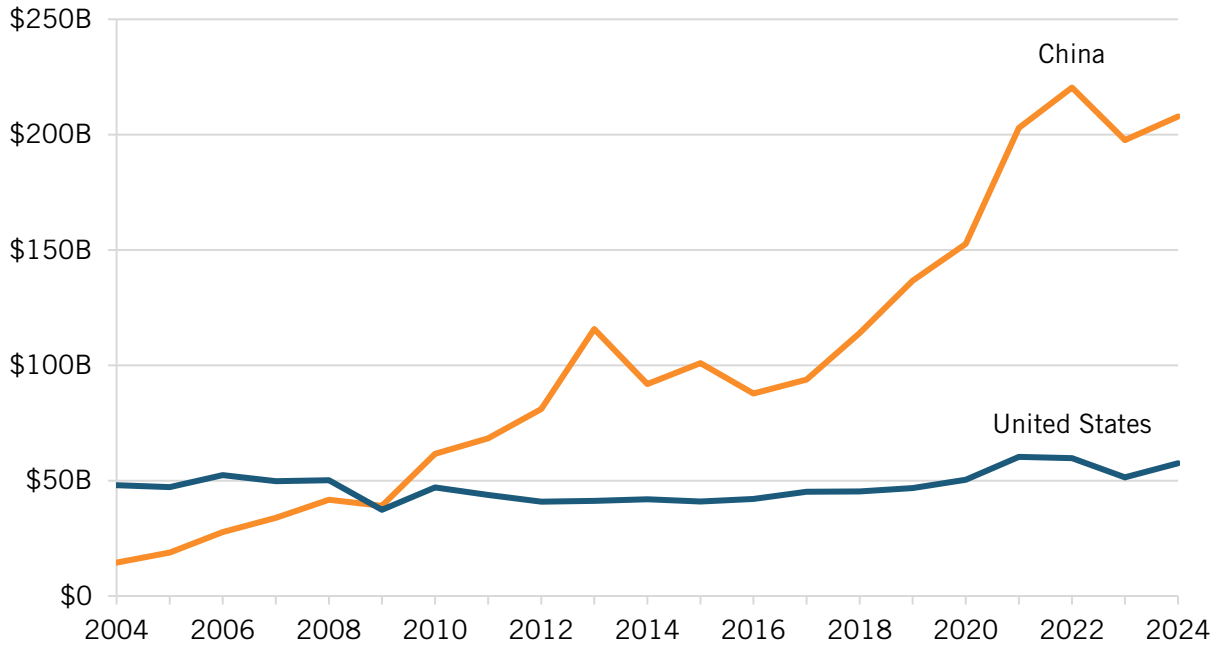
China's push for dominance in semiconductors is most evident in legacy semiconductor manufacturing, which has benefited from significant industrial subsidies and has grown faster than the rest of the global market. Chinese legacy chip production capacity grew more than four times as fast as global demand between 2015 and 2023.[23] Continually increasing production capacity without corresponding demand growth can result in overcapacity, which reduces prices and revenue for U.S. chip manufacturers. In terms of overall semiconductor production capacity, China's stock has been rising at the expense of the United States, disproportionately affecting areas highly concentrated in semiconductors, such as Arizona. Between 2000 and 2025, China's share of global semiconductor manufacturing capacity increased by 20 percentage points, while the United States saw its share decline by 8 percentage points.[24] (See figure 9.)

Figure 9: Share of global semiconductor production capacity, 2000–2032 (projected from 2025)



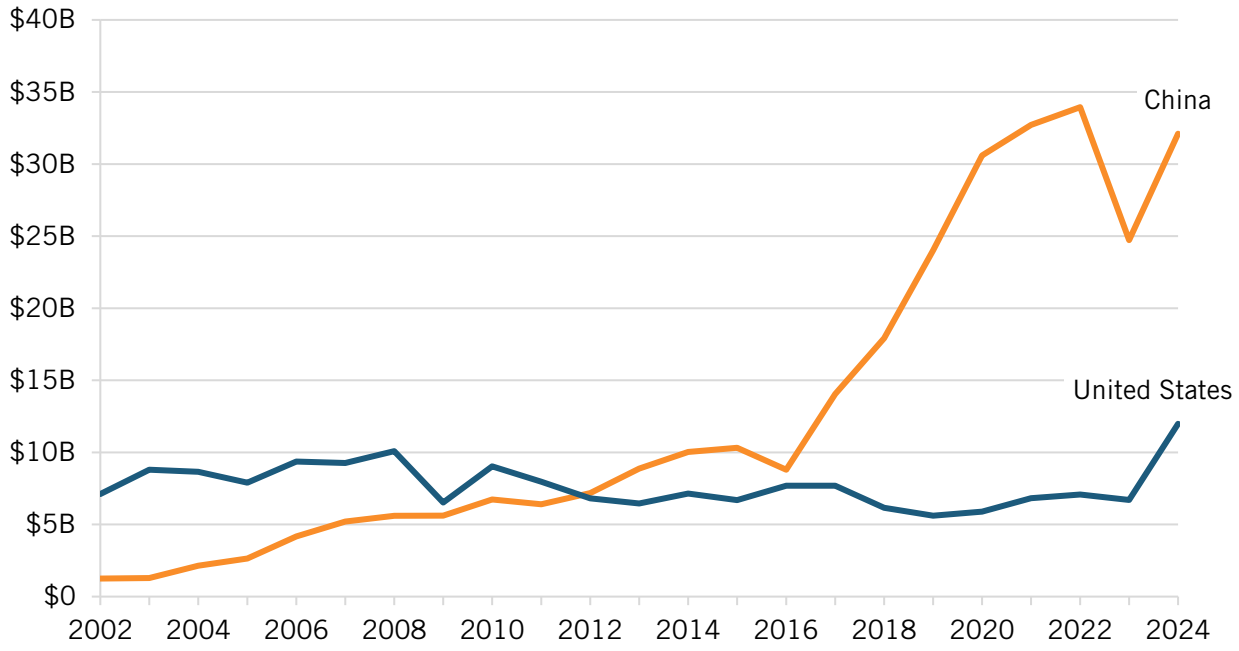
For much of the early 2000s, the United States exported far more semiconductors (HS codes 8541 and 8542) than China did. However, from 2009 until the present, China has overtaken the United States, with exports growing exponentially while U.S. exports have remained stagnant. From 2014 to 2024, Chinese semiconductor exports grew by 126 percent, while U.S. exports increased by just 37 percent.[25] (See figure 10.) Indeed, TSMC's $165 billion investment to support the construction of six fabs in Arizona, most of which are not yet operational, will likely increase U.S. exports as more fabs come online.[26] However, the U.S. Commerce Department has noted that China's chip industry expansion poses a threat to new chip facilities in the United States, stating that new Chinese chip capacity could result in fabs in the United States and other allied countries being reduced to producing fewer chips than is necessary to remain profitable.[27]

Figure 10: Semiconductor exports



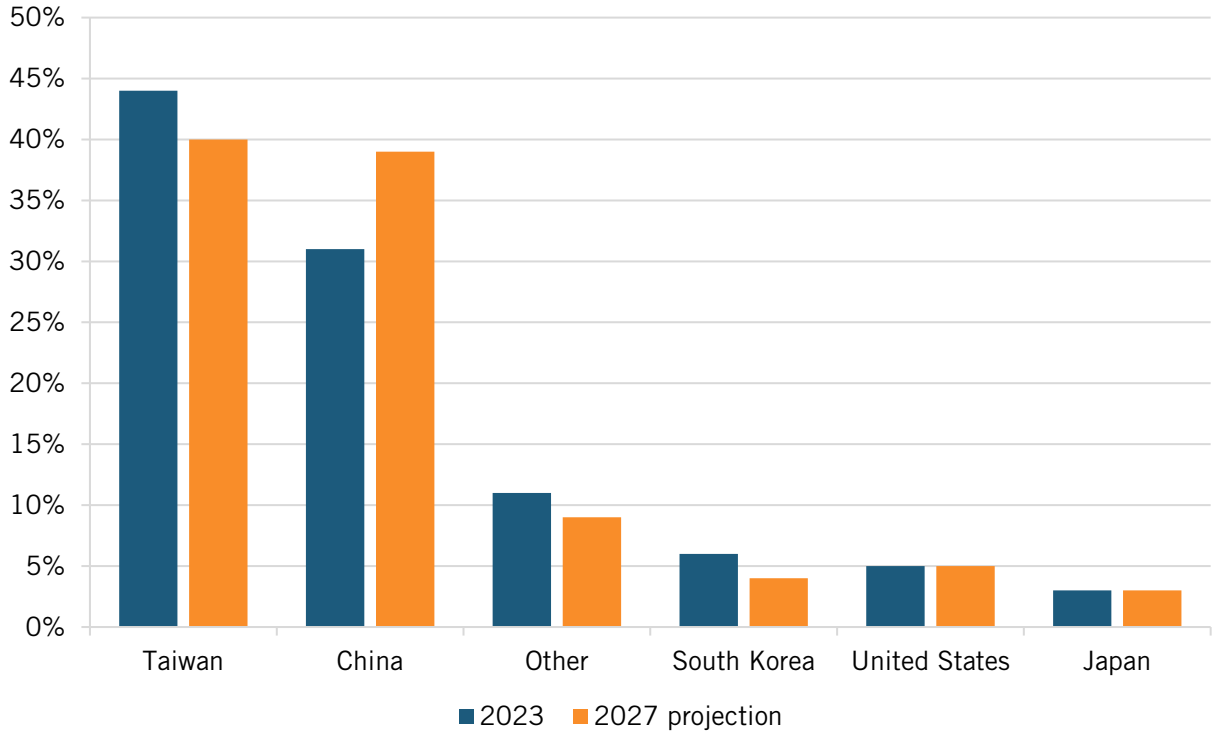
The high subsidies in the Chinese semiconductor industry allow Chinese firms to sell semiconductors at a lower cost than U.S. competitors can, at times selling chips below production cost. Chinese manufacturers sell chips 30 to 50 percent cheaper than U.S. suppliers do, making their products more attractive in third-party markets.[28] U.S. exports to Malaysia, Singapore, and Vietnam have grown at a fraction of the pace of China's, with Chinese exports to these countries close to double that of the United States in 2024. (See figure 11.)

Figure 11: Semiconductor exports to Malaysia, Singapore, and Vietnam[29]



In China's Made in China 2025 strategy, released in 2015, the government explicitly aims to achieve 70 percent self-sufficiency in semiconductor products by 2025 and to become the world leader in semiconductor manufacturing by 2030.[30] Although these goals haven't yet been reached, China-based firms are expected to continue to grow rapidly, as policy support and investment remain aligned with these objectives. China's share of legacy chip manufacturing is expected to grow from 31 percent in 2023 to 39 percent in 2027, making it second globally behind Taiwan, whose share is projected to decline from 44 percent to 40 percent.[31] The United States is projected to hold 5 percent of the global market share. (See figure 12.) Moreover, between 2022 and 2026, China is expected to build more new fabs and complete more major expansions than any other region will, bringing 26 facilities online, compared with only 16 in the Americas.[32]

Figure 12: Global market share in legacy semiconductor manufacturing, 2023 vs. 2027 projection[33]



China's push for dominance in the global semiconductor market poses a direct threat to U.S. firms, and its growth is not expected to slow.[34] As Chinese producers replace U.S. suppliers domestically and expand aggressively into third-country markets, U.S. semiconductor exports will face sustained erosion in market share, revenue, and profitability. Chinese authorities will continue to aggressively subsidize the semiconductor industry to reach their $150 billion target, thereby contributing to overcapacity and artificially low prices for Chinese firms. For Arizona, where semiconductors are one of the state's most important export industries and an industry that has seen rapid growth over the past several years, this loss of global demand and reduced revenue would translate into slower industry growth and weaker job creation—a threat to the future of the state's economy.

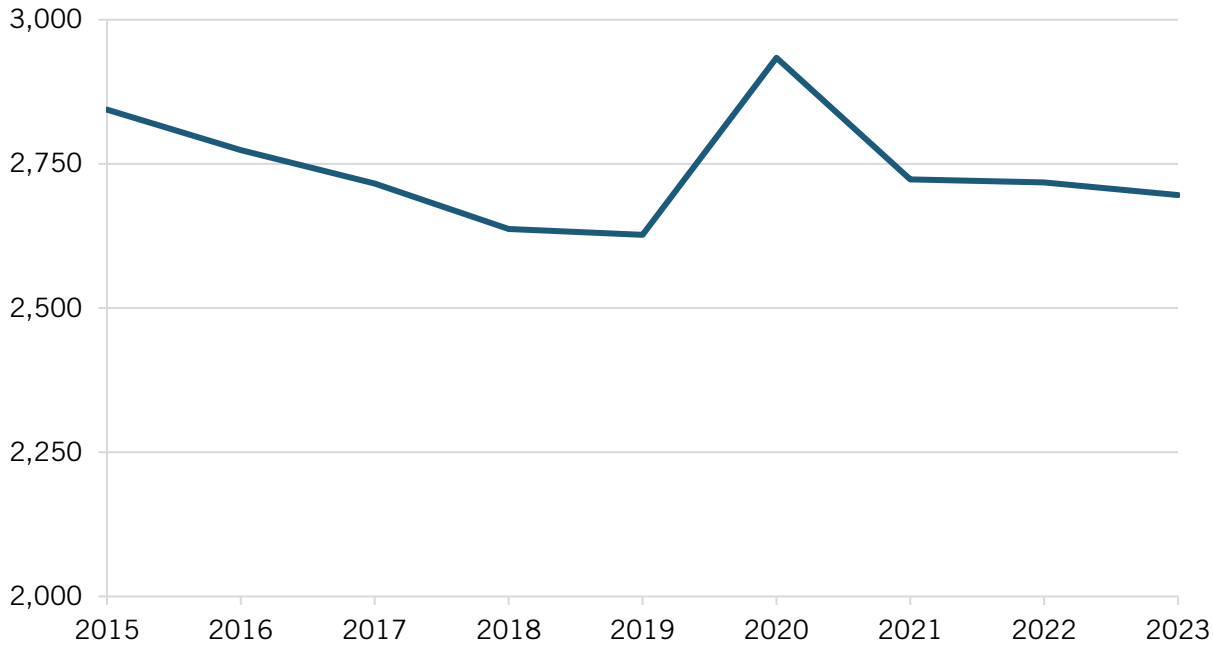
Arkansas: Motor and Generator Manufacturing (NAICS 335312)

Arkansas has one of the largest motor and generator manufacturing industries in the country, employing over 2,600 workers and competing in a competitive global market.[35] This industry is a critical input to U.S. energy and power infrastructure, making it vital for the United States to maintain a secure supply chain and strong domestic manufacturing capabilities. While the United States has historically been a major producer of advanced electrical equipment, including industrial motors and generators, China's rapid expansion in electrical machinery manufacturing poses a significant threat to the sector's future success and U.S. national and economic security.[36]

Motor and generator manufacturing produces essential components used in industrial machinery, HVAC systems, power generation equipment, and manufacturing processes. These products are critical inputs across the economy, with generators serving as primary and secondary power sources for factories, hospitals, telecommunications towers, and data centers, making the industry a key part of critical infrastructure.[37] The expansion of data center infrastructure, in particular, has been a powerful catalyst for growth in this sector.

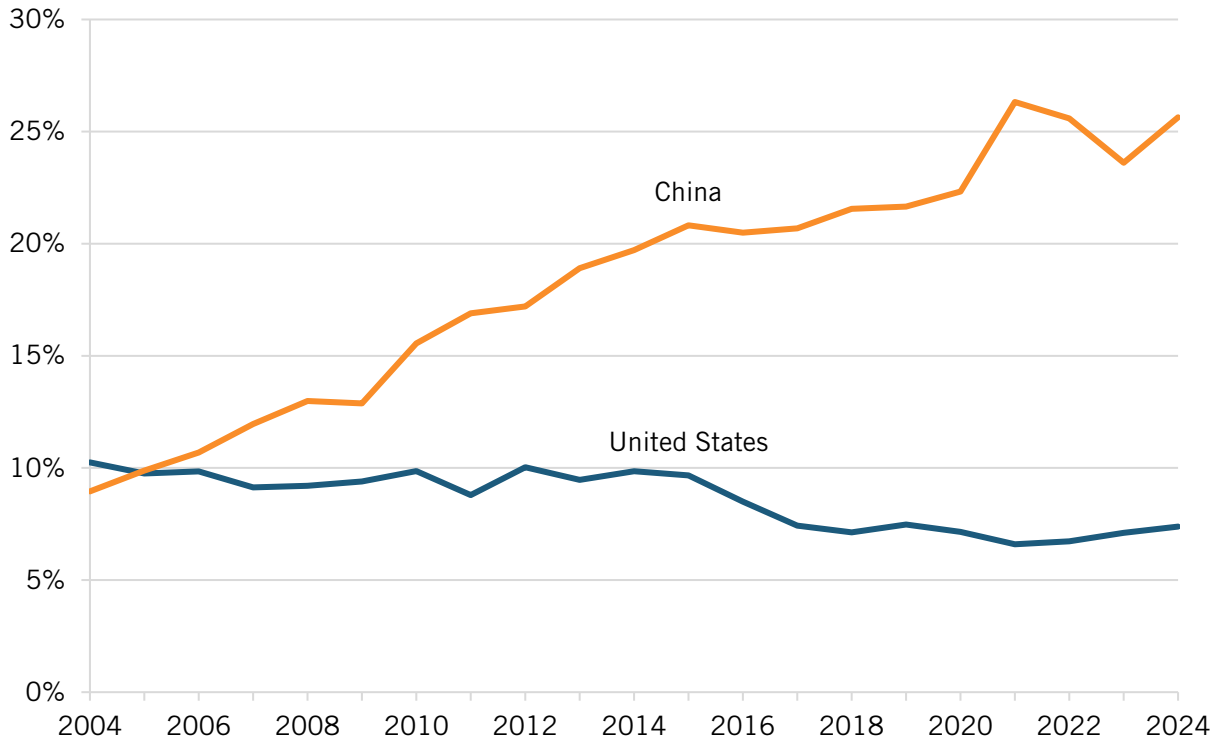
Arkansas plays an important role in this industry, particularly in the state's western regions. The state is home to major manufacturers, including ABB Motors and Mechanical, headquartered in Fort Smith, and Nidec Motor Corporation in Mena. The concentration of production in a handful of facilities makes the industry particularly important to local economies in Arkansas, where manufacturing jobs provide stable, high-wage employment. Between 2015 and 2023, employment in the motor and generator industry in Arkansas experienced a decline. Despite a surge from 2019 to 2020, employment in this industry fell by about 5 percent, while overall employment in the state increased by 11 percent.[38] (See figure 13).

Figure 13: Employment in the motor and generator manufacturing industry in Arkansas



Despite its importance to Arkansas, the U.S. motor and generator industry has lost ground globally. China has rapidly increased its share of global exports, becoming a dominant supplier of electric motors and generators. In the early 2000s, the United States' share of global exports of motors and generators (HS 8501, 8502, and 8503) exceeded that of China, with the United States holding about 10 percent of the global market while China held 9 percent. However, by 2005, China had surpassed the United States and continued to increase its global export share, rising from 9 percent to over 25 percent by 2024. In comparison, the U.S. share of global exports fell from 10 percent to 7 percent.[39]

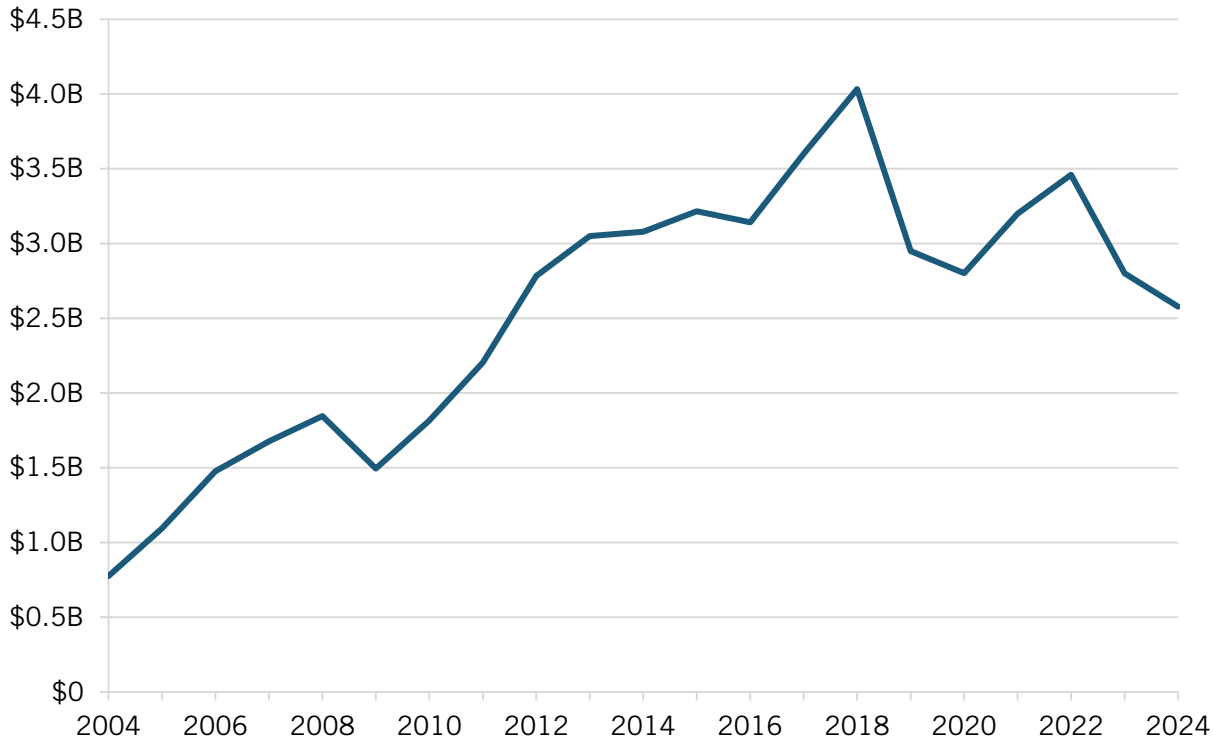
Figure 14: United States' and China's shares of global exports of motors and generators



China's rise in global market share has been driven in part by its ability to penetrate foreign markets, including the United States. U.S. imports of motors and generators from China increased substantially between 2004 and 2018, peaking at over $4 billion, a 420 percent increase, before declining slightly in recent years. Despite this decline, import levels remain significantly higher than over 20 years ago in 2004, demonstrating the continued presence of China's producers in the U.S. market. (See figure 15.)

Being a significant input to critical infrastructure, the United States needs to have a strong and secure supply chain for motors and generators. Relying on imports from China in this industry leaves the United States vulnerable to economic coercion and national security risks.

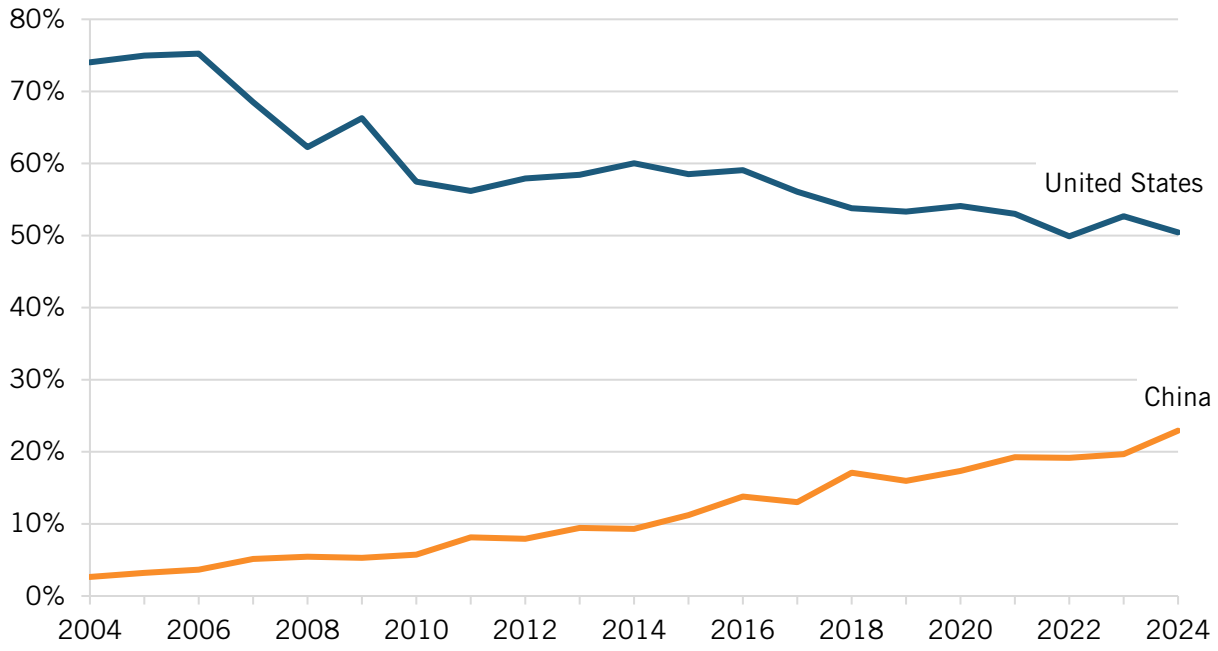
Figure 15: U.S. imports of motors and generators from China



China's rapid expansion in the motor and generator industry has occurred within a broader industrial strategy prioritizing the electrical equipment industry, recognizing it as a strategic manufacturing sector under the Made in China 2025 plan.[40] Made in China 2025 is a cohesive strategy for Chinese industrial dominance, outlining the government's support for national champions in strategic industries through large-scale subsidization, tax credits, export seller credits, and more. These policies have supported the scaling of the Chinese electrical equipment industries, including motors and generators, and likely reduced costs for Chinese producers, allowing them to quickly gain market share globally.

China's growing competitiveness is evident not only in its penetration of the U.S. market but also in third-country markets that have traditionally been dominated by U.S. firms. Canada and Mexico, the two largest export destinations for U.S. motor and generator manufacturers, are increasingly importing motor and generator products from China.[41] Over the past decade, the share of exports of motors and generators to Canada and Mexico from the United States has declined from about 75 percent to 50 percent, while China's export share has grown from 3 percent to 23 percent, nearly a quarter of all imports.[42] (See figure 16.)

Figure 16: United States' and China's shares of motors and generator exports to Canada and Mexico



China's continued expansion in motor and generator manufacturing poses a direct threat to U.S. firms and the regional economies that depend on them. As Chinese producers gain market share in both domestic and international markets, U.S. manufacturers may face declining exports, tighter profit margins, and reduced investment. In Arkansas, motor and generator manufacturing employment has already experienced a decline over the past several years, and the growing threat of China could worsen the situation still, translating into slower growth, reduced economic output, and potential jobs losses.

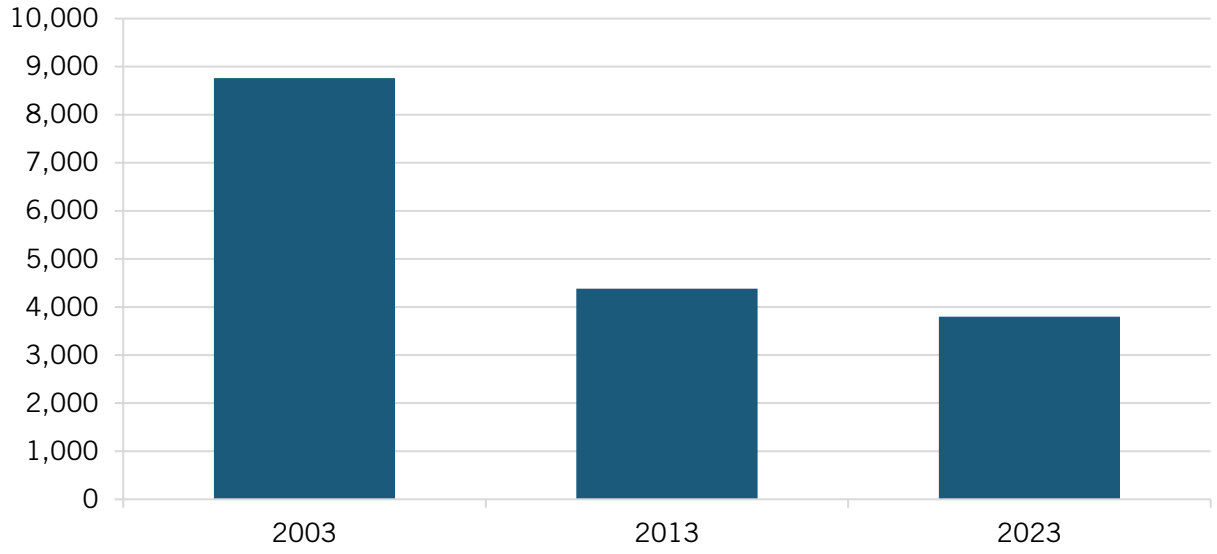
California: Computer Storage Device Manufacturing (NAICS 334112)

California specializes in the computer and storage device manufacturing industry, which operates in a highly competitive global market. Although California remains home to many of the United States' most important computer hardware and data storage firms, China's extensive industrial support for electronics and information technology manufacturing has helped it become the dominant global producer and exporter in this space, posing a significant challenge to California's future industry success.

Computer and storage device manufacturing includes products such as servers, enterprise computing systems, and computer storage devices. These products are critical to the digital economy, particularly as the build-out of data centers continues and the demand for data storage supporting artificial intelligence (AI) continues to grow. California is the center of gravity for this industry in the United States, with many of the country's leading firms in computing hardware, data infrastructure, and storage systems based in the state. California is home to Supermicro in San Jose, Western Digital in San Jose, and Apple in Cupertino. This concentration of firms has made California one of the country's most important states for advanced computing hardware. At the same time, the industry has shrunk over the long term in employment terms. California's employment in this industry fell from 8,761 workers in 2003 to 4,381 in 2013 and then to 3,799 in 2023, a decline of roughly 57 percent.[43] (See figure 17.) Still, 84 percent of the

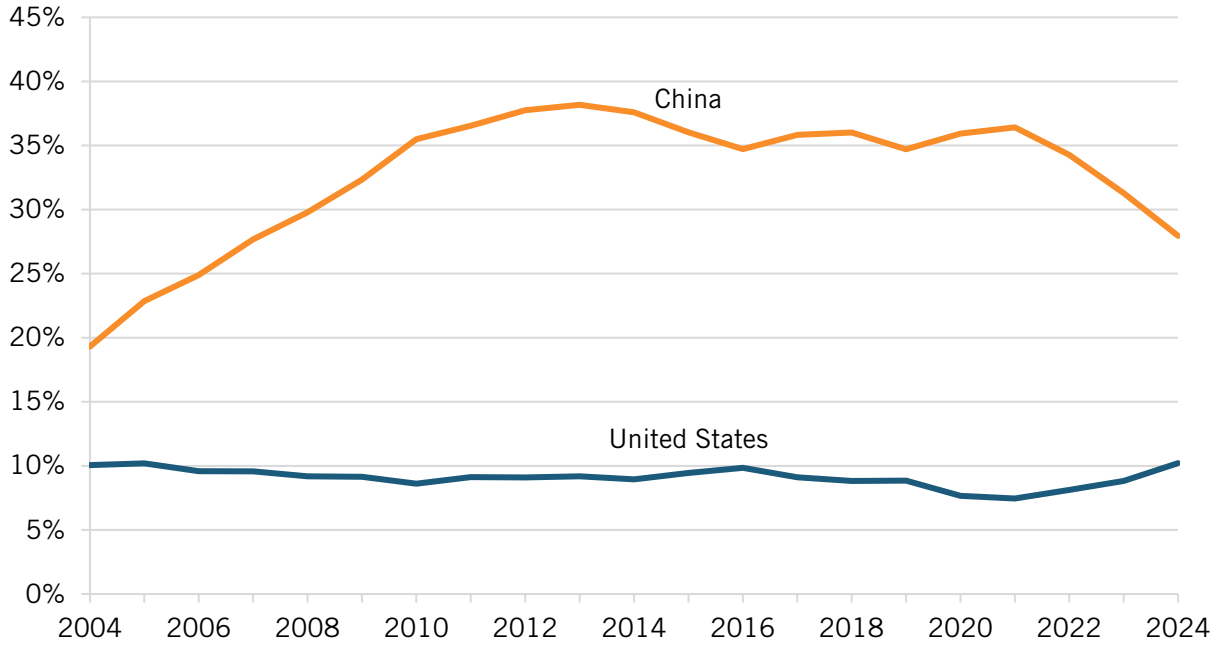
country's workforce in this industry is in California, underscoring California's importance to this industry.[44]

Figure 17: Employment in computer storage device manufacturing in California



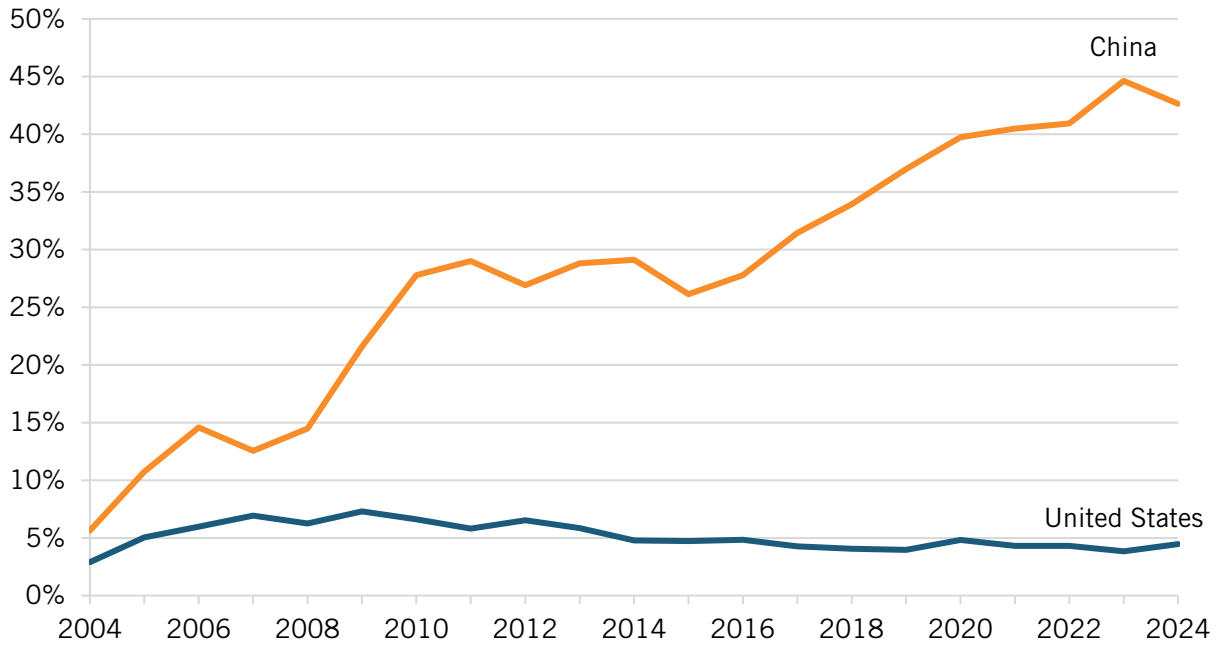
China has consistently held a larger share of the export market for computer storage devices (HS codes 8471, 8473, and 8523) than the United States has over the past two decades. In 2004, China accounted for about 20 percent of all exports in this industry, while the United States accounted for about 10 percent. China's exports continued to increase relative to the rest of the world over the next decade, controlling about 37 percent of the export market at its peak in 2013, before declining for the next several years. In 2024, China's exports in this industry accounted for one-quarter of all exports, while U.S. exports still sat at about 10 percent.[45]

Figure 18: United States' and China's shares of global exports of computer storage devices



In East Asian markets, a critical region for technology exports such as computer storage devices, China's market share has also surged. In 2024, China exported about 6 percent of all computer storage device products to Indonesia, the Philippines, and Vietnam, while the United States exported about 3 percent. By 2024, however, Chinese exports had surged, reaching 45 percent in 2023 before declining slightly to 43 percent in 2024. The United States' exports to these markets, on the other hand, stagnated. By 2024, the United States accounted for about 5 percent of all exports to this region, a marginal increase from 20 years prior. The scale of China's growth underscores its aggressive export expansion strategy and its dominance of third-country markets.[46]

Figure 19: United States' and China's shares computer storage device exports to Indonesia, the Philippines, and Vietnam



China's dominance in computer and storage device manufacturing has been driven by a deliberate strategy to build a broader computing hardware stack. Under Made in China 2025, Beijing identified next-generation information technology as a priority sector and pushed implementation through national, provincial, and city-level guidance.[47] In practice, that support has enabled Chinese firms to produce high-value computer hardware, including servers, data center equipment, and other digital infrastructure products.[48] China's vast domestic market for cloud services, enterprise IT, and digital infrastructure has further reinforced this growth, allowing domestic producers to scale rapidly before expanding abroad.

China's concerted effort to build advanced manufacturing capacity and expand into higher-value products has been highly successful, driving a surge in exports and likely a substantial increase in global market share. While it's difficult to conclude definitively that China's rise in computer storage device manufacturing directly caused California's employment decline or the stagnation of U.S exports, the correlation is clear.

China's continued growth in this industry could be an even greater threat to California in the future. Should China continue its strategic investment in next-generation IT industries through

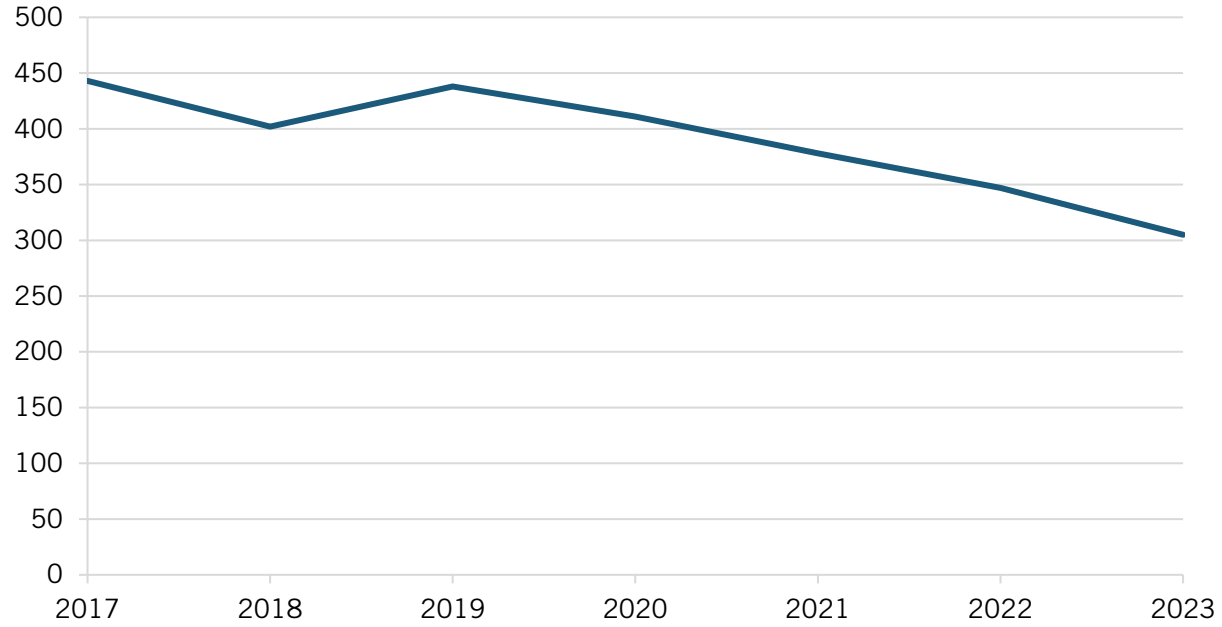
industrial strategies similar to Made in China 2025, we can expect Chinese exports to continue rising while U.S. producers face growing pressure. For California, that would mean weaker export volume, lower profits, reduced output, and further job losses in the country's most important computer and electronics manufacturing state.

Colorado: Computer Storage Device Manufacturing (NAICS 334112)

Colorado has the second-largest computer storage device manufacturing industry in the country, operating in a highly competitive global market. Although the state remains home to important data storage and enterprise hardware capabilities, China's rapid expansion in electronics manufacturing and data-storage supply chains poses a growing challenge to the future competitiveness of Colorado firms.

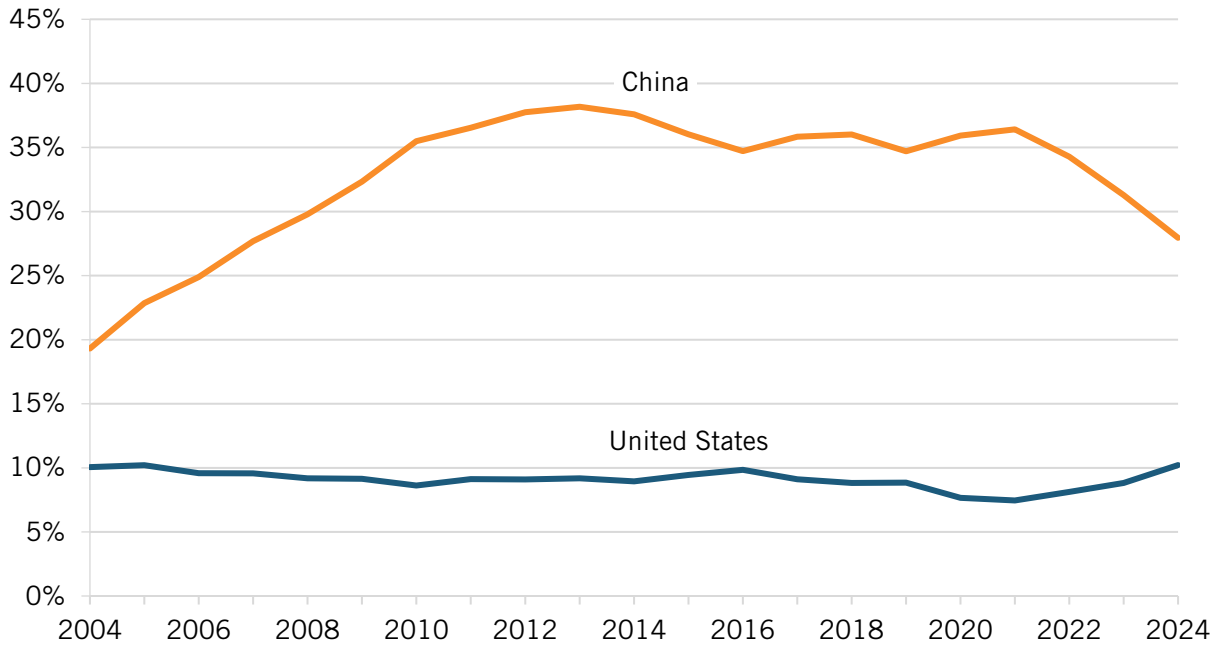
Computer and storage device manufacturing includes products such as servers, enterprise computing systems, and computer storage devices. These products are critical to the digital economy, particularly as the build-out of data centers continues, and the demand for data storage to support AI grows. Seagate Technology, a major global data-storage company, has a long-standing presence in Colorado, leading the industry in the state. Between 2017 and 2023, employment declined gradually, falling from about 450 to 300. Yet, as of 2023, 7 percent of the country's workforce in this industry is still located in Colorado, making it the second-largest employer in the U.S. computer storage device industry, behind only California.[49]

Figure 20: Employment in computer storage device manufacturing in Colorado



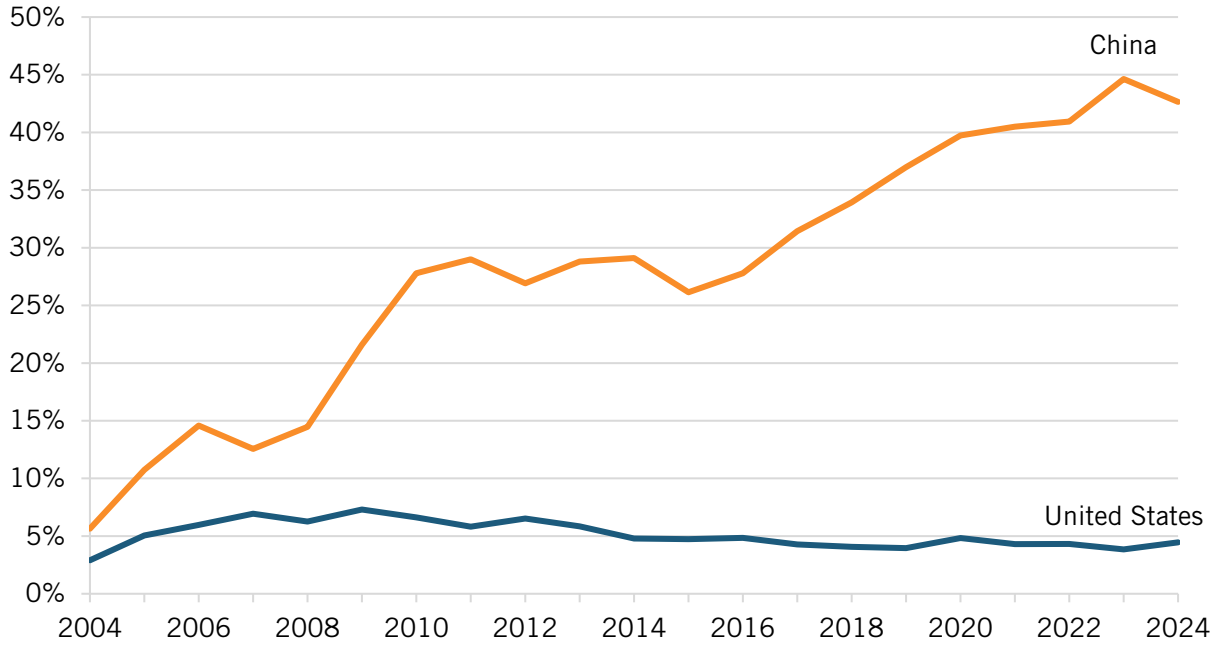
However, this industry, like many others, is being increasingly shaped by Chinese firms, themselves supported by large-scale industrial policy. China has outpaced the United States in global exports of computer storage devices (HS codes 8471, 8473, and 8523) over the past two decades, with China's share of exports increasing from 20 percent in 2004 to 28 percent in 2024, and reaching a peak of 37 percent in 2023. The United States, on the other hand, has seen its share of global exports in this industry sit at about 5 percent over the same two-decade period.[50] (See figure 21.)

Figure 21: United States' and China's shares of global exports of computer storage devices



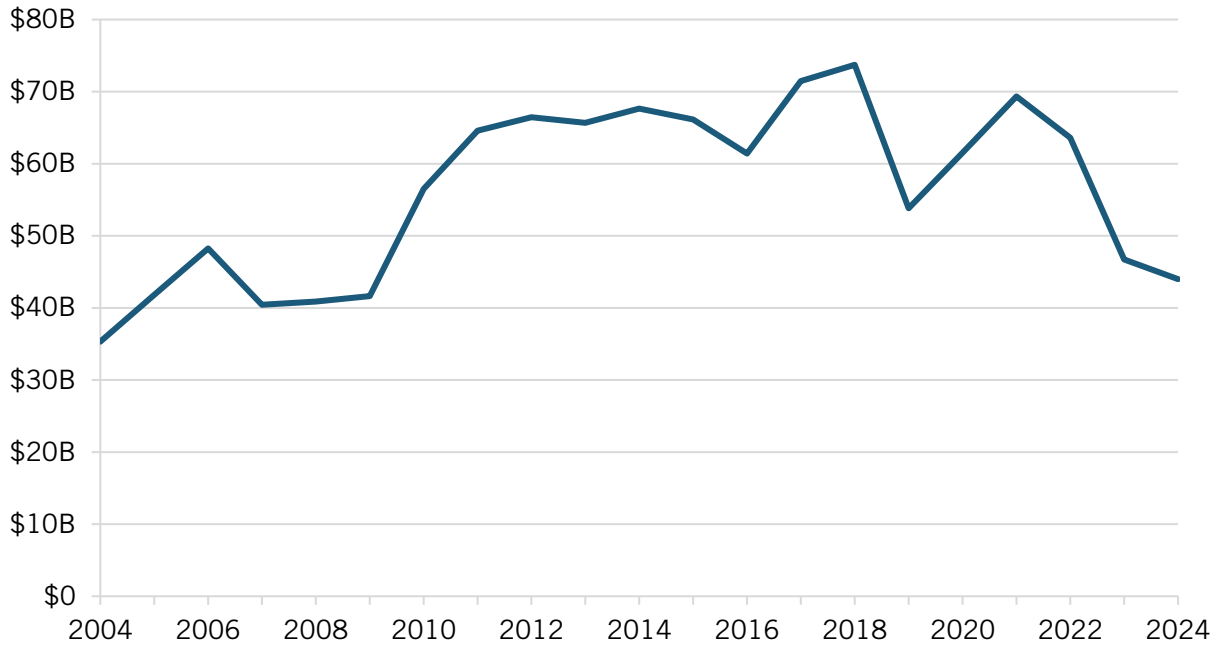
China accounted for about 6 percent of exports to Indonesia, the Philippines, and Vietnam in 2004, but by 2024, this share had increased substantially to nearly 45 percent. This increase also significantly widened the gap between China and the United States. U.S. exports to these markets in 2024 was very similar to 2004, with its share of exports increasing from 3 percent to just 5 percent.[51]

Figure 22: United States' and China's shares of computer storage device exports to Indonesia, the Philippines, and Vietnam



China has penetrated not only foreign, third-country markets but also the U.S. market. Imports of computer storage devices from China increased steadily from 2004 to 2018, rising from $35 billion to nearly $74 billion. In the years since, imports from China have declined gradually, falling to $43 billion, still a 25 percent increase since 2004.[52]

Figure 23: U.S. imports of computer storage devices from China



China's dominance in computer and storage device manufacturing has been driven by a deliberate strategy to build out its broader computing hardware ecosystem. Under Made in China 2025, Beijing identified next-generation information technology as a priority sector and advanced that goal through coordinated national, provincial, and local policy support.[53] In practice, this support has helped Chinese firms expand production of higher-value computer hardware, including servers, data center equipment, and other digital infrastructure products.[54] China's vast domestic market for cloud services, enterprise IT, and digital infrastructure has reinforced this growth, allowing domestic producers to achieve scale at home before expanding aggressively into foreign markets.

China's concerted effort to build advanced manufacturing capacity and move into higher-value technology products has been highly successful, fueling a surge in exports and likely a substantial increase in global market share. While it is difficult to say definitively that China's rise in computer storage device manufacturing has directly caused a decline in Colorado employment or the stagnation of U.S. exports, the correlation is hard to ignore.

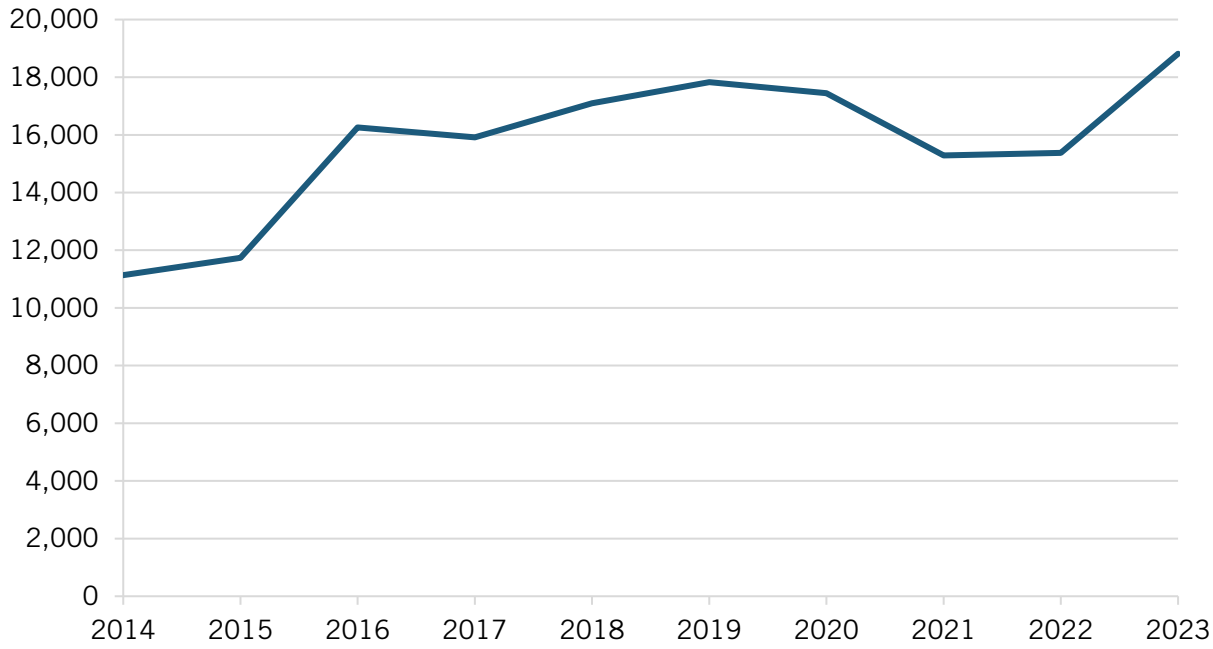
China's continued growth in this industry could pose an even greater threat to Colorado in the years ahead. If China continues to support next-generation IT industries through industrial strategies similar to Made in China 2025, Chinese exports are likely to continue rising while U.S. producers face mounting competitive pressure. For Colorado, China's competition could still place pressure on the expanding industry, resulting in potential for lower profits, reduced output, and substantial job losses.

Connecticut: Aircraft Engine and Engine Parts Manufacturing (NAICS 336412)

Connecticut is one of the most important states for aircraft engine and engine parts manufacturing in the United States, with a highly specialized workforce and a concentration of globally competitive firms. However, the industry operates in an increasingly competitive global market in which China's state-backed push into aerospace manufacturing poses a growing long-term threat to U.S. leadership.

Aircraft engine and engine parts manufacturing includes the production of propulsion systems, turbines, and critical components used in both commercial and military aircraft. These products are essential to national defense, commercial aviation, and the broader aerospace supply chain. Connecticut plays an outsized role in this industry, anchored by major firms such as RTX, which owns Pratt & Whitney, a leading manufacturer of aircraft engines, and GE Aerospace, which maintains significant operations in the state. Sikorsky (a Lockheed Martin company) also contributes to the broader aerospace ecosystem in Connecticut.[55] Employment trends reflect the strength and growth of the industry over the past decade, with employment increasing from approximately 11,000 workers in 2014 to a peak of nearly 19,000 in 2023.[56] (See figure 24.)

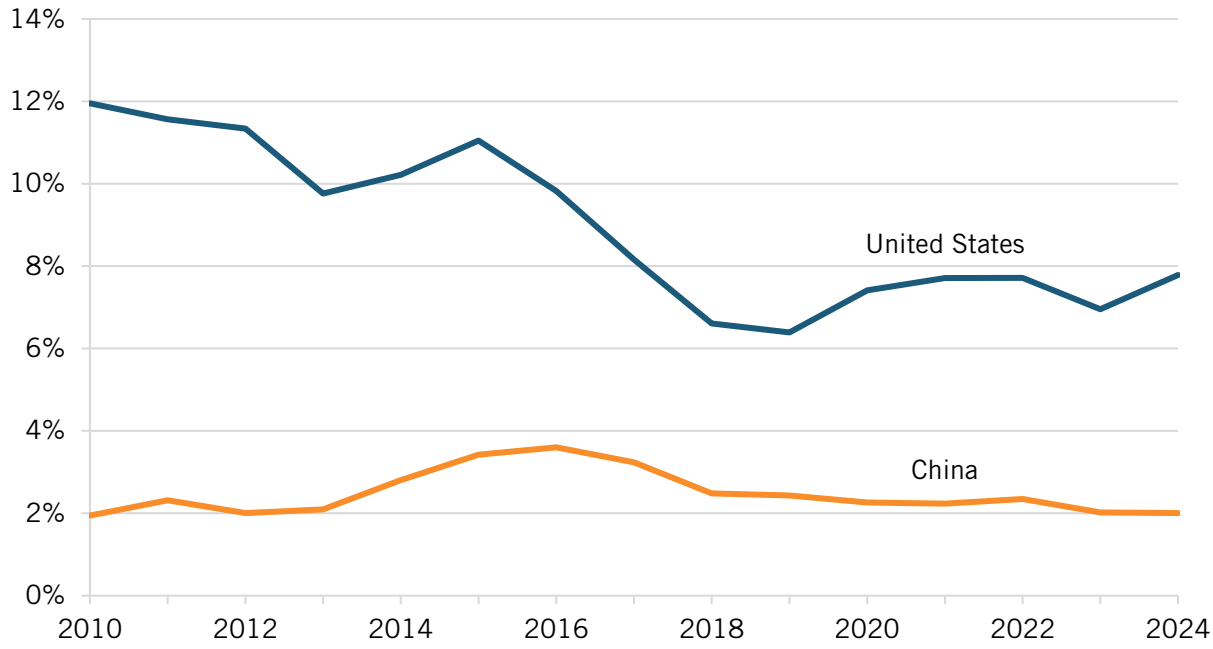
Figure 24: Employment in aircraft engine and engine parts manufacturing in Connecticut



Despite Connecticut's importance domestically, the United States has seen its position in the global aerospace supply chain face increasing pressure. Historically, the United States has maintained a strong lead in aircraft engine exports, but its share of global exports (HS codes 840710, 840910. 8411, 841210) has declined over time as other countries—including China—have expanded their capabilities. In the late-2000s, the United States accounted for over 13 percent of global exports in this industry, but that share has since fallen to below 10 percent in recent years. China's share of global exports has also increased marginally over this period, from about 1.5 percent to 2 percent.[57] (See figure 25.)

China's comprehensive five-year plan, Made in China 2025, identifies aerospace equipment as a priority sector, and therefore the Chinese government has provided extensive support to domestic aerospace firms through subsidies, state-directed financing, and government procurement policies.[58] For example, the Commercial Aircraft Corporation of China (COMAC), the country's flagship civil aviation manufacturer, has received tens of billions of dollars in state support to develop indigenous aircraft such as the C919. According to the Center for Strategic and International Studies (CSIS), COMAC had received an estimated $49 billion in state subsidies and support mechanisms as of 2020.[59] However, it is notable that COMAC does not produce its own engines and instead relies on other firms.

Figure 25: United States' and China's shares of global exports of aircraft engines and engine parts

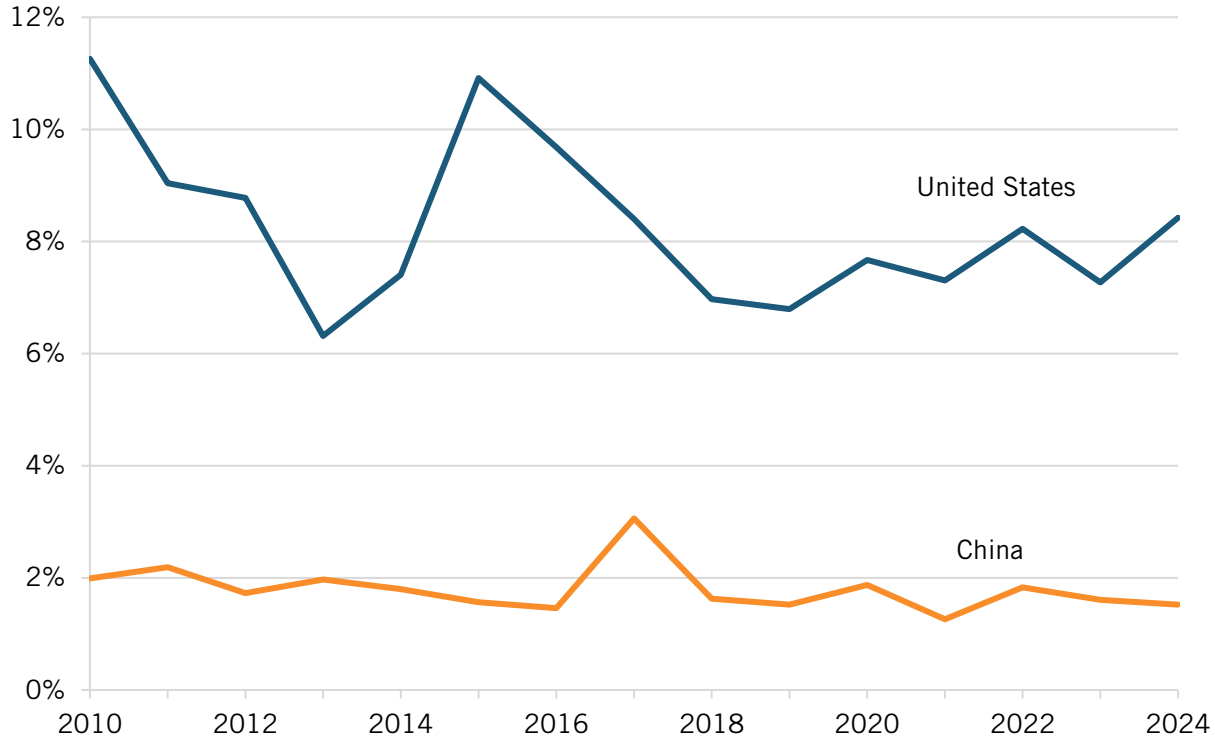


In addition to direct subsidies, Chinese aerospace firms benefit from preferential access to financing from state-owned banks, subsidized inputs, and government-backed R&D initiatives. The OECD has documented significant government support across China's aerospace sector, noting that such policies reduce production costs, enable below-equity returns for investors, and allow firms to compete internationally even before achieving full technological parity.[60]

While China still lags behind the United States and key allies in high-performance jet engine technology, it has made notable progress. Programs such as the CJ-1000A jet engine aim to reduce reliance on foreign suppliers and build a fully domestic aerospace supply chain. Over time, this could allow Chinese firms to compete more directly in global markets, particularly in third-country exports.

Exports to some of the United States' closest aerospace trading partners, including Canada, the United Kingdom, and Germany, closely mirror global trends.[61] The United States still holds a greater share of the export market in these countries than China does; however, its leadership has faced a slow decline. As of 2024, the United States accounted for 8 percent of all exports to these countries, while China accounted for just 2 percent.[62]

Figure 26: United States' and China's shares of aircraft engine and engine part exports to Canada, the United Kingdom, and Germany



China's expansion into aerospace part manufacturing has broader implications for global market dynamics. As in other advanced manufacturing sectors, state support can enable overcapacity and pricing advantages that distort international competition. China's sustained investment signals a long-term strategy to compete with established producers in the United States. For Connecticut, a state that is highly competitive in this industry and has seen its workforce grow over the past several years, these dynamics do not pose an imminent risk, but they could threaten the success of the industry in the long term.

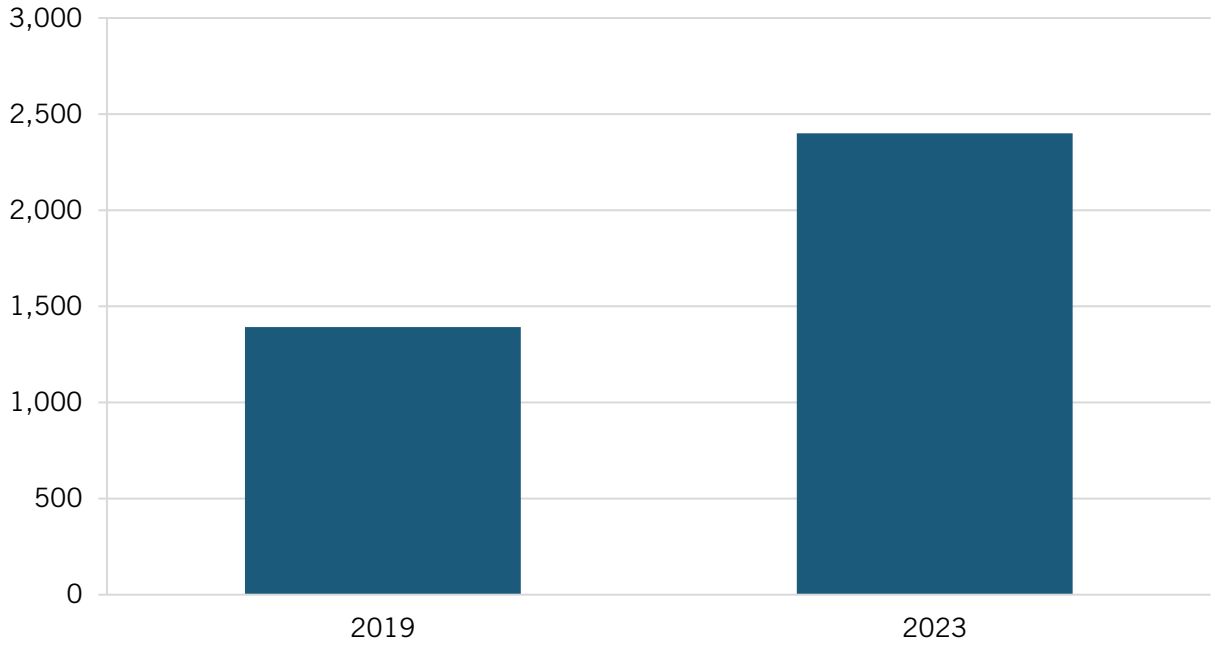
Delaware: In-Vitro Diagnostic Substance Manufacturing (NAICS 325413)

In-vitro diagnostic substance manufacturing is a growing advanced-manufacturing industry in Delaware. While China has expanded its presence in the global diagnostics market, the available evidence does not indicate that Chinese competition is currently a major cause for concern for Delaware producers, but it is something to watch out for in the future. China has benefited from substantial state support in the broader medical technology sector and has improved its capabilities over time, but the United States remains the far larger exporter of in-vitro diagnostic substances and continues to dominate exports to key advanced foreign markets. For Delaware, the data suggests that the state's diagnostics industry is growing in a market wherein U.S. firms still hold a stronger competitive position.

In-vitro diagnostic substance manufacturing includes the production of diagnostic and laboratory reagents, assay kits, calibrators, controls, and related products used to detect disease and monitor patient health. These goods are a critical part of modern health care and support hospital laboratories, chronic disease management, and infectious disease testing. Delaware has become a meaningful location for this activity. Employment in this industry in Delaware rose

from about 1,400 in 2019 to 2,400 in 2023, an increase of 72 percent.[63] (See figure 27.) Though its workforce is relatively small in absolute terms, Delaware employs 6 percent of all workers in in-vitro diagnostic substance manufacturing, making it home to a significant share of the national workforce. The state is home to several major firms in this industry, including Siemens Healthineers, which, in 2021, announced that it would invest more than $32 million to expand its laboratory diagnostics manufacturing facility in Newark, Delaware, increasing its manufacturing capacity.[64]

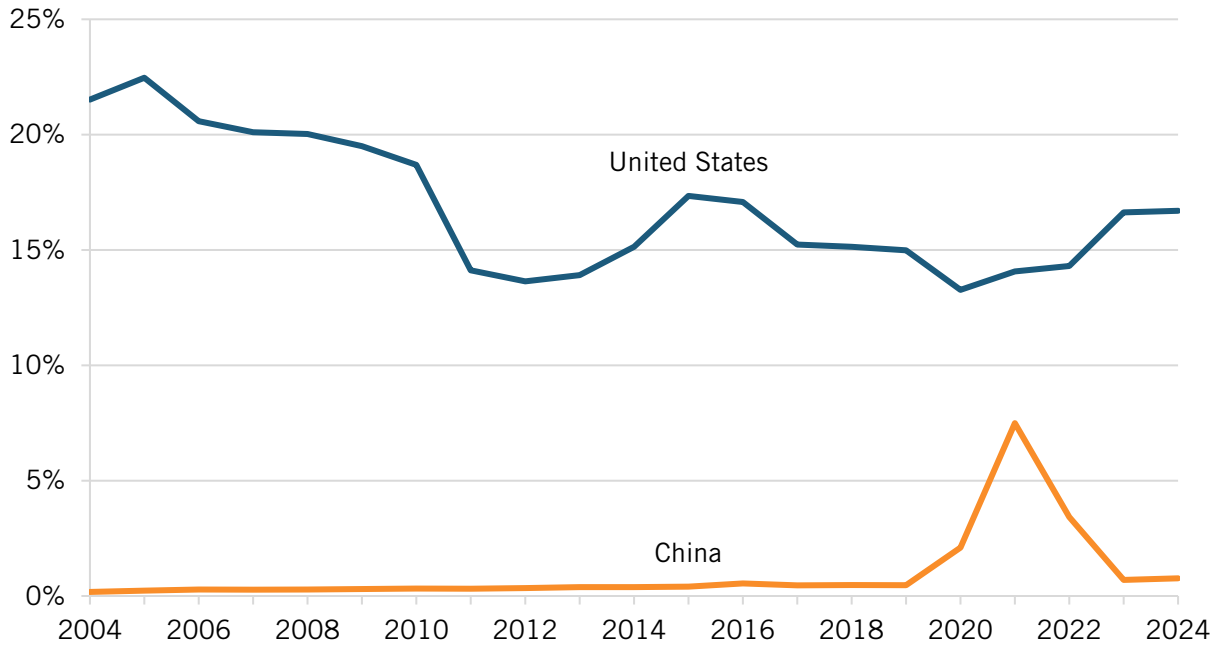
Figure 27: Employment in in-vitro diagnostic substance manufacturing in Delaware



China has invested heavily in its biopharmaceutical and medical devices industries, with these sectors among the 10 critical industries highlighted in its Made in China 2025 strategy. Under Made in China 2025, China mobilized federal, state, and local funding to support critical industries and elevate national champions, aiming to lead the world in advanced manufacturing and strategic industries.[65] And though China has made significant strides in all these industries, it has failed to make a meaningful mark in the in-vitro diagnostic substance industry, lagging behind the United States in total exports.

The United States' export share of in-vitro diagnostic substances (HS codes 3002 and 3822) has actually fallen in recent years, despite the United States' leadership and the industry's growth in states such as Delaware. From 2004 to 2024, the share of global exports from the United States declined from 22 percent to 17 percent, with the low point occurring during the COVID pandemic, when medical device manufacturing increased globally. Despite this decline, the United States still maintains a meaningful lead over China, whose exports have accounted for close to 0 percent of the total market for most of the period from 2004 to 2024. Notably, China's exports increased sharply during the pandemic, reaching a peak global export share of 7 percent, but have since declined back to pre-2020 levels.[66] (See figure 28.)

Figure 28: United States' and China's shares of global exports of in-vitro diagnostic substances

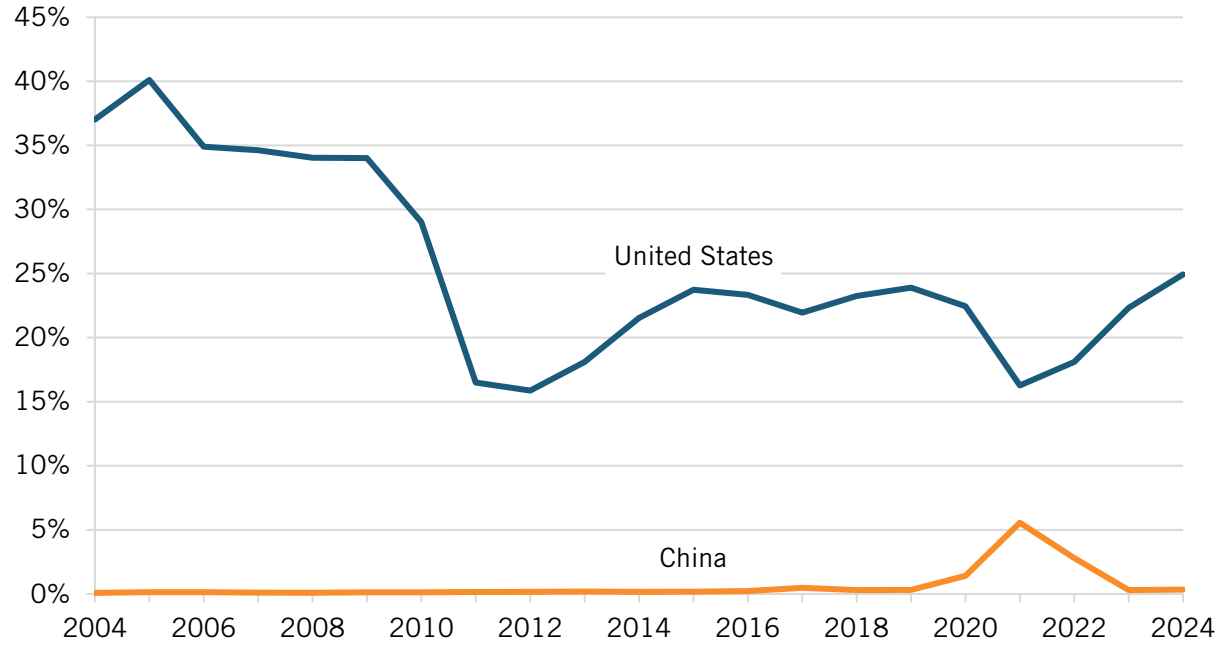


Similarly, China has failed to make inroads into the United States' most prominent export markets. Looking at the three largest export destinations for U.S. in-vitro diagnostic substances (excluding China), the United States still dominates the market, accounting for 25 percent of all exports in 2024.[67] China, on the other hand, accounted for just 0.3 percent of exports to these markets in 2024, down from its surge in 2020, further demonstrating its weakness in this industry relative to the United States.[68] (See figure 29.)

That said, China has demonstrated its ability to rapidly increase output and gain market share in industries it deems critical to national power, and it has long treated medical technology as one of these industries. Under Made in China 2025, China set a goal of increasing its global market share in this industry by developing 5 to 10 globally recognizable brands, which the U.S.-China Economic and Security Review Commission finds China has succeeded at.[69] They also set a goal of procuring 70 percent of hospital medical devices domestically, which China has not yet achieved. The localization rate for in-vitro diagnostic equipment was about 46 percent in 2024.[70]

Additionally, a report from MERICS finds that Chinese medical technology firms received measurable financial support from the government between 2017 and 2022, including subsidies, tax incentives, and below-market financing. Overall, government support grew from $725 million in 2017 to between $2.9 billion and $3.9 billion in 2022.[71] This support was equivalent to at least 25 percent of companies' net profit over that period. With such substantial support for firms and a clearly defined plan to increase competitiveness and global market share, medical device manufacturers in China have the means to become major competitors in the future, posing a potential threat to the dominance of the U.S. in-vitro diagnostic industry.

Figure 29: United States' and China's shares of in-vitro diagnostic substance exports to Germany, Japan, and the Netherlands



For Delaware, the main takeaway is that China's role in this industry should be viewed as a long-term development rather than an immediate threat. Delaware's in-vitro diagnostic substance manufacturing base has expanded in recent years, with employment growing substantially and large investments on the way, helping the United States to lead the world in this industry. Conversely, China has seen minimal growth in this industry's exports, suggesting that Chinese firms have thus far failed to challenge their U.S. counterparts. However, if Chinese firms continue to receive substantial state support, they could become more formidable competitors in the future, posing a threat to the U.S. industry's success.

Florida: Computer Terminal and Other Computer Peripheral Equipment (NAICS 334118)

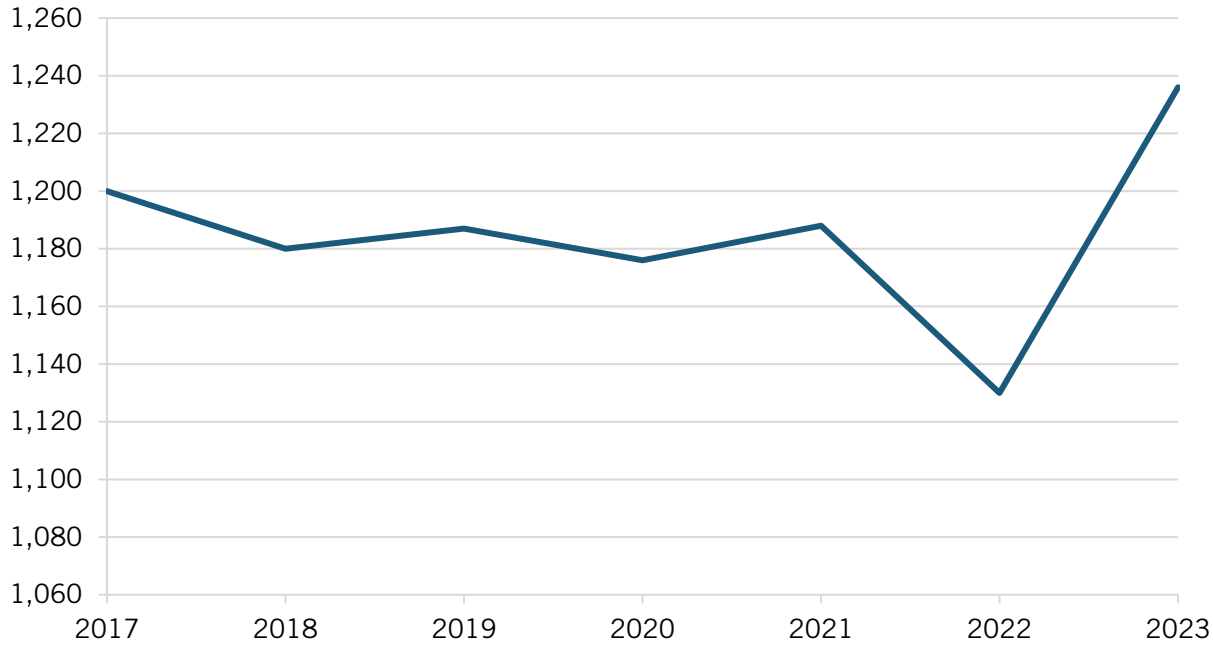
Florida is a strong producer of computer terminals and peripheral equipment, particularly in high-value segments such as enterprise hardware, storage systems, and defense-related electronics. However, China's growth in the industry, supported by state-backed industrial policies, poses a significant challenge to the long-term competitiveness of U.S. producers.

Computer terminal and other computer peripheral equipment manufacturing includes products such as monitors, terminals, storage devices, servers, and input/output peripherals. These products are critical inputs into the broader information technology ecosystem, supporting industries ranging from cloud computing and telecommunications to defense and aerospace systems. Notably, these products are increasingly valuable because of their necessity for data center construction.

Florida is home to several major firms in this industry, including Jabil Inc., one of the largest electronics manufacturing services firms in the world, and TD SYNNEX, a distributor of information technology. These firms, along with several others, support one of the largest workforces for this industry in the country, employing 12 percent of the U.S. workforce. Despite

the industry's growing importance and Florida's strength, employment has remained relatively stagnant. Between 2017 and 2023, employment in this industry increased by just 36 workers, from 1,200 to 1,236.[72] (See figure 30.)

Figure 30: Employment in computer terminal and computer peripheral equipment manufacturing in Florida

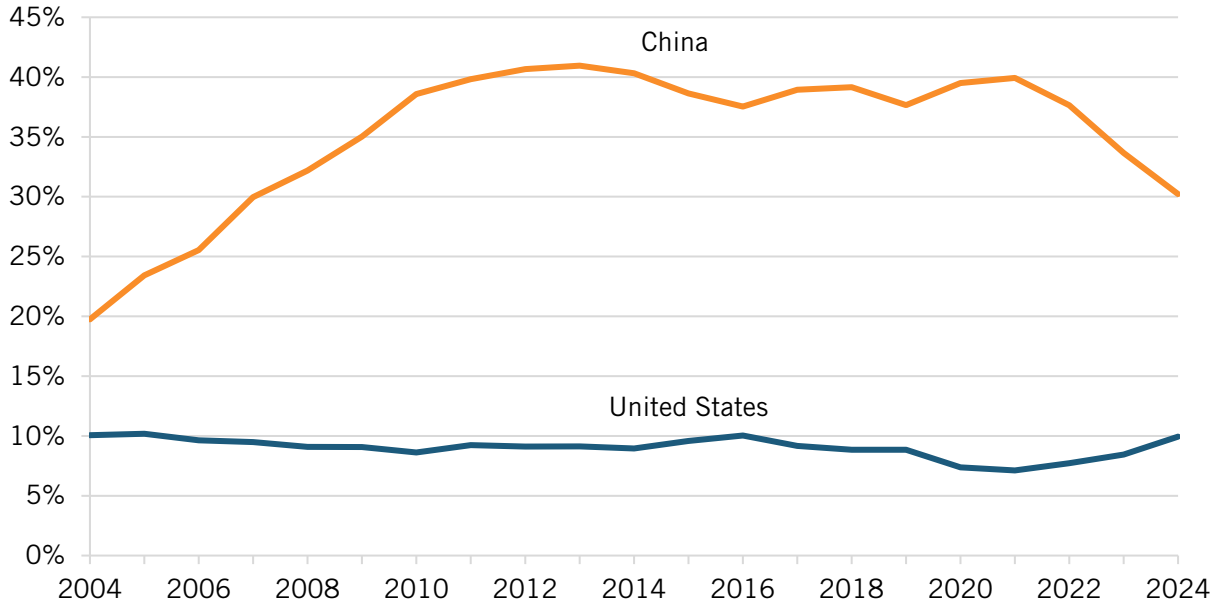


However, like other technology manufacturing industries, the United States remains a relatively small player in the global market, especially compared with China. Under the Made in China 2025 strategy, Beijing identified next-generation information technology as a priority sector and pushed implementation through national, provincial, and city-level guidance.[73] In practice, that support has enabled Chinese firms to produce high-value computer hardware, including servers, terminals, and other digital infrastructure products.[74] China's vast domestic market for cloud services, enterprise IT, and digital infrastructure has further reinforced this growth, allowing domestic producers to scale rapidly before expanding abroad.

China's concerted effort to build advanced manufacturing capacity in computer equipment and next-generation IT has been highly successful, driving a surge in exports and likely a substantial increase in global market share. It has also enabled Chinese firms to emerge as global leaders. Lenovo, for example, was the world's largest PC manufacturer as of 2024, accounting for roughly one-quarter of global shipments.[75] Other major firms, including Huawei and Inspur, are leading producers of enterprise computing equipment, while contract manufacturers such as Foxconn operate large-scale facilities in China that supply global markets.

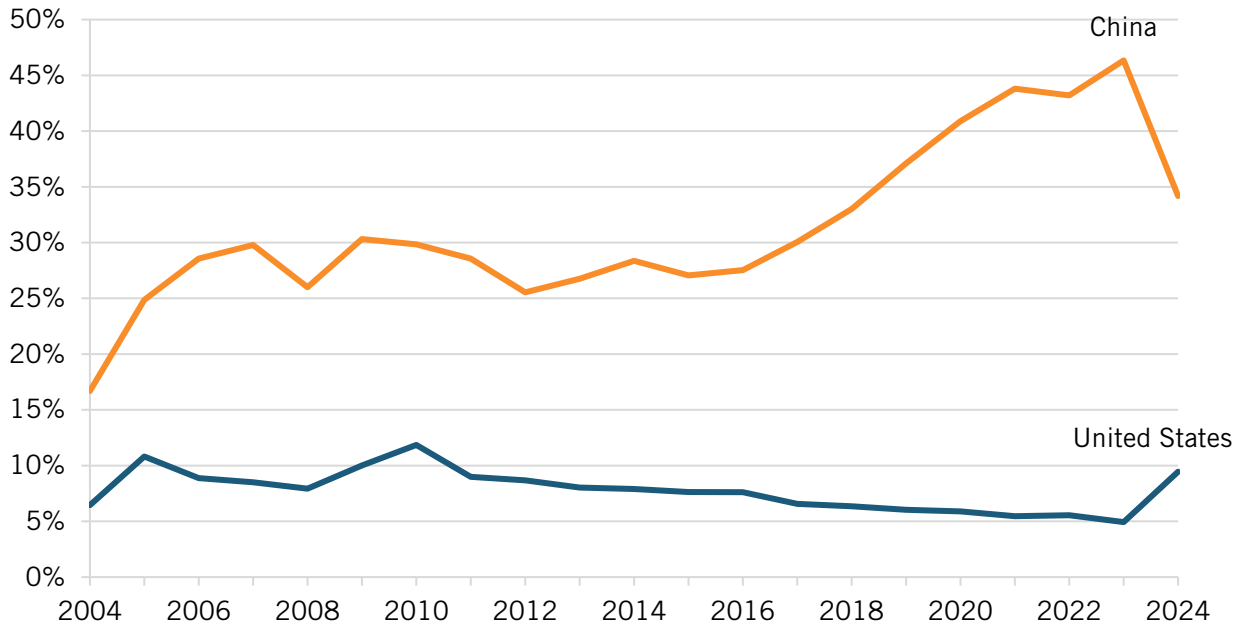
While China has consistently exported more computer terminals and peripheral equipment (HS codes 8471 and 8473) than the United States has since the early 2000s, the gap has widened over the past two decades. From 2004 to 2024, China's share of global exports grew from approximately 20 percent to 30 percent, peaking at about 41 percent around 2013. In contrast, the United States' share of exports stagnated, staying at about 10 percent or less over the 21-year period.[76] (See figure 31.)

Figure 31: United States' and China's shares of global exports of computer terminals and other computer peripheral equipment



China's rapid export growth has been driven by its ability to dominate third-country markets, particularly in Asia. Malaysia, Vietnam, and the Philippines—three key electronics manufacturing hubs—serve as critical destinations for intermediate goods used in global supply chains. Over the past two decades, China's share of exports of computer peripheral equipment to these countries has increased significantly, rising from about 16 percent to about 35 percent from 2004 to 2024, and peaking at 45 percent in 2023. In contrast, The United States's share of exports to these markets again stayed stagnant between 5 and 10 percent.[77]

Figure 32: United States' and China's shares of computer terminal and other computer peripheral equipment exports to Malaysia, Vietnam, and the Philippines



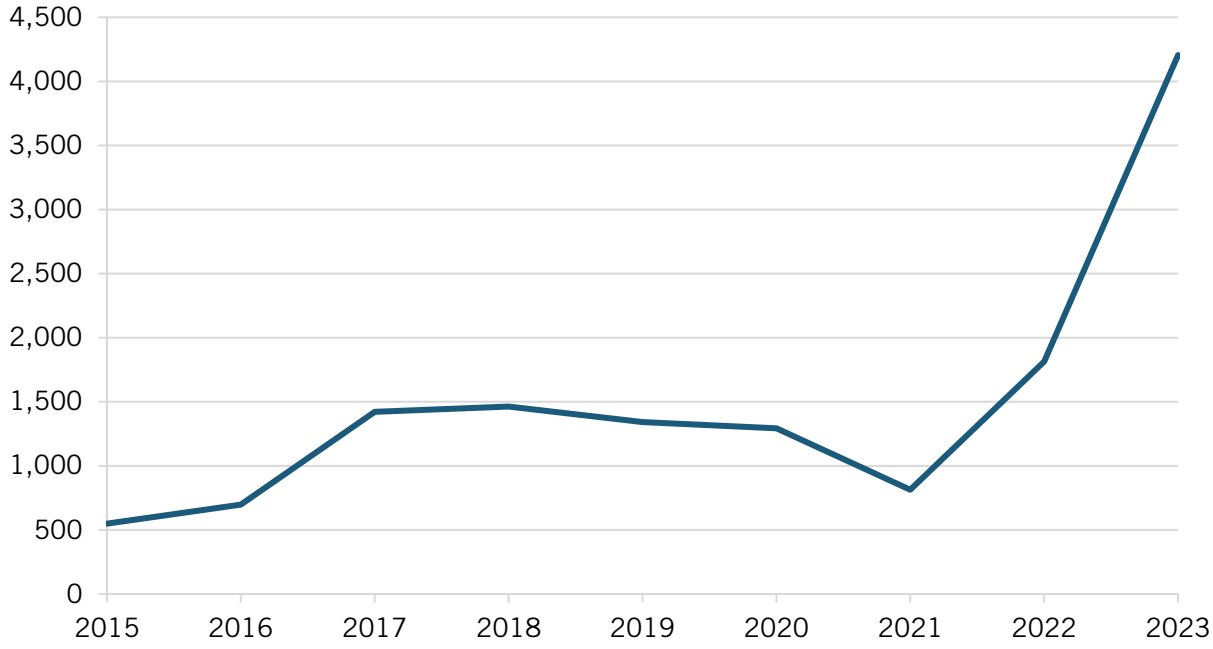
China's push for dominance in the global computer hardware market poses a direct threat to U.S. producers, and its growth is unlikely to slow. As Chinese firms continue to benefit from extensive state support and rapidly increase exports, especially into key third-country markets, U.S. firms will also continue to face reduced export opportunities, risking the growth of the already large gap between the United States and China. In Florida, where this industry supports high-value manufacturing and high levels of skilled employment, continued erosion of global competitiveness could translate into slower growth, reduced investment, and weaker job creation, posing a long-term risk to the state's economy.

Georgia: Storage Battery Manufacturing (NAICS 335911)

Georgia is specialized in and dependent on the storage battery industry, which operates in a highly competitive global market. However, by using mercantilist policy instruments such as subsidies and tax incentives, China has rapidly expanded its manufacturing capacity in this industry, moving it from a nation on par with the United States to a global leader. Though recent policy actions have strengthened the Georgia battery economy, China's dominance is likely to pose a challenge to the sector's future success.

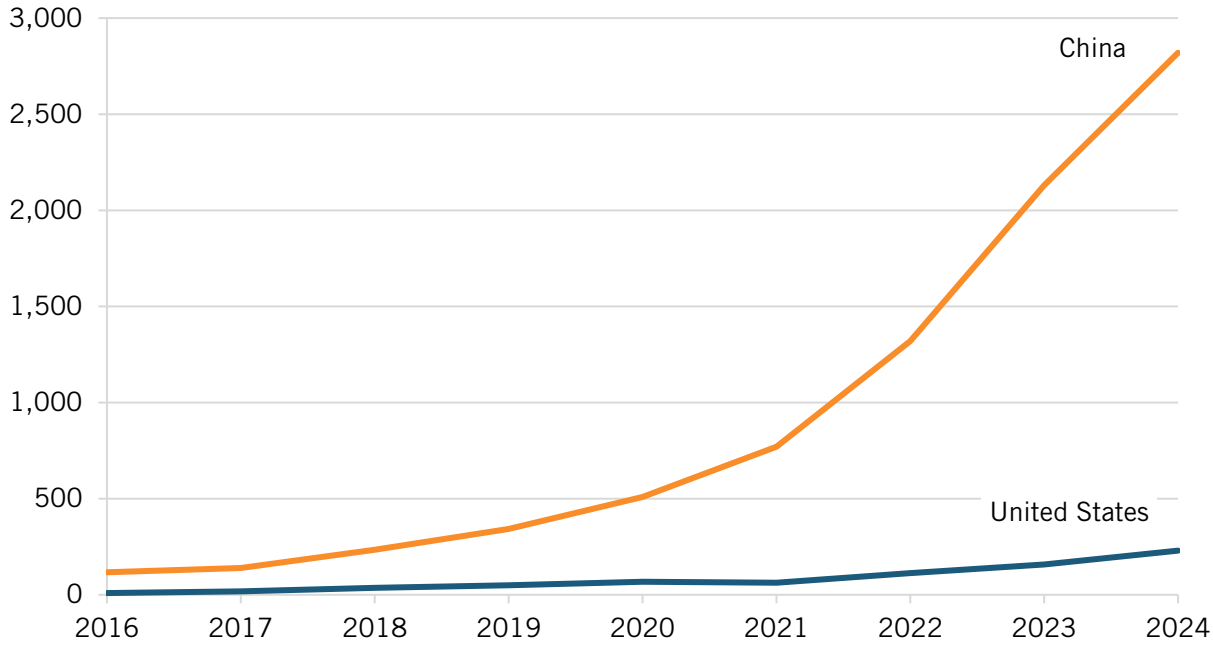
Storage battery manufacturing, which includes the production of rechargeable batteries, including lithium-ion and lithium iron phosphate (LFP), is a critical input to several national power industries, including electric vehicles (EVs) and renewable energy storage, and Georgia is a critical producer of these products in the United States. Following the passage of the Inflation Reduction Act (IRA), which provides tax credits for EVs with battery minerals and components sourced in North America, Georgia received billions of dollars in investment for battery production as SK On, LG Energy, and several EV companies constructed factories in the state.[78] Of the national workforce in this industry, 13 percent is reside in Georgia, totaling 4,200 workers directly employed, a more than sixfold increase in the size of the workforce compared with 2015.[79] (See figure 33). Additionally, following the completion of an LG Energy Solutions plant in Bryan County in 2026, another 3,000 workers will be employed in the state.[80] However, the repeal of the EV tax credits under the Trump administration could be detrimental to the industry. The International Council on Clean Transportation has estimated that by 2030, the loss of the EV tax credit could risk 7,000 jobs in battery pack and cell component manufacturing and recycling.[81]

Figure 33: Employment in storage battery manufacturing in Georgia



Regardless of the future of Georgia's battery manufacturing economy, the state's current strength in this industry is relatively small compared with China's. In 2024, China accounted for 85 percent of global battery production capacity, while the United States held less than 10 percent. Looking specifically at lithium-ion batteries, China's capacity was about 12 times that of the United States.[82] (See figure 34.)

Figure 34: Lithium-ion battery manufacturing capacity (gigawatt hours)[83]



China's dominance in the battery industry would not be possible without the support of China's federal and provincial governments, which have used a concerted strategy of industrial subsidies, research and development (R&D) financing, and vertical integration to support the increase and advancement of Chinese battery supply, while using EV adoption incentives and minimum battery purchase mandates to boost demand.

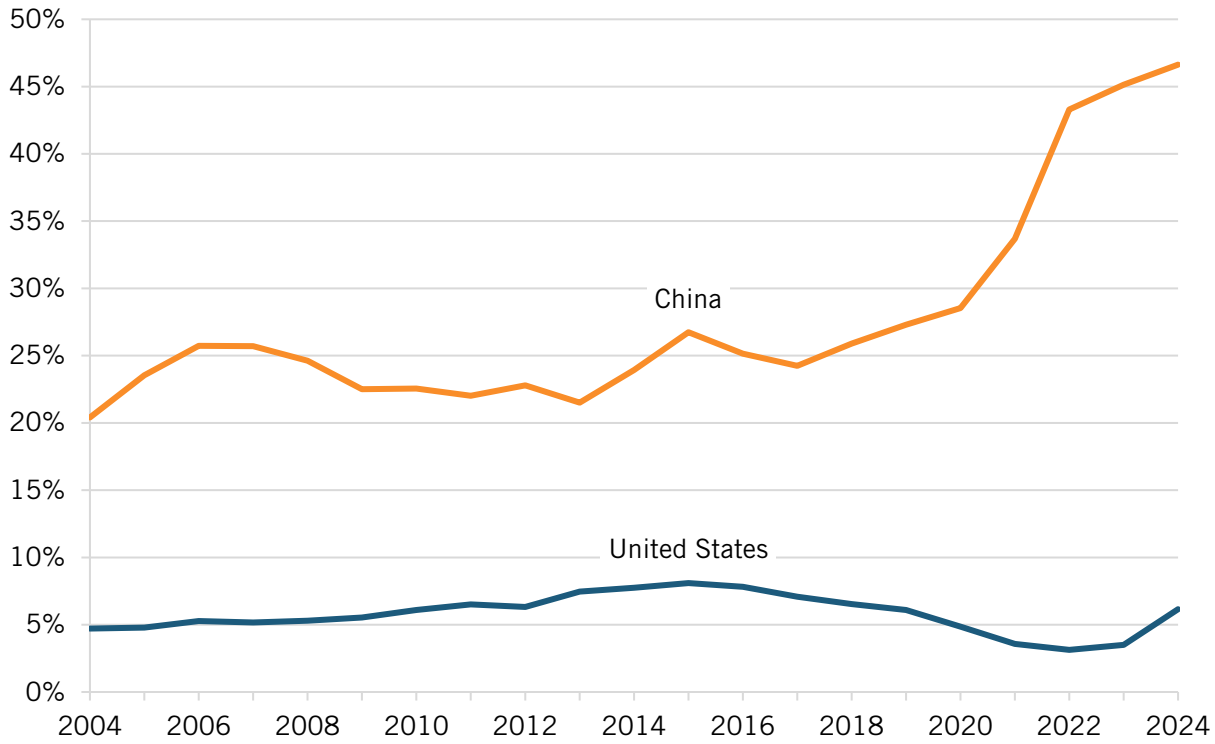
Perhaps the most powerful reason Chinese firms have been able to innovate and rapidly increase production in the battery industry is their complete vertical integration. China mines over two-thirds of the world's graphite and 18 percent of its lithium—two key inputs to batteries—and overall extracts 60 percent of all rare earth minerals mined annually in the world. China also holds a near monopoly on the processing of rare earth minerals. In 2023, China refined 95 percent of the world's manganese, 70 percent of cobalt and graphite, 67 percent of lithium, and more than 60 percent of nickel. In the transition of these minerals to battery components, China accounts for more than 90 percent of global cathode and anode material capacity.[84] Moreover, China's dominance is expected to continue and grow, with the International Energy Agency (IEA) estimating that more than 77 percent of refined rare earths will come from China by 2030.[85] By dominating the battery supply chain, Chinese battery makers gain first access to key intermediate inputs for battery production, purchase these products at lower prices, experiment with new chemical combinations before competitors can, and potentially block competitors from accessing materials.[86]

Additionally, China's federal and provincial governments have provided battery producers with substantial subsidies. CATL, China's largest battery maker, received $1.8 billion from the Chinese government in subsidies from 2018 to 2023, while EVE Energy, the country's fourth-largest battery producer, received $209 billion in 2023 alone. The government has also provided battery makers with R&D subsidies, helping Chinese firms stay ahead of global competition and boost sales. CATL and BYD, which together produce nearly half of all batteries globally, received nearly $830 million in research support to produce solid-state batteries, the next generation of storage batteries.[87]

The Chinese government has also boosted sales of its national champions in battery manufacturing by incentivizing EV adoption and the use of storage batteries. Since 2009, the Chinese government has invested hundreds of billions of dollars in advancing the EV industry, enabling Chinese EVs to be the cheapest in the world, often priced below cost. China has also implemented financial incentives for EV owners, such as waiving the license plate fee, exempting EVs from traffic control measures (which limit the number of cars on the road), and developing the world's largest public charging infrastructure.[88] In the energy sector, the Chinese government began requiring firms to add 10 to 30 percent of battery storage to their grids for each gigawatt of wind or solar power, increasing demand for batteries.[89] By incentivizing EV and battery storage adoption, the Chinese government has catalyzed demand for batteries, boosting industry sales.

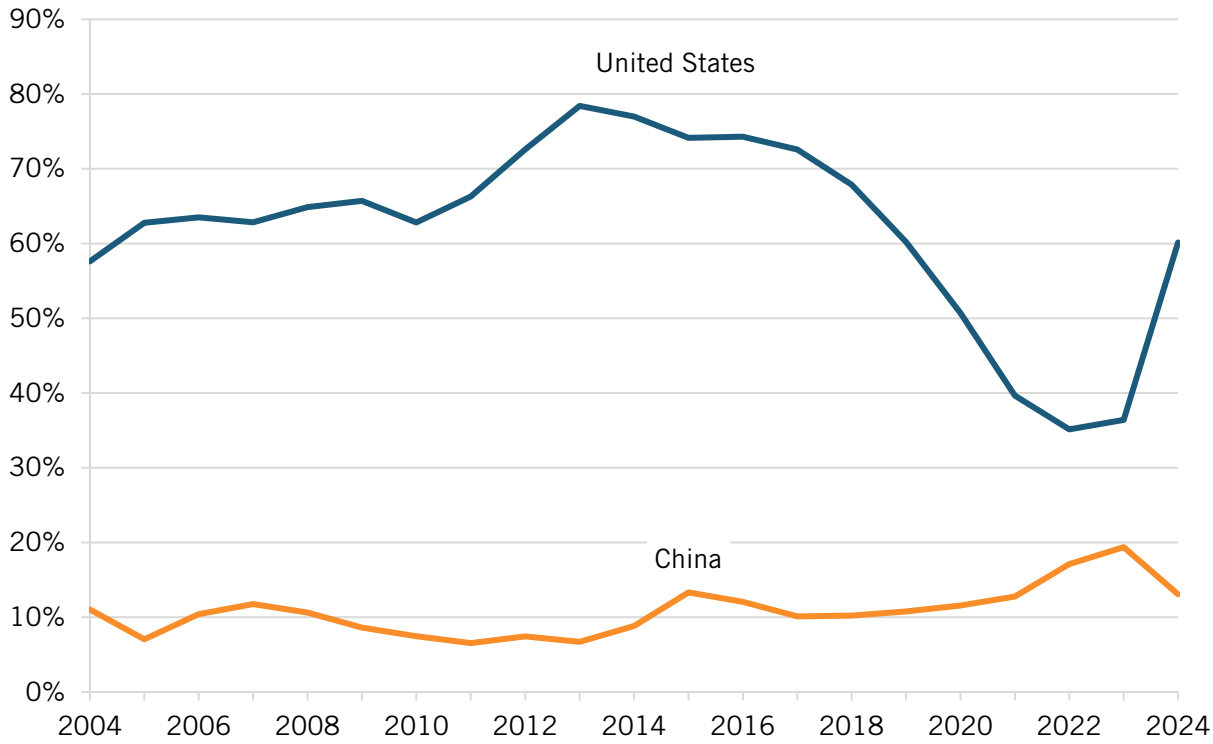
It's no surprise that, given these favorable policies, China has become the world's largest battery manufacturer. In 2024, China's share of storage battery exports (HS code 8507) reached a peak of 46 percent, meaning that almost half of all storage batteries exported originated in China. China's exports are far above those of the United States, despite recent investments in the industry, as U.S. exports accounted for just over 5 percent of global exports in 2024, as seen in figure 35.

Figure 35: United States' and China's shares of global exports of storage batteries



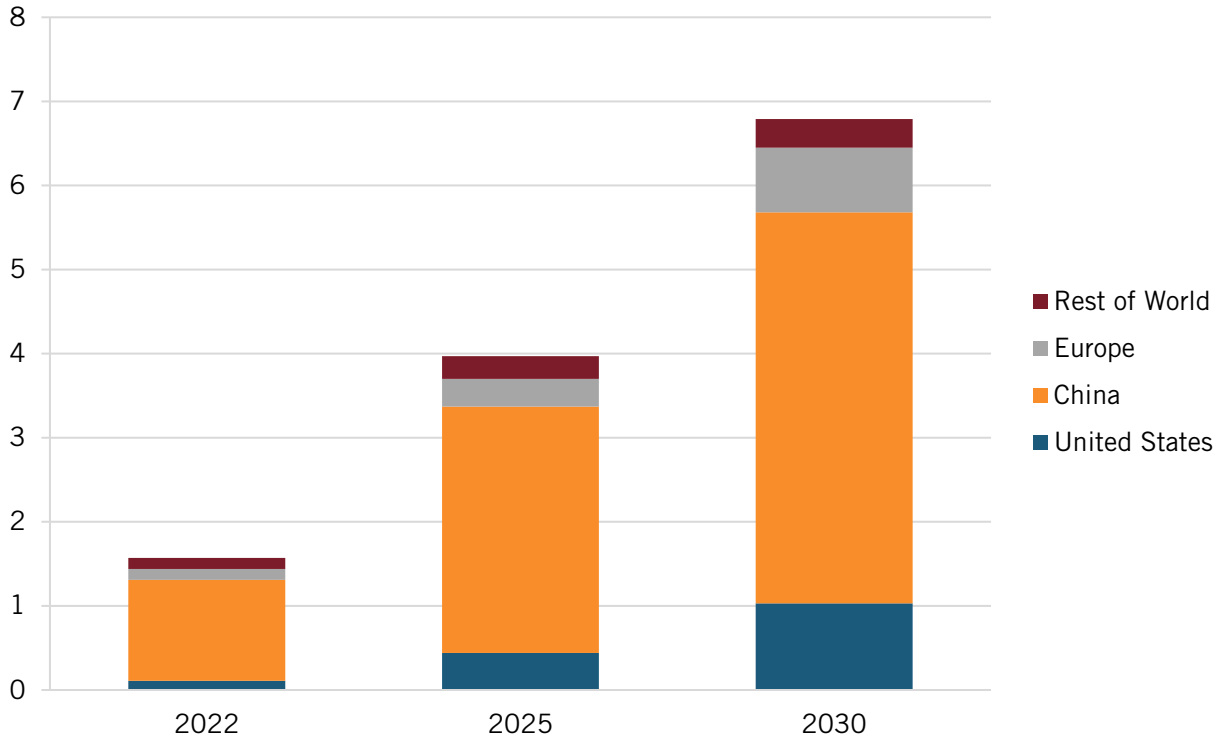
Despite its dominance in the storage battery industry, China has so far failed to take a significant share of the export market of America's closest trade partners. Canada and Mexico are the two largest destinations for U.S. storage battery exports, and for much of the early to mid 2000s, the United States accounted for the majority of battery exports to those two countries. Its share of exports increased from 60 percent to about 80 percent from 2004 to 2013, but then experienced a decline, falling to a nadir of just 35 percent in 2022. In the years since, U.S. exports have rebounded, jumping back to 60 percent in 2024. In contrast, China has slowly increased its exports to these countries, with its export share increasing from about 10 percent in 2004 to 20 percent in 2023. In 2024, China's share of exports to Canada and Mexico declined to 13 percent, as shown in figure 36.

Figure 36: United States' and China's shares of storage battery exports to Canada and Mexico



According to IEA, China is expected to increase its battery manufacturing capacity significantly over the next several years, but additional capacity created in the United States and Europe in response to a critical need to diversify the battery supply chain is set to erode China's lead in global market share. By 2030, IEA estimates that China will account for about two-thirds of the global market share, and its manufacturing capacity will rise to 4.7 terawatt-hours (TWh). The United States, heavily influenced by the growth of domestic manufacturing in states such as Georgia, is expected to see its lithium-ion battery manufacturing more than double between 2025 and 2030, reaching 1 TWh. (See figure 37).

Figure 37: Lithium-ion battery manufacturing capacity, TWh (projected for 2025 and 2030)[90]



China's dominance in battery manufacturing poses a direct threat to U.S. firms seeking to enter or expand in the global battery market, and recent U.S. policy actions put the future of battery manufacturing in Georgia and other states at risk. As Chinese firms continue to benefit greatly from favorable policies and massive subsidies from the federal and provincial governments, American policymakers must view battery manufacturing not just as another industry but also as one critical to national power. In Georgia, the storage battery industry has been a boon to the economy, resulting in thousands of jobs and high levels of economic growth. However, failing to protect and empower this industry on the state and federal levels will threaten the progress that has already been made, resulting in the continued loss of global market share, slower growth, and weaker job creation—a threat to the Georgia economy.

Hawaii: Optical Instrument and Lens Manufacturing (NAICS 333314)

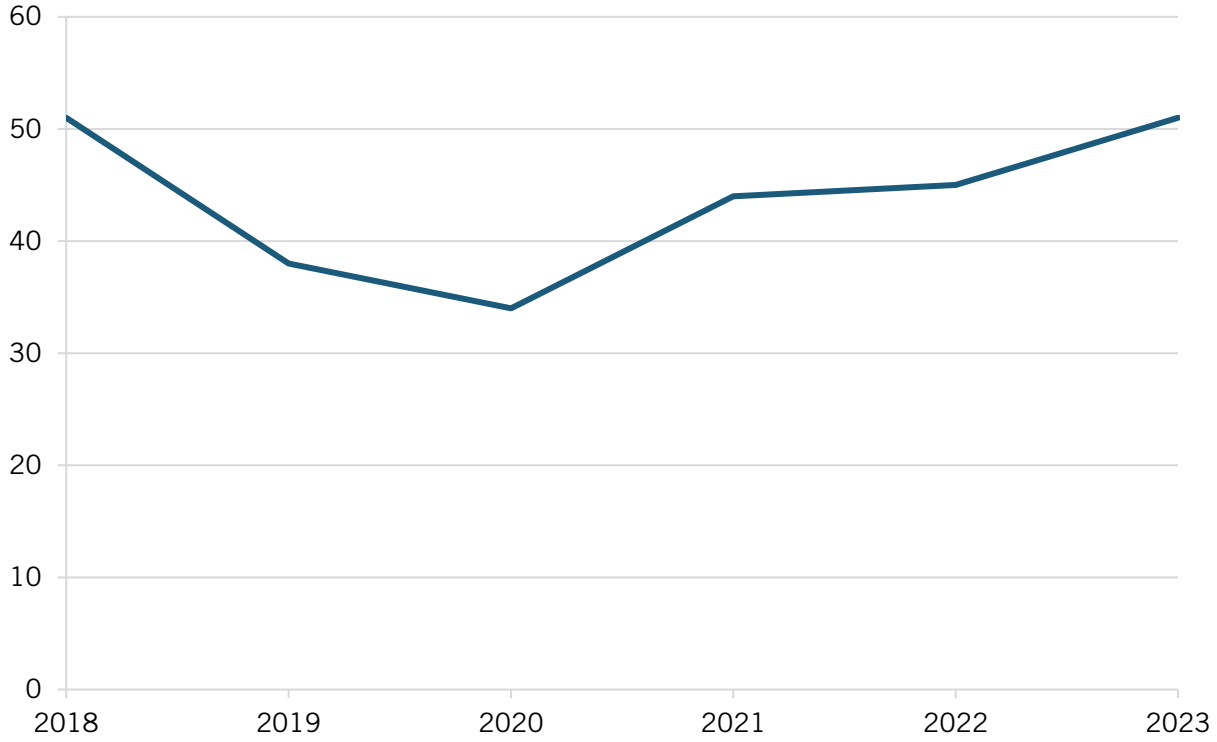
Hawaii has developed a niche but strategically important presence in optical instrument and lens manufacturing, an industry that supports scientific research, defense, and advanced imaging technologies. However, the industry operates in an increasingly competitive global market in which China's rapid expansion—supported by concerted industrial policy and state-backed financing—poses a growing threat to U.S. producers.

Optical instruments and lens manufacturing includes the production of microscopes, telescopes, surveying instruments, and precision optical components used across aerospace, defense, medical, and research applications. Institutions in Hawaii, such as the University of Hawaii and observatories on Mauna Kea, have helped foster a localized ecosystem of optical engineering and precision manufacturing.[91] Firms such as Oceanit Laboratories and smaller precision optics

contractors contribute to this specialized manufacturing base, often serving defense and research markets.[92]

Despite its relatively small size, Hawaii's optical manufacturing workforce has remained stable and has shown modest growth in recent years. Employment declined from just over 50 workers in 2018 (the first year of available data) to about 34 in 2020, then rebounded to approximately 51 by 2023, reflecting both the volatility and resilience of this niche sector.[93]

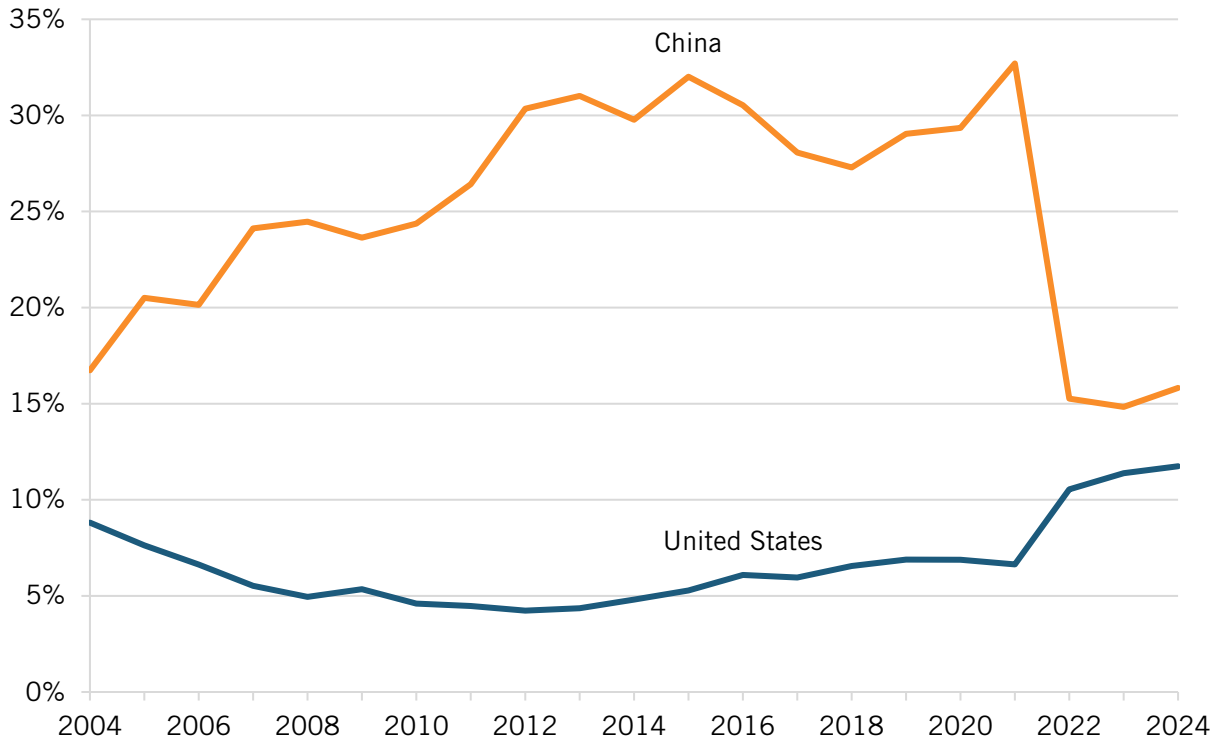
Figure 38: Number of workers in optical instrument and lens manufacturing in Hawaii



At the national level, the United States remains a significant producer of high-end optical instruments, particularly in advanced and defense-related applications. However, it is a relatively small player in the global export market compared with China, which has rapidly expanded its production capacity across a wide range of optical goods, including lower- and mid-range instruments.

China's rise in the optical instruments and lens industry has been substantial. In the early 2000s, China held a larger share of global exports (HS code 9001, 9002, 9005, 9011, 9013), than the United States did, holding about 17 percent compared with the United States' 9 percent. Over the next decade, China steadily increased its share, reaching a peak of 33 percent in 2021, while the United States saw its share hover between 4 and 7 percent. However, in 2022, Chinese exports experienced a sudden dip, dropping to about 16 percent in 2024, while the U.S. export share increased to 12 percent.[94] (See figure 39.)

Figure 39: United States' and China's shares of global exports of optical instruments and lenses



China's dominance in this industry (at least up until 2022) has been enabled in large part by Chinese government support. Optical and precision instruments are identified as priority sectors under China's Made in China 2025 strategy, which emphasizes high-end manufacturing and technological self-sufficiency.[95] Chinese firms benefit from a range of policy tools, including direct subsidies, tax incentives, discounted land, and below-market financing from state-owned banks. According to analyses by the OECD, such support mechanisms reduce production costs and allow Chinese firms to scale rapidly, often leading to overcapacity and downward pressure on global prices.[96]

Major Chinese firms in the optical instruments industry include Sunny Optical Technology, one of the world's largest manufacturers of optical components and camera modules, as well as firms such as OFILM, which produces optical and imaging components for consumer electronics and industrial applications.[97] These firms have benefited from strong domestic demand and government-backed expansion into global markets. In contrast, U.S. optical manufacturing is concentrated in high-value, specialized segments. Leading American firms such as Teledyne Technologies focus on precision optics, photonics, and scientific instrumentation for specific industries.[98]

China's continued expansion in optical manufacturing—fueled by state support, economies of scale, and aggressive export strategies—poses a long-term risk to U.S. producers. As Chinese firms move up the value chain and compete more directly with high-end manufacturers, the competitive pressures facing U.S. firms are likely to intensify. For Hawaii, where the industry is small and highly specialized, these global dynamics translate into heightened vulnerability. Maintaining a strong foothold in this industry will depend on continued investment in research, innovation, and defense-related applications. Without such support, the state's niche optical

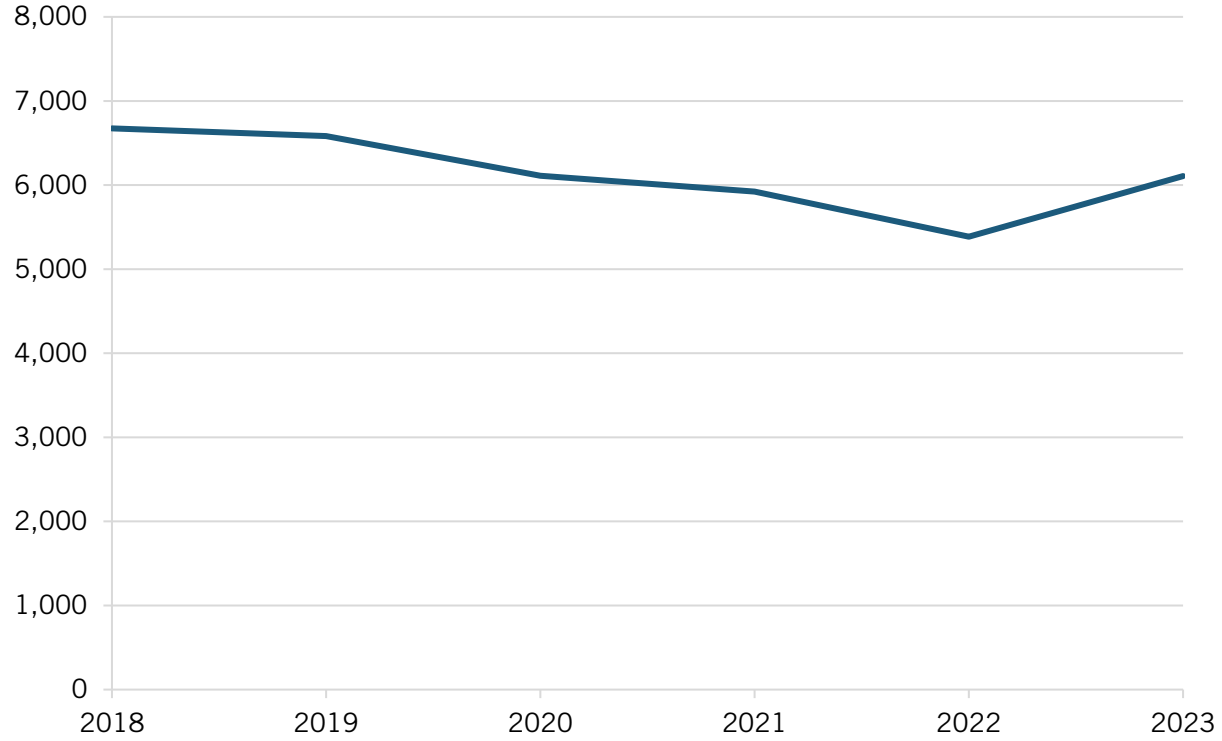
manufacturing sector risks being overshadowed by lower-cost, state-backed competitors in the global market, and the United States risks ceding greater shares of the export market to Chinese competitors.

Idaho: Semiconductor and Related Device Manufacturing (NAICS 334413)

Idaho is specialized in and dependent on the semiconductor industry, which operates in a highly competitive global market. Micron, a leading producer of memory semiconductors that's headquartered in Idaho, is poised to make a significant investment in the Idaho economy and increase manufacturing output. However, China's extensive subsidies to its own memory chip manufacturer pose a significant challenge to Micron's future domestic manufacturing success.

The semiconductor industry is Idaho's largest export industry, exporting $539 million in 2022.[99] It is also one of the largest employers in the state, employing just over 6,000 workers in 2023. However, since 2018, employment in the semiconductor manufacturing industry has declined by roughly 9 percent while Idaho's overall workforce has increased by nearly 19 percent, demonstrating a decline in the industry despite high levels of economic output.[100] (See figure 40).

Figure 40: Employment in the semiconductor manufacturing industry in Idaho

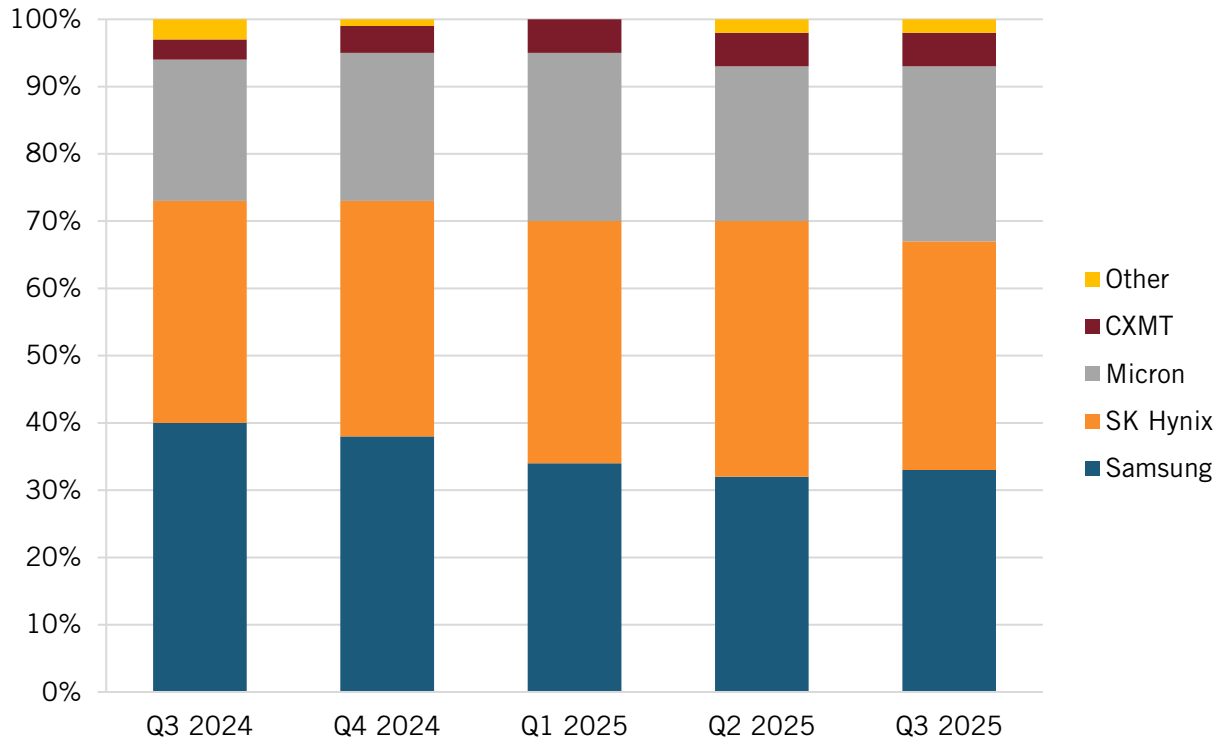


Micron, one of the largest dynamic random access memory (DRAM) chip manufacturers in the world, is the state's largest employer, employing 10,000 workers and contributing substantially to the $2.5 billion in value added created by the Idaho semiconductor industry.[101] DRAM chips are essential for the construction of data centers and the build-out of AI, as they provide the high-bandwidth memory needed to power AI server computations.[102] Micron controls 26 percent of the global market share in this industry, behind South Korean firms Samsung and SK Hynix.[103] Though this industry has historically been dominated by these three firms, Chinese

competitor ChangXin Memory Technology (CXMT) has made waves in the global market, rising to the fourth-largest firm and holding 5 percent of global market share in late 2025.[104] (See figure 41.)

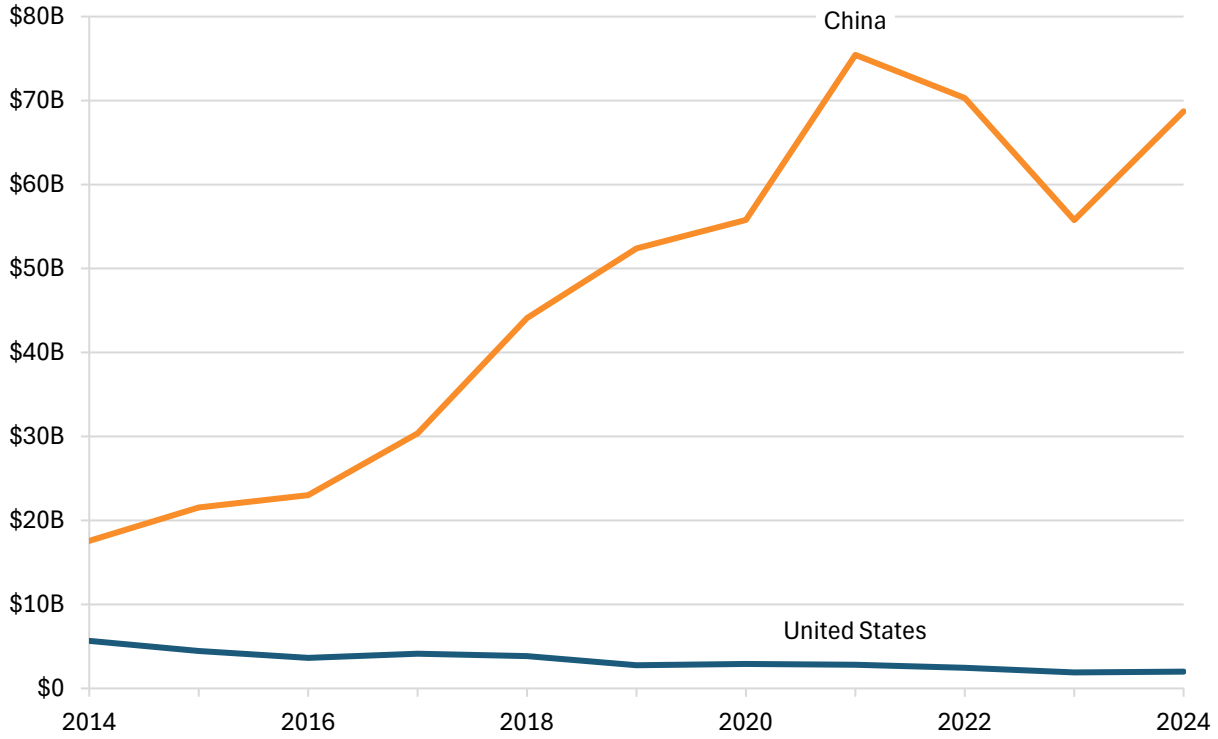
CXMT was founded by the local government of the Chinese city of Hefei and receives substantial subsidies from the Chinese national government.[105] The Chinese government plans to invest over $150 billion in the semiconductor industry by 2030, nearly three times the $52 billion invested by the United States in the CHIPS and Science Act in 2022.[106] What's more, the Chinese government has recently indicated that DRAM memory technologies are a priority area for future subsidies, a benefit for CXMT, and a potential threat to Micron.[107]

Figure 41: Global DRAM chip market share by revenue[108]



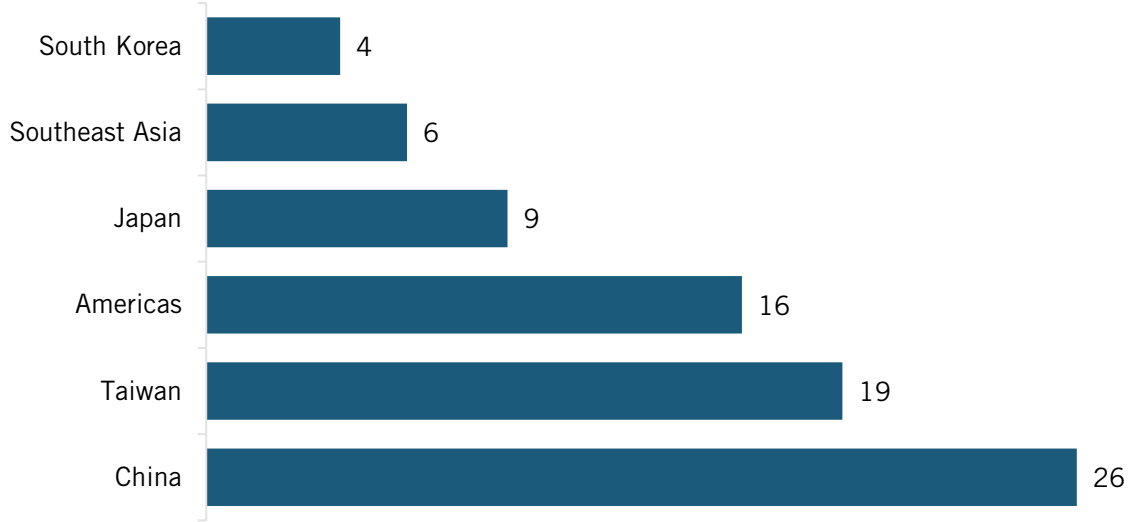
Despite Micron's success, memory chip manufacturing has historically been offshored, with very few fabs operating in the United States. However, Micron has announced that it will increase its investment in the U.S. semiconductor manufacturing industry, with plans to build two new fabs in Idaho, one of which will be operational by 2027.[109] These investments will likely increase U.S. exports of memory chips (HS 854232), which fell by 64 percent from 2014 to 2024. In comparison, China, with its significant subsidies, saw exports increase nearly threefold over the same period. (See figure 42.)

Figure 42: Memory semiconductor exports



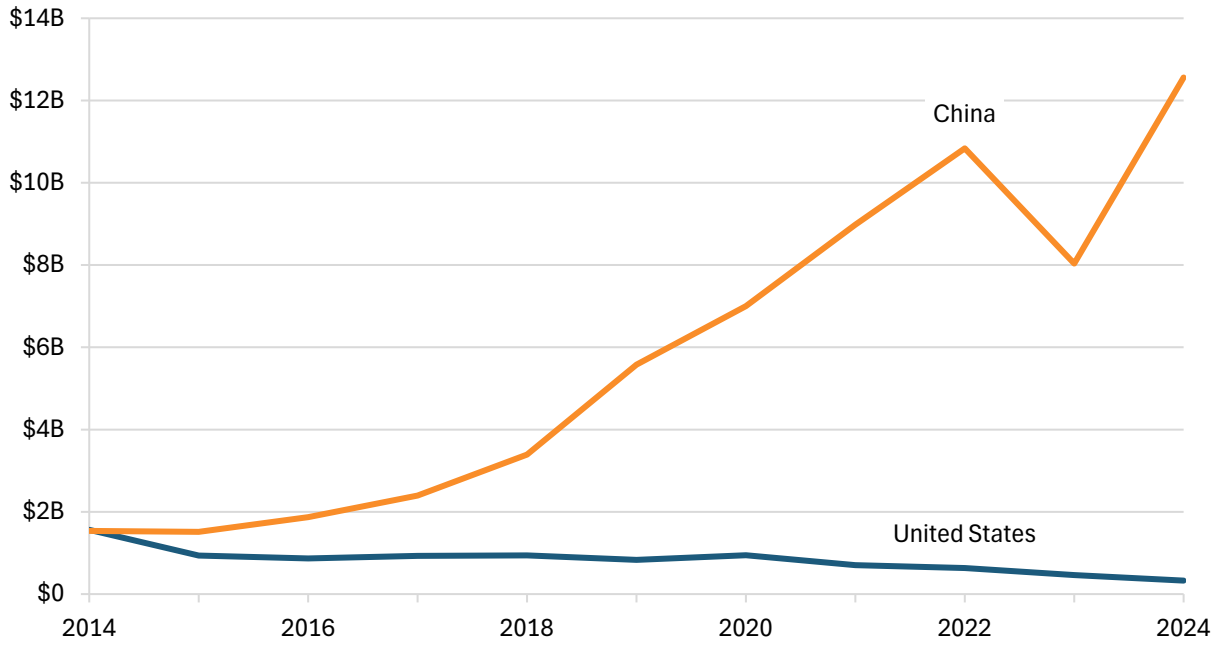
However, Micron's expansion of domestic production does not guarantee increased exports. The U.S. Commerce Department has noted that China's chip industry expansion poses a threat to new chip facilities in the United States, and that new Chinese chip capacity could lead U.S. and allied countries' fabs to produce fewer chips than is necessary to remain profitable.[110] Between 2022 and 2026, China is expected to increase production capacity by building more new fabs and completing more major expansions than any other region in the world, bringing 26 facilities online, compared with only 16 in the Americas.[111] (See figure 43.)

Figure 43: New fabs and major expansions to come online, 2022–2026[112]



The high subsidies in the Chinese semiconductor industry enable Chinese firms to sell semiconductors at lower prices than U.S. competitors can, at times selling chips below production cost. Chinese manufacturers sell chips 30 to 50 percent cheaper than U.S. suppliers, making their products more attractive in third-party markets.[113] U.S. exports of memory chips to Malaysia, Singapore, and Vietnam have grown at a fraction of the pace of China's since 2014, with Chinese exports to these markets 38-times greater in value than U.S. exports. (See figure 44.)

Figure 44: Memory semiconductor exports to Malaysia, Singapore, and Vietnam



In China's Made in China 2025 strategy, the government explicitly aims to achieve 70 percent self-sufficiency in semiconductor products by 2025 and to become the leader in semiconductor manufacturing, including DRAM chips, by 2030.[114] Although these goals haven't yet been reached, China-based firms are expected to continue to grow rapidly as policy support and government subsidy programs remain aligned with these objectives.

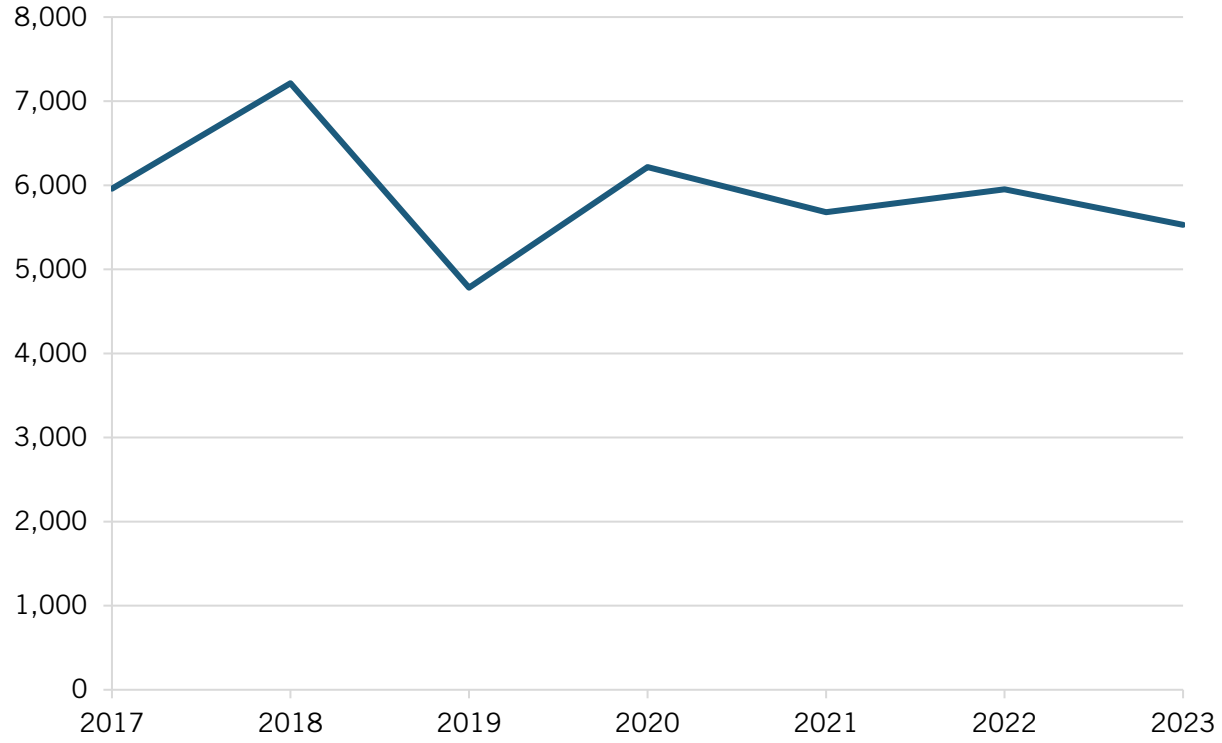
China's push for dominance in the global semiconductor market and its emergence in the memory chip market pose a direct threat to U.S. firms, and its progress is not expected to slow.[115] As Chinese producers replace U.S. suppliers domestically and expand aggressively into third-country markets, U.S. semiconductor exports will face sustained erosion in global market share, revenue, and profitability. Chinese firms such as CXMT will continue to receive financial benefits unmatched by U.S. competitors, enabling them to retain and gain market share at the expense of American and allied firms. Chinese authorities will continue to aggressively subsidize the semiconductor industry in order to reach their $150 billion target, thereby contributing to artificially low prices for Chinese firms. For Idaho, which has seen both a recent decline in its semiconductor industry and heightened investment in the industry, these trends are worrying, as China's dominance in this industry could translate into slower growth and weaker job creation in the state's most important traded industry.

Illinois: Construction Machinery Manufacturing (NAICS 333120)

Illinois is specialized in and dependent on the construction equipment manufacturing industry, which operates in a highly competitive global market. Despite the dominance of American firms in this industry, many of which are based in Illinois, Chinese firms have become legitimate players on the global stage. China's use of subsidies and artificial demand shocks has contributed to the rapid growth of Chinese construction equipment manufacturers, posing a significant risk to the future success of American firms.

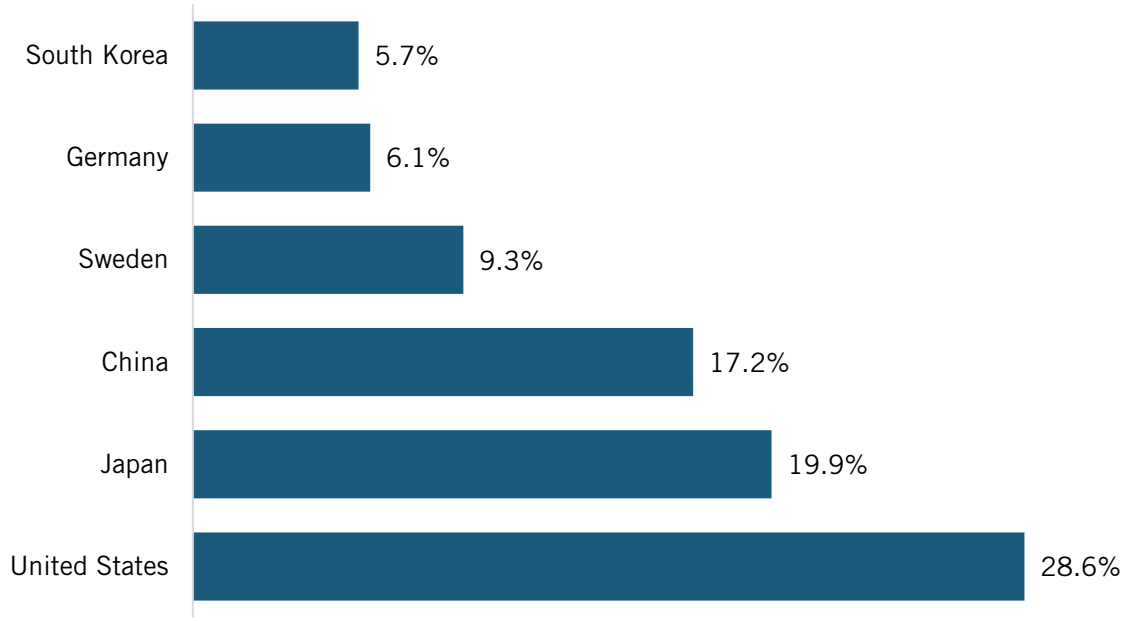
Machinery manufacturing is the second-largest export industry in Illinois (behind chemical manufacturing), with exports valued at $12.5 billion in 2024.[116] Construction machinery exports alone accounted for $1.8 billion, driven by the presence of some of the largest manufacturers in the world.[117] Illinois employs about 1/10th of the country's workforce in construction machinery manufacturing, with about 5,500 employees as of 2023. However, the number of employees has declined by about 7 percent since 2017, while, in comparison, Illinois's total workforce has grown by 3 percent.[118] (See figure 45.)

Figure 45: Employment in construction machinery manufacturing in Illinois



Caterpillar and John Deere, the first and third-largest construction equipment manufacturers by global revenue, are each headquartered in Illinois, while Komatsu, the second-largest firm by global revenue, also maintains manufacturing operations in the state.[119] In total, American firms control roughly 27 percent of the global market share in this industry, ahead of Japan (21 percent) and China (18 percent). (See figure 46.)

Figure 46: Global market share in construction equipment by revenue, 2025[120]



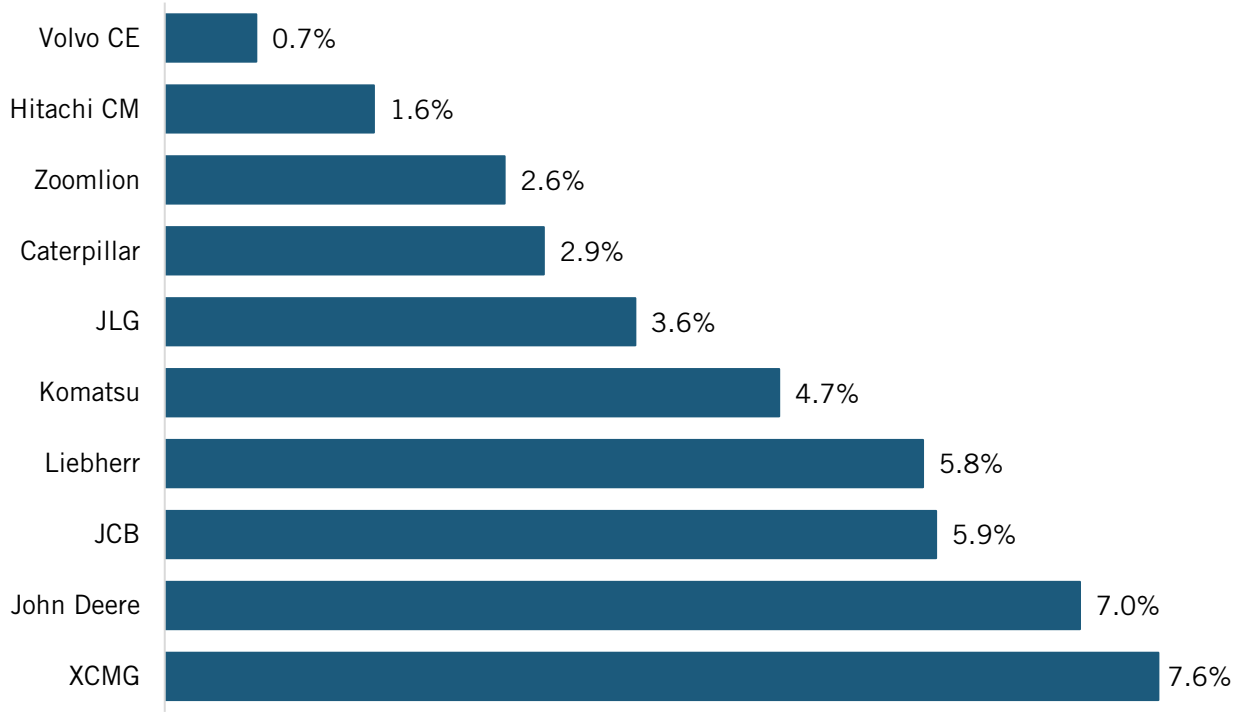
However, American leadership in this industry is far from guaranteed. While employment has declined in Illinois, U.S. global market share has also seen a decline, falling by more than 1 percentage point between 2024 and 2025, while China increased its market share by an equal amount. Chinese firms have benefited from the national government's financial and policy support, including several policies that increase demand for industrial equipment. First, Chinese construction equipment firms have received direct government subsidies, enabling them to produce more goods and sell them at lower prices. In 2022 and 2023, XCMG, the largest construction manufacturer in China and the fourth-largest in the world, received $56 million and $94 million in government subsidies, respectively.[121] The European Union has also found evidence of subsidization and dumping by the Chinese construction equipment industry, which allowed Chinese firms to sell products at below-market prices, making it difficult for European firms to compete.[122]

In March 2024, the Action Plan for Promotion of Large-Scale Equipment Replacement and Trade-in of Consumer Goods called for a 25 percent increase in capital investment for equipment in seven key industries by 2027, including the construction industry. This domestic-demand shock for equipment manufacturers is estimated to increase industrial equipment purchases by approximately $38.8 billion. In support of this initiative, the government also passed a series of financial support vehicles to further incentivize the purchase of construction equipment. These vehicles included value-added tax exemptions and special loans valued at $69 billion for specific industries and small businesses. While these incentives will apply to construction equipment from all countries, the U.S. International Trade Administration (ITA) has noted that domestically manufactured products will be prioritized when possible, advantaging Chinese firms.[123]

With the help of these initiatives, three Chinese firms are now among the world's 15 largest construction equipment manufacturers, and one has grown rapidly. Between 2015 and 2025, XCMG saw its revenue grow at a compounded annual growth rate (CAGR) of 8 percent, exceeding

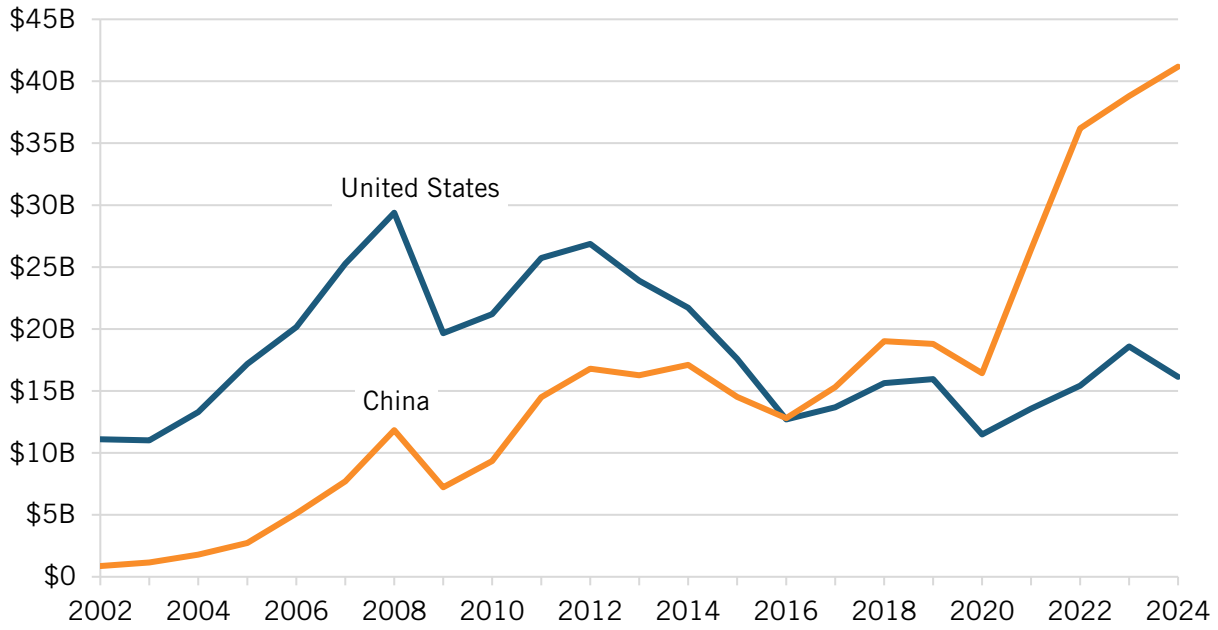
those of John Deere, Komatsu, and Caterpillar. Zoomlion, another Chinese firm, experienced a 3 percent CAGR. (See figure 47.) Growing at a faster rate than American and allied firms, XCMG, Zoomlion, and other Chinese firms such as Sany present a real threat to American leadership in this industry.

Figure 47: CAGR of revenue, 2015–2025[124]



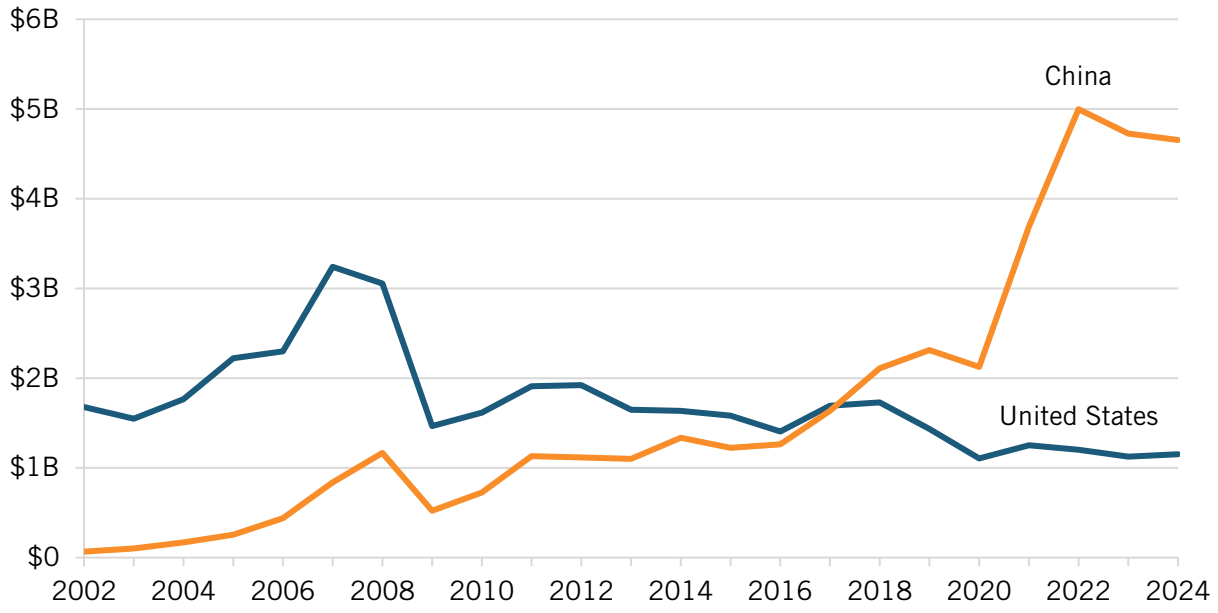
The financial support provided to Chinese firms has made their goods cheaper and more plentiful on the global market. Despite exporting more than twice the value of construction equipment than China did throughout the early 2000s, U.S. exports are now just a fraction of China's. From 2014 to 2024, U.S. exports of construction equipment (HS codes 8427, 8429, 8430, 8431) fell by 26 percent, while Chinese exports grew by 141 percent over the same period, making Chinese exports more than 2.5 times those of the United States. (See figure 48.)

Figure 48: Construction equipment exports[125]



The impact of subsidies is particularly pronounced in Chinese exports to U.S. allied nations. Not only do Chinese subsidies on construction equipment make it difficult for European firms to compete with cheaper Chinese imports, but they also severely impact the competitiveness of American-made products. U.S. exports to Belgium, Germany, France, Italy, the Netherlands, and the United Kingdom, the largest European importers of American construction equipment, have declined steadily since the early 2000s, while Chinese exports have had an opposite experience. China now exports four times as much construction equipment by value to European allied nations as the United States does. (See figure 49.)

Figure 49: Construction equipment exports to Belgium, Germany, France, Italy, Netherlands, and the United Kingdom[126]



China's push for dominance in the global construction equipment market poses a direct threat to U.S. firms, and experts believe this growth is unlikely to slow. Industry leaders in the Chinese construction equipment industry have postulated that the industry would grow up to 15 percent in 2025, with the largest growth expected in international markets.[127] At the same time, though U.S. firms benefited from strong domestic demand in 2025, firms must be wary of the decline in foreign sales to Chinese competitors.[128] Chinese firms will continue to expand into foreign markets with the government's financial backing, enabling them to retain and gain market share at the expense of American and allied firms. In Illinois, which has already started to see a decline in its construction machinery workforce, the loss of global demand and reduced revenue due to Chinese competition could be detrimental to the state's economy.

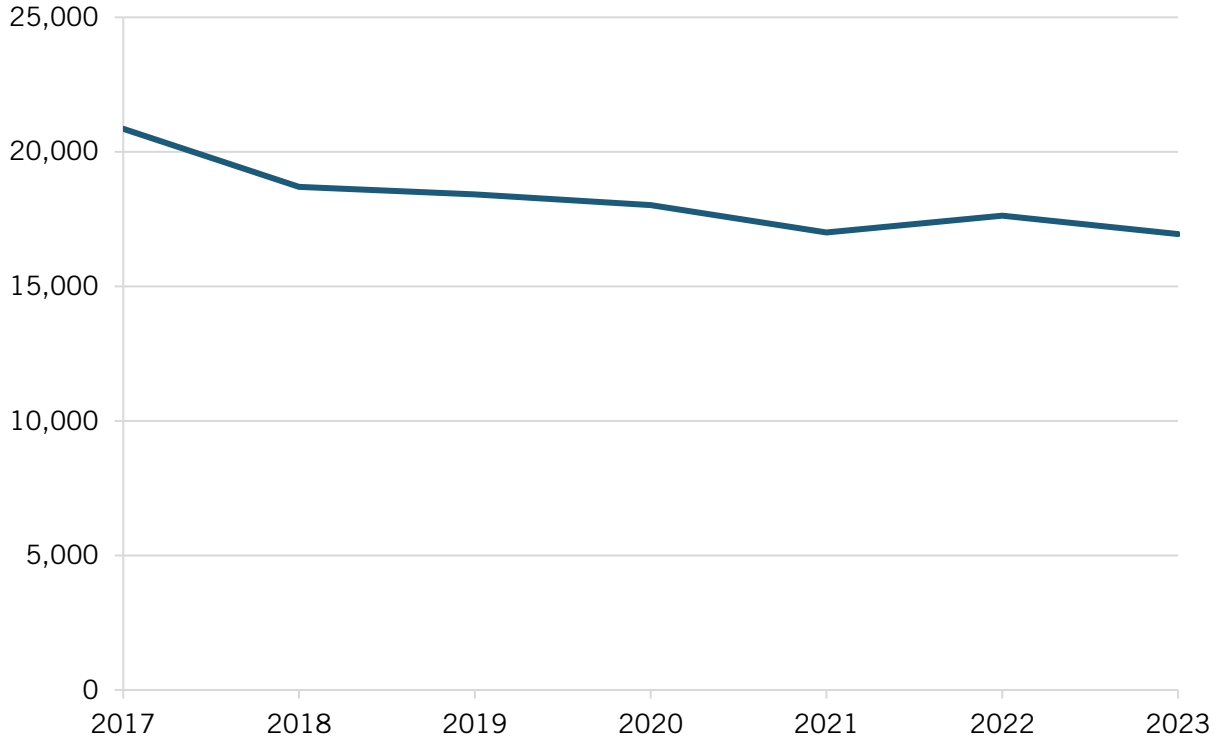
Indiana: Iron and Steel Mills and Ferroalloy Manufacturing (NAICS 331110)

Indiana is a critical piece of the U.S. steel industry, accounting for a substantial share of domestic steel production and employment. However, the industry operates in a highly competitive global market, wherein China's rapid expansion, supported by extensive state subsidies and comprehensive industrial policies, has contributed to global overcapacity, downward price pressure, and intensifying competition in export markets. China's continued dominance will have a negative impact on the U.S. and Indiana steel and iron industries if left unchecked.

Iron and steel mills and ferroalloy manufacturing include the production of pig iron, steel, and ferroalloys used in construction, automotive manufacturing, energy infrastructure, and defense applications. Indiana plays a critical role in this industry, consistently being the largest steel-producing state in the country, accounting for roughly 25–30 percent of total U.S. raw steel production according to the U.S. Geological Survey, and about 22 percent of national employment in the industry.[129] Cleveland-Cliffs' Indiana Harbor complex (one of the largest integrated steel mills in North America) and U.S. Steel's Gary Works (one of the largest steel plants in the Western Hemisphere) are both critical to the Indiana iron and steel supply chain network.[130]

Despite the state's strength, employment trends indicate a regression. Employment in Indiana's iron and steel mills industry declined by 19 percent between 2017 and 2023, from about 21,000 to 17,000.[131] (See figure 50.)

Figure 50: Employment in iron and steel mills and ferroalloy manufacturing in Indiana

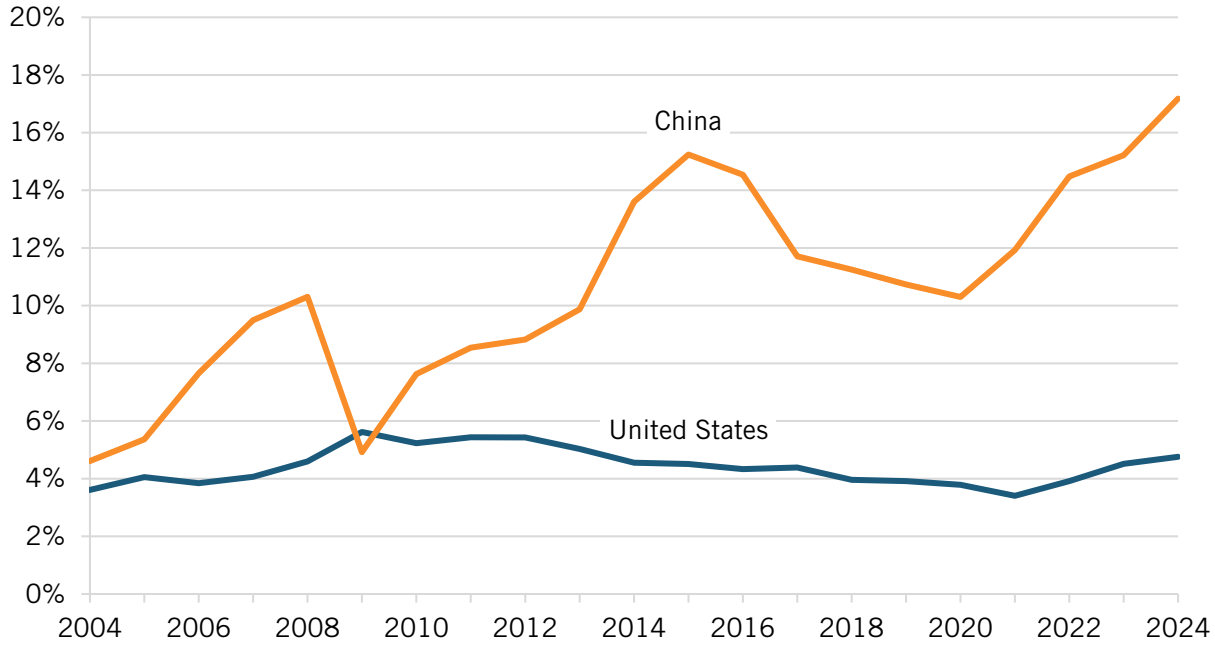


This employment decline mirrors broader structural challenges in the U.S. steel industry, including import competition and price volatility tied to global overcapacity, both due largely to China. In 2005, China designated the steel sector as a "pillar industry," deeming it strategic and thus qualifying it for high levels of state support.[132] In the years since, China's steel industry has received subsidized energy, preferential financing from state-owned banks, tax incentives, and direct subsidies. The OECD has documented that government support for Chinese steel firms significantly exceeds that of firms in market economies, contributing to persistent excess capacity and allowing them to rise to the top of the global steel production.[133] In 2024, China accounted for more than 50 percent of global crude steel production, compared with roughly 4 percent for the United States.[134] Such high levels of production and overcapacity have placed sustained downward pressure on global steel prices, reducing profitability for U.S. producers.[135]

Chinese firms such as China Baowu Steel Group (the world's largest steel producer), HBIS Group, and Ansteel Group have expanded rapidly with government backing. China Baowu alone produces more steel annually than the entire U.S. industry does.[136] These firms are at least partially state owned and are able to maintain production even during periods of low profitability, contributing to global oversupply.

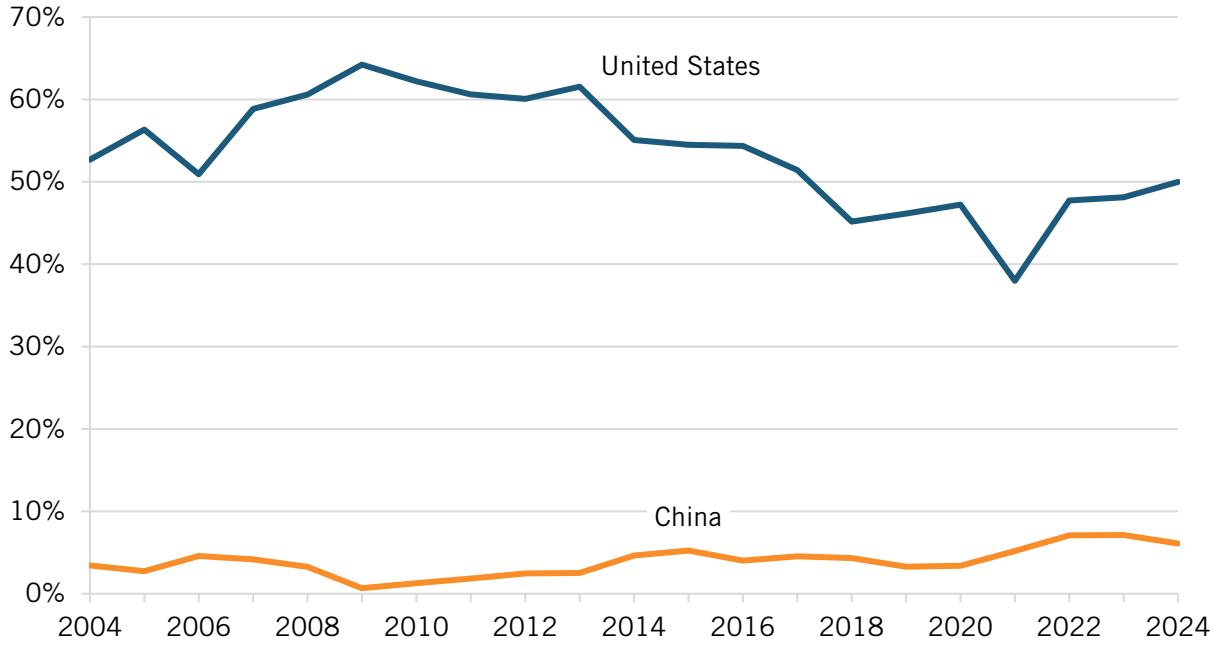
The growth of China's industry has coincided with a relative stagnation in the United States' share of global exports. From 2004 to 2024, the United States exported between 4 and 5 percent of global iron and steel (HS code 72), while Chinese exports surged, from about 5 percent of global exports in 2004 to 17 percent in 2024. In other words, U.S. exports as a share of global exports stayed relatively stagnant; China's share of global exports increased threefold.[137]

Figure 51: United States' and China's shares of global exports of iron and steel



However, the United States retains a stronger position in exports relative to its closest trading partners, Canada and Mexico, supported by an integrated North American supply chain.[138] As shown in figure 52, U.S. exports to these countries have consistently exceeded China's, though the share of exports from the United States has declined gradually over the past 20 years. In 2009, the United States accounted for nearly two-thirds of all exports of iron and steel to Canada and Mexico, but in 2024, that share fell to just 50 percent. Though China has measurably gained export share in this industry, the relative decline of U.S. exports is a cause for concern.[139]

Figure 52: United States' and China's shares of iron and steel exports to Canada and Mexico



China's industrial policies have contributed to a chronic global oversupply in steel, with the OECD estimating that excess global steel capacity will exceed 720 million metric tons by 2027, more than the combined steel production of the OECD countries in 2024.[140] This persistent oversupply suppresses prices, advantaging firms with high levels of state support, such as those in China, and making it difficult for those without said support, such as those in Indiana and the rest of the United States, to compete.

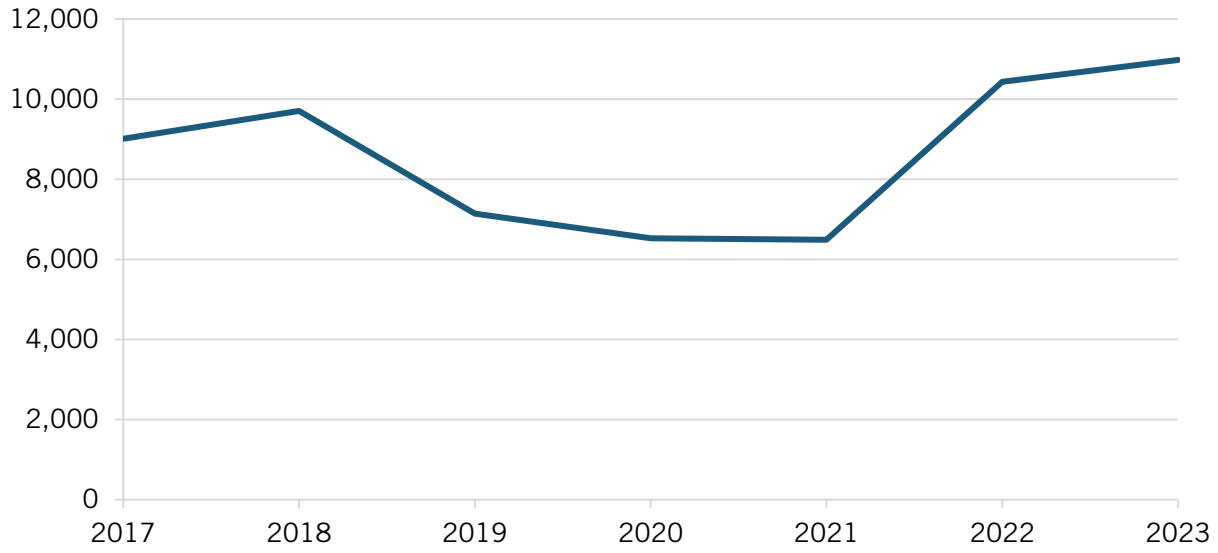
For Indiana, where steel production is a critical driver of the manufacturing economy, these global dynamics present clear risks. Though the state's industry remains highly productive and a cornerstone of the U.S. steel industry, Chinese production and overcapacity threaten its long-term viability, risking future economic decline, job losses, and the security of one of the United States' most critical supply chains.

Iowa: Construction Equipment Manufacturing (NAICS 333111)

Iowa specializes in the construction machinery industry, which operates in a highly competitive global market. The state hosts several major equipment manufacturers and a dense network of suppliers that produce machinery for construction, earthmoving, and infrastructure development. However, the rapid rise of Chinese construction equipment manufacturers, aided by extensive subsidies and government-catalyzed demand, poses an increasing challenge to the long-term competitiveness of U.S. producers in Iowa.

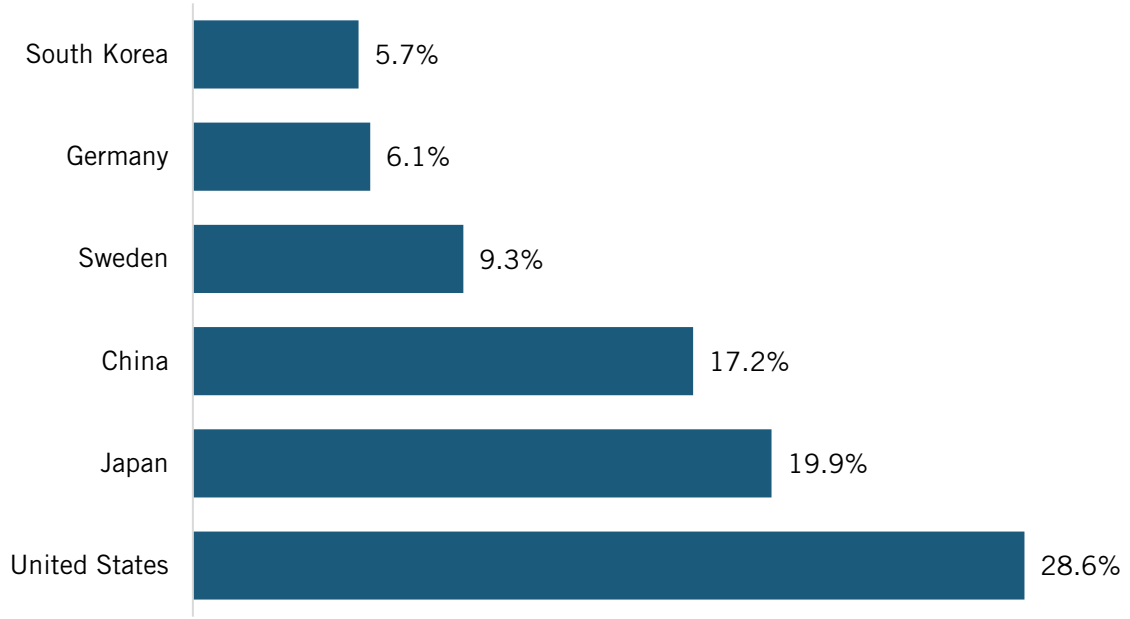
Construction machinery manufacturing is a significant manufacturing industry in Iowa. According to data from the U.S. Census Bureau, the industry's employment levels have fluctuated significantly over the past several years. In 2018, the industry employed nearly 10,000 workers; however, this number declined through 2021, reaching a low of about 6,500, and then climbed again to nearly 11,000 in 2023, the most of any state in the country.[141] (See figure 53.) Iowa's equipment manufacturing ecosystem includes globally recognized firms such as Vermeer Corporation, which produces trenchers, directional drills, and other infrastructure equipment, and Deere & Company, one of the world's largest construction companies, which has several production facilities across the state.[142]

Figure 53: Employment in construction equipment manufacturing in Iowa



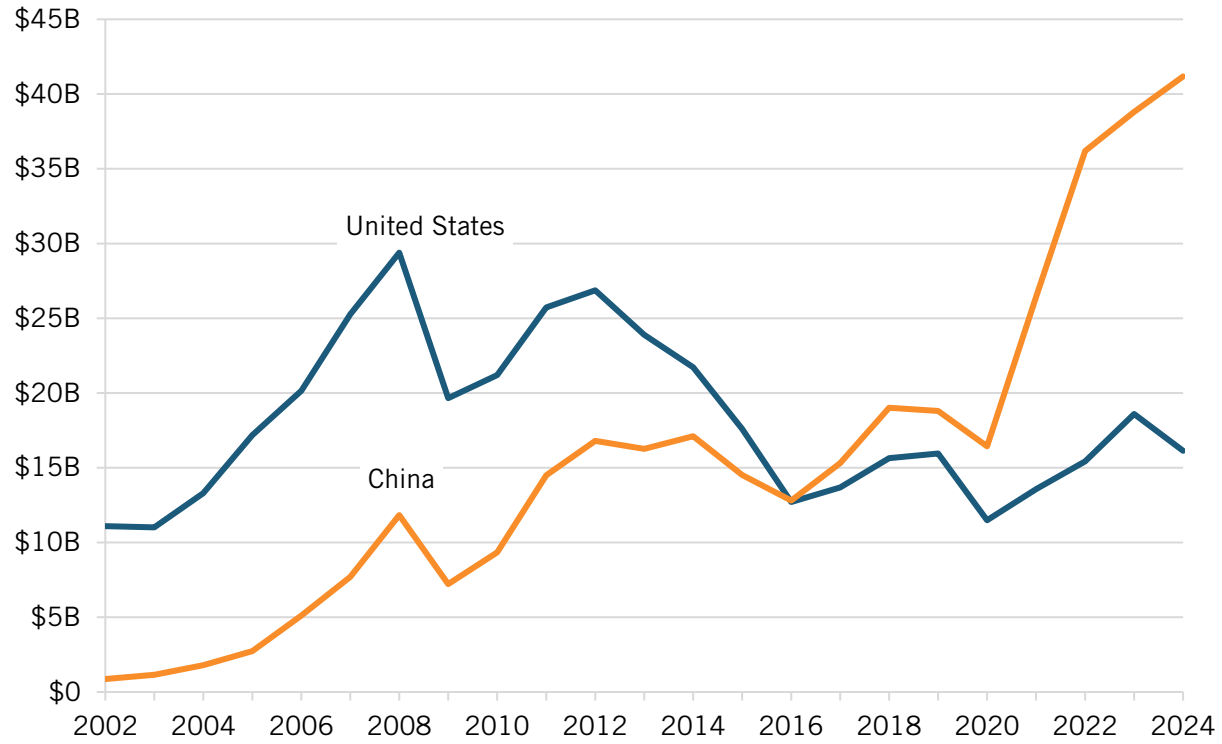
Despite the strength of these American firms in Iowa, global competition in construction machinery has intensified over the past two decades, largely due to the rise of Chinese manufacturers. In the early 2000s, U.S. companies dominated global exports of construction equipment. However, by the 2020s, Chinese firms had rapidly gained global market share. As of 2025, American firms controlled roughly 27 percent of the global market by revenue, while China had moved up to third place, holding 18 percent of market share.[143] (See figure 54.)

Figure 54: Global market share in construction equipment by revenue, 2025[144]



Accordingly, as China gained market share, its exports grew at the expense of the United States. U.S. exports of construction equipment (HS codes 8427, 8429, 8430, and 8431) fell by roughly 26 percent between 2014 and 2024, while Chinese exports grew by about 141 percent, leaving China exporting more than two and a half times the value of U.S. construction equipment exports.[145]

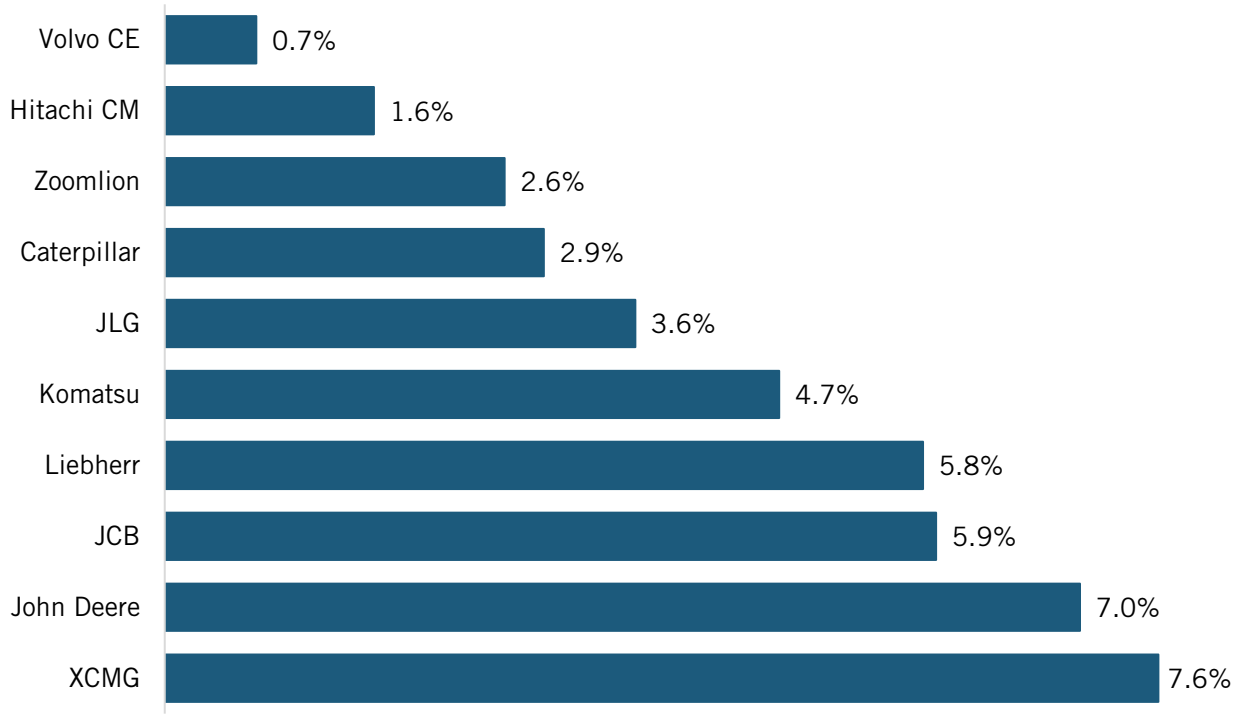
Figure 55: Construction equipment exports



China's rapid rise in this industry has been fueled by extensive government support for domestic manufacturers. Major Chinese equipment producers such as XCMG Group, Zoomlion, and Sany Group have benefited from subsidies, preferential financing, and industrial policies aimed at strengthening China's machinery sector. For example, XCMG, the largest Chinese construction equipment manufacturer, received $56 million in subsidies in 2022 and $94 million in 2023 from the Chinese government in programs designed to boost manufacturing capacity and exports.[146] Chinese policy initiatives have also increased domestic demand for construction equipment, helping national manufacturers scale production more rapidly and increase revenue more than foreign competitors have. In 2024, the Chinese government released the Action Plan for Promotion of Large-Scale Equipment Replacement and Trade-in of Consumer Goods, which calls for a 25 percent increase in capital investment in equipment across several industries by 2027.[147] The policy is expected to generate approximately $38.8 billion in additional industrial equipment purchases, supported by financial incentives, including value-added tax exemptions and special lending programs, totaling roughly $69 billion in support.[148]

These programs have enabled XCMG to become not only the largest manufacturer in China but also the world's fastest-growing construction firm by global revenue. Its CAGR from 2015 to 2025 was 8 percent. Zoomlion, another Chinese firm, experienced a CAGR of about 3 percent. (See figure 56.) John Deere, in comparison, comes in second at about 7 percent.[149]

Figure 56: CAGR of revenue, 2015–2025[150]

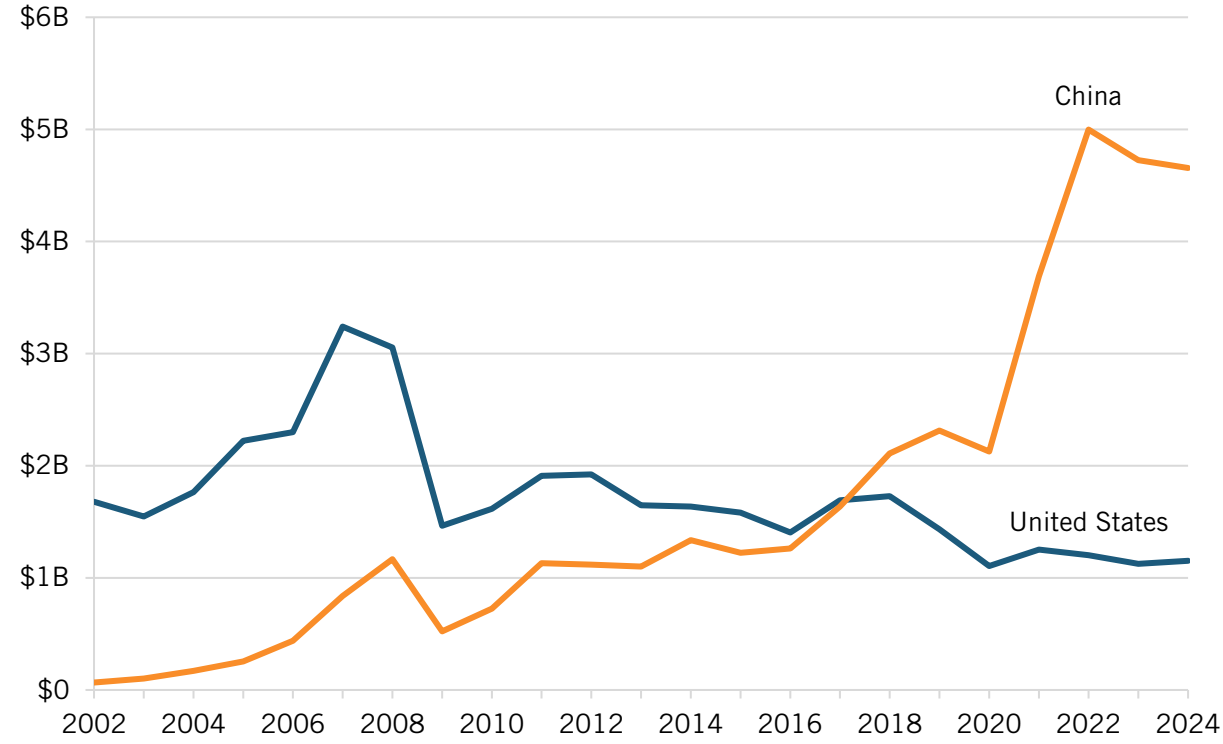


As Chinese firms scale production and expand abroad, they have increasingly targeted third-party markets that have historically been important destinations for American machinery exports. Europe has been a key target, where China has gained market share by offering products at lower prices than many Western competitors have. Investigations by the European Commission have found evidence that subsidies and other state support mechanisms allow Chinese equipment manufacturers to sell machinery at artificially low prices, making it difficult for U.S. and European producers to compete in international markets.[151]

U.S. exports to Belgium, Germany, France, Italy, the Netherlands, and the United Kingdom, the largest European importers of American construction equipment, have declined steadily since the early 2000s, while Chinese exports have had the opposite experience. China now exports four times as much construction equipment by value to European allied nations as the United States does. (See figure 57.) At the same time, Chinese exports to the United States have also grown rapidly. Between 2014 and 2024, imports of Chinese construction machinery increased by 66 percent.[152]

For Iowa, where construction machinery manufacturing is a highly concentrated, export-oriented industry, these global trends pose a significant long-term risk. As Chinese firms expand capacity and aggressively enter foreign markets, American manufacturers may face declining global market share, lower export revenues, and increased price competition. Because Iowa's machinery industry depends heavily on international demand, prolonged erosion of U.S. competitiveness could translate into slower industry growth, reduced investment, and potential job losses in the future.

Figure 57: Construction equipment exports to Belgium, Germany, France, Italy, the Netherlands, and the United Kingdom[153]

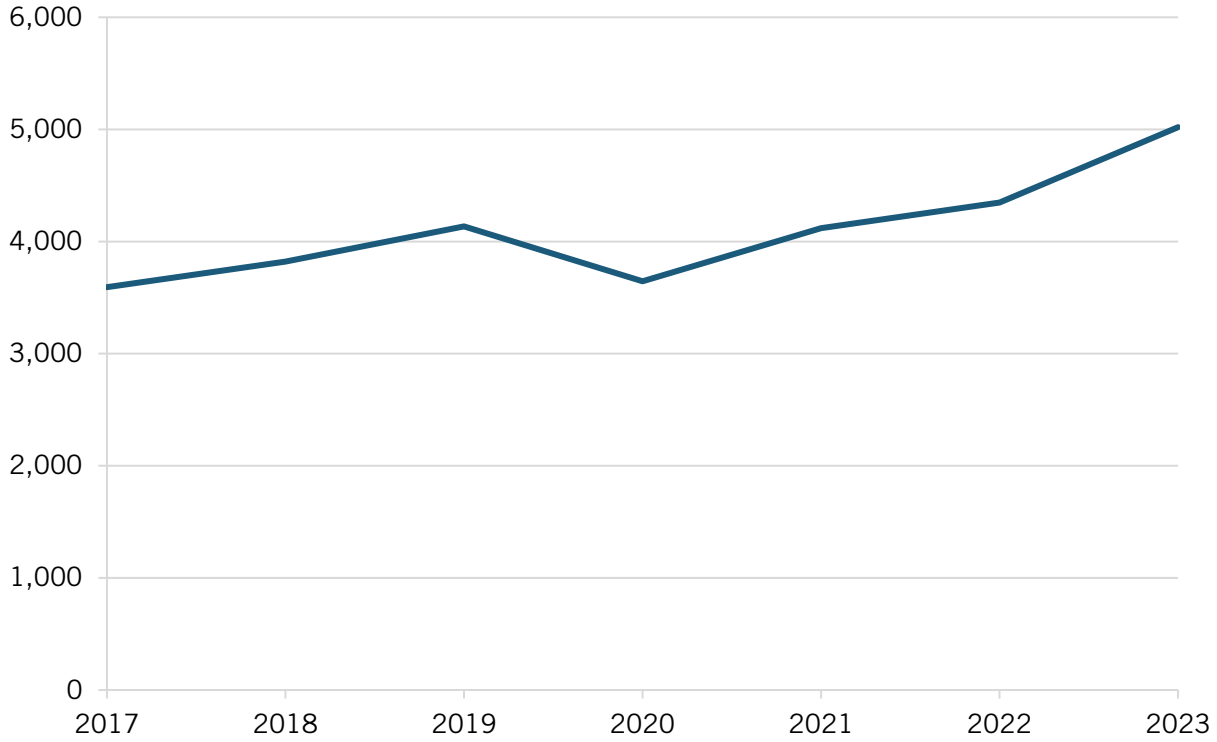


Kansas: Farm Machinery and Equipment Manufacturing (NAICS 333111)

Kansas is specialized in and dependent on the farm machinery and equipment industry, which operates in a highly competitive global market dependent on exports. While the United States has historically been a global leader in agricultural equipment production, China's rapid expansion, driven by state support, rising exports, and increasing global market share, poses a growing threat to the long-term competitiveness of American firms and the Kansas economy.

Farm machinery and equipment manufacturing is a cornerstone of Kansas's industrial base, reflecting the state's deep integration with large-scale commercial agriculture, which relies on equipment essential to modern farming. Major firms such as AGCO produce large industrial equipment, such as tractors, combines, and forage equipment, in Kansas, with AGCO operating two major facilities in Hesston and Beloit. AGCO, along with other major producers such as John Deere, has made Kansas one of the largest states for farm machinery manufacturing, directly employing over 5,000 people. In fact, employment in Kansas's farm machinery sector has increased steadily over the past several years, rising 40 percent from 2017 to 2023.[154] (See figure 58.) These jobs are particularly important, as they support both above-average wages and a broad network of suppliers, logistics providers, and agricultural workers.[155] However, employment in the industry has declined in recent years, falling by 14 percent over the previous decade, even as overall employment has increased.[156]

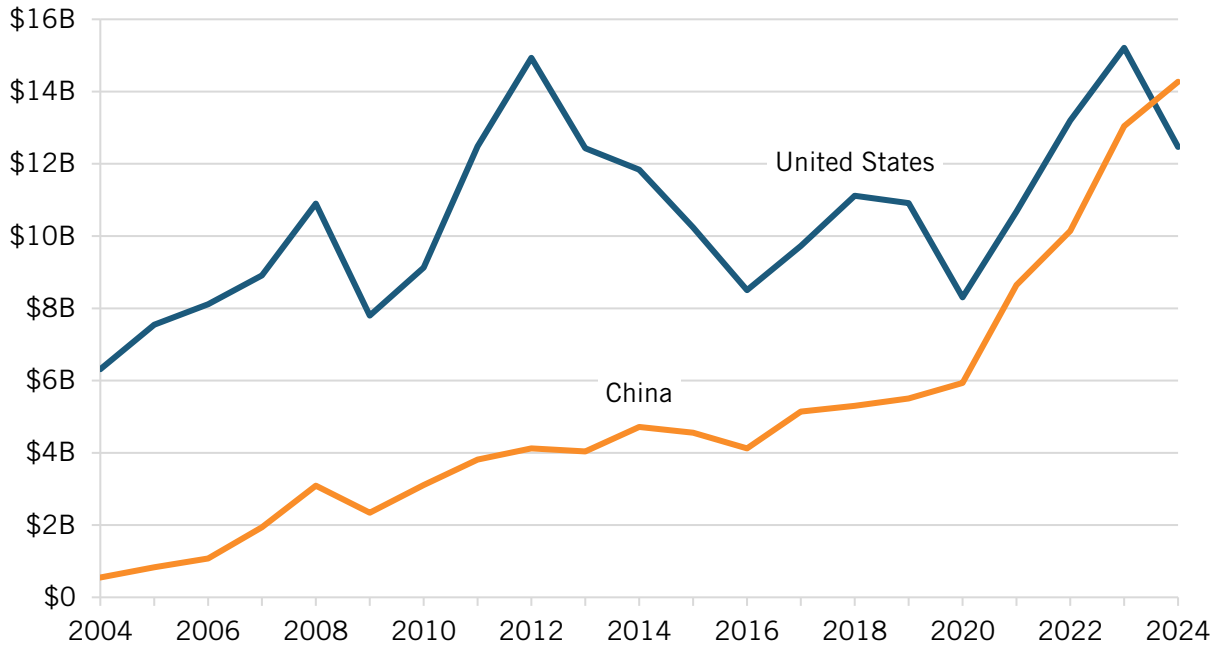
Figure 58: Employment in farm machinery manufacturing in Kansas



The industry's importance to Kansas is reflected not only in employment but also in its economic output. Industrial machinery, which includes agricultural machinery and equipment, was the third-largest export from Kansas in 2023, behind aircraft parts and meat products, and was valued at over $1.3 billion.

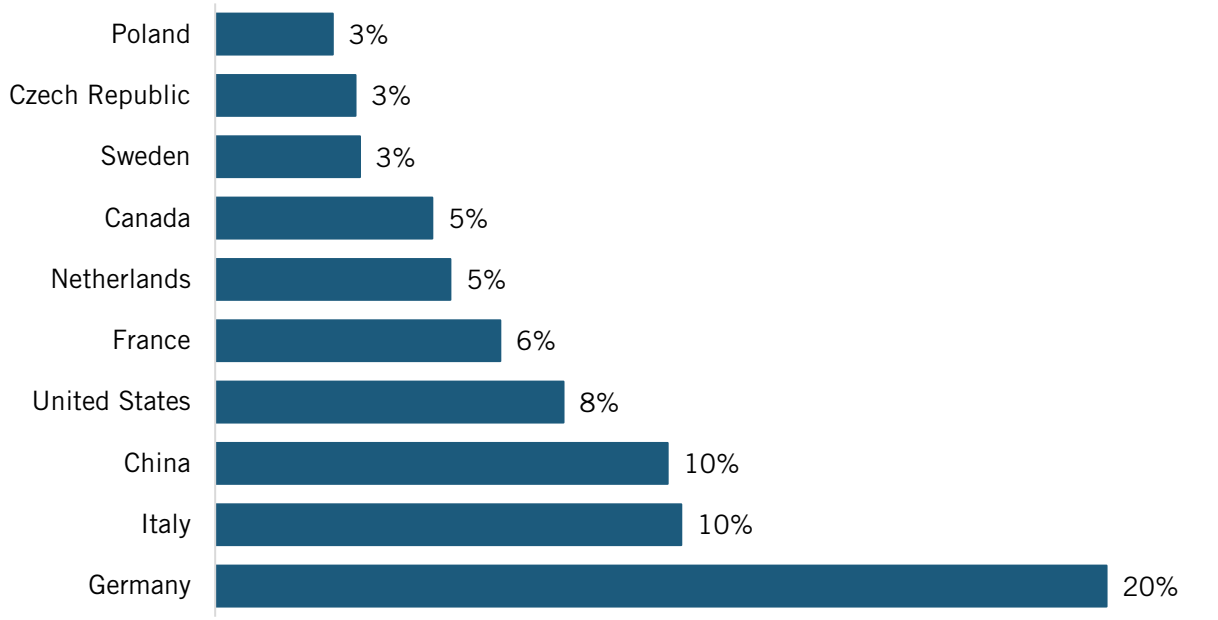
Kansas's success in the industry has helped the United States become one of the largest agricultural machinery manufacturers in the world. However, global competition has intensified. As shown in figure 59, U.S. exports of farm machinery and equipment (HS Codes 8432, 8433, 8434, 8435, 8436, 8437, 8701) once dwarfed those from China. In 2004, the United States exported 12 times more value in agricultural equipment than China did, and for the next several years, the United States maintained a significant lead over its competitor, even as Chinese exports increased gradually. However, by 2020, Chinese exports had begun to surge, overtaking those of the United States in 2023. As of 2024, China exported nearly $2 billion more in agricultural machinery than did the United States.[157]

Figure 59: Agricultural equipment exports[158]



Not only has China overtaken the United States, but it also exports more agricultural machinery than almost every other nation does. Only Germany and Italy exceeded China in 2023.[159] (See figure 60.) According to Chinese customs data from 2025, agricultural exports increased by 32.2 percent between 2024 and 2025, surpassing Italy and making China the world's second-largest exporter of agricultural machinery.[160]

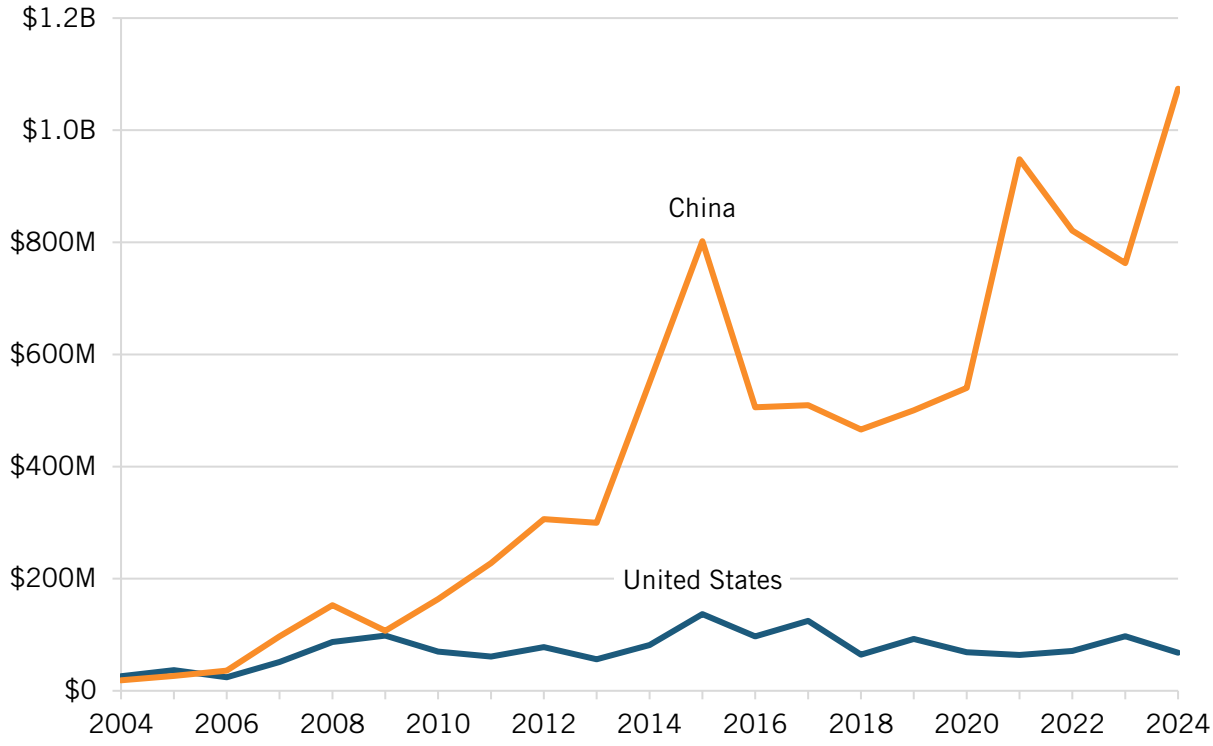
Figure 60: United States' and China's share of global exports of agricultural, horticultural, and forestry machinery by country, 2023[161]



China's rapid rise in this industry has been supported by a range of industrial policies aimed at increasing domestic production and global competitiveness. The federal government implemented the Agricultural Machinery Production Subsidies in 2020, which provide a fixed-rate subsidy of approximately 30 percent on agricultural machinery, effectively reducing the price of Chinese agricultural machinery and increasing demand.[162] The government also artificially catalyzed demand for agricultural machinery through its 2018 document "Guiding Opinions on Accelerating the Promotion of Agricultural Mechanization and Transformation and Upgrading of Agricultural Machinery Equipment Industry," which called for an increase in the mechanization rate for crop cultivation from 67 percent in 2018 to 75 percent in 2025.[163] Both these initiatives, combined with export promotion through programs such as the Belt and Road Initiative, which encourage developing countries to purchase Chinese products in tandem with China-led infrastructure projects, have enabled Chinese firms to compete aggressively with the United States and allied countries.

This competition is evident not only in total exports but also in exports to key markets in developing countries. Chinese exports of farm machinery to key Southeast Asian markets, including Indonesia, the Philippines, and Vietnam, have grown dramatically over the past two decades, while U.S. exports to these countries have remained relatively flat, hovering around $65 million; Chinese exports have surged, exceeding $1 billion annually in recent years. (See figure 61.)

Figure 61: Farm machinery exports to Indonesia, the Philippines, and Vietnam[164]



China's continued expansion in agricultural machinery poses a direct threat to U.S. firms and the regional economies that depend on them. As Chinese producers gain market share in both domestic and international markets, U.S. manufacturers may face declining exports, tighter profit margins, and reduced investment. For Kansas, where farm machinery manufacturing

supports thousands of jobs and plays a critical role in the state's industrial economy, these trends could translate into slower growth and long-term economic vulnerability for the United States in the future.

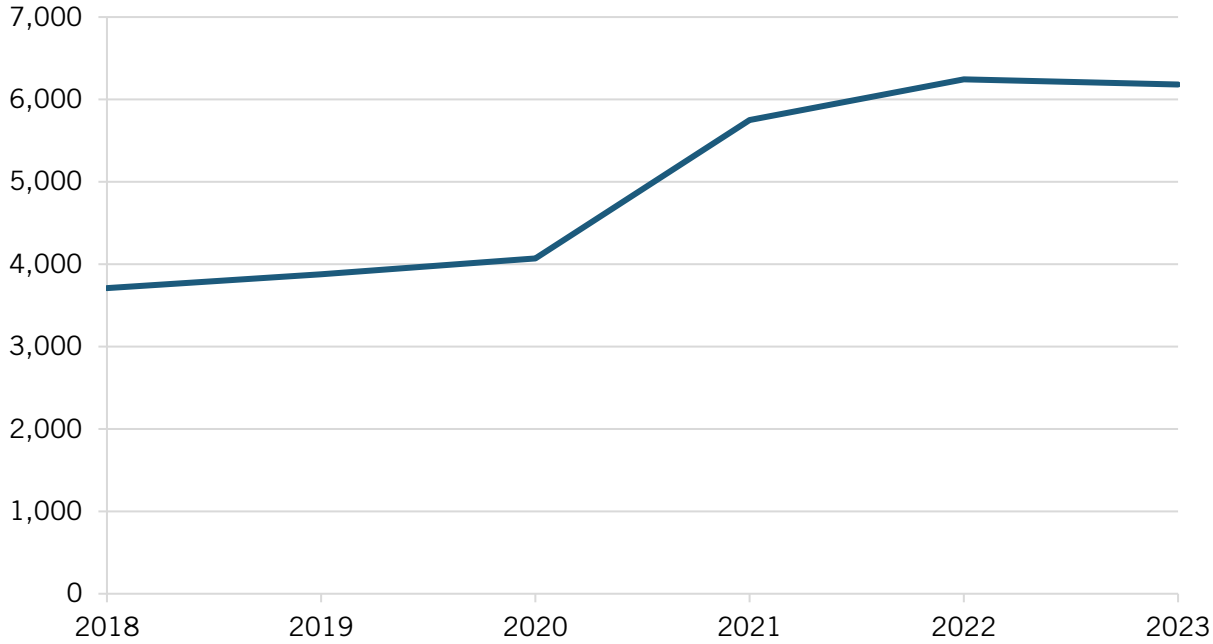
Kentucky: Major Household Appliance Manufacturing (NAICS 335220)

Kentucky is highly specialized in household appliance manufacturing, an advanced industry that plays a central role in the state's economy and export base. However, rising Chinese dominance, fueled by large-scale industrial subsidies, rapid capacity expansion, and aggressive export strategies, poses a growing threat to the long-term competitiveness and independence of both Kentucky's and America's appliance sector

Major household appliance manufacturing includes the production of refrigerators, freezers, washing machines, dishwashers, dryers, and other large household appliances used in residential settings. These products are widely traded internationally and rely on complex manufacturing supply chains that include steel components, compressors, electronics, and software systems. The industry is highly capital intensive and historically dominated by firms in the United States, Europe, Japan, and South Korea.

Kentucky is one of the largest appliance manufacturers in the United States and hosts one of the world's largest appliance manufacturing complexes. Appliance Park in Louisville is the global headquarters and largest manufacturing facility of GE Appliances, which employs approximately 8,000 workers in the state.[165] Additionally, Kentucky is home to other large appliance producers such as Whirlpool and Samsung. Altogether, the Kentucky economy is highly dependent on the household appliance industry, with employment in the industry growing by 66 percent from 2018 to 2023, from about 3,700 to about 6,200. In comparison, the overall Kentucky workforce grew just 4 percent over that same period.[166]

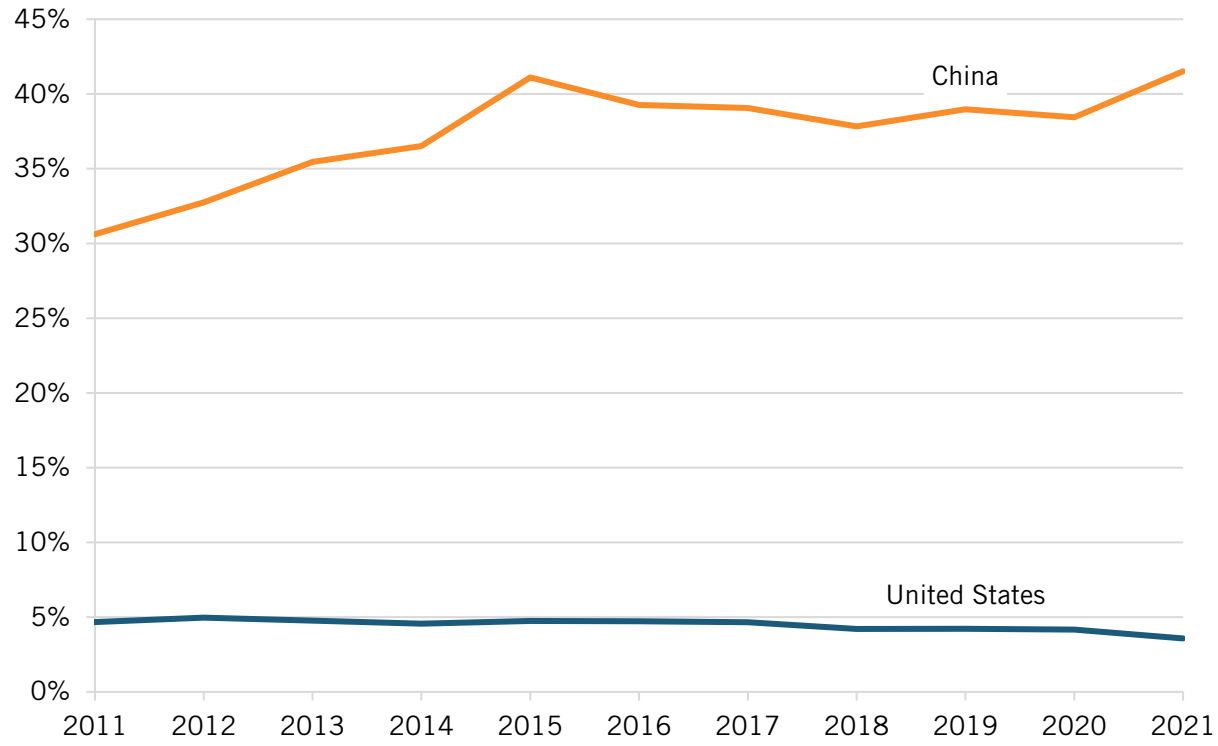
Figure 62: Employment in major household appliance manufacturing in Kentucky



GE Appliances alone contributes billions to the state economy, with a 2024 impact analysis estimating that the company's operations contributed $12.8 billion to Kentucky's gross domestic product (GDP).[167] Its presence in the state is also projected to grow. In 2025, the company announced an additional $490 million investment in Appliance Park, which will create 800 new jobs and shift the production of several washing machine models from China back to Kentucky.[168]

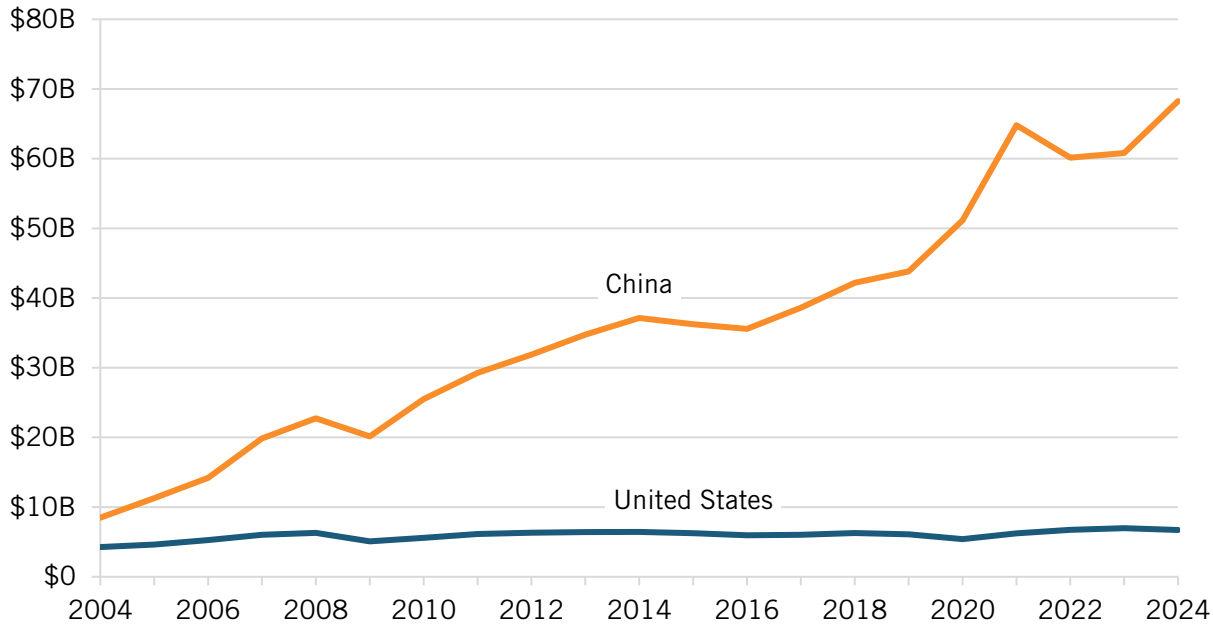
Despite Kentucky's strength, the global appliance market has shifted dramatically toward China over the past two decades. China is now the world's largest producer and exporter of household appliances, accounting for over 40 percent of global production. (See figure 63). Chinese firms such as Haier, Midea, and Hisense have become dominant global players, competing directly with U.S.-based manufacturers. Haier has also expanded its operations through acquisitions, including an acquisition of GE Appliances in 2016, meaning one of the largest domestic appliance producers in the United States is now under China's purview.

Figure 63: United States' and China's market shares in household appliances[169]



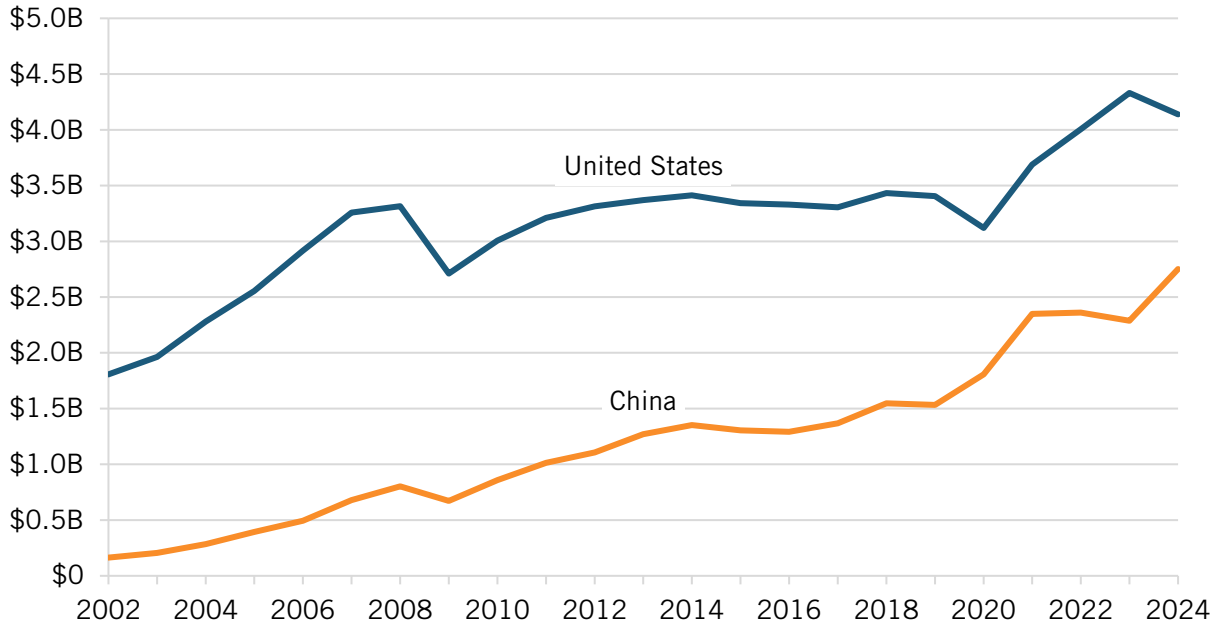
This shift is clearly visible in global trade data. In the early 2000s, the United States was a leading exporter of household appliances (HS codes 8418, 8422, 8450, 8508, 8516), and while it still exported $4 billion less in volume than China, it was relatively close considering the gap today. But from 2004 to 2024, China increased its exports of household appliances by an incredible 704 percent, while the United States increased exports by just 58 percent.[170] China now exports $62 billion more than the United States does in household appliances.

Figure 64: United States' and China's exports of household appliances[171]



China's export growth has been driven in large part by its expansion into third-country markets, particularly Canada and Mexico. America's two largest trading partners have increasingly imported household appliances from China rather than the United States, allowing China to close the export gap in this critical market for U.S. exporters. Though the United States still exports more to these countries, Chinese exports increased by 865 percent between 2004 and 2024, compared with just 81 percent for U.S. exports, demonstrating China's encroachment on key American trading partners and allies, while the United States continues to exhibit lackluster growth.[172]

Figure 65: United States' and China's exports of household appliances to Canada and Mexico[173]



A major driver of China's success in appliance manufacturing is extensive government support. For example, public filings show that Midea and Haier received more than $200 million annually in government subsidies between 2022 and 2024.[174] Additionally, the Chinese government has implemented demand-side policies designed to stimulate appliance consumption. Programs such as the "Home Appliances Going to the Countryside" initiative, launched in 2007, and appliance trade-in subsidies have boosted domestic demand, enabling firms to achieve economies of scale and lower per-unit costs.[175] More recently, China's 2024 to 2027 equipment replacement initiative includes incentives for consumer goods purchases.[176] In its 2024 financial reports, Midea stated that both supply- and demand-side subsidy policies had led to increased sales volumes, higher consumer demand, and lower prices for certain products.[177]

China's rapid expansion in the global appliance industry poses a growing challenge both to U.S. producers and to Kentucky's position as a major manufacturing hub for household appliances. Chinese firms continue to benefit from a large manufacturing ecosystem, strong government support, and policies aimed at expanding both domestic demand and exports. These advantages have enabled Chinese manufacturers to rapidly increase global production capacity and capture market share in international markets. As Chinese producers continue to scale production and expand their presence around the world, global appliance prices could face downward pressure, making it more difficult for U.S. manufacturers to compete on cost. Such an effect could erode U.S. export opportunities and reduce the profitability of domestic production. Despite Kentucky's expansion of its household appliance manufacturing workforce, continued aggressive competition from China could severely hurt the Kentucky economy, leading to job losses and a decline in economic growth.

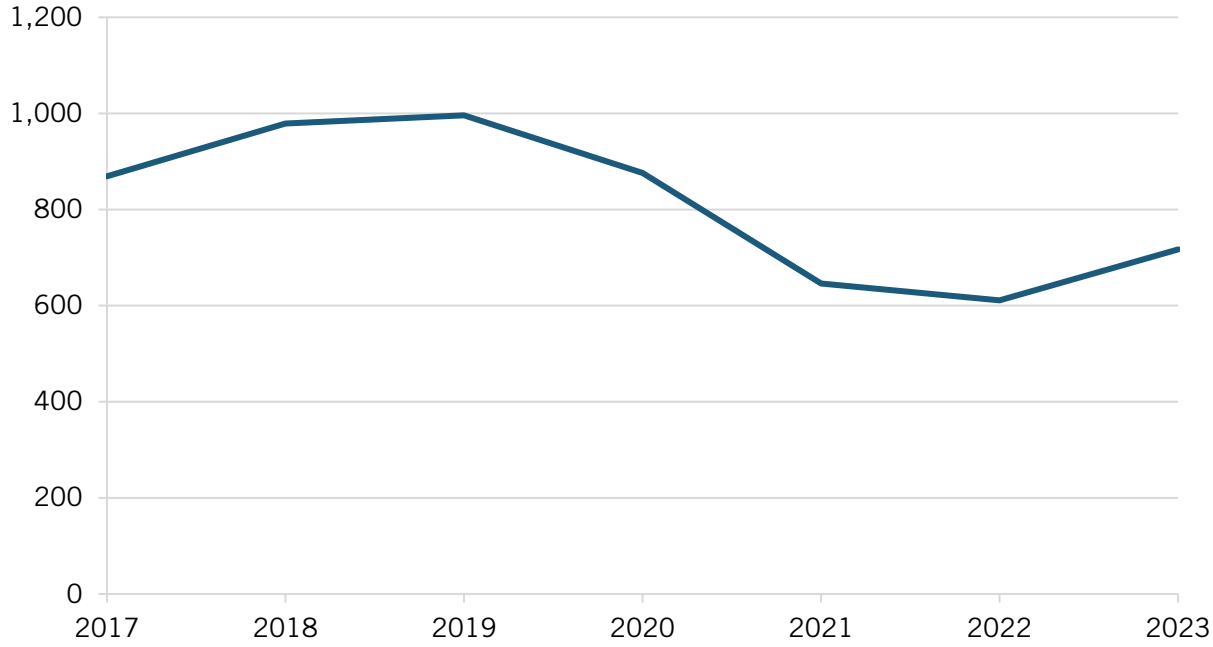
Louisiana: Alumina Refining and Primary Aluminum Production (NAICS 331313)

Louisiana is a critical hub for the U.S. aluminum value chain, particularly in alumina refining and primary aluminum production. However, the industry operates in an increasingly competitive global market wherein China's rapid expansion—supported by extensive state subsidies and industrial policy—poses a significant threat to the long-term competitiveness of U.S. producers.

Alumina refining and primary aluminum production includes the processing of bauxite into alumina and the smelting of alumina into primary aluminum. These materials are essential inputs for aerospace, automotive, construction, and defense applications, making this industry an essential input to the national power industry supply chain. Louisiana plays an outsized role in this industry due to its access to the Mississippi River system, deepwater ports, and energy infrastructure, making it a strategic location for refining and processing. Overall, it employs 78 percent of the nation's workforce in this sector.[178]

Louisiana is home to the last operating alumina refinery in the United States, operated by Atalco in Gramercy.[179] However, despite the necessity of maintaining domestic alumina refining and processing capabilities in the United States, employment in this industry has declined over the past several years. As shown in figure 66, employment fell from nearly 1,000 workers in 2019 to a low of about 600 in 2022, before rebounding slightly in 2023.[180]

Figure 66: Employment in aluminum refining and processing in Louisiana

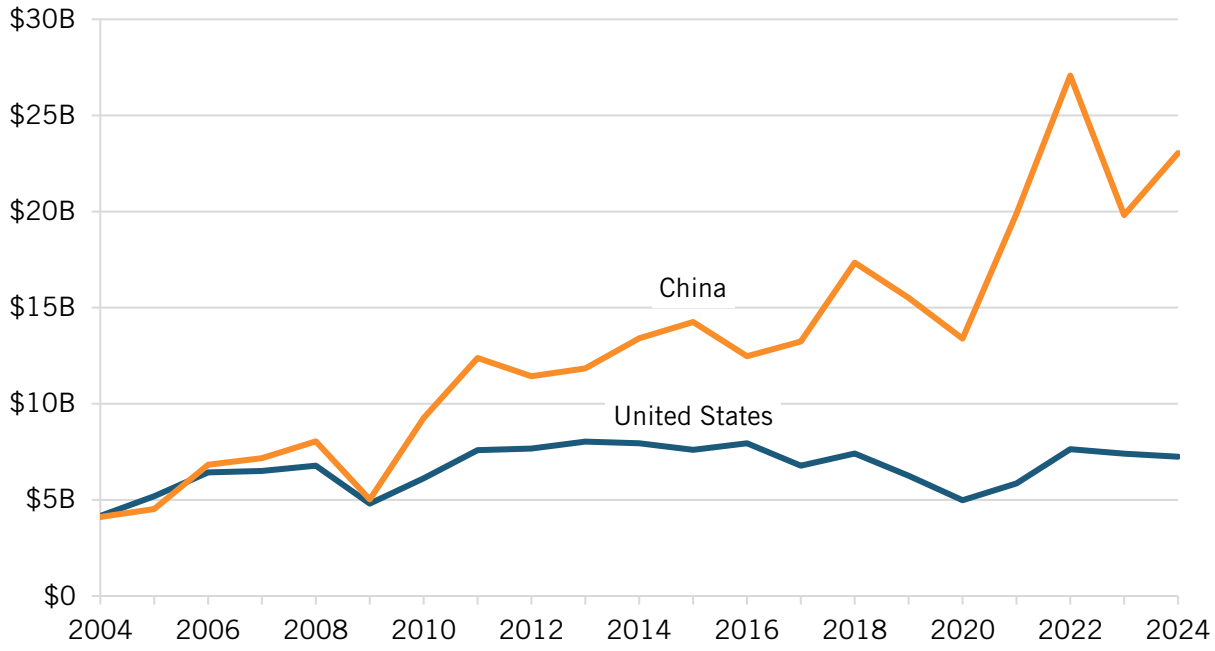


Considering the state's prominence in the U.S. alumina refining and aluminum production industry, Louisiana's employment decline has coincided with an overall weakening of the U.S. aluminum industry. And this weakening has also coincided with the rise of China. According to the U.S. Geological Survey, China now accounts for more than half of global primary aluminum production, compared with less than 10 percent for the United States.[181]

China's dominance is driven in large part by state support. Aluminum was identified as a strategic industry in Made in China 2025, enabling Chinese firms to benefit from subsidized electricity, preferential loans from state-owned banks, tax incentives, and direct financial subsidies. A report by the OECD finds that Chinese aluminum producers receive significantly higher government support than do firms in market economies, contributing to persistent global overcapacity.[182] Estimates suggest that Chinese aluminum producers, such as Aluminum Corporation of China and Hongqiao Group, receive tens of billions of dollars in implicit subsidies, particularly through below-market electricity pricing, which can account for up to 40 percent of production costs.[183] This support allows Chinese firms to maintain production even when global prices fall below market-based cost levels, contributing to downward pressure on global aluminum prices.[184]

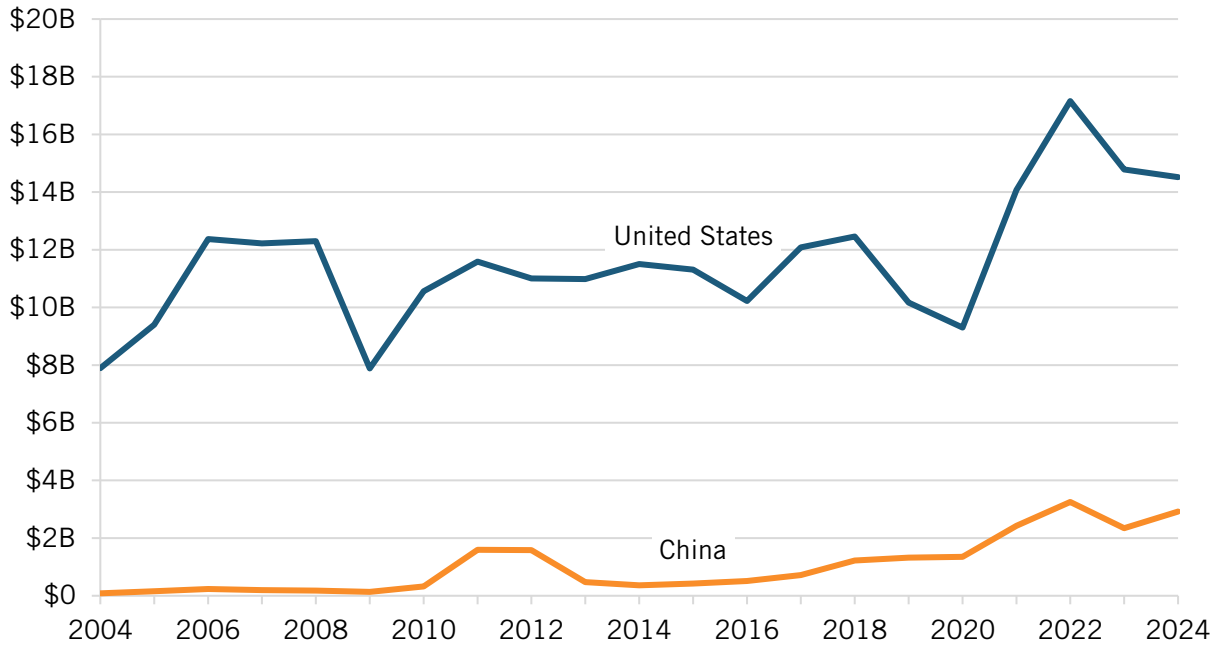
These policies have led Chinese exports to surge relative to the United States' over the past 20 years or so. From 2004 to 2024, U.S. exports of primary aluminum products (HS codes 2818, 7601, 7603, 7604, 7605, 7606, 7607) increased from $4.2 billion to $7.2 billion.[185] Comparatively, Chinese exports, which stood at about $4.1 billion in 2004, boomed, increasing to $23 billion. (See figure 67.)

Figure 67: United States' and China's exports of the aluminum refining and production industry



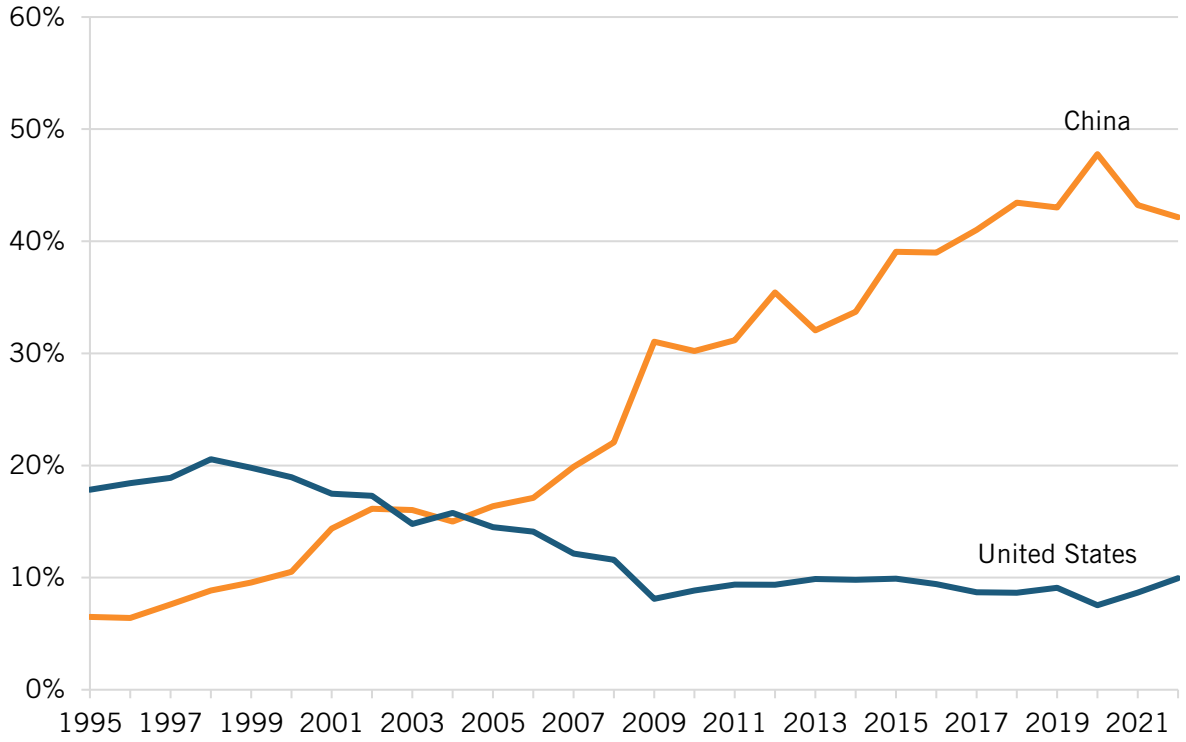
Despite the growth of China, the United States has maintained relatively strong export relations with its closest trading partners. Canada and Mexico remain the largest destinations for U.S. aluminum exports.[186] As shown in figure 68, U.S. exports to these countries have remained consistently higher than Chinese exports, though China has begun to increase its presence in these markets in recent years.[187]

Figure 68: United States' and China's exports of the aluminum refining and production industry to Canada and Mexico



Overall, China maintains a strong grip on the global aluminum industry, and by extension, the greater basic metals industry. In 2022, the most recent year of available data, China held 42 percent of the global market share in basic metals, over four times that of the United States, which held about 10 percent.[188] That decade alone, China's market share had climbed 10 percentage points, from 32 percent in 2013. (See figure 69.)

Figure 69: Global market share in basic metals



For Louisiana, these global dynamics translate into tangible economic risks. Though it's impossible to say if the growth of China's aluminum industry has directly caused the weakening of Louisiana's, it's evident that, as China's industry grows, the state's alumina refining industry is increasingly exposed to international competition against state-backed enterprises. As Chinese overcapacity continues to suppress global aluminum prices and take over export markets, Louisiana-based firms face tighter margins and potential employment declines. Should China's explosion in the aluminum market continue unimpeded and expand into key U.S. markets such as Canada and Mexico, the viability of domestic aluminum refining and production may be called into question.

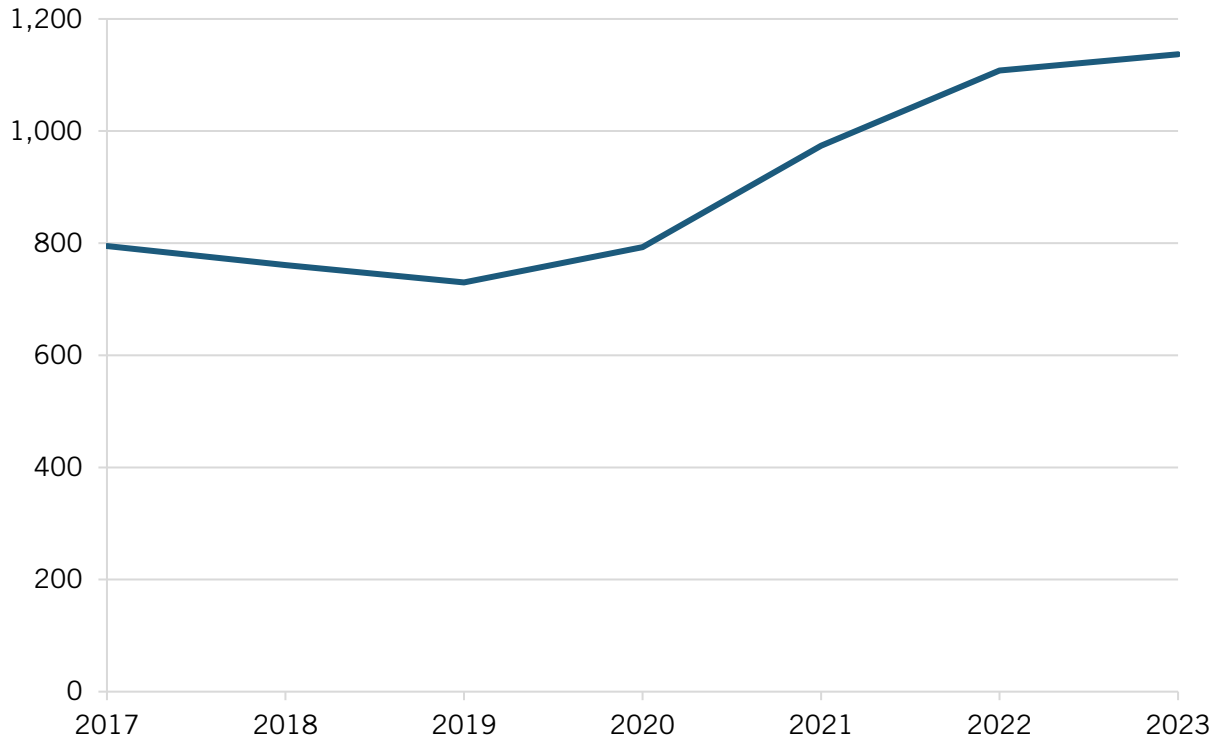
Maine: Analytical Laboratory Instrument Manufacturing (334516)

Analytical laboratory instrument manufacturing is a small but growing advanced-manufacturing industry in Maine. While China has expanded rapidly in the global analytical instrumentation market—supported by industrial policy and state backing—the available evidence suggests that U.S. firms continue to dominate the industry, and Chinese competition, while rising, represents a longer-term challenge rather than an immediate threat to Maine producers.

This industry produces high-precision instruments used in laboratory analysis, including chromatography systems, spectrometers, and diagnostic equipment. These tools are critical for

applications in pharmaceuticals, environmental monitoring, food safety, and biotechnology. Maine has developed a niche presence in this industry, driven by specialized firms and growing employment. Employment in Maine's analytical laboratory instrument manufacturing sector increased from about 800 workers in 2013 to over 1,100 in 2023.[189] (See figure 70.) Maine is home to several notable firms in this space. Most prominently, IDEXX Laboratories, headquartered in Westbrook, is a global leader in veterinary diagnostics and water testing instrumentation.[190] The company produces advanced diagnostic analyzers and laboratory systems used worldwide. Other firms, including Ocean Insight (formerly Ocean Optics), contribute to Maine's specialization in spectroscopy and optical measurement technologies.[191]

Figure 70: Employment in analytical laboratory instrument manufacturing in Maine



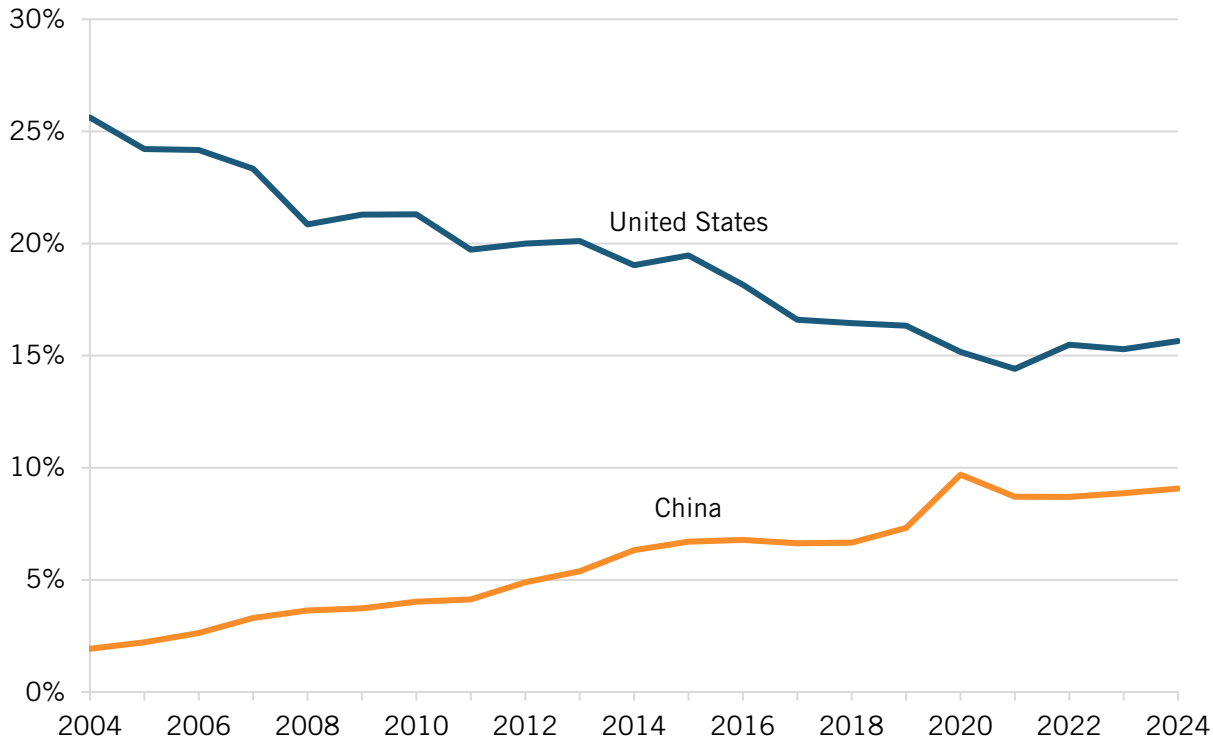
China has identified scientific instruments and medical devices as priority industries under its Made in China 2025 strategy, mobilizing national and provincial resources to build domestic capabilities. Chinese firms have benefited from subsidies, tax incentives, government procurement preferences, and state-backed financing.[192] According to analyses by organizations such as the U.S.-China Economic and Security Review Commission and MERICS, these policies have supported rapid growth in China's scientific instrument industry. The former has found that, under the policies laid out in Made in China 2025, China has cultivated at least 6 internationally recognized medical equipment firms, meeting its goal of developing between 5 and 10 of these companies by 2025.[193] Though not all these companies directly compete in the specific subset of analytical laboratory equipment manufacturing, some do, such as the firm Mindray.

Additionally, MERICS has found that Chinese medical technology firms received measurable financial support from the government between 2017 and 2022, including subsidies, tax incentives, and below-market financing. Overall, government support grew from $725 million in

2017 to between $2.9 billion and $3.9 billion in 2022.[194] This support was equivalent to at least 25 percent of companies' net profit over this period.

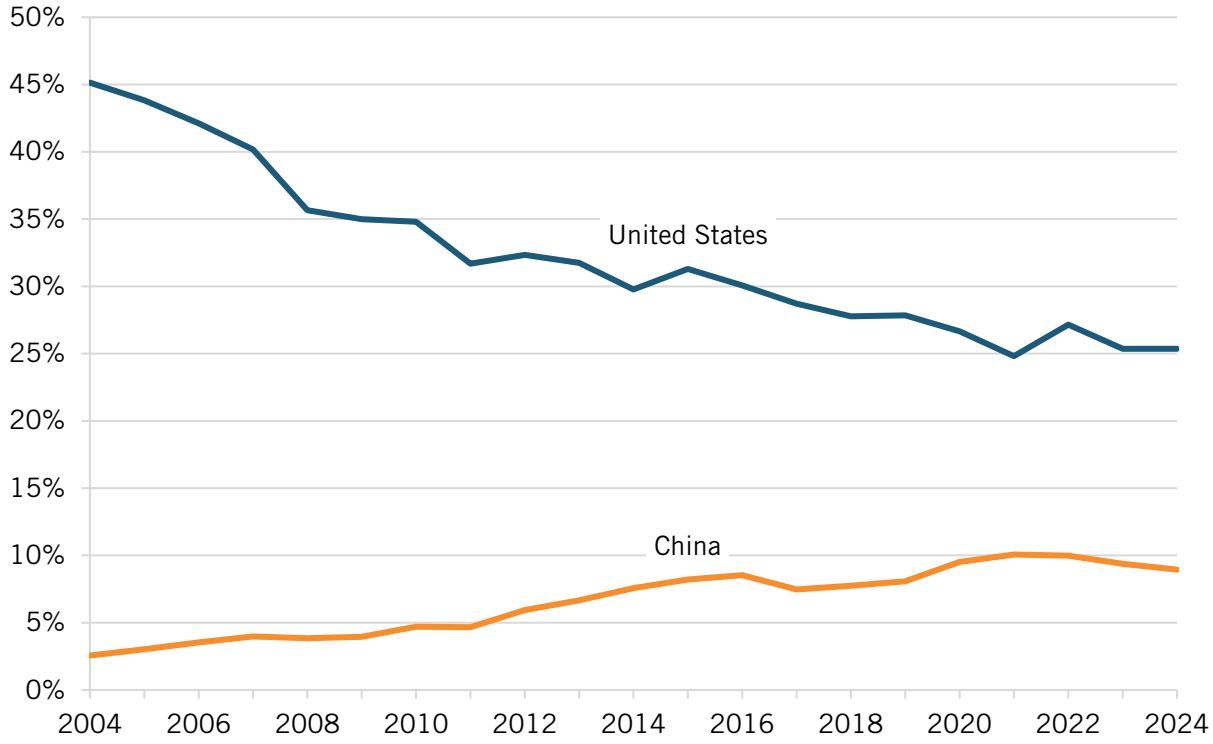
With these levels of substantial support and clearly defined goals for the industry, Chinese firms have been able to substantially increase exports of analytical lab instruments (HS codes 9012, 9025, 9027, 9030, and 9031). From 2004 to 2024, China's share of global exports increased from roughly 2 percent to about 9 percent. In contrast, the United States' export share decreased from just over 25 percent to 16 percent, a 36 percent decline. Nevertheless, the United States still holds an absolute advantage over China, exporting about $11 billion more in value.[195] (See figure 71.)

Figure 71: United States' and China's shares of global exports of analytical laboratory equipment



This trend is also evident in key allied markets. The United States continues to export more analytical instruments to its largest export markets, such as Canada, Germany, and Japan, for these goods, but Chinese exports to these countries have increased steadily, reducing its gap to the United States from about 42 percentage points to about 16 percentage points, indicating China's growing competitiveness abroad.[196] (See figure 72.)

Figure 72: United States' and China's shares of analytical laboratory equipment exports to Canada, Germany, and Japan



The United States currently retains a leading position in analytical laboratory instruments by trade value, with exports continually increasing, while leading states, such as Maine, continue to grow their workforces. China, however, has made significant gains in the industry, expanding its export presence with sustained state support and making inroads into the global medical device market through several world-recognized firms. Should Chinese firms continue to receive substantial state support, and should the Chinese government continue to prioritize the growth of its medical device sector, China could become a more formidable competitor in the future, potentially taking global market share from U.S. firms and risking the decline of revenue, growth, and jobs in the future.

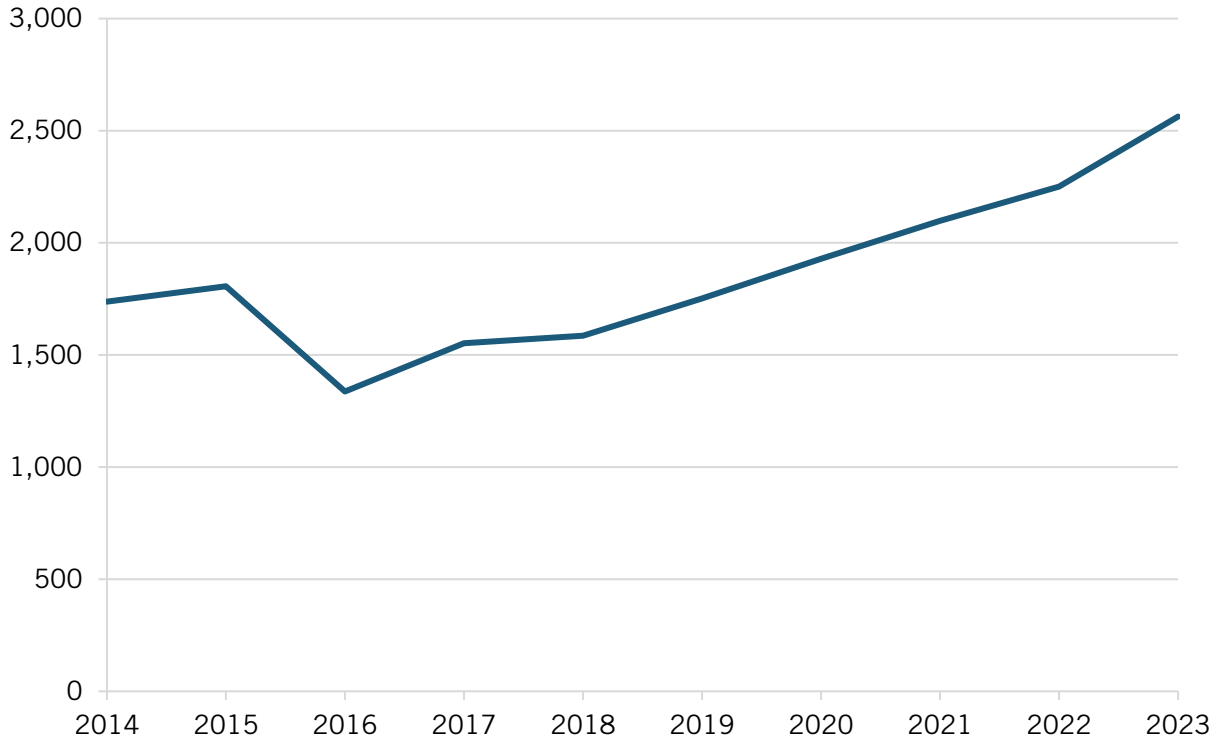
Maryland: Biological Product (except Diagnostic) Manufacturing (NAICS: 325414)

A core industry in Maryland is biological product (except diagnostic) manufacturing (NAICS: 325414). Biological product (except diagnostic) manufacturing is defined as "establishments primarily engaged in manufacturing vaccines, toxoids, blood fractions, and culture media of plant or animal origin (except diagnostic)."[197] Biological product (except diagnostic) manufacturing companies in Maryland include IDT Biologika Corporation and Intralytix, Inc.[198] The primary products produced by these companies include malaria diagnostic test kits (SITC: 54163), human blood plasma (SITC: 54163), cell therapy products (SITC: 54164), and others.[199]

Over the past 10 years (available data), the biological product (except diagnostic) manufacturing industry in Maryland has expanded. Indeed, from 2014 to 2023, Maryland's industry's employees rose 47.5 percent from 1,738 to 2,563 employees while the overall U.S. manufacturing sector only rose 8 percent.[200] As such, this indicates that Maryland's industry has grown faster than the overall manufacturing sector and has expanded to be a greater share of the

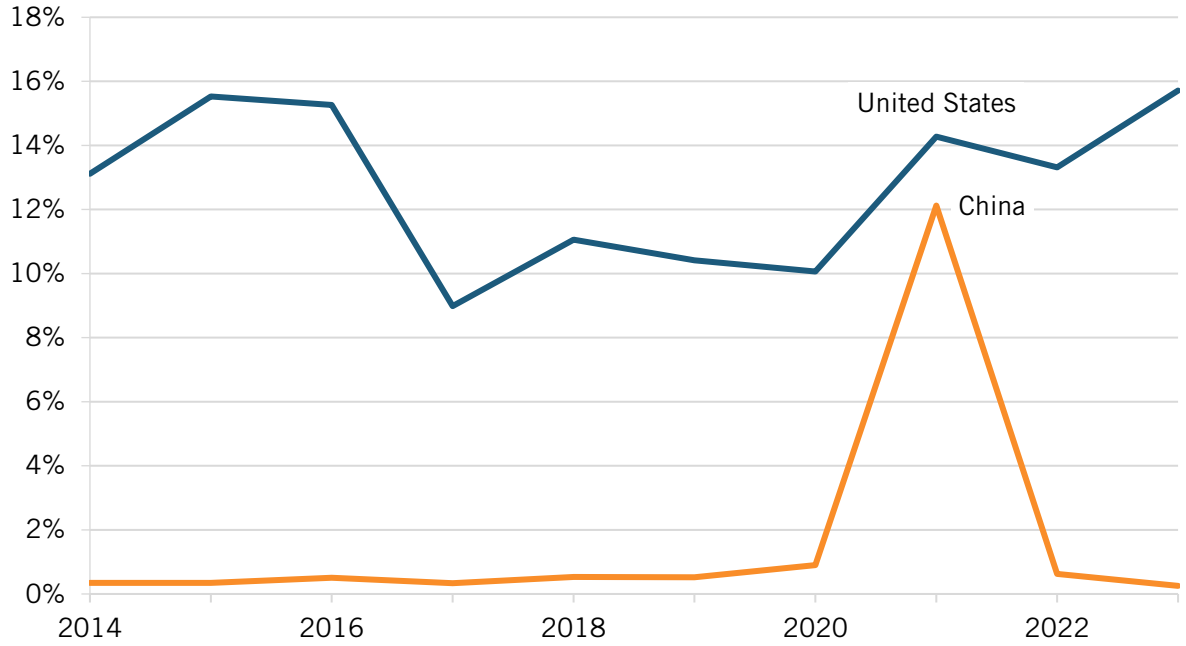
sector. When examined closer, Maryland's industry did experience a slight decline from 2015 to 2016, but has generally trended upward.[201]

Figure 73: Employment in biological product (except diagnostic) manufacturing in Maryland



Corresponding with the time period above, from 2014 to 2023, China's exports to the world remained stable while Maryland's biological product (except diagnostic) manufacturing industry grew. Indeed, while Maryland's industry employees expanded, China's exports as a share of the global exports remained at 0.3 percent.[202] This indicates that Chinese competition is unlikely to have influenced Maryland's industry trends, as Chinese exports did not change despite Maryland's industry growth. Although Chinese exports did experience a large spike from 0.9 percent to 12.1 percent from 2020 to 2021, Maryland's industry continued to grow and did not seem to be affected by the large growth—this growth was likely due to the COVID-19 pandemic.[203] More generally, Chinese competition does not seem to affect the U.S. biological products manufacturing industry. Indeed, while U.S. exports have gone through periods of growth and decline, Chinese exports have remained stable.[204]

Figure 74: United States' and China's shares of global exports of biological (except diagnostic) product manufacturing

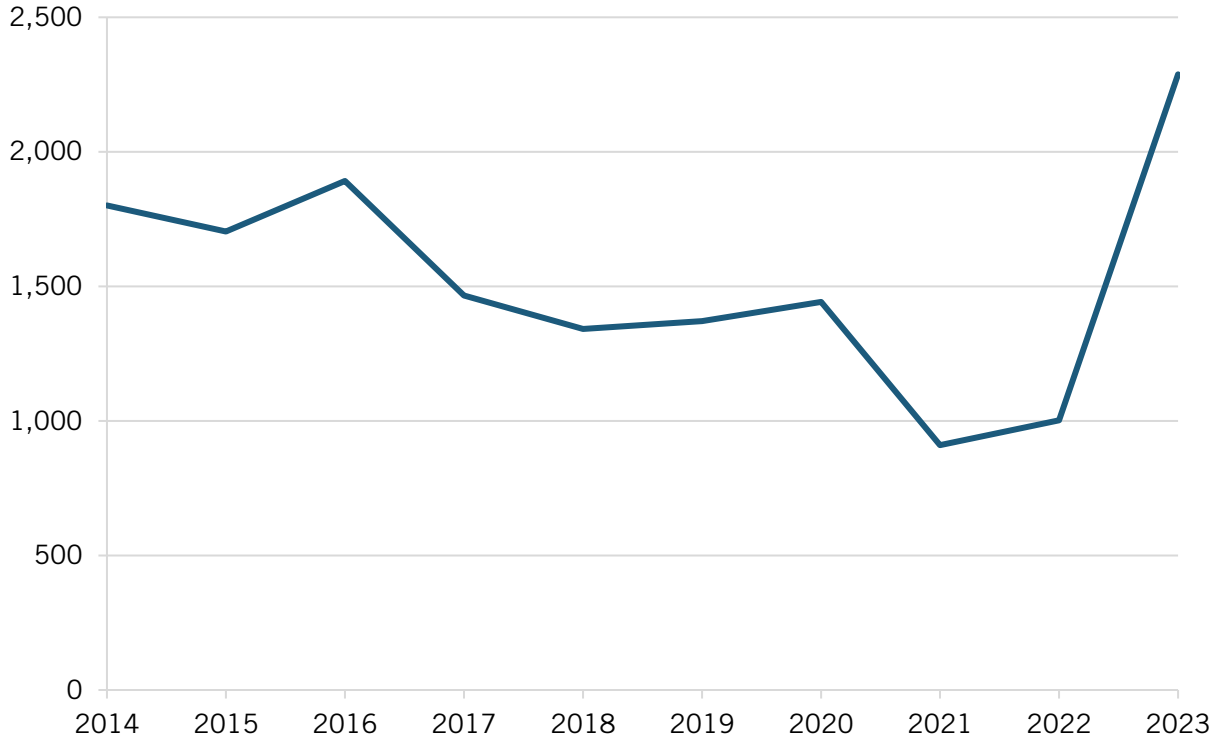


Massachusetts: Irradiation Apparatus Manufacturing (NAICS 334517)

A core industry in Massachusetts is irradiation apparatus manufacturing. The irradiation apparatus manufacturing industry is defined as "establishments primarily engaged in manufacturing irradiation apparatus and tubes for applications, such as medical diagnostic, medical therapeutic, industrial, research and scientific evaluation. Irradiation can take the form of beta-rays, gamma-rays, X-rays, or other ionizing radiation."[205] The irradiation apparatus manufacturing companies in Massachusetts include Image Diagnostics, Inc., Pyramid Technical Consultants, Inc., and Wasik Associates Inc.[206] The primary products produced by these companies include scintigraph apparatus for use in medical, surgical, dental, or veterinary sciences (SITC: 77412), computed tomography apparatus (SITC: 77421), x-ray tubes (SITC: 77423), and others.[207]

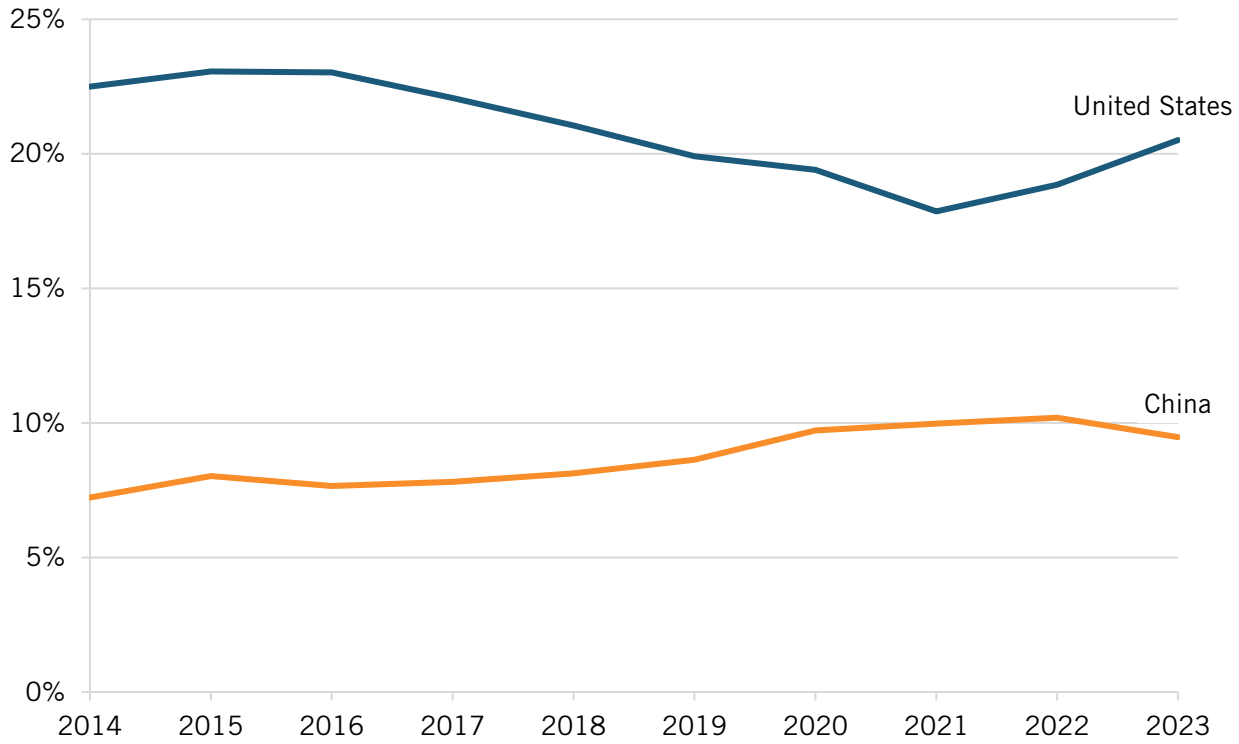
Over the past 10 years (available data), the irradiation apparatus manufacturing industry in Massachusetts has expanded. Indeed, from 2014 to 2023, Massachusetts' industry's employees grew 27 percent from 1,801 to 2,288 employees, while overall U.S. manufacturing worker employment only grew by 8 percent.[208] As such, Massachusetts' industry has expanded faster than the manufacturing sector has and now accounts for a larger share of it. However, on closer examination, the vast majority of Massachusetts' industry's growth came from 2022 to 2023, when the number of employees rose 128 percent from 1,002 to 2,288 employees.[209] When these outlier years are removed, Massachusetts' industry is contracting, with employees declining 44 percent, while the overall U.S. manufacturing sector has grown 6.7 percent.[210] In sum, Massachusetts' industry may have grown overall, but that growth is due to a single year. This surge could have been due to the increase in employment in Massachusetts' biopharma industry, which saw employment rise 6.9 percent in 2022.[211]

Figure 75: Employment in irradiation apparatus manufacturing in Massachusetts



Corresponding with the time period above, from 2014 to 2023, China's exports to the world grew while Massachusetts' irradiation apparatus manufacturing industry also grew. Indeed, while Massachusetts' industry's employees expanded, China's exports as a share of the global exports rose from 7.2 percent to 9.5 percent, indicating that China is unlikely to have played a role in Massachusetts' industry trends, since both were growing concurrently.[212] However, when Massachusetts' industry outlier years (2022–2023) are removed, China may indeed have had some impact on Massachusetts' industry trends. Indeed, when those two years are removed, Chinese export shares rose from 7.2 percent to 10.2 percent while Massachusetts' industry employees declined 44 percent from 1,801 to 1,002 employees.[213] And when Massachusetts' industry employees rose significantly from 1,002 to 2,288 during those outlier years, Chinese exports declined from 10.2 percent to 9.5 percent.[214] As such, this indicates that Chinese competition may indeed play a role in Massachusetts' irradiation apparatus manufacturing industry trends.

Figure 76: United States' and China's shares of global exports of the irradiation apparatus manufacturing industry



Although the Chinese government does not provide subsidies that are specifically for the irradiation apparatus manufacturing industry, the Chinese industry likely does not compete fairly with global competitors. This is because the Chinese government provides subsidies to its medical technology industry, which could subsequently benefit the irradiation apparatus manufacturing industry, as it is used in the medical technology field. Indeed, a paper by the European Center for International Political Economy finds that the Chinese medical technology industry benefits from direct financial support, tax benefits, R&D support, and local content requirements from the Chinese government.[215] As a result, the Chinese medical technology industry has taken away market shares from other global competitors that do not benefit from government support.[216] Corroborating this, a study by MERICS finds that the Chinese government increased its support to 122 medical technology firms by 5 times between 2017 and 2022, from roughly $734 billion to $4 billion.[217] It also finds that China provided significantly more state support to this sector than did any other advanced economies.[218] As a result, China's medical technology and irradiation apparatus products likely do not compete fairly with their global competitors.

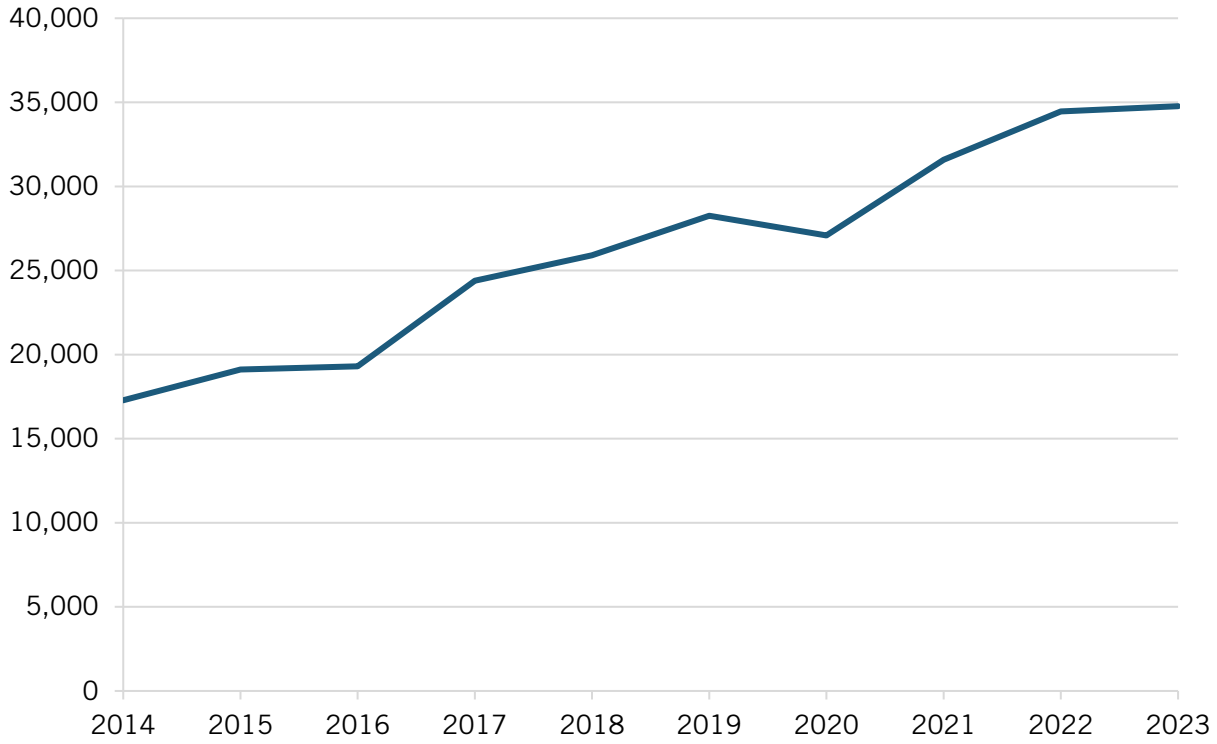
Michigan: Light Truck and Utility Vehicle Manufacturing (NAICS: 336112)

A core industry in Michigan is the light truck and utility vehicle manufacturing industry (NAICS: 336112). This industry is defined as "establishments primarily engaged in (1) manufacturing complete light trucks and utility vehicles (i.e., body and chassis) or (2) manufacturing light truck and utility vehicle chassis only. Vehicles made include light duty vans, pick-up trucks, minivans, and sport utility vehicles."[219] The light truck and utility vehicle manufacturing companies in Michigan include General Motors, Ford Motor Company, and AutoAlliance International. The primary products produced by these companies include motor vehicles for the transport of goods,

not elsewhere specified or included (nesoi), with diesel engines, having a gross vehicle weight (GVW) not exceeding 5 metric tons (SITC: 78120), vehicles for the transport of goods, spark-ignition internal combustion piston engine, GVW not exceeding 2.5 metric tons (SITC: 78219), and others.[220]

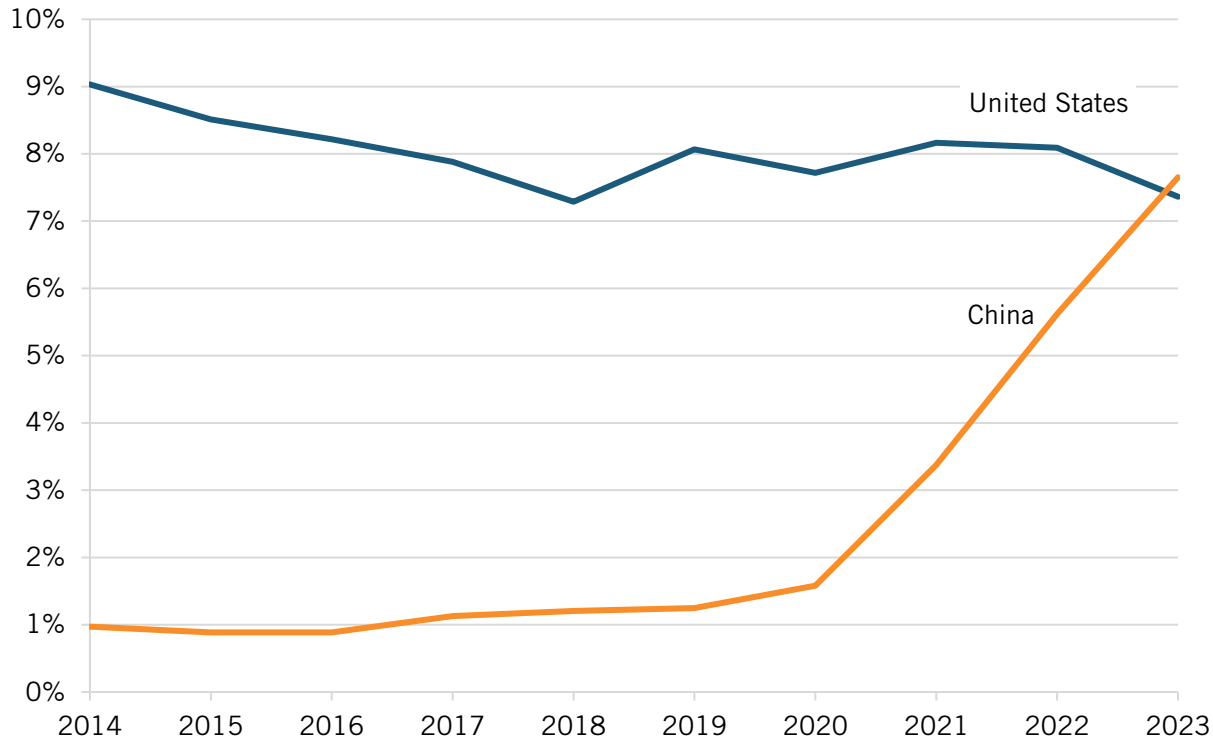
Over the past 10 years (available data), the light truck and utility vehicle manufacturing industry in Michigan has expanded. Indeed, from 2014 to 2023, Michigan's industry's employees grew 101 percent from 17,285 to 34,771 employees while U.S. manufacturing sector's employees only grew 8 percent.[221] As such, Michigan's industry grew 10 times faster than did the overall manufacturing sector and, as such, has quickly expanded its share of the sector.[222] When examined closer, Michigan's industry has followed a relatively stable year-over-year growth rather than experiencing periods of large declines or growth.[223]

Figure 77: Employment in the light truck and utility vehicle industry in Michigan



Corresponding with the time period above, from 2014 to 2023, China's exports to the world grew while Michigan's industry was also expanding. China's exports as a share of the global exports grew significantly from 1 percent to 7.7 percent, indicating that Chinese competition is unlikely to have influenced Michigan's industry trends, as both were growing concurrently.[224] Even when Chinese export shares grew quickly from 2021 to 2023 (from 3.4 percent to 7.7 percent), Michigan's industry continued to grow steadily, further indicating that Chinese competition may not have influenced Michigan's industry.[225] However, in general, Chinese competition could have an impact on the overall U.S. industry. Indeed, while the share of Chinese exports rose, U.S. export share fell from 9 percent to 7.4 percent.[226]

Figure 78: United States' and China's shares of global exports of the light truck and utility vehicle industry



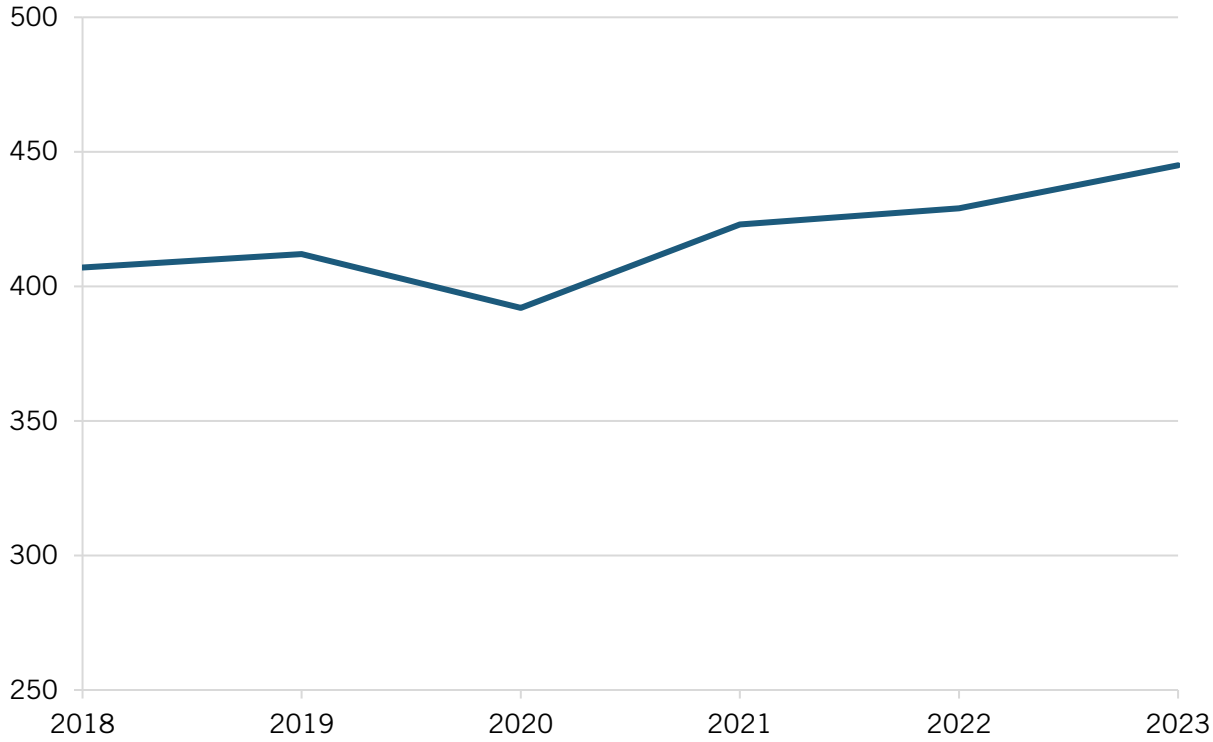
Chinese auto firms do not compete fairly with their global competitors. Indeed, the Chinese government has historically provided subsidies to bolster both its auto parts industry. For instance, from 2001 to 2012, the Chinese government provided the auto parts industry with about $27.5 billion in subsidies and intended to provide an additional $10.9 billion in subsidies from 2012 to 2022 in order to advance the technological development of the industry.[227] As a result, China's auto parts industry could gain market share from its foreign competitors, such as U.S. firms, due to the extra support from the government.

Minnesota: Scale and Balance Manufacturing (NAICS 333997)

A core industry in Minnesota is the scale and balance manufacturing industry, which is defined as "establishments primarily engaged in manufacturing scales and balances, including those used in laboratories."[228] The scale and balance manufacturing companies in Minnesota include Thermo Ramsey LLC and Avery Weigh-Tronix LLC.[229] Among the primary products produced by these companies are digital electronic type personal weighing machines, including baby and household scales (SITC: 74532), scales for continuous weighing of goods on conveyors (SITC: 74531), parts of weighing machinery except digital weight indicators (SITC: 74539), and others.[230]

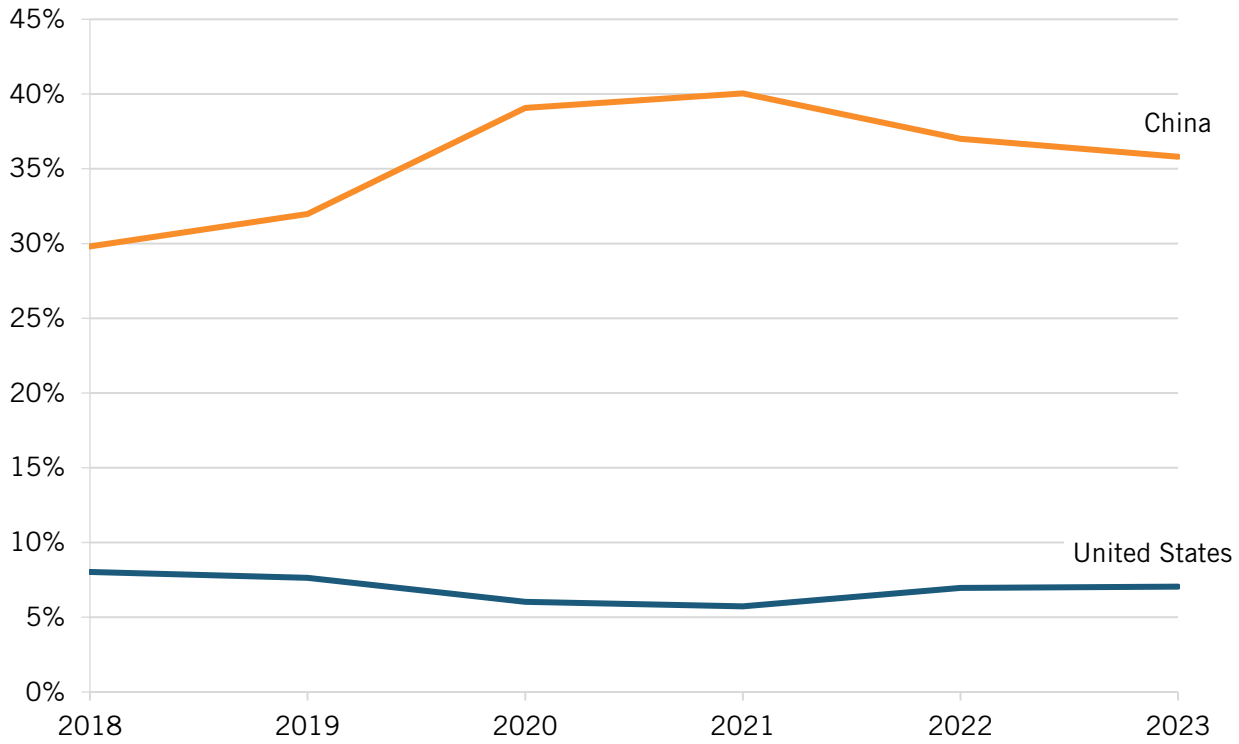
Over the past six years (available data), the scale and balance manufacturing industry in Minnesota has expanded. Indeed, from 2018 to 2023, Minnesota's industry's employees grew 9.3 percent from 407 to 445 employees, while the U.S. manufacturing sector only grew 3.5 percent.[231] As such, Minnesota's industry grew more than twice as fast as the overall manufacturing sector.[232] When examined closer, Minnesota's industry followed a relatively stable year-over-year growth rather than fluctuating between large growth and decline periods.[233]

Figure 79: Employment in scale and balance manufacturing in Minnesota



Corresponding with the time period above, from 2018 to 2023, China's exports to the world grew while Minnesota's scale and balance manufacturing industry was also expanding. Indeed, while Minnesota's industry's employees expanded, China's exports as a share of the global exports grew from 29.8 percent to 35.8 percent, indicating that Chinese competition is unlikely to have influenced Minnesota's industry trends, as both are growing concurrently.[234] However, in general, Chinese competition could have some impact on the overall U.S. scale and balance industry, as Chinese export share growth is correlated with U.S. export share decline. For instance, from 2018 to 2020, the Chinese export share rose from 29.8 percent to 39.1 percent while the U.S. export share declined from 8 percent to 6 percent.[235] Yet, from 2021 to 2023, when China's export share declined from 40 percent to 35.8 percent, the U.S. share rose from 5.7 percent to 7.1 percent.[236] In sum, Chinese competition may not have influenced Minnesota's industry trends, but may have affected U.S. industry overall.

Figure 80: United States' and China's shares of global exports of the scale and balance manufacturing industry

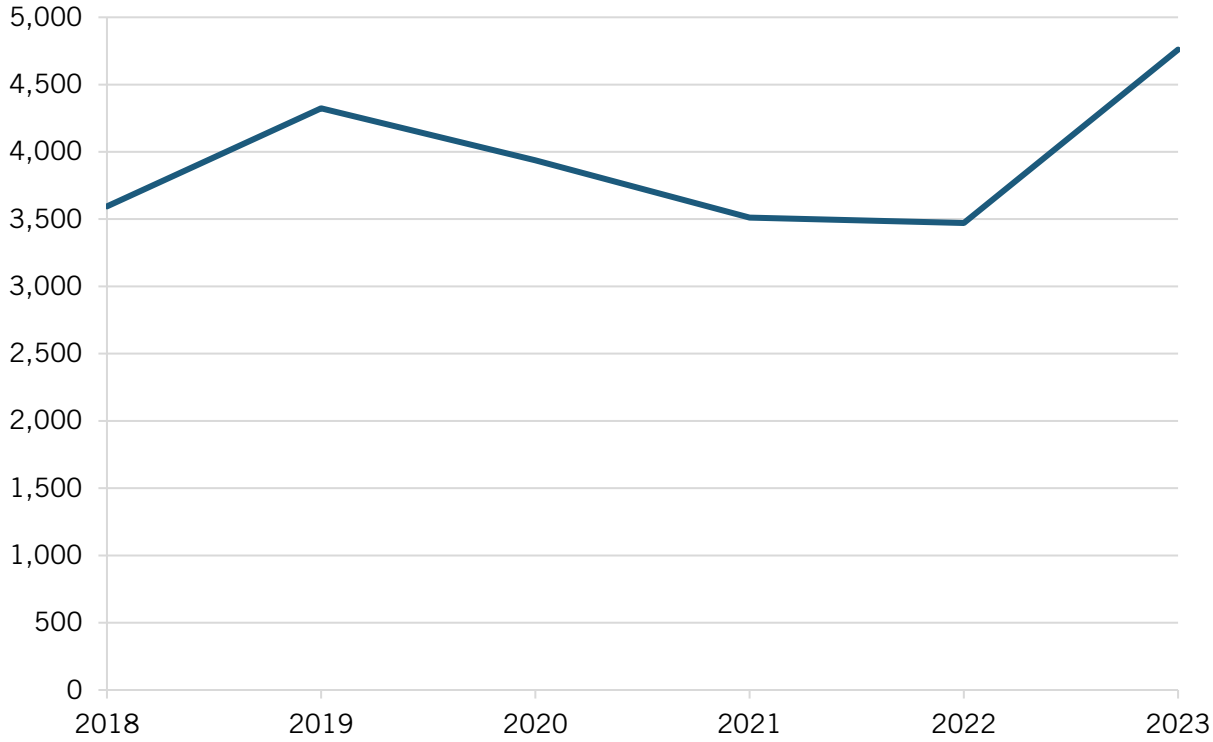


Mississippi: Power, Distribution, and Specialty Transformer Manufacturing (NAICS 335311)

A core industry in Mississippi is power, distribution, and specialty transformer manufacturing. The industry is defined as "establishments primarily engaged in manufacturing power, distribution, and specialty transformers (except electronic components). Industrial-type and consumer-type transformers in this industry vary (e.g., step up or step down) voltage but do not convert alternating to direct or direct to alternating current."[237] The power, distribution, and specialty transformer manufacturing companies in Mississippi include National Distribution Systems, Inc. and Southern Power and Coating Solutions.[238] The primary products produced by these companies include ballasts for discharge lamps or tubes (SITC: 77123), liquid dielectric transformers having a power handling capacity not exceeding 50 kilovolt-ampere (SITC: 77111), transformer parts (SITC: 77129), and others.[239]

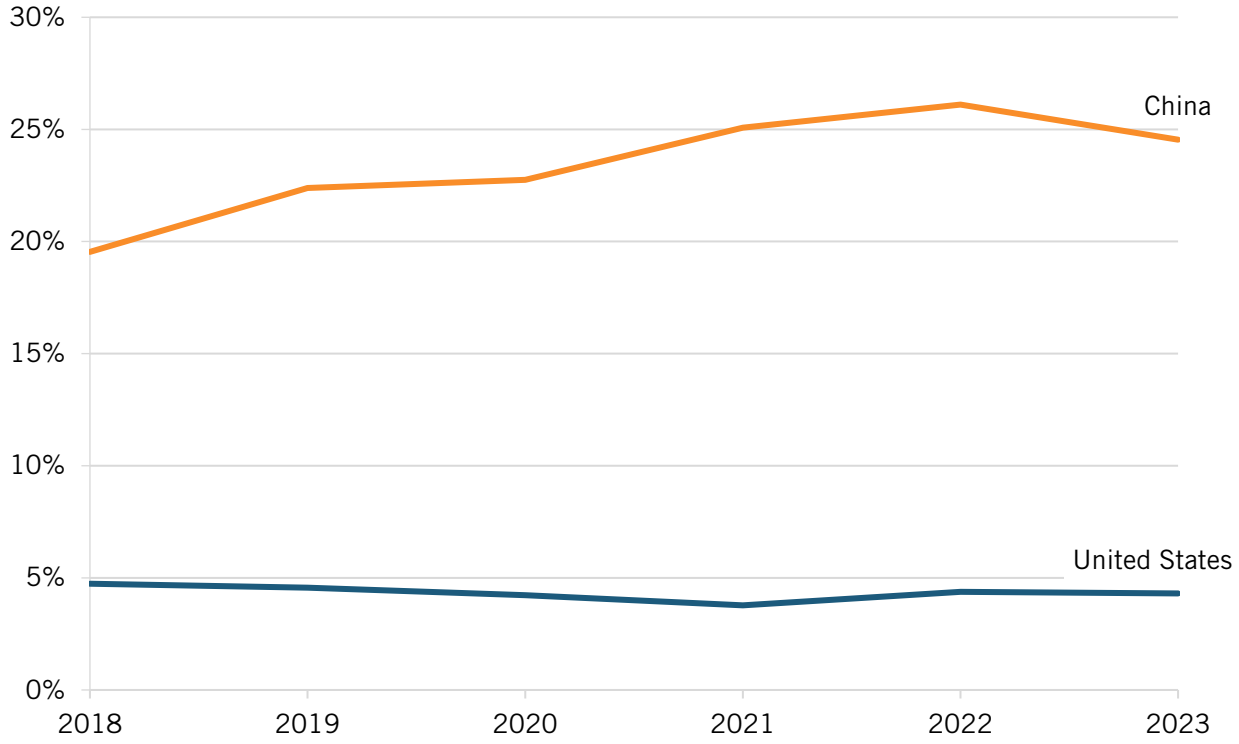
Over the past six years (available data), the power, distribution, and specialty transformer manufacturing industry in Mississippi has expanded. Indeed, from 2018 to 2023, Mississippi's industry's employees grew 32 percent from 3,595 to 4,760 employees while U.S. manufacturing sector's employees grew only 3.5 percent.[240] In other words, Mississippi's industry grew faster than the overall manufacturing sector and, as such, expanded its share of the manufacturing sector. When examined closer, Mississippi's industry's growth comes primarily from a sudden growth from 2018 to 2019 and 2022 to 2023.[241] During the intervening years, Mississippi's industry went through a period of contraction.[242]

Figure 81: Employment in power, distribution, and specialty transformer manufacturing in Mississippi



Corresponding with the time period above, from 2018 to 2023, China's exports to the world grew while Mississippi's power, distribution, and specialty transformer manufacturing was also expanding. Indeed, while Mississippi's employees expanded, China's exports as a share of the global exports grew from 19.5 percent to 24.5 percent, showing that Chinese competition may not have any influence on Mississippi's industry trends.[243] However, on closer inspection, Chinese competition could have some influence on Mississippi's industry if the two outlier growth years are removed. Indeed, when examining Mississippi's industry's declining years (2019–2022), Chinese exports grew from 22.4 percent to a high of 26.1 percent, indicating that Chinese competition could have influenced Mississippi's industry decline.[244] In sum, Chinese competition may have some influence over Mississippi's industry trends, but longer time series data is needed. In general, Chinese competition may have had only minimal impact on the overall U.S. industry as its exports rose while U.S. exports remained around 4.5 percent.[245]

Figure 82: United States' and China's shares of global exports of the power, distribution, and specialty transformer manufacturing industry exports

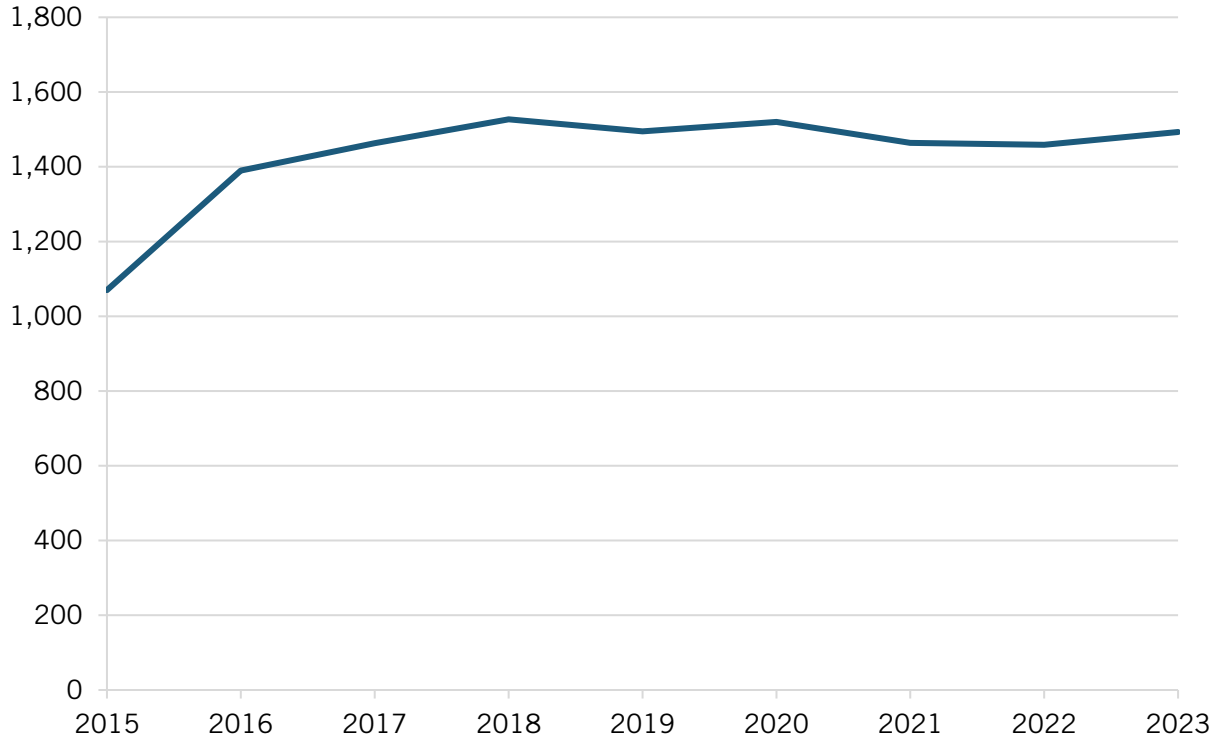


Missouri: Noncurrent Carrying Wiring Device Manufacturing Industry (NAICS 335932)

A core industry in Missouri is the noncurrent carrying wiring device manufacturing industry, which "comprises establishments primarily engaged in manufacturing noncurrent-carrying wiring devices."[246] The noncurrent carrying wiring device manufacturing companies in Missouri include The Gund Company, Inc. and Zpartz Inc.[247] The primary products produced by these companies include electrical junction boxes for a voltage not exceeding 1,000 V (SITC: 77259), electrical conduit tubing lined with insulation (SITC: 77329), insulators, nesoi (SITC: 77324), and others.[248]

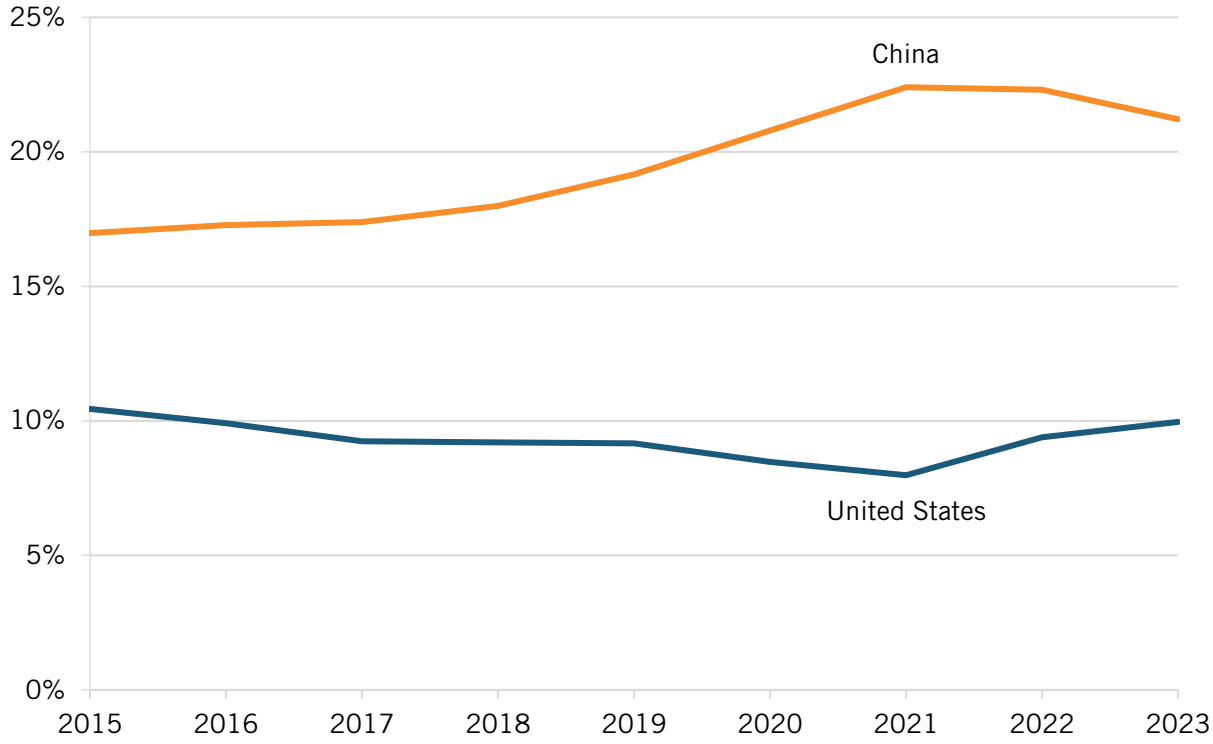
Over the past nine years (available data), the noncurrent carrying wiring device manufacturing industry in Missouri has expanded. Indeed, from 2015 to 2023, Missouri's industry's employees rose 40 percent from 1,070 to 1,493 employees while U.S. manufacturing sector's employees grew 6.3 percent.[249] As such, this indicates that Missouri's industry's growth far exceeded the overall manufacturing sector's growth and has expanded its share of the overall manufacturing sector. When examined closer, a large share of Missouri's industry's growth came from 2015 to 2016 when employees rose from 1,070 to 1,390.[250] Yet, even when this outlier is removed, Missouri's industry still expanded 7.4 percent, exceeding U.S. manufacturing sector's 6.4 percent growth rate.[251]

Figure 83: Employment in noncurrent carrying wiring device manufacturing in Missouri



Corresponding with the time period above, from 2015 to 2023, China's exports to the world grew while Missouri's noncurrent carrying wiring device manufacturing industry was also expanding. Indeed, while Missouri's industry's employees expanded, China's exports as a share of the global exports grew from 17 percent to 21.2 percent.[252] As such, Chinese competition is unlikely to have an impact on Missouri's industry, as both have grown concurrently. Moreover, even when Missouri's industry's outlier year is removed, both Missouri's industry and Chinese exports have risen, further corroborating that Chinese competition may not have any influence over the Missouri's industry trends. However, it should be noted that Chinese competition could have some influence over the noncurrent carrying wiring device manufacturing industry in other states. Indeed, from 2015 to 2021, while Chinese exports rose from 17 percent to 22.4 percent, U.S. exports experienced a decline from 10.4 percent to 8 percent.[253] Yet, from 2021 to 2023, when Chinese exports declined from 22.4 percent to 21.2 percent, U.S. exports rose from 8 percent to 10 percent.[254] In sum, Chinese competition may not have influenced the trends on Missouri's industry, but it could certainly have some impact over other U.S. states' industry.

Figure 84: United States' and China's shares of global exports of the noncurrent carrying wiring device manufacturing industry

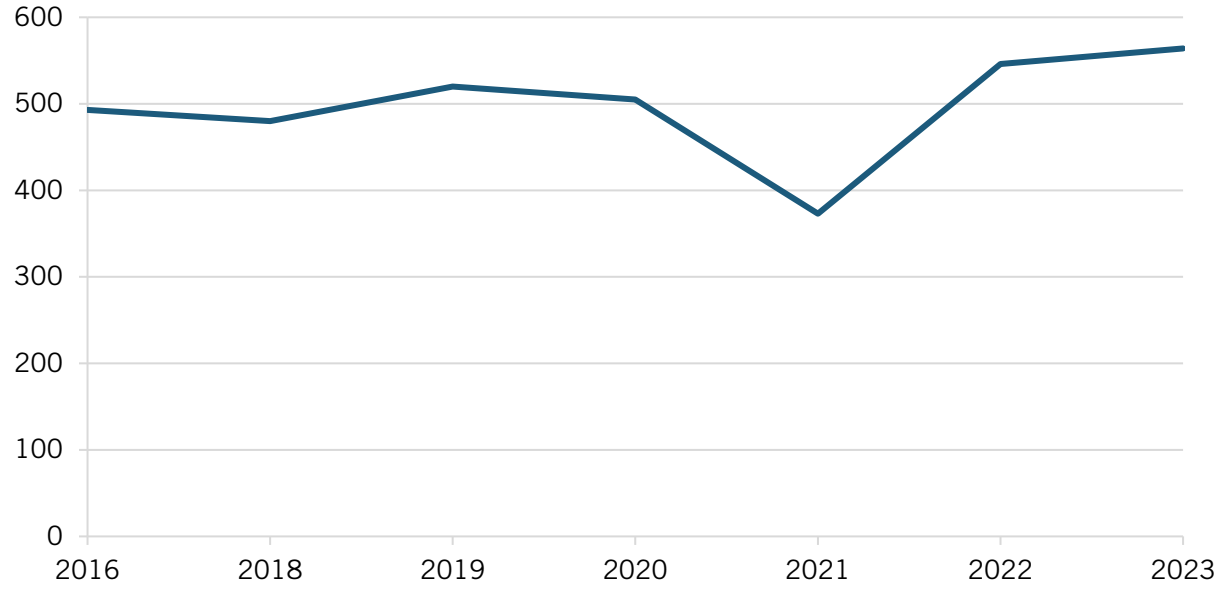


Montana: Nonferrous Metal (except Aluminum) Smelting and Refining Industry (NAICS 331410)

A core industry in Montana is the nonferrous metal (except aluminum) smelting and refining industry. It is defined as "establishments primarily engaged in (1) smelting ores into nonferrous metals and/or (2) the primary refining of nonferrous metals (except aluminum) by electrolytic methods or other processes."[255] The nonferrous metal (except aluminum) smelting and refining companies in Montana include Boulder River Foundary, Inc., N-S Refinery Services, and Rec Advanced Silicon materials LLC.[256] The primary products produced by these companies include hard zinc spelter (SITC: 28810), selenium (SITC: 52222), copper mattes (SITC: 28320), and others.[257]

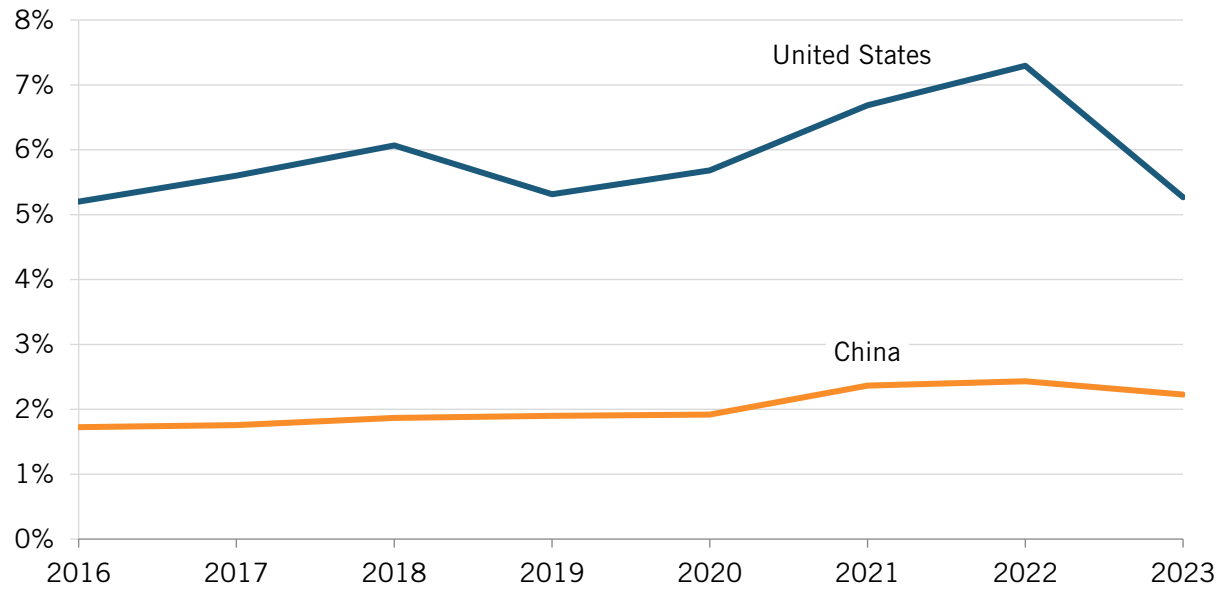
Over the past eight years (available data), the nonferrous metal (except aluminum) smelting and refining industry in Montana has expanded. Indeed, from 2016 to 2023, Montana's industry's employees expanded 14.4 percent from 493 to 564 employees while U.S. manufacturing sector's employees rose 6.4 percent.[258] As such, this indicates that Montana's industry has exceeded the growth of the overall manufacturing sector and now comprises a larger share of it as well. When examined closer, Montana's industry employees have seen a stable increase for most years but also a large decline from 2020 to 2021 before increasing significantly from 2021 to 2022.[259] This was likely due to layoffs during the pandemic. Overall, Montana's industry has trended upward.

Figure 85: Employment in nonferrous metal (except aluminum) smelting and refining in Montana



Corresponding with the time period above, from 2016 to 2023, China's exports to the world grew while Montana's nonferrous metal (except aluminum) smelting and refining industry was also expanding. Indeed, while Montana's employees grew, China's exports as a share of the global exports rose slightly from 1.7 percent to 2.2 percent, indicating that Chinese competition is unlikely to have impacted Montana's industry, as both grew concurrently.[260] Corroborating this, during periods when overall U.S. exports in the industry grew, Chinese exports remained stable or only grew slightly. Indeed, from 2016 to 2022, U.S. exports rose from 5.2 percent to 7.3 percent while Chinese exports remained stable at about 2 percent from 2016 to 2020 and grew slightly from 1.9 percent to 2.2 percent in the subsequent years.[261]

Figure 86: United States' and China's shares of global exports of the nonferrous metal (except aluminum) smelting and refining industry



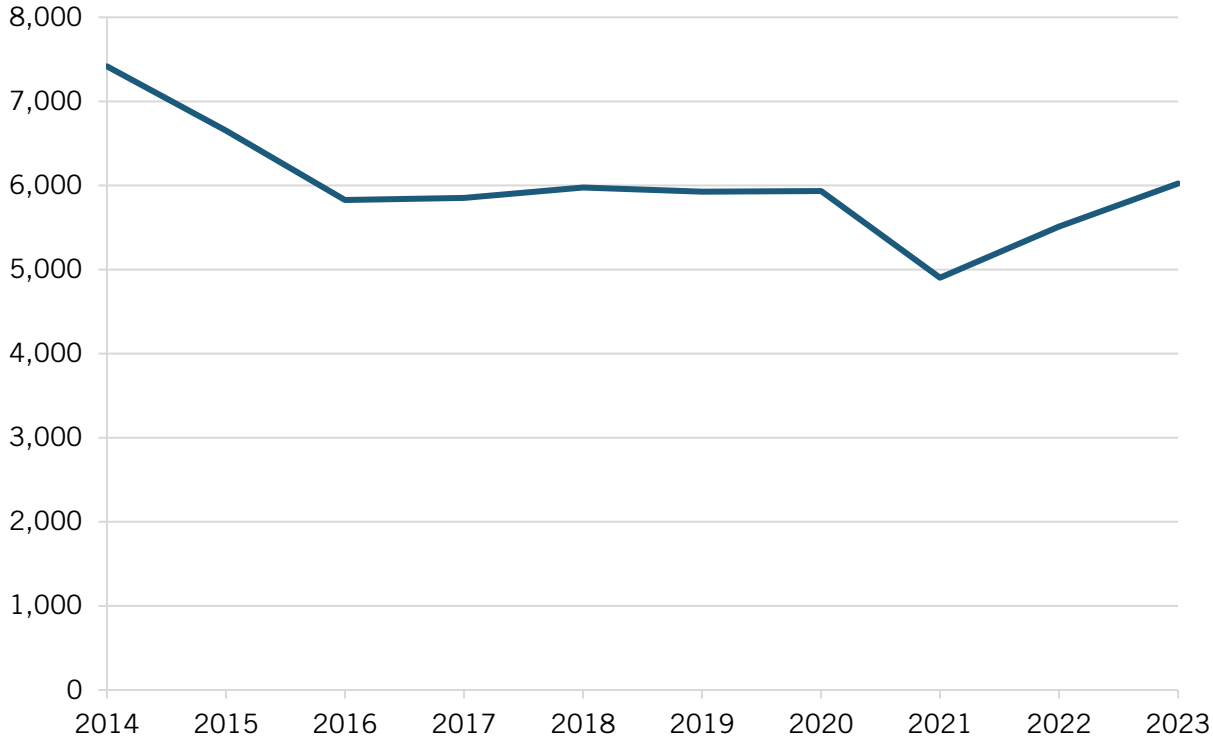
The Chinese nonferrous metal smelting and refining industry competes unfairly with its global competitors. Indeed, the Chinese government has historically provided direct subsidies to bolster some of its nonferrous metal industries. For instance, the Chinese government provided about $9 billion to $10 billion in financial support to its rare earth companies between 2010 and 2019.[262] These subsidies grew at about 22 percent annually and came in the form of direct grants, tax breaks, discounted resources, and preferential treatment.[263] One of the recipients of these subsidies, the China Northern Rare Earth Group High-Tec Co., received $21 million in subsidies in 2020 alone.[264] As a result of these subsidies, China had captured 85 to 90 percent of the global rare earth refining capacity by 2019.[265] In addition to the rare earth industry, the Chinese government also provides support to the general nonferrous metal sector. For example, in 2025, the Chinse government released a plan to support the growth of the nonferrous metal that intends to raise the average value-added growth rate by 5 percent from 2025 to 2026.[266] In sum, the Chinese nonferrous metal (except aluminum) industry is not competing fairly with its global competitors even if it is not taking away shares from U.S. companies.

Nebraska: Farm Machinery and Equipment Industry (NAICS 333111)

A core industry in Nebraska is farm machinery and equipment, which "comprises establishments primarily engaged in manufacturing agricultural and farm machinery and equipment, and other turf and grounds care equipment, including planting, harvesting, and grass mowing equipment (except lawn and garden-type)."[267] The farm machinery and equipment industry companies in Nebraska include Agco, Automatic Equipment Manufacturing, and Agri-Products Inc. The primary products produced by these companies are greens mowers (SITC: 72121), harvesting machinery or threshing machinery, nesoi (SITC: 72123), cotton gins (SITC: 72442), and others.[268]

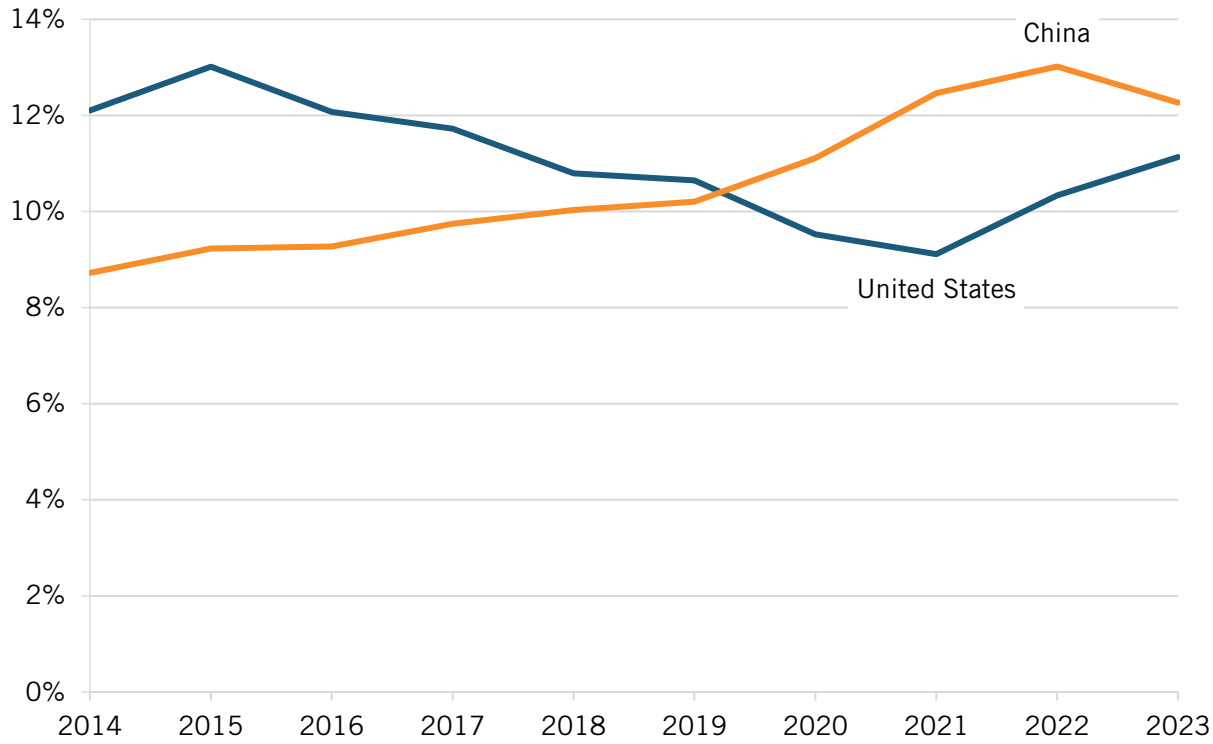
Over the past 10 years (available data), the farm machinery and equipment industry in Nebraska has contracted.[269] Indeed, from 2014 to 2023, Nebraska's industry's employees declined 19 percent while the overall U.S. manufacturing industry's employees grew 8 percent, indicating that the Nebraskan industry is in decline, as it is not keeping up with U.S. manufacturing growth. When it comes to raw values, the state's industry declined during this period from 7,417 to 6,024 employees.[270] At its peak in 2014, the state's industry had 7,417 workers.[271] (See figure 87.)

Figure 87: Employment in farm machinery and equipment manufacturing in Nebraska



Corresponding with the time period above, from 2014 to 2023, China's exports in this industry rose while Nebraska's industry was declining. Indeed, while Nebraska's industry's employees in this industry declined, China's exports as a share of the global exports rose from 8.7 percent to 12.3 percent, the highest growth all nations.[272] In other words, this is an indication that China's production in this industry is growing and could be impacting the farm machinery and equipment companies in Nebraska. Moreover, U.S. exports in this industry had the second largest decline at 2.4 percent from 13.2 percent to 10.8 percent, further indicating that the Nebraskan and U.S. farm machinery industry could be in decline due to China's rise.[273] (See figure 88.)

Figure 88: United States' and China's share of global exports of farm machinery and equipment



Nevada: Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing (NAICS 334511)

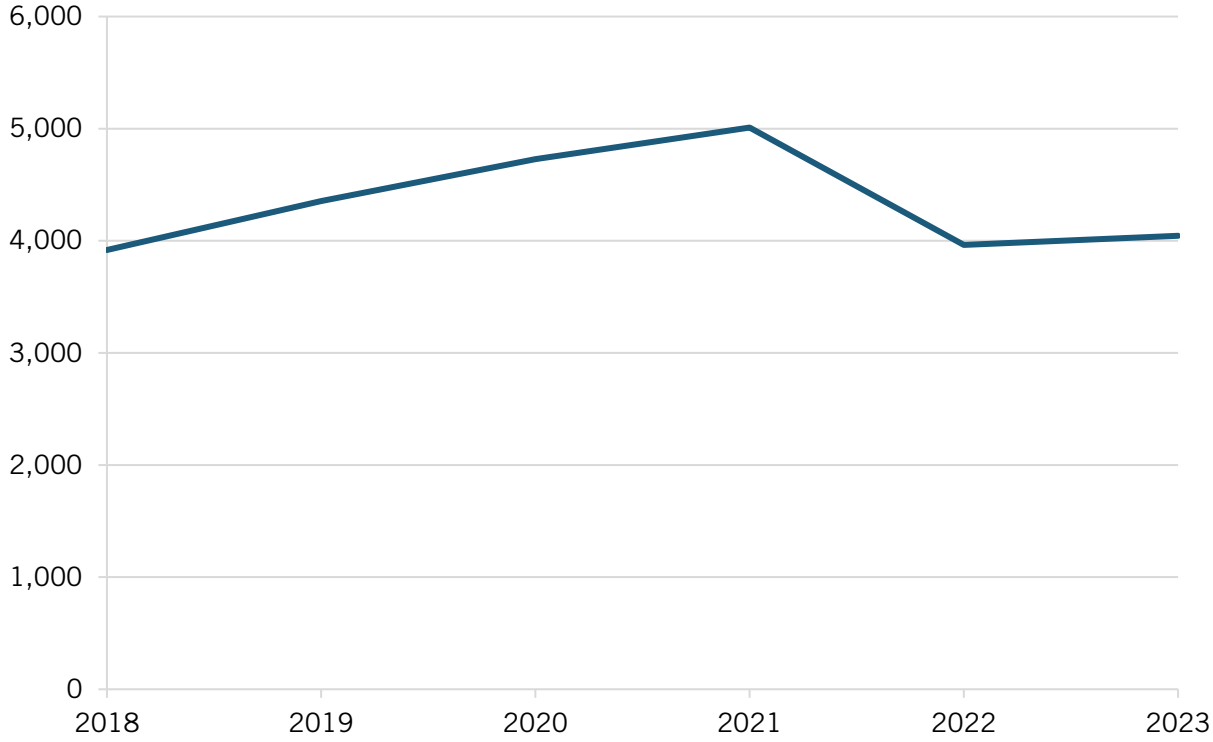
A core industry in Nevada is the search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing industry. This industry "comprises establishments primarily engaged in manufacturing search, detection, navigation, guidance, aeronautical, and nautical systems and instruments."[274] Industry products include aircraft instruments (except engine), flight recorders, and navigational instruments and systems.[275] The companies falling into this industry in Nevada include Sierra Pacific Innovations Corp and Valkyrie Systems Aerospace Inc.[276] The primary products produced by these companies include radar detectors of a kind used in motor vehicles (SITC: 77834), optical direction finding compasses for use in civil aircraft (SITC: 87411), instrument and appliances for use in civil aircraft (SITC: 87411).[277]

Over the past six years (available data), the navigation, guidance, aeronautical system, and instrument manufacturing industry in Nevada has contracted slightly. Indeed, from 2018 to 2023, Nevada's industry's employees grew 3.2 percent while the overall U.S. manufacturing industry's employees grew 3.5 percent, indicating that the Nevada industry is in decline as it is not keeping up with U.S. manufacturing growth. When examined closer, from 2018 to 2021, Nevada's industry did experience an expansion as its employees grew 28 percent, while U.S. manufacturing industry's employees declined 1.7 percent. However, from 2021 to 2023, the industry declined 19 percent despite U.S. manufacturing growing 5.3 percent.

When it comes to raw values, Nevada's industry had 3,918 employees in 2018 before peaking at 5,010 in 2021.[278] However, by 2023, that number had declined back to 4,045 employees, just

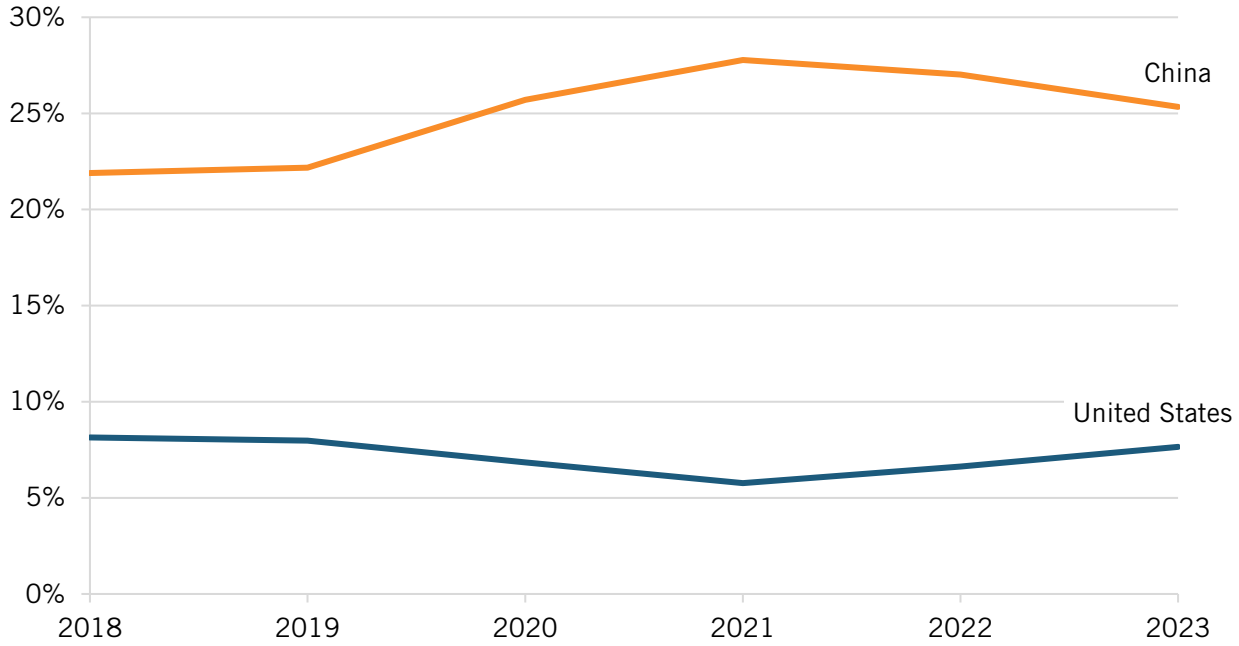
slightly higher than its 2018 numbers.[279] As such, this decline back to 4,045 employees means that the Nevada industry could not keep up with U.S. manufacturing growth.

Figure 89: Employment in search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing in Nevada



Corresponding with the time period above, from 2018 to 2023, China's exports to the world followed similar trends as Nevada's search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing industry. Indeed, while the Nevada industry's employees grew from 2018 to 2021, China's exports as a share of the global exports also rose from 22.5 percent to 28 percent.[280] From 2021 to 2023, while Nevada industry's employees contracted, China's exports also declined from 28 percent back to 26 percent.[281] In other words, China's industry likely could not have an influence on Nevada's search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing industry's trends. Corroborating this, U.S. share of global exports in this industry remained relatively stable despite China's export growth. More likely, during this period, the industry expanded and then contracted as both China's exports and Nevada's employees from the industry followed the same trend.

Figure 90: United States' and China's shares of global exports of search, detection, navigation, guidance, aeronautical, and nautical systems and instruments

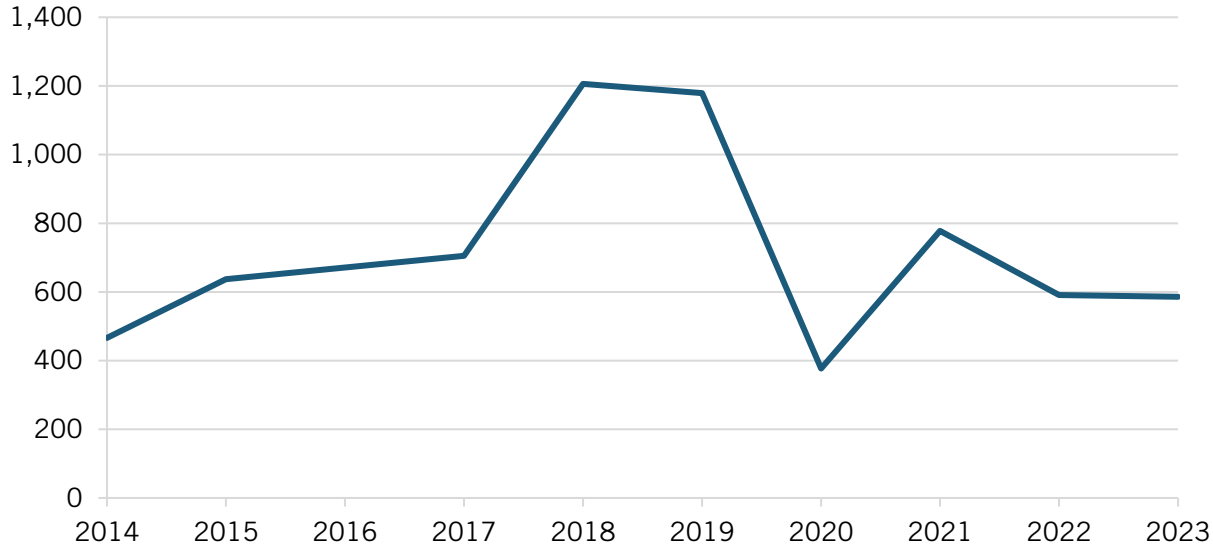


New Hampshire: Computer Terminal and Other Computer Peripheral Equipment Manufacturing (NAICS 334118)

A core industry in New Hampshire is the computer terminal and other computer peripheral equipment manufacturing industry, defined as "establishments primarily engaged in manufacturing computer terminals and other computer peripheral equipment (except storage devices)."[282] More specifically, the industry involves automatic teller machine (ATM) manufacturing, joystick devices manufacturing, and keyboard manufacturing.[283] The computer terminal and other computer peripheral equipment manufacturing industry companies in New Hampshire include Global American Sales, Inc., Microdaq.co Ltd., and Seamark International LLC.[284] Some of primary products produced by these companies include keyboard units (SITC: 75260), card key and magnetic media entry devices (SITC: 75260), and monitors, of a kind solely or principally used in an automatic data processing systems of heading 8471, nesoi (SITC: 76140).[285]

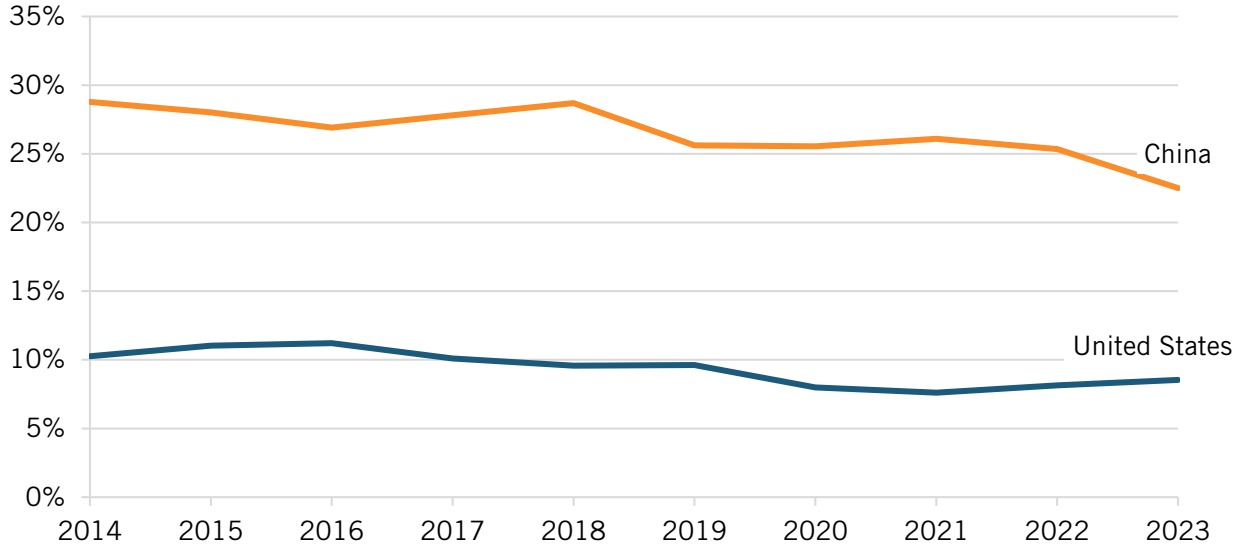
Over the past 10 years (available data), the computer terminal and other computer peripheral equipment manufacturing industry in New Hampshire has expanded. Indeed, from 2014 to 2023, New Hampshire's industry's employees grew 26 percent from 466 to 600. Meanwhile, the U.S. manufacturing sector's employees grew by 8 percent, indicating that New Hampshire's industry is becoming a larger portion of the manufacturing sector. Despite this overall expansion, New Hampshire's industry saw an even larger expansion from 2014 to 2018 when its employees grew 159 percent to 1,206 employees while the U.S. manufacturing industry's grew 4.3 percent.[286] Finally, from 2018 to 2023, New Hampshire's industry contracted 51 percent while the U.S. manufacturing industry grew 3.5 percent. This is partly due to a single year contraction from 2019 to 2020 when employees dropped from 1,179 to 377. Regardless of the shifts, New Hampshire's industry expanded from 2014 to 2023.

Figure 91: Employment in computer terminal and other computer peripheral equipment manufacturing in New Hampshire



Corresponding with the time period above, from 2014 to 2023, China's exports to the world has not followed a trend that indicates it had any heavy influence on New Hampshire's computer terminal and other computer peripheral equipment manufacturing industry. Indeed, from 2014 to 2018, while New Hampshire's industry was rising, China's exports as a share of the global total remained relatively stable at about 27 to 29 percent.[287] And during New Hampshire's industry's decline from 2018 to 2023, China's exports as a share of the world total also declined from 29 to 23 percent, indicating that the industry simply may have been facing a decline rather than Chinese firms gaining U.S. firms' markets.[288]

Figure 92: United States' and China's shares of global exports of computer terminals and other computer peripheral equipment



Besides a lagging industry, any losses in the New Hampshire industry were likely captured by other Asian nations. The exports data shows that Other Asia had the highest increase in exports

as a share of the global total at 9.3 percent during New Hampshire's industry's decline from 2018 to 2023.[289]

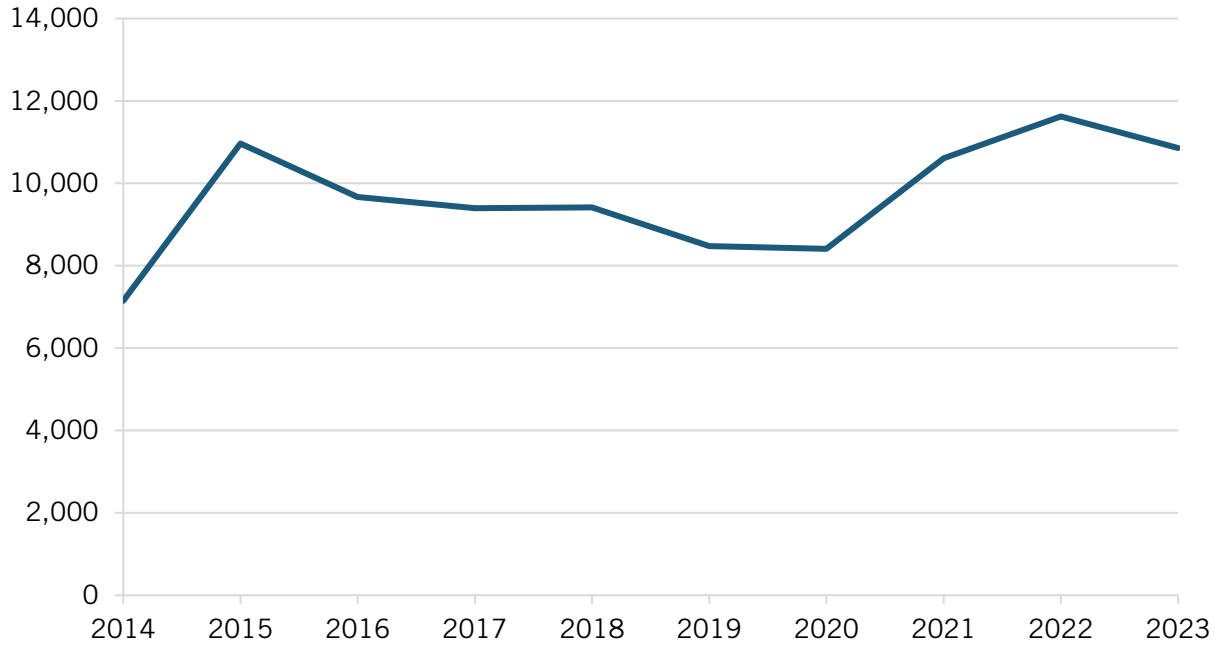
In sum, competition from Chinese companies was not a primary driver in New Hampshire's computer terminal and other computer peripheral equipment manufacturing industry's rise from 2014 to 2018 and its subsequent decline from 2018 to 2023.

New Jersey: Pharmaceutical Preparation Manufacturing (NAICS 325412)

A core industry in New Jersey is the pharmaceutical preparation manufacturing industry. The pharmaceutical preparation manufacturing industry is defined as "establishments primarily engaged in manufacturing in-vivo diagnostic substances and pharmaceutical preparations (except biological) intended for internal and external consumption in dose forms, such as ampoules, tablets, capsules, vials, ointments, powders, solutions, and suspensions."[290] Such companies in New Jersey include Aace Pharmaceuticals Inc., Aarkish Pharmaceuticals NJ Inc, and Apogee Pharma Inc.[291] The primary products produced by these companies include tilitdine (inn) and its salts (SITC: 51465), antihistamines (SITC: 51577), and epinephrine (SITC: 54155), and others.[292]

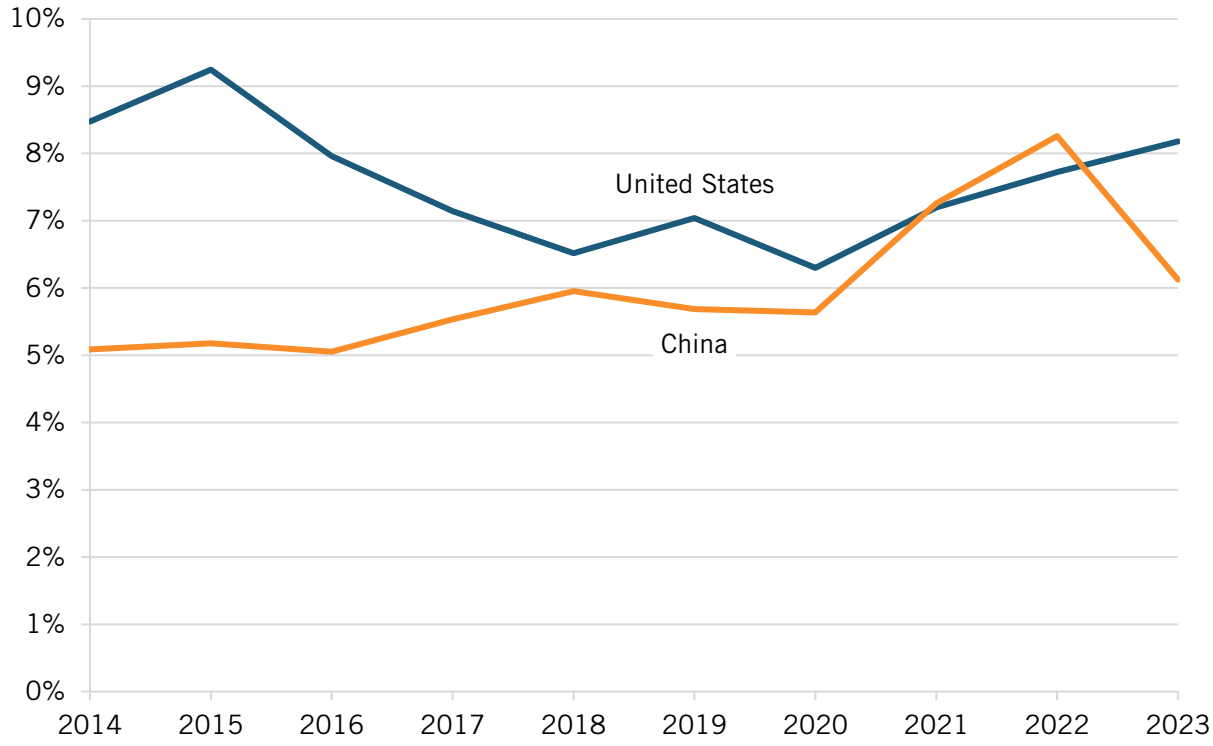
Over the past 10 years (available data), the pharmaceutical preparation manufacturing industry in New Jersey has expanded. Indeed, from 2014 to 2023, New Jersey's industry's employees grew 52 percent from 7,147 to 10,858 while the overall U.S. manufacturing industry's employees grew 8 percent, indicating that New Jersey's industry expanded its share of manufacturing employees. Despite the general upward trend, New Jersey's industry employees experienced a 23 percent decline while the overall U.S. manufacturing sector's employees grew 3.4 percent from 2015 to 2020. In the subsequent years, New Jersey's industry expanded again with employees growing 29 percent compared with the U.S. manufacturing sector's 2.8 percent. Regardless of the shifts, New Jersey's industry expanded from 2014 to 2023.

Figure 93: Employment in pharmaceutical preparation manufacturing in New Jersey



Corresponding with the time period above, from 2014 to 2023, China's exports to the world generally rose while New Jersey's industry was also rising. Indeed, while New Jersey' industry's employees grew, China's exports as a share of the global exports also rose from 5.1 percent to 6.1 percent.[293] From 2015 to 2020 when New Jersey's industry was declining, China's exports as a share of the global total remained relatively stable at a range of 5.2 percent to 5.6 percent, indicating that China is unlikely to have played a role in New Jersey's industry's trends.[294] Moreover, while New Jersey's industry expanded from 2020 to 2023, China's exports shares also grew, further indicating that Chinese competition is unlikely to have influenced New Jersey's industry.

Figure 94: United States' and China's share of global exports of the pharmaceutical preparation manufacturing industry



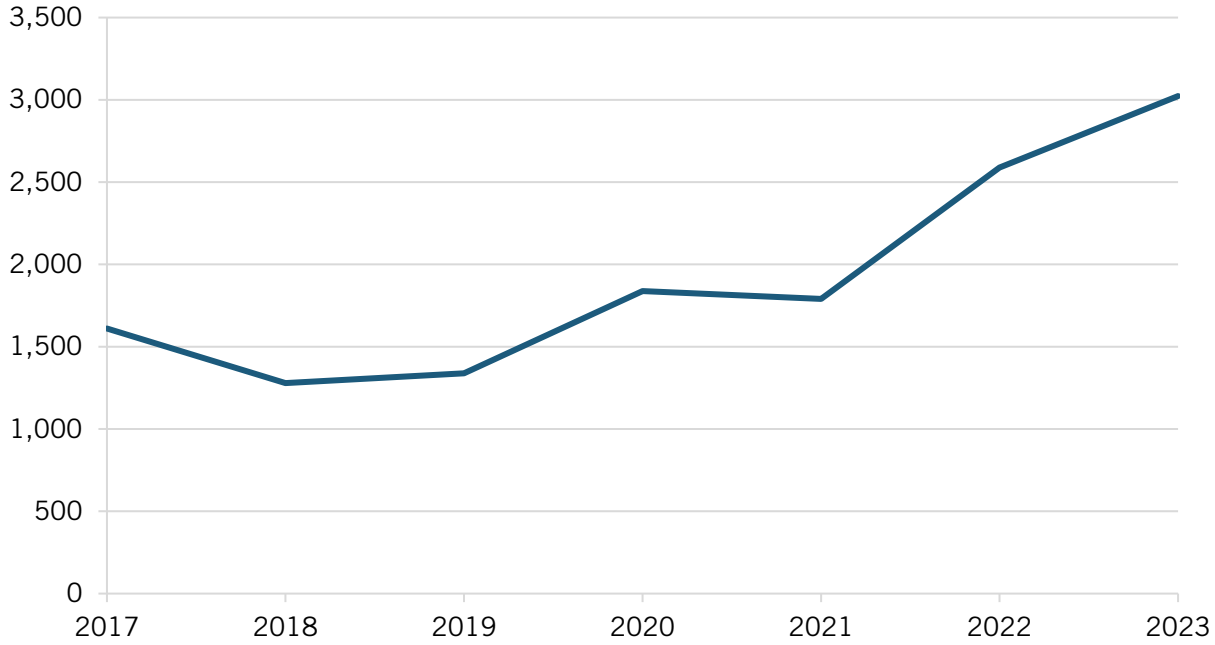
New Mexico: Semiconductor and Related Device Manufacturing (NAICS 334413)

New Mexico has a long-standing presence in semiconductor manufacturing, anchored by major legacy fabrication facilities and federal research infrastructure. While smaller than leading semiconductor hubs such as Arizona or Texas, the industry remains a critical component of New Mexico's advanced manufacturing base. However, like other U.S. semiconductor clusters, New Mexico faces growing competitive pressure from China's state-backed expansion of chip production capacity.

Semiconductor manufacturing in New Mexico is highly concentrated in the Albuquerque area, where Intel operates one of its largest and most advanced U.S. manufacturing campuses. Its Rio Rancho facility alone employs thousands of workers and represents one of the largest private-sector employers in the state.[295] The facility has received billions in cumulative investment and continues to play a role in advanced packaging and fabrication processes. In addition to Intel, New Mexico benefits from the presence of Sandia National Laboratories and Los Alamos National

Laboratory, both of which contribute to semiconductor R&D, materials science, and microelectronics innovation.[296] Overall, New Mexico has seen a rapid increase in the number of semiconductor manufacturing employees in the state. Between 2017 and 2023, the number of employees increased by 88 percent, from about 1,600 to over 3,000.[297] (See figure 95.)

Figure 95: Employment in semiconductor manufacturing in New Mexico



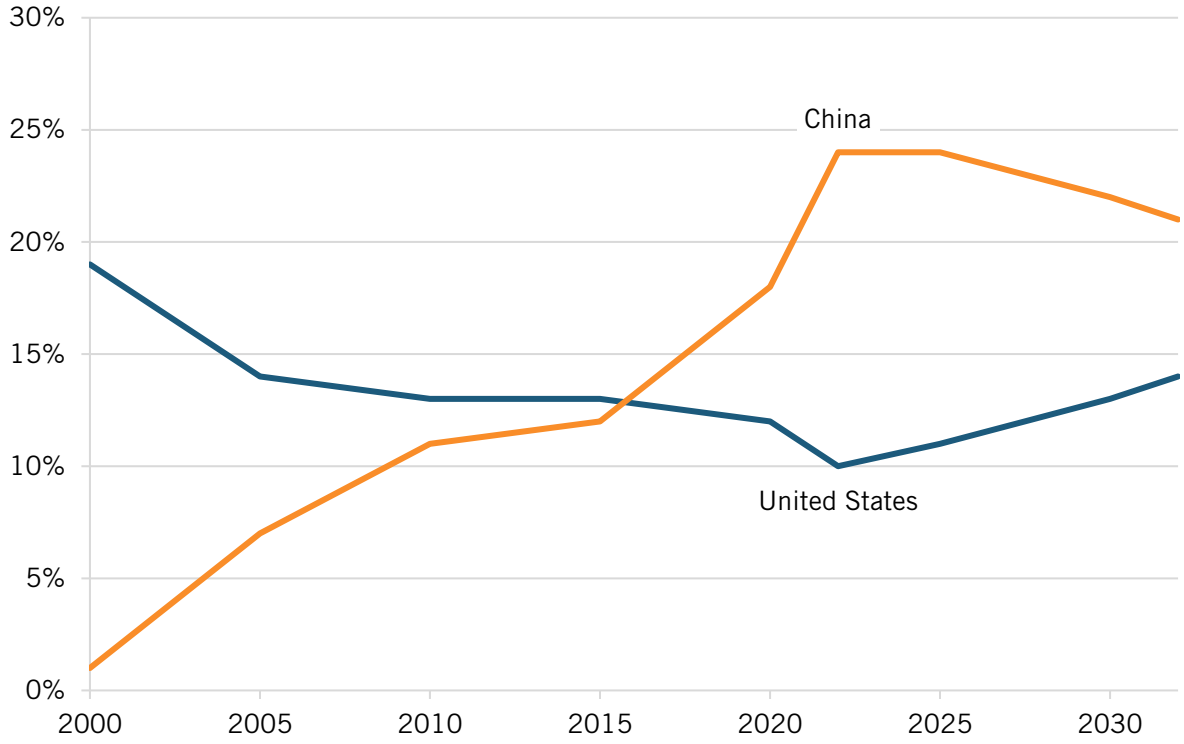
In 2022, the federal government invested $52 billion in the U.S. semiconductor industry through the CHIPS and Science Act, which aimed to revitalize domestic semiconductor manufacturing. Though much of the investment is directed toward larger semiconductor hubs such as in Arizona, New Mexico still stands to benefit indirectly through investment in workforce development and R&D funding for the national laboratories.[298] Overall, New Mexico employs nearly 4,000 workers in the semiconductor industry, and semiconductors are the state's second-most valuable exports, valued at about $1.6 billion in 2022.[299]

While investment in domestic semiconductor production has the potential to increase U.S. manufacturing capacity and American competitiveness, the Chinese government has invested even more, thereby threatening the global market share the United States commands. Through substantial subsidies and overproduction, Chinese firms are suppressing semiconductor prices, gaining global market share, and harming the future success of Arizona fabs. Overall, the Chinese government plans to invest over $150 billion in the industry by 2030.[300]

China's push for dominance in semiconductors is most evident in legacy semiconductor manufacturing, which has benefited from significant industrial subsidies and grown faster than the rest of the global market has. This is also the type of semiconductor that Intel specializes in. Chinese legacy chip production capacity grew more than four times faster than global demand did between 2015 and 2023.[301] Continually increasing production capacity without corresponding growth in demand can result in overcapacity, which reduces prices and revenue for U.S. chip manufacturers. In terms of overall semiconductor production capacity, China's stock has been rising at the expense of the United States, disproportionately affecting areas

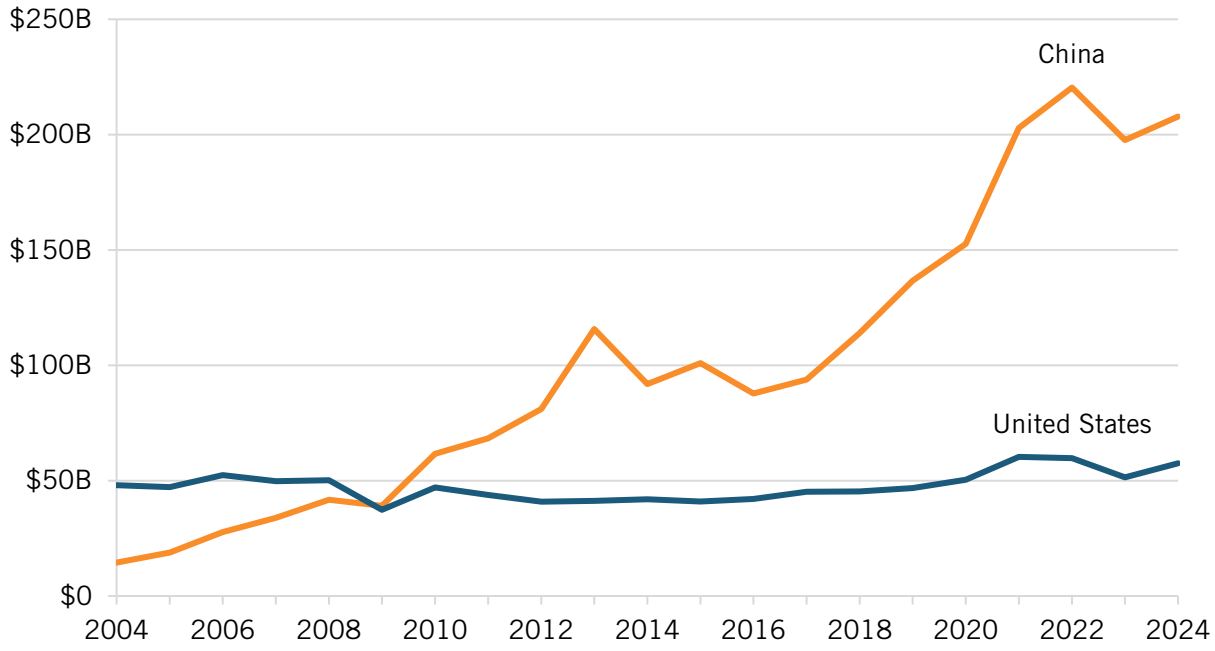
highly concentrated in semiconductors, such as New Mexico. Between 2000 and 2025, China's share of global semiconductor manufacturing capacity increased by 20 percentage points, while the United States saw its share decline by 8 percentage points.[302] (See figure 96.)

Figure 96: Share of global semiconductor production capacity (projected from 2025)



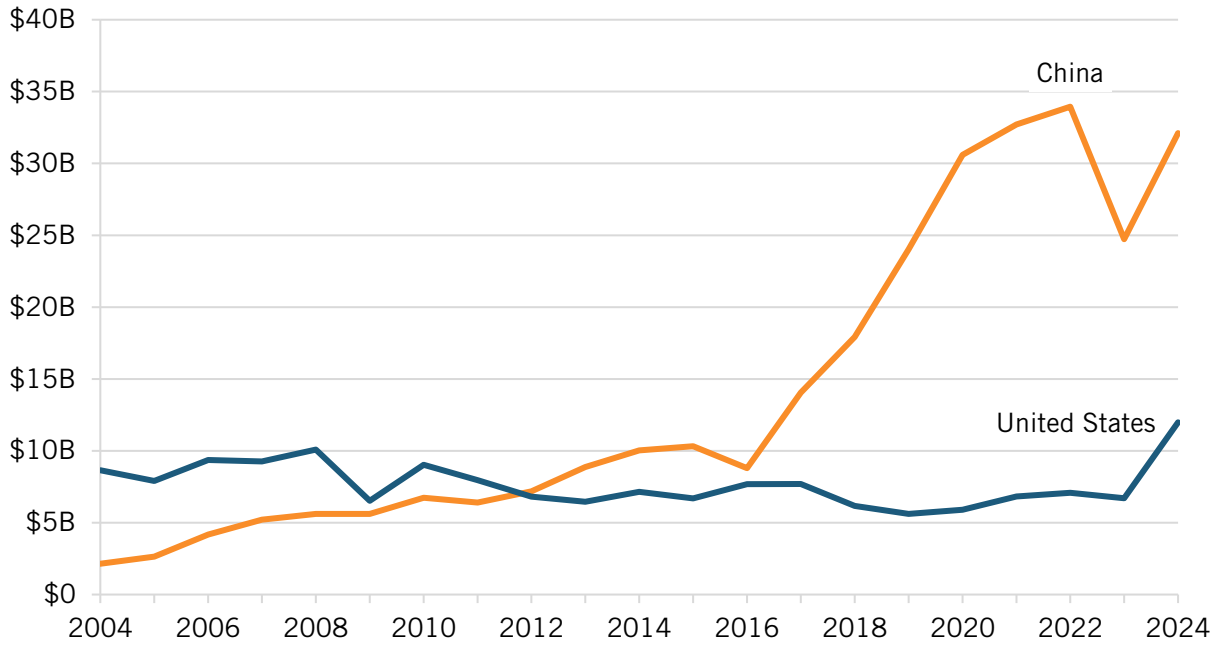
For much of the early 2000s, the United States exported far more semiconductors (HS 8541 and 8542) than China did. However, since 2009, China has overtaken the United States, with exports growing rapidly while U.S. exports have remained stagnant. From 2014 to 2024, Chinese semiconductor exports grew from $91 billion to $208 billion, an increase of 126 percent. Conversely, U.S. exports increased from $41 billion to just $57 billion, a 37 percent increase.[303] (See figure 97.) Indeed, investment spurred by the CHIPS and Science Act will increase U.S. manufacturing capacity and exports after those new fabs become operational. The U.S. Department of Commerce has warned that China's rapid expansion of semiconductor production poses a risk to newly built fabrication facilities in the United States and allied countries, as increased Chinese capacity could reduce utilization rates at these fabs below levels needed to sustain profitability.[304]

Figure 97: Semiconductor exports



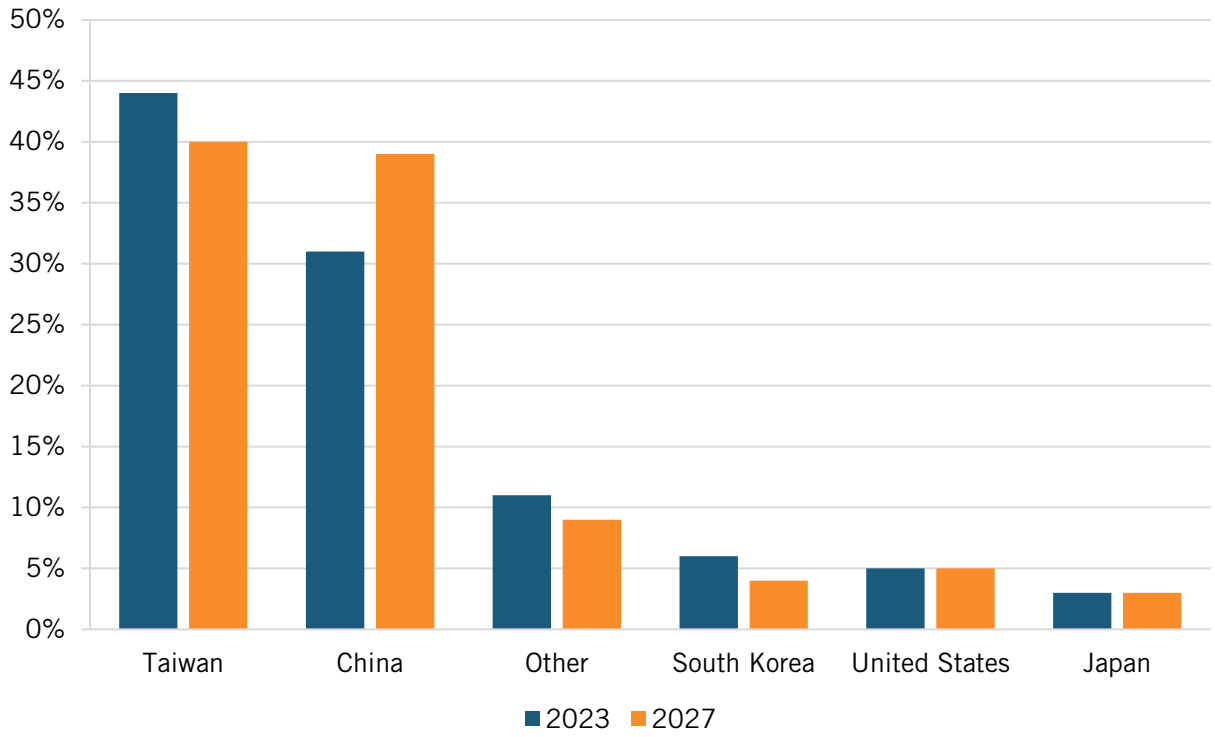
The high subsidies in the Chinese semiconductor industry allow Chinese firms to sell semiconductors at a lower cost than U.S. competitors can, at times selling chips below production cost. On average, Chinese manufacturers sell chips between 30 and 50 percent cheaper than U.S. suppliers do, increasing the attractiveness of their products in third-party markets.[305] Consequentially, U.S. exports to Malaysia, Singapore, and Vietnam have grown at a fraction of the pace of China's, with Chinese exports to these countries close to double that of the United States in 2024.[306] (See figure 98.)

Figure 98: Semiconductor exports to Malaysia, Singapore, and Vietnam



Under its Made in China 2025 strategy, the Chinese government set explicit targets of achieving 70 percent self-sufficiency in semiconductors by 2025 and establishing global leadership in semiconductor manufacturing by 2030.[307] While these benchmarks have not yet been fully met, Chinese firms are expected to continue expanding rapidly as state support and investment remain closely aligned with these long-term objectives. China's share of legacy chip manufacturing is expected to grow from 31 percent in 2023 to 39 percent in 2027, making it second globally behind Taiwan, whose share is projected to decline from 44 percent to 40 percent.[308] The United States is projected to hold 5 percent of the global market share. (See figure 99.) Moreover, between 2022 and 2026, China is expected to build more new fabs and complete more major expansions than any other region, bringing 26 facilities online, compared with only 16 in the Americas.[309]

Figure 99: Global market share in legacy semiconductor manufacturing, 2023 vs. 2027 projection[310]



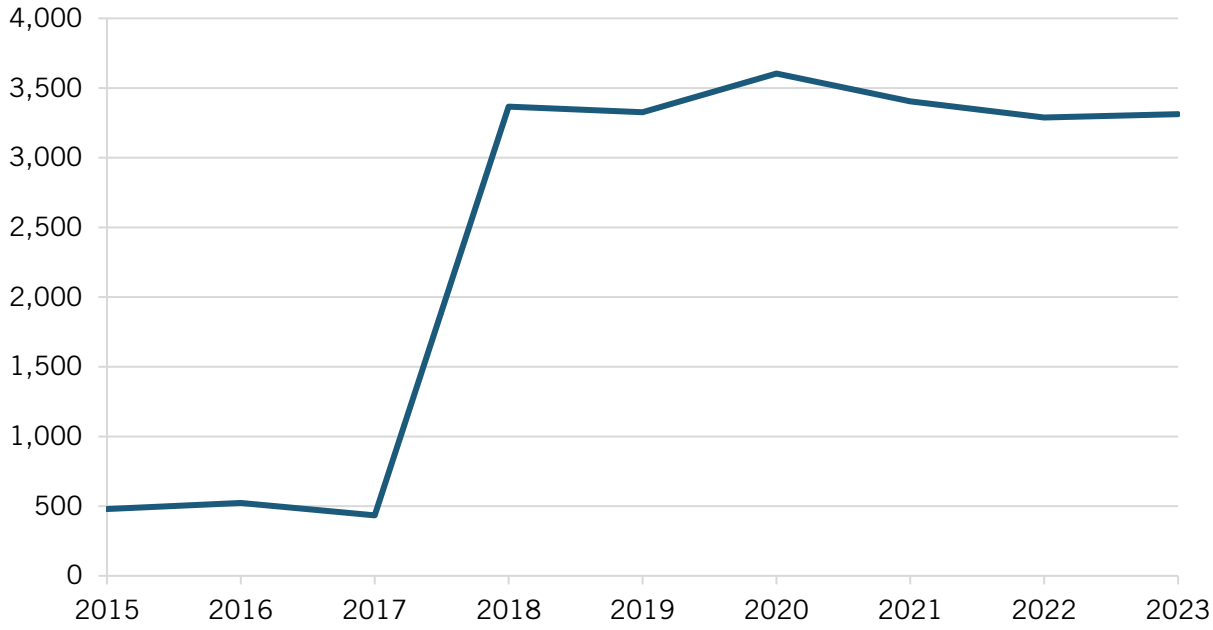
China's push for dominance in the global semiconductor market poses an imminent threat to U.S. manufacturers, and China's growth is not expected to slow.[311] As Chinese producers replace U.S. suppliers domestically and expand aggressively into competitive export markets, U.S. semiconductor firms will face sustained erosion in market share, revenue, and profitability. Chinese authorities will continue to aggressively subsidize the semiconductor industry to reach China's $150 billion target, thereby contributing to overcapacity and artificially low prices for Chinese firms. For New Mexico, where the semiconductor industry has seen rapid growth over the past several years, this loss of global demand and reduced revenue would translate into slower industry growth and weaker job creation, a threat to the future of the state's economy.

New York: Electronic Computer Manufacturing (NAICS 334111)

A core industry in New York is the electronic computer manufacturing industry, defined as "establishments primarily engaged in manufacturing and/or assembling electronic computers, such as mainframes, personal computers, workstations, laptops, and computer servers … The manufacture of computers includes the assembly or integration of processors, coprocessors, memory, storage, and input/output devices into a user-programmable final product."[312] The electronic computer manufacturing industry companies in New York include Addex, Inc., International Electronic Machines Corporation, and Main Stream Computing, Inc.[313] The primary products produced by these companies include digital adaptive machines comprising (in the same housing) at least a CPU and an input and output unit (whether or not combined) without a cathode ray tube (CRT), nesoi (SITC: 75230), process units with a CRT, whether or not containing in the same housing one or two of the following: storage units, input units, or output units (SITC: 75230), and portable digital automatic data processing machines, weight not more than 10 kg, consisting of at least a central processing unit, keyboard, and display (SITC: 75220), and others.[314]

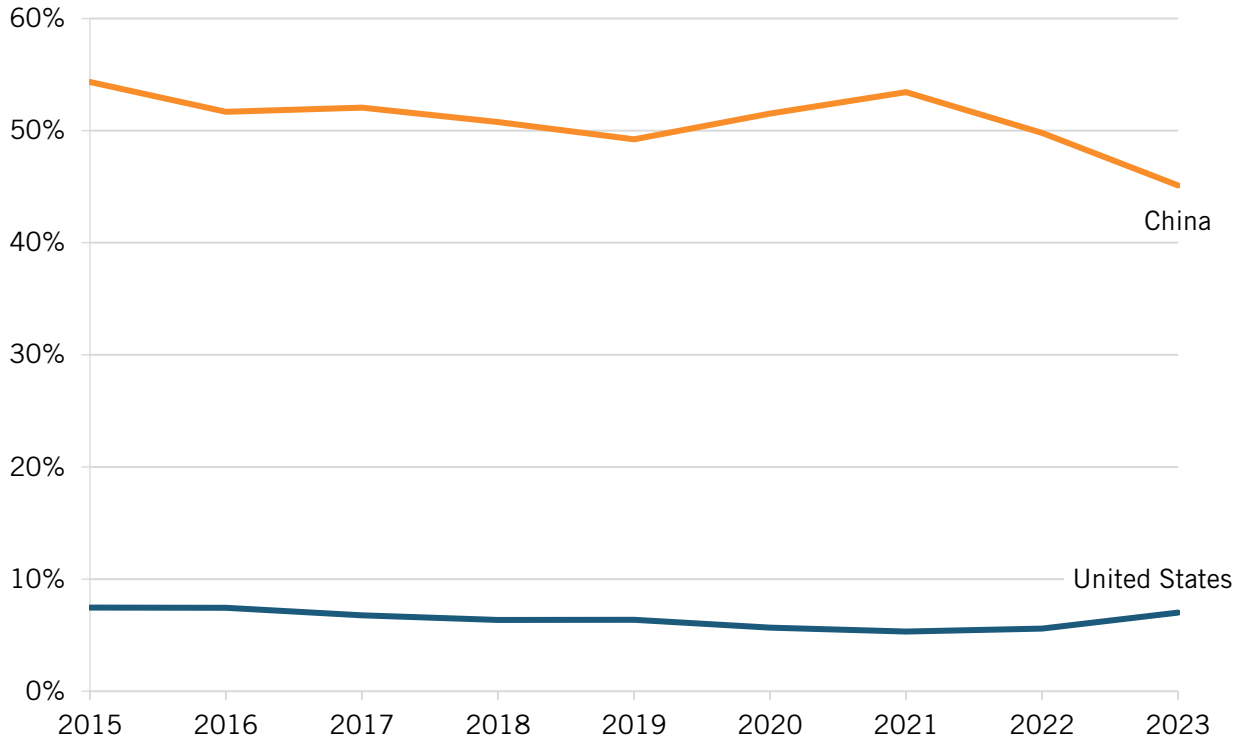
Over the past nine years (available data), the electronic computer manufacturing industry in New York has expanded. Indeed, from 2015 to 2023, New York's industry's employees expanded 592 percent from 479 to 3,313 employees while the overall U.S. manufacturing sector only grew 6.3 percent. As such, this indicates that New York's industry grew faster than the U.S. manufacturing industry did and encompassed a larger share of the manufacturing industry's employees in 2023. New York's industry experienced its largest growth from 2017 to 2018, when its employees jumped from 434 to 3,313. Although data is limited, this large increase could have been due to a new electronic computer manufacturing establishment opening up in New York or the reclassification of an existing manufacturing plant to the electronic computer manufacturing industry.

Figure 100: Employment in electronic computer manufacturing in New York



Corresponding with that time period, from 2015 to 2023, China's exports to the world declined slightly while New York's electronic computer manufacturing industry was rising. Indeed, while New York's industry's employees grew, China's exports as a share of the global exports declined from 54 percent to 45 percent.[315] In other words, New York's industry could be competitive with Chinese firms in this industry, as New York's growth is correlated with Chinese firms' export decline.

Figure 101: United States' and China's electronic computer manufacturing exports to the world

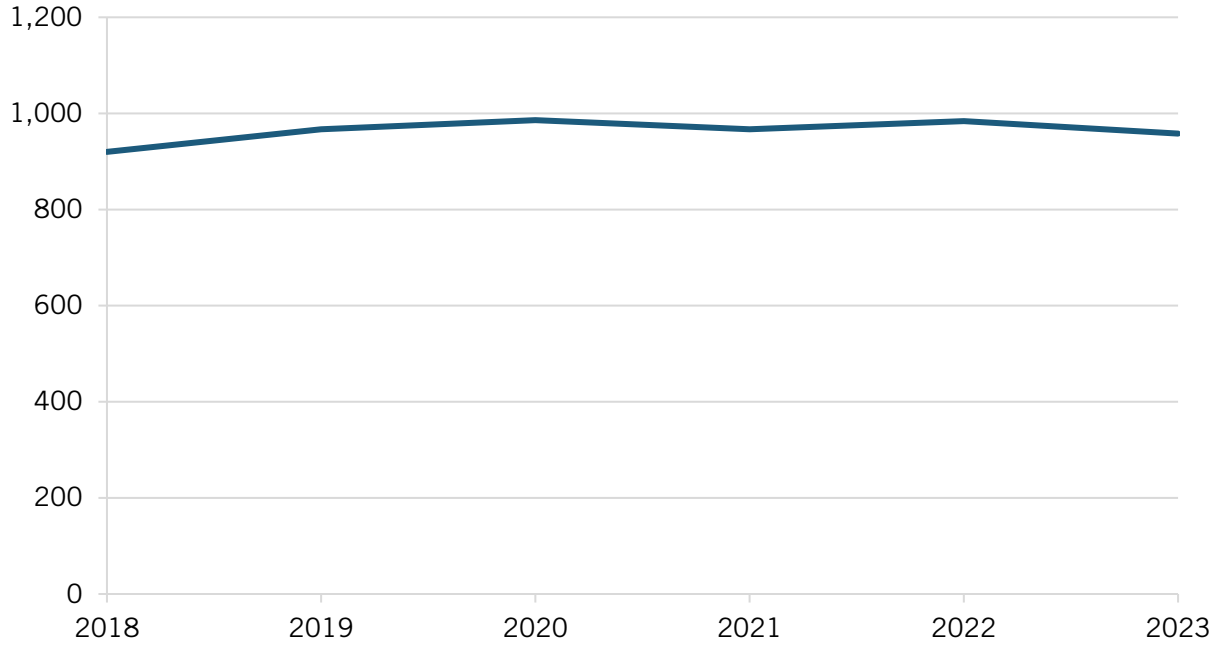


North Carolina: Fiber Optic Cable Manufacturing Industry (NAICS 335921)

A core industry in North Carolina is the fiber optic cable manufacturing industry. This industry is defined as "establishments primarily engaged in manufacturing insulated fiber optic cable from purchased fiber optic strand."[316] The fiber optic cable manufacturing industry companies in North Carolina include JCM Telecom Corporation, Roblon U.S. Inc, and Mid-Atlantic Cable Solutions Inc.[317] The primary products produced by these companies include insulated optical fiber cables with individually sheathed fibers (SITC: 77318).[318]

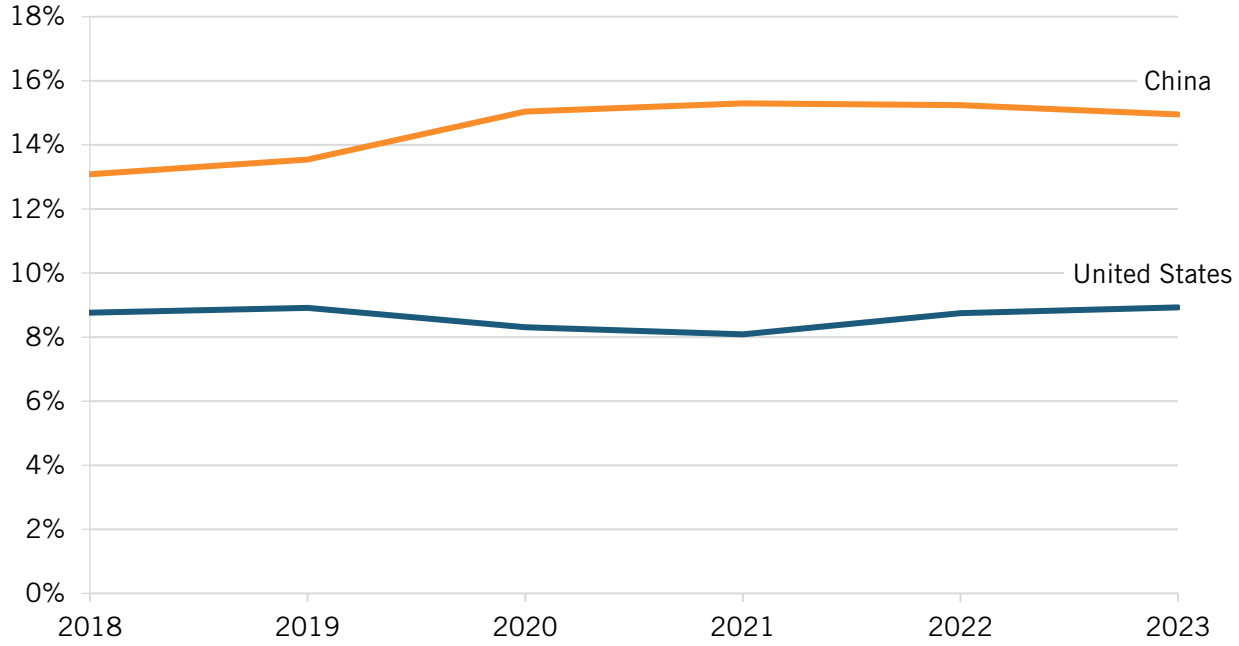
Over the past six years (available data), the fiber optic cable manufacturing industry in North Carolina has expanded. Indeed, from 2018 to 2023, North Carolina's industry's employees grew only 4.1 percent from 920 to 958 employees while the overall U.S. manufacturing sector's employees grew 3.5 percent. As such, this indicates that North Carolina's industry grew slightly faster than the U.S. manufacturing sector did and subsequently increased its share of the sector.

Figure 102: Employment in fiber optic cable manufacturing in North Carolina



Corresponding with the time period above, from 2018 to 2023, China's share of exports from the industry to the world rose while North Carolina's fiber optic cable manufacturing industry was also expanding. Indeed, while the state's industry's employees expanded, China's exports as a share of the global exports rose the most of 187 nations (with available data) from 13.1 percent to 14.9 percent.[319] In other words, China's industry is unlikely to have influenced North Carolina's industry, as its exports growth is positively correlated with North Carolina's industry's growth.

Figure 103: United States' and China's shares of global exports of fiber optic cables

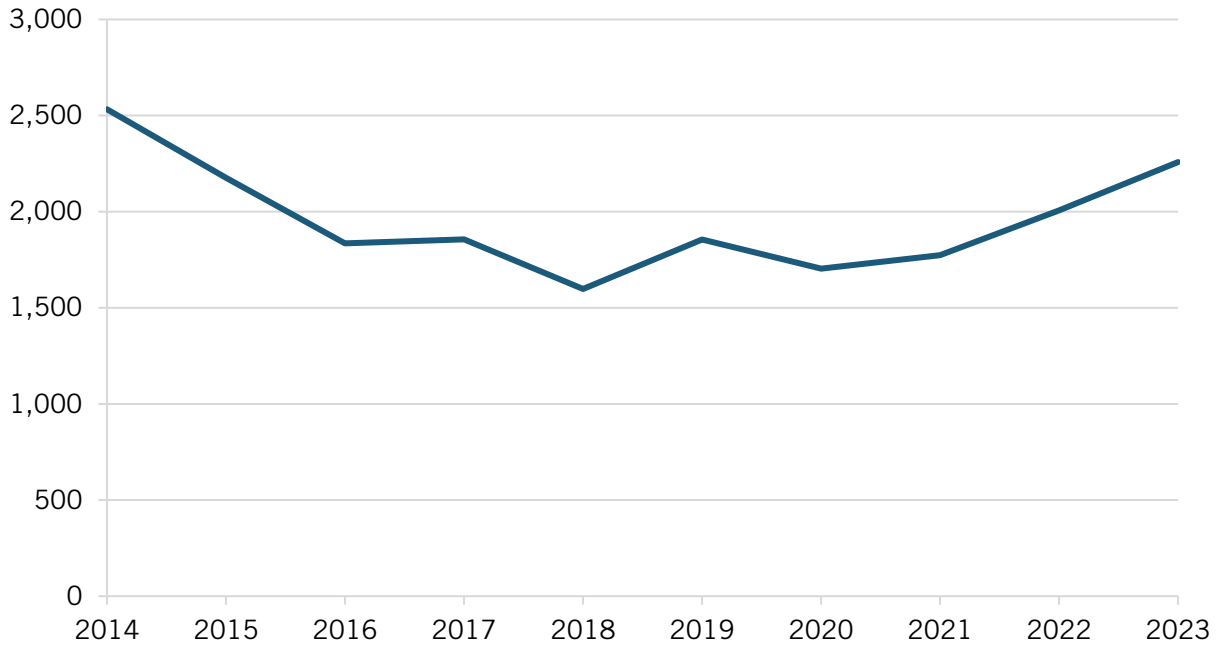


North Dakota: Farm Machinery and Equipment Manufacturing (NAICS 333111)

A core industry in North Dakota is the farm machinery and equipment manufacturing industry, which is defined as "establishments primarily engaged in manufacturing agricultural and farm machinery and equipment, and other turf and grounds care equipment, including planting, harvesting, and grass mowing equipment (except lawn and garden-type)."[320] The farm machinery and equipment manufacturing companies in North Dakota include Degelman Industries USA Ltd., Hausers Farm Supply, and Lange Supply Inc.[321] The primary products produced by these companies are greens mowers (SITC: 72121), harvesting machinery or threshing machinery, nesoi (SITC: 72123), cotton gins (SITC: 72442), and others.[322]

Over the past 10 years, the farm machinery and equipment manufacturing industry in North Dakota has contracted. Indeed, from 2014 to 2023, North Dakota's industry's employees declined 11 percent from 2,533 to 2,258 employees while the U.S. manufacturing sector expanded by 8 percent. As such, North Dakota's industry has not kept up with the manufacturing sector's growth and was a smaller share of the sector in 2023 than in 2015. When examined more closely, from 2014 to 2018, North Dakota's industry experienced an even larger decline of 37 percent while the overall U.S. manufacturing industry rose 4.3 percent. However, in the subsequent years, North Dakota's industry grew 41 percent while U.S. manufacturing grew 3.5 percent, reducing the overall contraction North Dakota's industry could have experienced from 2014 to 2023.

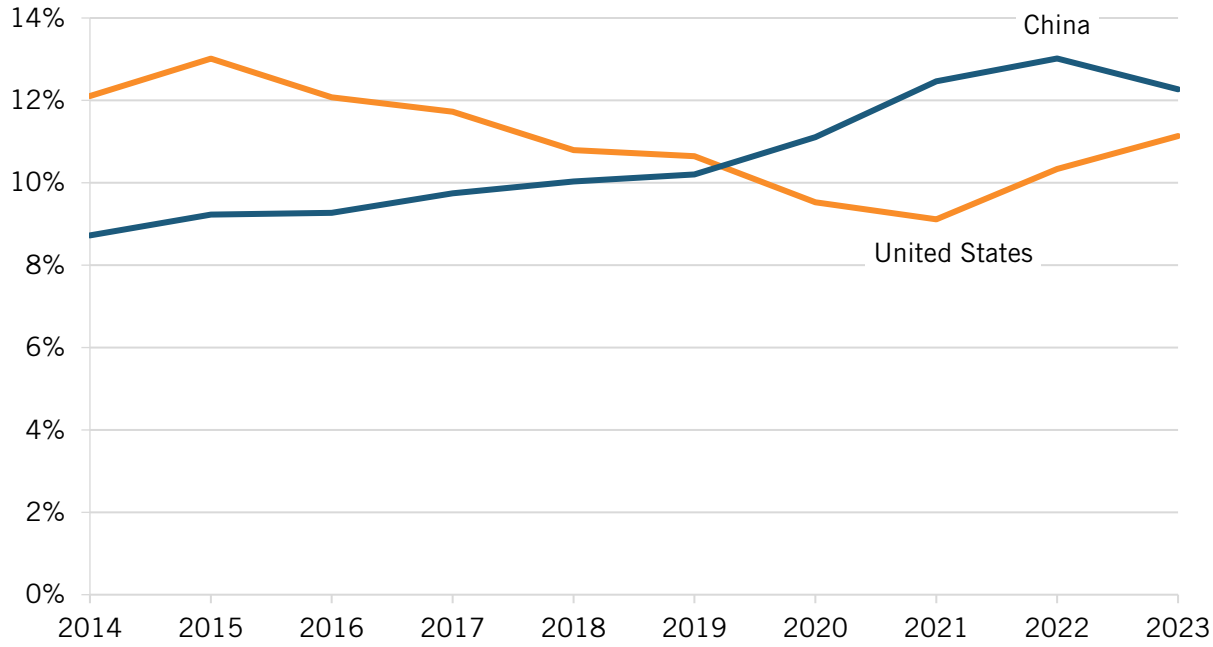
Figure 104: Employment in farm machinery and equipment manufacturing in North Dakota



Corresponding with the time period above, from 2014 to 2023, China's exports to the world grew while North Dakota's farm machinery and equipment industry was contracting. Indeed, during this period, while North Dakota's employees contracted, Chinese exports' share in the industry grew from 8.7 percent to 12.3 percent, indicating that Chinese competition could have an impact on North Dakota's industry. Moreover, when North Dakota's industry's employees contracted from 2014 to 2018, China's exports as a share of the global exports rose from 8.7

percent to 10 percent, indicating that China's growth could have influenced North Dakota's industry's decline.[323] While North Dakota's employees rose again from 2018 to 2023, China's exports also continued to rise from 10 percent to 12.3 percent, indicating that Chinese competition could have only impacted North Dakota's industry by slowing its growth but could also have had no impact.[324] In general, North Dakota's industry's success is negatively correlated with China's exports growth when a longer period is considered, indicating that Chinese competition could have some impact on North Dakota's industry.

Figure 105: United States' and China's shares of global exports of farm machinery and equipment



China's farm machinery and equipment industry competes unfairly against global competitors. Although not direct subsidies to companies, subsidies provided by the Chinese government for the purchase of agricultural machinery and tools have bolstered the industry, increasing companies' revenue, ability to increase R&D, and global competitiveness. For instance, the Chinese government provides subsidies for replacing cotton pickers at up to ~$11,750 per unit.[325] In 2012, the Chinese government also provided subsidies of up to $2.9 billion for the purchase of agricultural machinery.[326] In sum, the data combined with Chinese government subsidies indicates that China has influenced Nebraska's farm machinery and equipment industry decline.

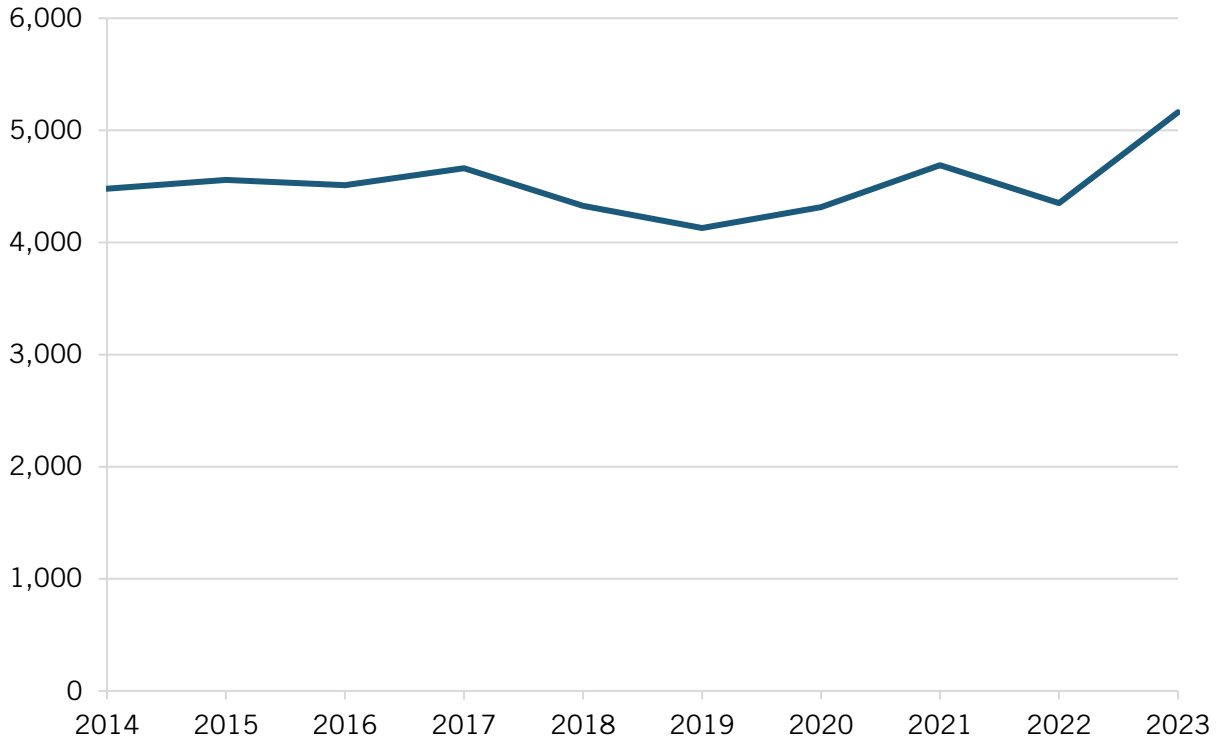
Ohio: Welding and Soldering Equipment Manufacturing Industry (NAICS 333992)

A core industry in Ohio is the welding and soldering equipment manufacturing industry, defined as "establishments primarily engaged in manufacturing welding and soldering equipment and accessories (except transformers), such as arc, resistance, gas, plasma, laser, electron beam, and ultrasonic welding equipment; welding electrodes; coated or cored welding wire; and soldering equipment (except handheld)."[327] The welding and soldering equipment manufacturing companies in Ohio include Advance Industrial Manufacturing Inc., Apex Welding Incorporated, and Arcweld, Inc.[328] The primary products produced by these companies include handheld blow

torches (SITC: 73741), core wired of base metal for electric arc-welding (SITC: 69955), and welding machine parts and parts of apparatus (SITC: 73739).[329]

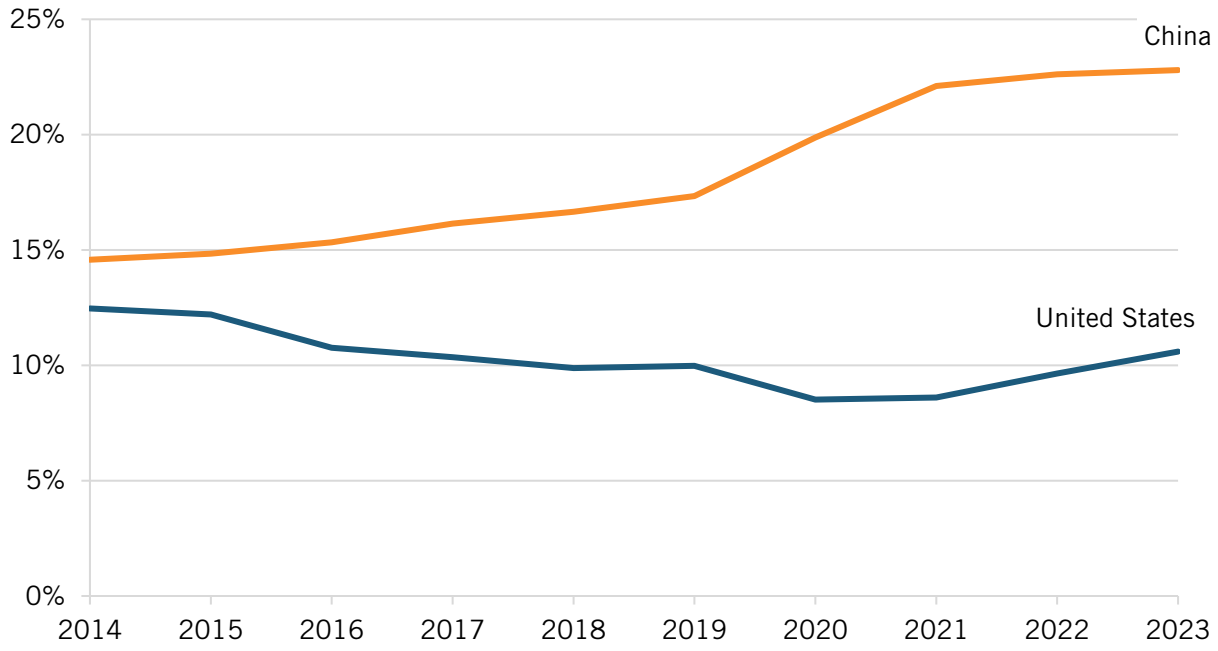
Over the past 10 years (available data), the welding and soldering equipment manufacturing industry in Ohio has expanded. Indeed, from 2014 to 2023, Ohio's industry's employees grew 15 percent from 4,479 to 5,162 employees while the U.S. manufacturing sector's employees grew 8 percent. As such, this indicates that Ohio's industry surpassed the manufacturing sector's growth and now encompasses a larger share of the manufacturing sector. When examined more closely, Ohio's industry's employees remained relatively stable and had a sharp growth from 2022 to 2023 when its employees jumped from 4,351 to 5,162. Without this growth, Ohio's industry would have declined 2.9 percent while the U.S. manufacturing sector grew 6.7 percent, meaning that Ohio's industry was declining until 2022.

Figure 106: Employment in the welding and soldering equipment industry in Ohio



Corresponding with the time period above, from 2014 to 2023, China's exports to the world rose while Ohio's welding and soldering equipment manufacturing industry also grew. Indeed, while Ohio's industry's employees grew, China's exports as a share of the global exports had the highest percentage point growth of 182 nations with available data—Chinese exports share grew from 14.6 percent to 22.8 percent.[330] However, when the 2022 to 2023 period is removed (giving its outlier status in growth), the data suggest that Chinese competition could have indeed impacted Ohio's industry. While Ohio's industry employees declined 2.9 percent from 2014 to 2022, Chinese exports rose from 14.6 percent to 22.6 percent. In sum, when outliers are removed from the data, Chinese competition could have influenced Ohio's industry trends.

Figure 107: United States' and China's shares of global exports of welding and soldering equipment



China's welding and soldering equipment industry unfairly competes with its global competitors. Although the Chinese government does not provide direct subsidies to the industry, the Chinese government does actively bolster the industry by incentivizing consumers to upgrade their industrial equipment. Indeed, in recent years, the Chinese government has promoted industrial equipment upgrading and has called for a 25 percent increase in capital investments in equipment by 2027.[331] Moreover, historically, China has implemented the Made in China 2025 plan to upgrade Chinese manufacturing industries, including the electrical equipment industry, which includes welding and soldering equipment.[332] As such, the industry would benefit from the subsidies, tax breaks, financial incentives, and other benefits that come from the plan.[333] In sum, Chinese welding and soldering equipment manufacturing firms have benefitted from some government assistance, thereby negatively impacting U.S. firms' ability to compete and grow.

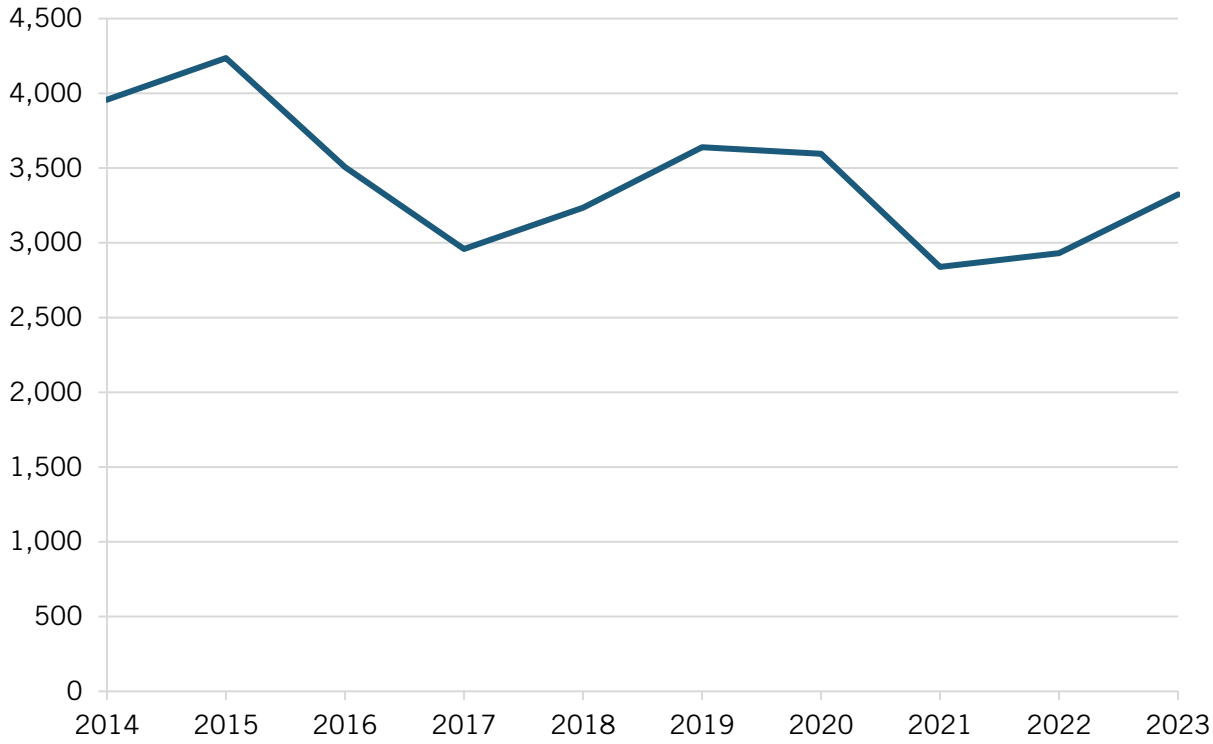
Oklahoma: Power Boiler and Heat Exchanger Manufacturing (NAICS 332410)

A core industry in Oklahoma is the power boiler and heat exchanger manufacturing industry. It is defined as "establishments primarily engaged in manufacturing power boilers and heat exchangers. Establishments in this industry may perform installation in addition to manufacturing power boilers and heat exchangers."[334] The power boiler and heat exchanger manufacturing companies in Oklahoma include 3D Manufacturing, Inc., Born Inc., and Cooling Products, Inc.[335] The primary products produced by these companies include nuclear reactors (SITC: 71871), super-heated water boilers (SITC: 71112), heat exchangers (SITC: 71191), and others.[336]

Over the past 10 years (available data), the power boiler and heat exchanger manufacturing industry in Oklahoma has contracted. Indeed, from 2014 to 2023, Oklahoma's industry's employees declined 16 percent from 3,957 to 3,324 while U.S. manufacturing sector employees grew 8 percent. As such, Oklahoma's industry has not kept up with the U.S. manufacturing sector's growth and is a smaller share of the manufacturing sector. Although Oklahoma's

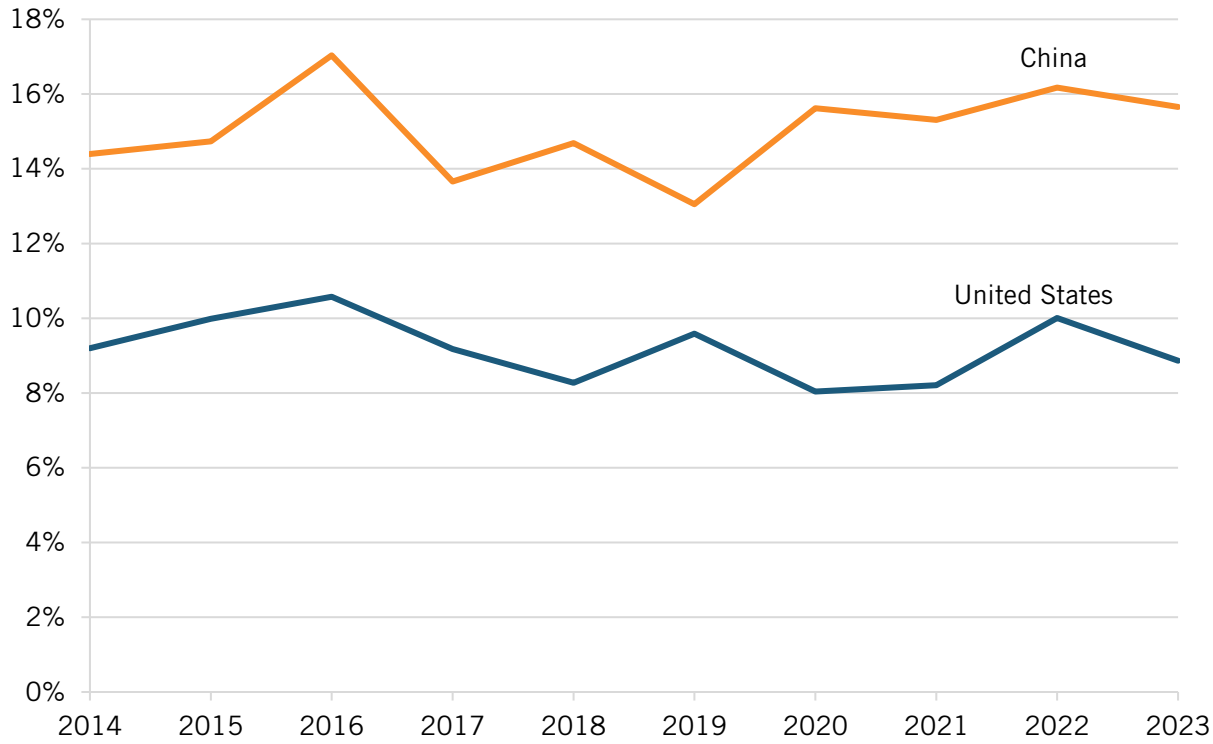
industry's employees have experienced a series of growth and declines, the industry has overall trended downward.

Figure 108: Number of employees in the power boiler and heat exchanger industry in Oklahoma



Corresponding with the time period above, from 2014 to 2023, China's exports to the world generally trended upward while Oklahoma's industry was trending downward. Indeed, while Oklahoma's power boiler and heat exchanger manufacturing industry's employees declined, China's exports as a share of the global exports rose from 14.4 percent to 15.7 percent, indicating that Chinese companies could be gaining Oklahoma's market shares and influencing its trends.[337] In sum, Chinese exports and Oklahoma's industry's growth are negatively correlated, indicating that China could have some influence over Oklahoma's industry success.

Figure 109: United States' and China's shares of global exports of the power boiler and heat exchanger industry



China's power boiler and heat exchanger industry unfairly competes with other global competitors. The Chinese government provides the Chinese power boiler and heat exchanger industry with subsidies. According to a report by Operate AI, the Chinese government provides device purchase incentives of 35 percent back for high-efficiency gas boilers, thereby bolstering the industry's revenue and competitiveness as more businesses invest in these boilers.[338] Corroborating this, China has also promoted boiler renewals and the elimination of older oil-fired boilers and coal-fired boilers that do not meet low emissions standards.[339] In addition, the Chinese government has also stated that it would provide subsidies—2.5 percent interest subsidy for two years—for renovation projects and equipment purchases for heat pump systems.[340] In spite of these subsidies, there is minimal information on direct subsidies to the Chinese power boiler and heat exchanger industry.

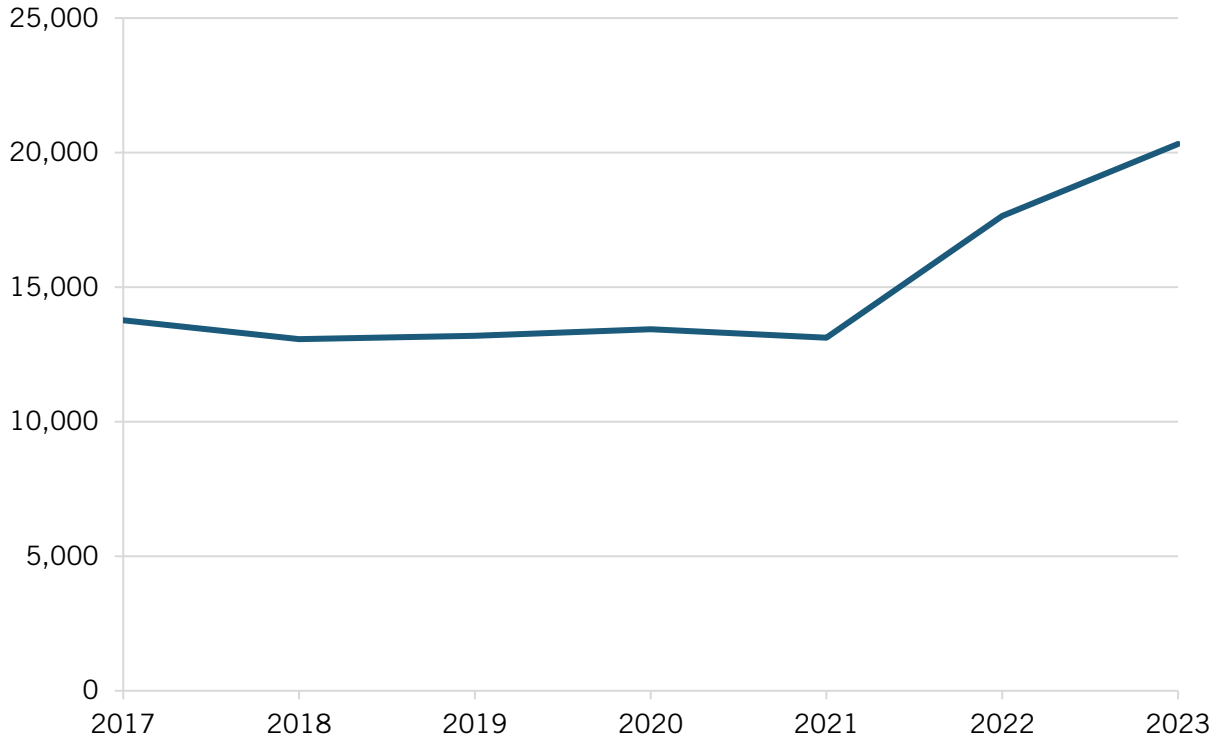
Oregon: Semiconductor and Related Device Manufacturing (334413)

Oregon is highly specialized in semiconductor manufacturing, a cornerstone of its advanced manufacturing economy that operates in an intensely competitive global market. However, China's rapid expansion of semiconductor manufacturing capacity, supported by extensive subsidies and powerful industrial policies, pose a growing challenge to the long-term competitiveness of Oregon's semiconductor sector.

Oregon employs one of the largest and growing semiconductor manufacturing workforces in the country. From 2017 to 2023, employment increased from over 13,700 to over 20,000 workers.[341] (See figure 110.) The state is also one of the most important hubs for the semiconductor industry in the country, home to industry leaders such as Intel, whose largest and most advanced research and manufacturing facilities are located in the Portland metropolitan

area, as well as smaller firms such as Microchip Technology and ON Semiconductor.[342] Semiconductor manufacturing is one of Oregon's largest export industries, with exports in 2022 valued at over $14.5 billion.[343]

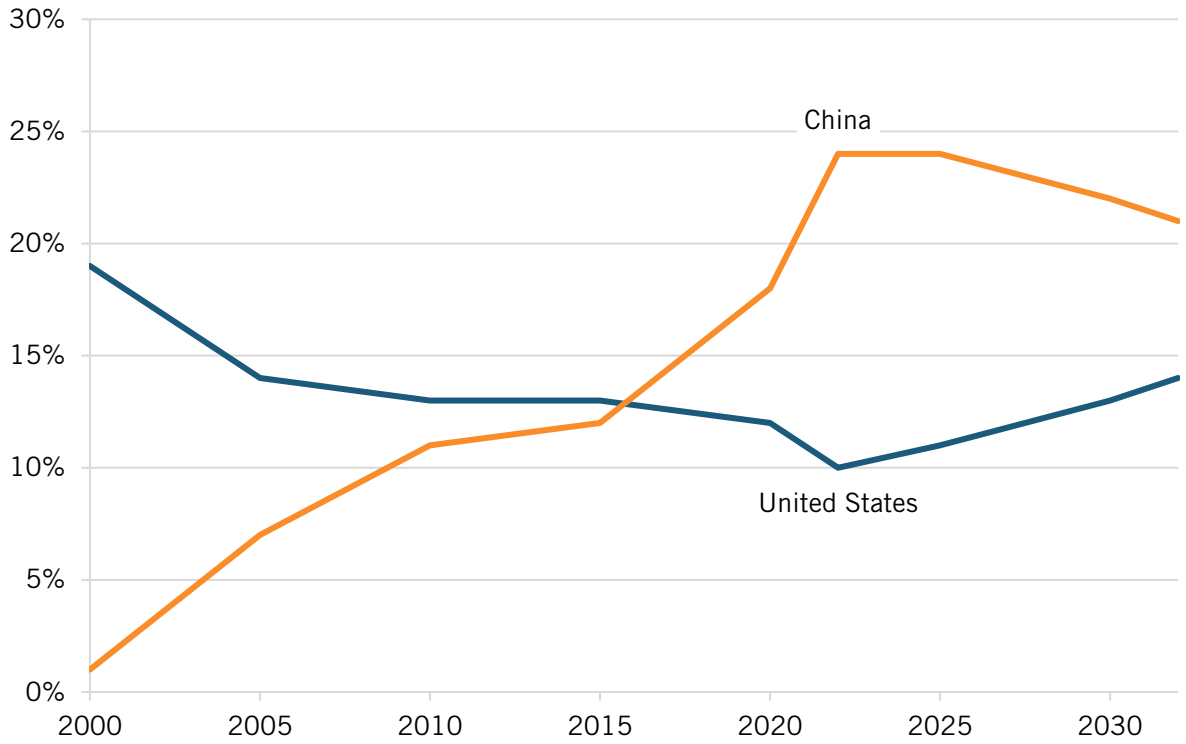
Figure 110: Employment in the semiconductor manufacturing industry in Oregon



However, while U.S. firms have continued to invest heavily in domestic manufacturing, including in Oregon—supported in part by the CHIPS and Science Act—China has invested even more aggressively in its own semiconductor industry.[344] Through a combination of subsidies, industrial policy, and strategic investment, Chinese firms are expanding production capacity at a pace that threatens to erode U.S. market share. China plans to invest more than $150 billion in semiconductors by 2030, nearly three times the $52 billion allocated under the CHIPS Act.[345] In the first half of 2025 alone, Chinese investment reached $63.3 billion.[346]

China's push for semiconductor dominance is particularly evident in legacy chip manufacturing, where state-backed firms have expanded rapidly. Between 2015 and 2023, Chinese legacy chip production capacity grew more than four times faster than global demand.[347] This imbalance has contributed to overcapacity, placing downward pressure on global semiconductor prices and reducing profitability for U.S. producers, including those operating in Oregon. Meanwhile, China's share of global semiconductor manufacturing capacity has risen significantly, by 20 percentage points, while the U.S. share has declined by 8.[348] (See figure 111.)

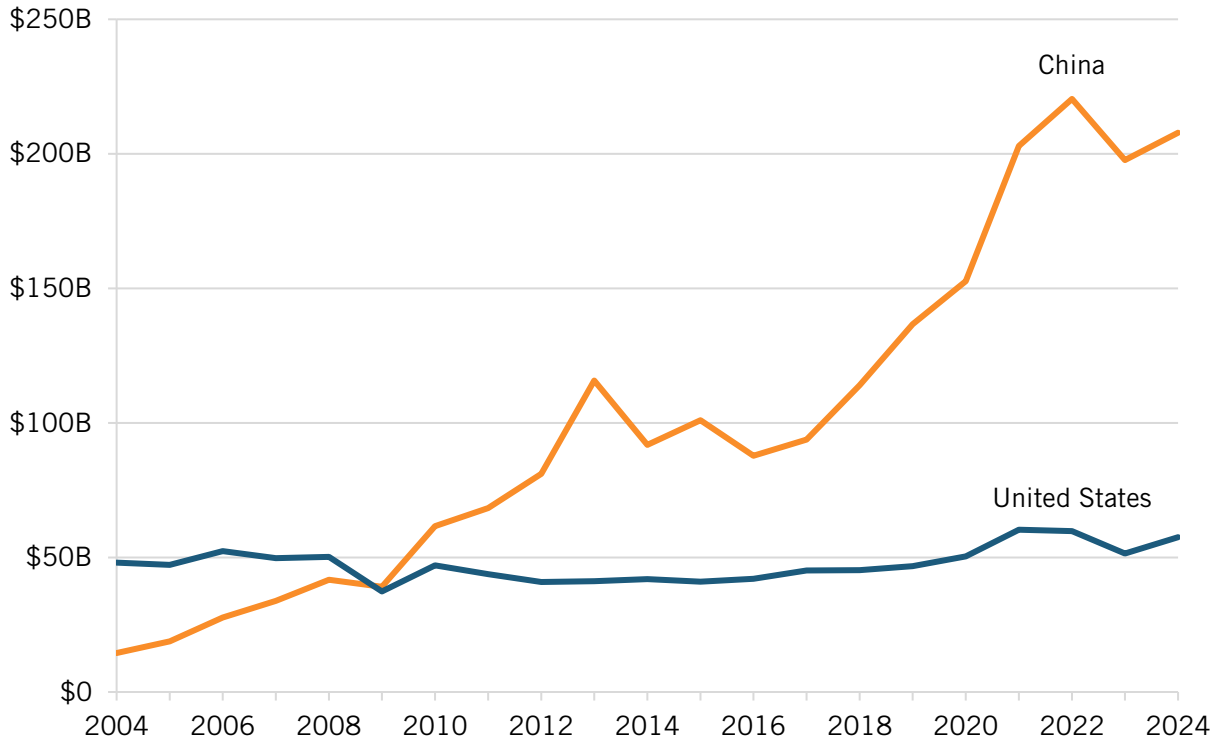
Figure 111: Share of global semiconductor production capacity (projected from 2025)



Further emphasizing China's rise, for much of the early 2000s, the United States exported far more semiconductors (HS 8541 and 8542) than did China. However, since 2009, China has overtaken the United States, with exports growing rapidly while U.S. exports have remained relatively stagnant. Between 2014 and 2024, Chinese semiconductor exports increased by 126 percent, compared with just 37 percent growth for the United States.[349] (See figure 112.)

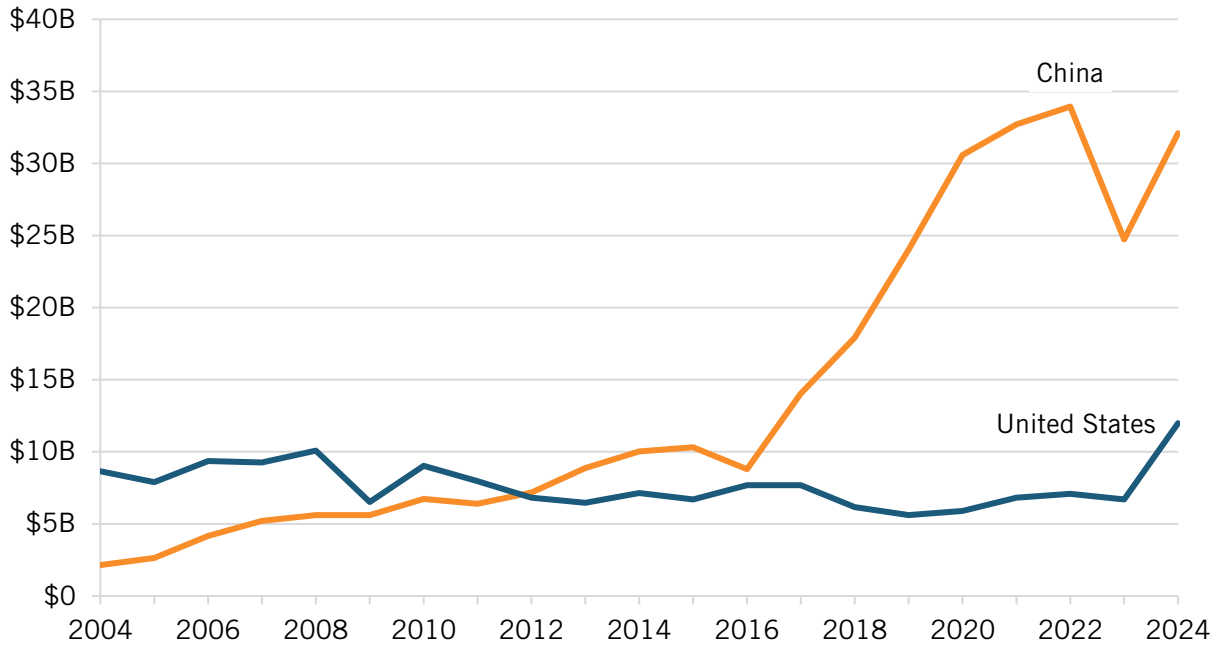
For Oregon, which relies heavily on global demand for semiconductors produced by firms such as Intel, this trend is particularly concerning. Although continued investment in advanced fabrication facilities may boost U.S. exports in the future, the U.S. Commerce Department has warned that China's expanding chip capacity could reduce utilization rates at U.S. fabs, threatening their long-term profitability.[350]

Figure 112: Semiconductor exports



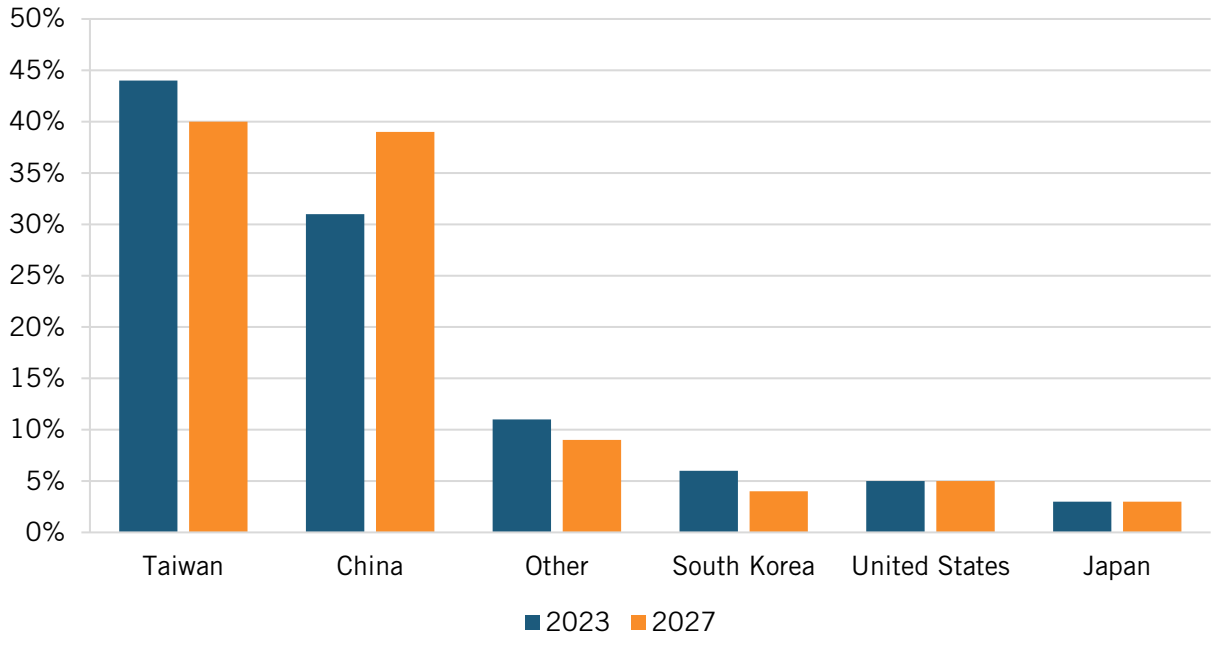
China's extensive subsidies allow its semiconductor firms to sell chips at significantly lower prices than U.S. competitors can—often 30 to 50 percent cheaper.[351] In some cases, Chinese firms have been able to sell products below production cost, enabling them to rapidly gain market share in third-country markets. As a result, U.S. exports to key markets such as Malaysia, Singapore, and Vietnam have grown far more slowly than China's, with Chinese exports to these countries reaching nearly double those of the United States in 2024.[352] (See figure 113.) This growing price competition places pressure on Oregon-based manufacturers, which typically face higher production costs and rely on export markets to sustain growth.

Figure 113: Semiconductor exports to Malaysia, Singapore, and Vietnam[353]



China's long-term ambitions in semiconductors are clearly outlined in its Made in China 2025 strategy, which aims for 70 percent self-sufficiency in semiconductor production and global leadership by 2030.[354] While these goals have not yet been fully realized, China's share of legacy chip manufacturing is projected to grow substantially—from 31 percent in 2023 to 39 percent in 2027—while the U.S. share will remain comparatively small.[355] Additionally, China is expected to bring more new fabrication facilities online than is any other region between 2022 and 2026.[356]

Figure 114: Global market share in legacy semiconductor manufacturing, 2023 vs. 2027 projection[357]



China's continued expansion in the semiconductor industry poses a direct challenge to U.S. producers. As Chinese firms replace foreign suppliers domestically and expand into international markets, U.S. semiconductor exports face increasing pressure on market share, revenue, and profitability. Persistent subsidies and overcapacity are likely to keep global prices artificially low, disadvantaging higher-cost producers.

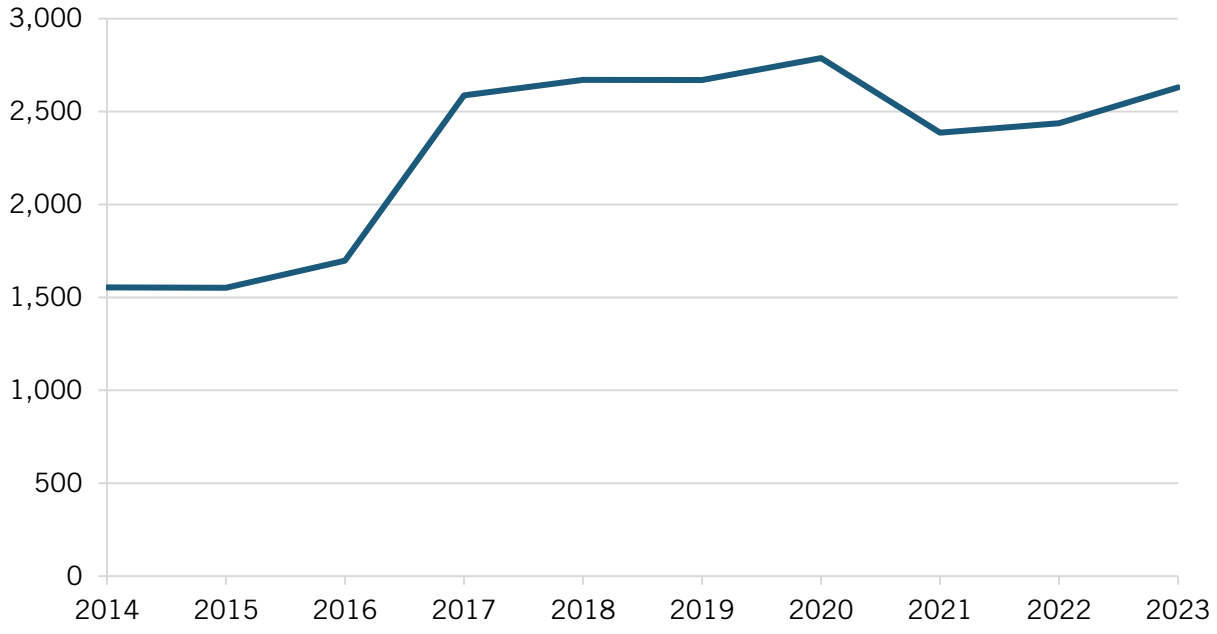
For Oregon, where semiconductors are a fast-growing and important advanced manufacturing industry and a key source of high-wage employment, these global dynamics present a significant economic risk. Reduced global demand and increased price competition could slow industry growth, weaken job creation, and threaten the long-term vitality of one of the state's most critical sectors.

Pennsylvania: Other Lighting Equipment Manufacturing Industry (NAICS 335129)

A core industry in Pennsylvania is the other lighting equipment manufacturing industry, which "comprises establishments primarily engaged in manufacturing electric lighting fixtures (except residential, commercial, industrial, institutional, and vehicular electric lighting fixtures) and nonelectric lighting equipment."[358] The other lighting equipment manufacturing industry companies in Pennsylvania include Spring City, Penn Global Lighting Design and Manufacturing, and Deval Corporation.[359] The primary products produced by these companies include portable electric lamp parts (SITC: 81380) and light-emitting diode (LED) lamps (SITC: 77878). [360]

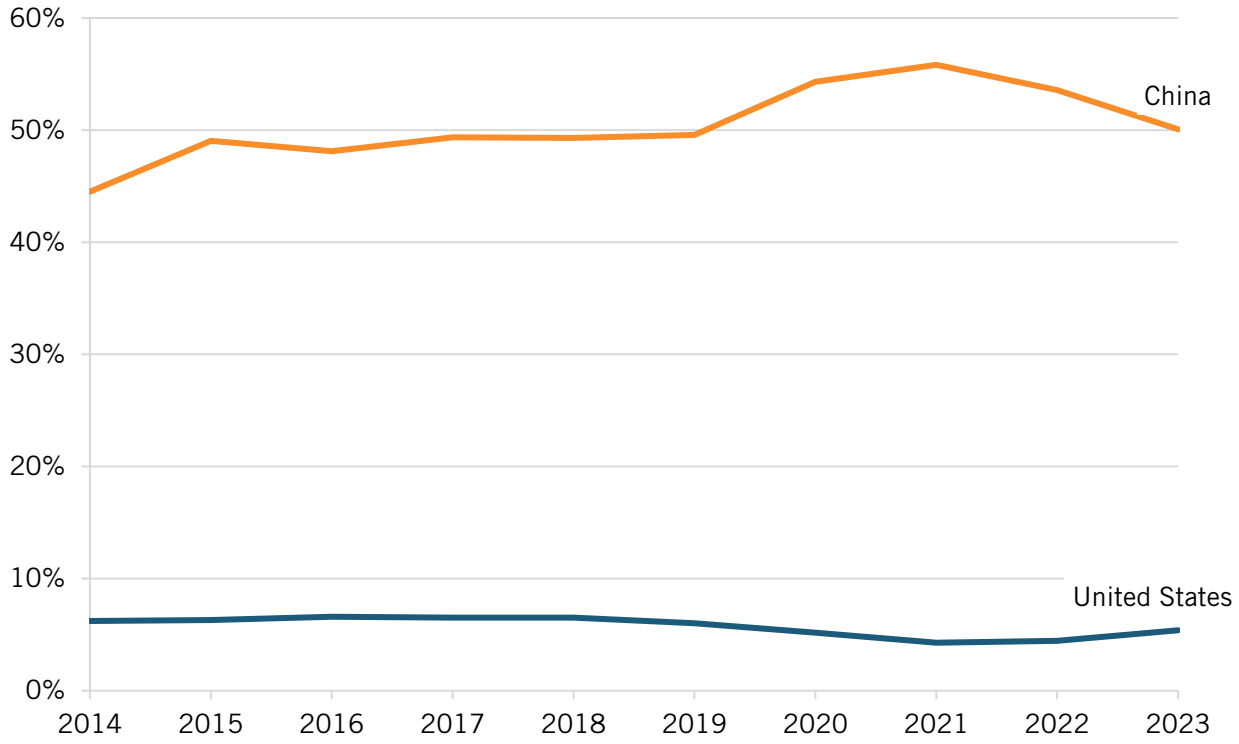
Over the past 10 years (available data), the other lighting equipment manufacturing industry in Pennsylvania's growth has expanded. Indeed, from 2014 to 2023, Pennsylvania's industry's employees rose 69 percent from 1,554 to 2,630 employees while the U.S. manufacturing sector's employees rose 8 percent. As such, this indicates that Pennsylvania's industry has far surpassed the manufacturing sector in growth and is now a larger share of the manufacturing sector. Of this overall growth, Pennsylvania's industry's growth is largely dependent of its increase in employees from 2016 to 2017 of 1,698 to 2,587.

Figure 115: Employment in other lighting equipment manufacturing in Pennsylvania



Corresponding with the time period above, from 2014 to 2023, China's exports to the world rose while Pennsylvania's industry was also rising. Indeed, while Pennsylvania's industry's employees were rising, China's exports as a share of the global exports for this industry had the highest percentage point growth of 182 nations with available data—China's exports rose from 44.5 percent to 50.1 percent.[361] Given that both Chinese exports and Pennsylvania's industry is growing in tandem, Chinese competition is unlikely to be influencing Pennsylvania's industry trends.

Figure 116: United States' and China's shares of global exports of other lighting equipment



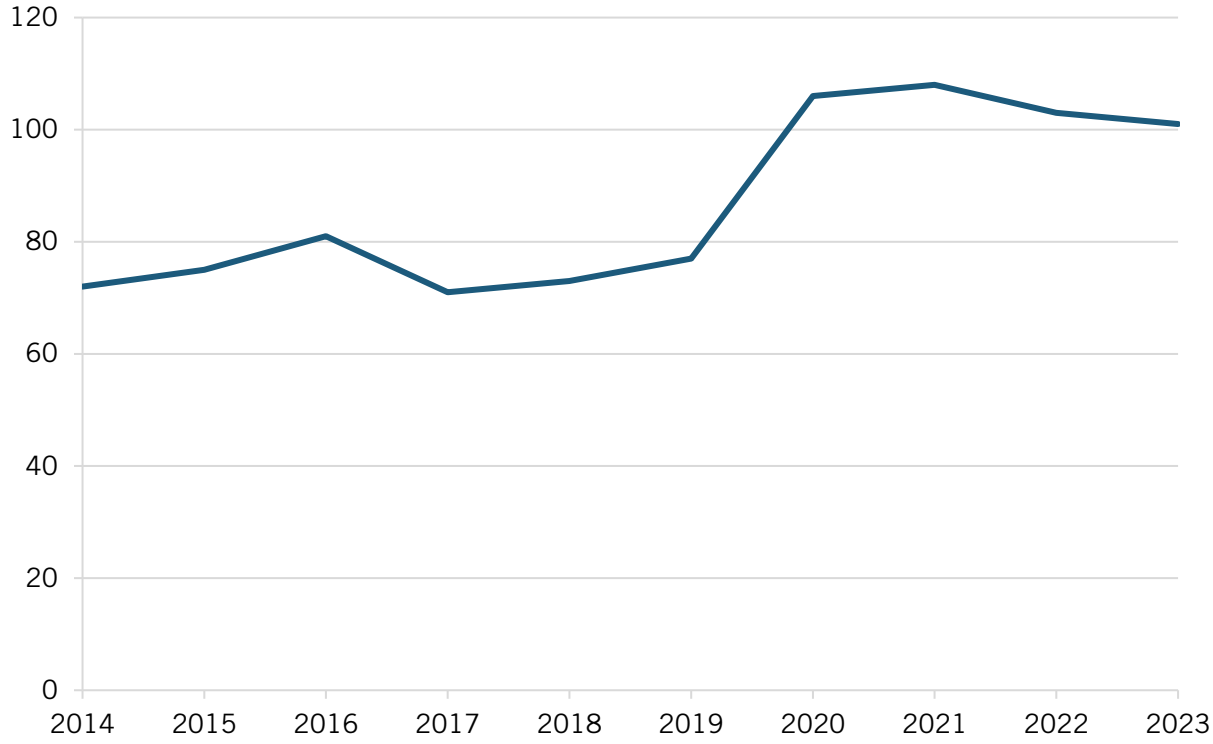
Rhode Island: Other Metal Container Manufacturing Industry (NAICS 332439)

A core industry in Rhode Island is the other metal container manufacturing industry, which is defined as "establishments primarily engaged in manufacturing metal (light gauge) containers (except cans)."[362] The other metal container manufacturing companies in Rhode Island include Future Case Corp. and R.I. Container Products Inc.[363] The primary products produced by these companies include other aluminum containers capacity 3.8–300 liters (SITC: 69242), flask and other vessels, complete with cases (SITC: 89997), parts of vacuum flasks etc., except glass inners (SITC: 89997), and others.[364]

Over the past 10 years (available data), the other metal container manufacturing industry in Rhode Island has expanded. Indeed, from 2014 to 2023, Rhode Island's industry's employees grew 40.3 percent from 72 to 101 while the overall U.S. manufacturing sector only expanded 8 percent.[365] As such, this indicates that Rhode Island's industry grew faster than the overall manufacturing sector and gained shares in the manufacturing sector during this period. When examined closer, Rhode Island's industry growth experienced a large spurt from 2019 to 2020 when its employees rose from 77 to 106.[366] Though information is limited, this increase could be

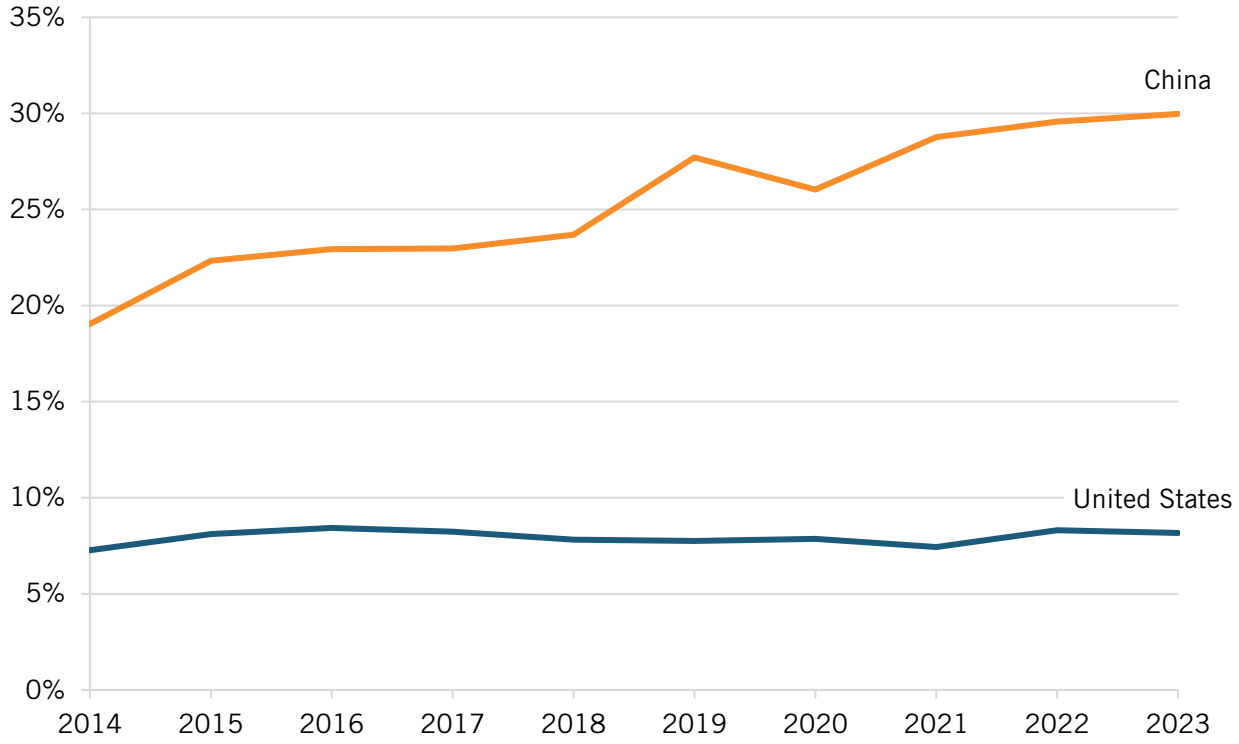
due to a structural change, such as a new factory. However, even if this outlier and the subsequent year were removed, Rhode Island's industry still expanded, as it grew 6.9 percent from 2014 to 2019 while the overall manufacturing sector only grew 6 percent.[367] In general, Rhode Island's industry has some periods of decline but is generally trending upward.

Figure 117: Employment in other metal container manufacturing in Rhode Island



Corresponding with the time period above, from 2014 to 2023, China's other metal container manufacturing industry exports to the world grew while Rhode Island's industry was also expanding. Indeed, while Rhode Island's industry's employees expanded, China's exports as a share of the global exports rose from 19 percent to 30 percent, indicating that Chinese competition is unlikely to have influenced Rhode Island's industry trends, as both are growing concurrently.[368] Even when Rhode Island's outlier and subsequent years (2019–2023) are removed, both Rhode Island's industry and Chinese exports share are still growing, further corroborating that Chinese competition may not have an impact on Rhode Island's industry trends.[369] More generally, Chinese competition is also unlikely to have an impact on the overall U.S. other metal container manufacturing industry. Indeed, while China's export share have risen, U.S. export share has remained relatively stable at about 7 to 8 percent, indicating that Chinese export shares is not negatively correlated with U.S. export shares.[370]

Figure 118: United States' and China's shares of global exports of the other metal container manufacturing industry

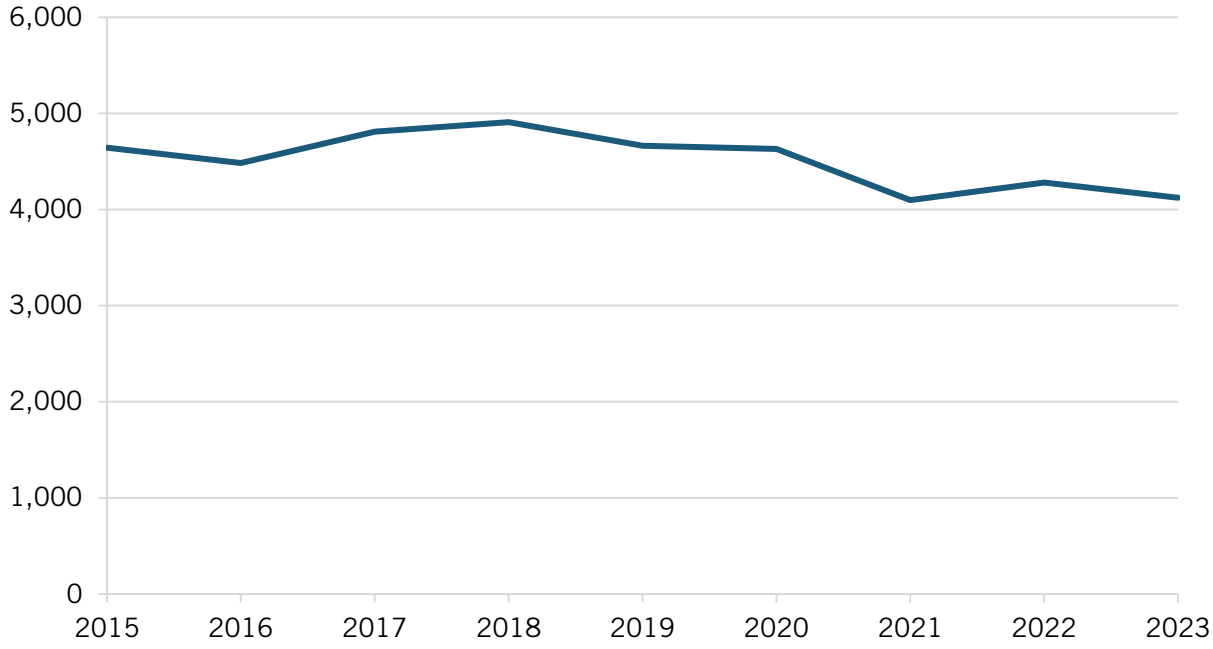


South Carolina: Ball and Roller Bearing Manufacturing Industry (NAICS 332991)

A core industry in South Carolina is the ball and roller bearing manufacturing industry, which "comprises establishments primarily engaged in manufacturing ball and roller bearings of all materials."[371] The ball and roller bearing manufacturing industry companies in South Carolina included Fintec, Inc., Simatec Inc., and Wheeler Industries Inc.[372] The primary products produced by these companies include ball bearings with integral shafts (SITC: 74610), spherical roller bearings, single row (SITC: 74630), tapered rollers for roller bearings (SITC: 74691), and others.[373]

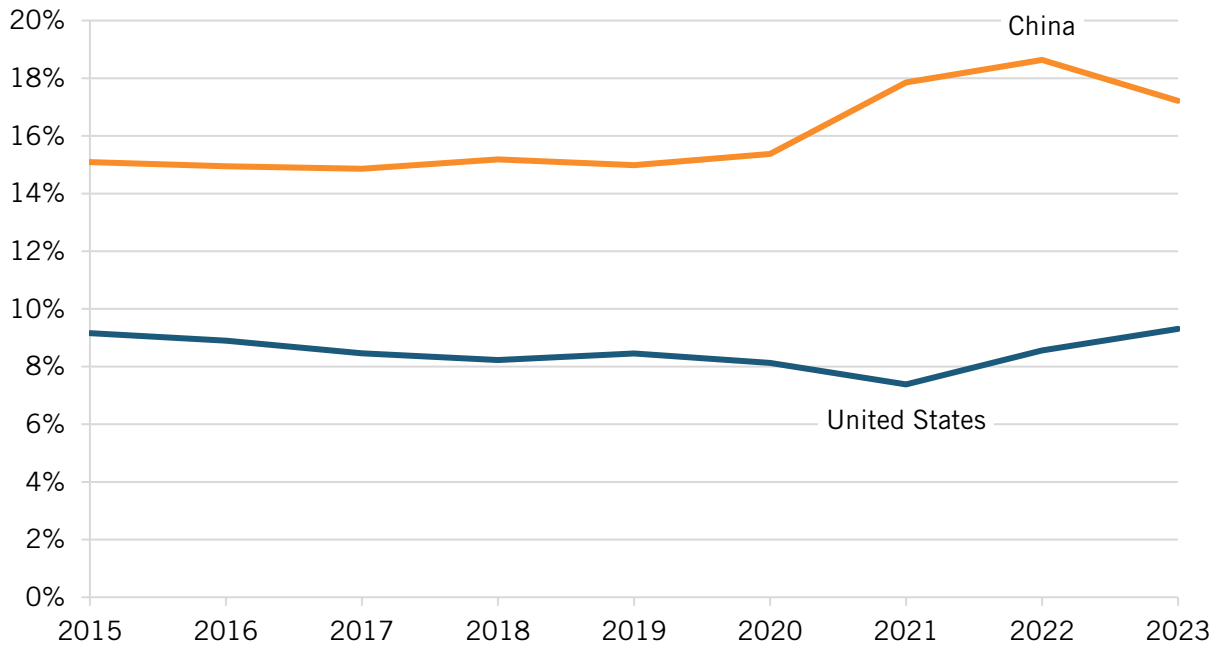
Over the past nine years (available data), the ball and roller bearing manufacturing industry in South Carolina has contracted. Indeed, from 2015 to 2023, South Carolina's industry's employees generally trended downward, declining 11 percent from 4,643 to 4,123 employees. Meanwhile, U.S. manufacturing sector's employees increased 6.3 percent. As such, this indicates that South Carolina's industry has not kept up with the overall manufacturing sector's growth and is now a smaller share of the manufacturing sector than before.

Figure 119: Employment in ball and roller bearing manufacturing industry in South Carolina



Corresponding with the time period above, from 2015 to 2023, China's exports to the world rose while South Carolina's industry contracted. Indeed, while South Carolina's employees contracted, China's exports share had the highest percentage point growth of 178 nations with available data—China's exports share rose from 15.1 percent to 17.2 percent. As such, this indicates that Chinese exports are negatively correlated with South Carolina's industry's growth and thus, Chinese competition could influence South Carolina's industry's success.

Figure 120: United States' and China's shares of global exports of the ball and roller bearing manufacturing industry



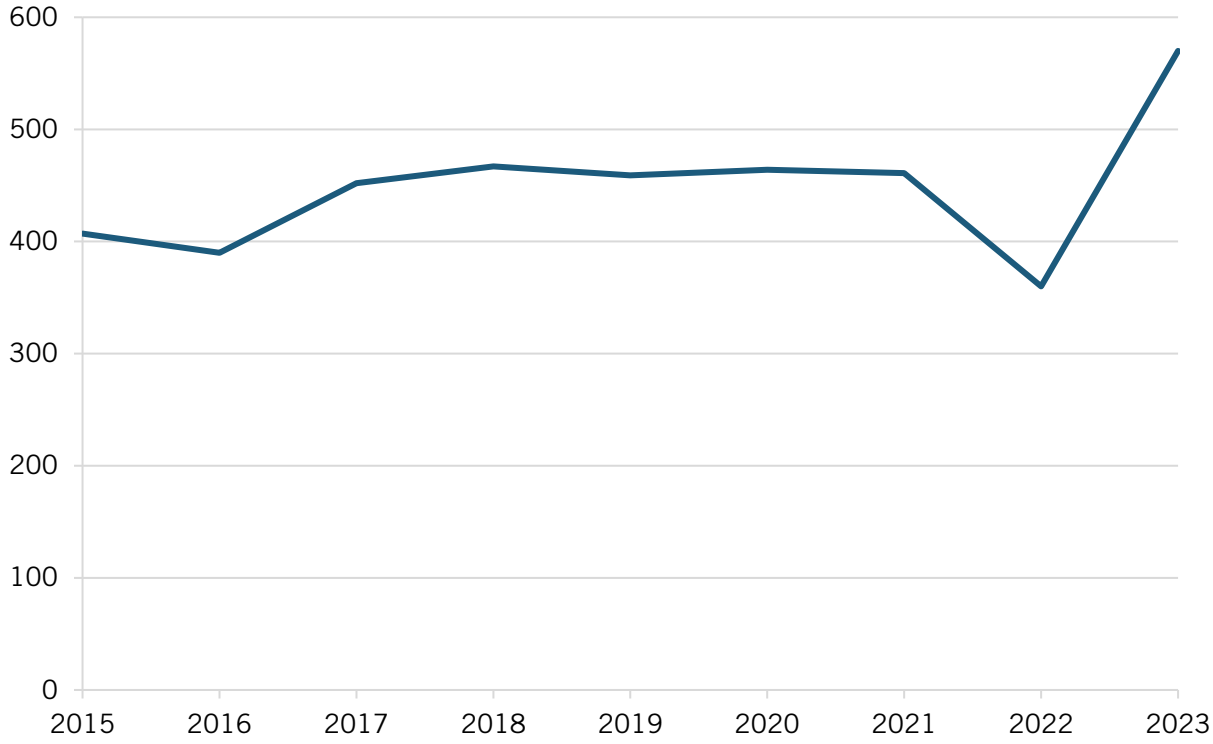
China's ball and roller bearing industry unfairly competes with other global competitors. Although the Chinese government does not provide the industry with direct subsidies, it likely does provide assistance in bolstering the industry. Indeed, according to a report by the U.S. International Trade Commission (USITC), "Domestic Producers claim that China increased its already large production capacity significantly throughout the period of review, consistent with Chinese government policies promoting the TRBs sector."[374] In China's National 12th Five-Year Development Plan, the Chinese government targeted an annual growth rate of 13.3 percent for the industry.[375] Moreover, the USITC report also finds that the Chinese tapered roller bearing industry negatively impacts its U.S. counterparts by underselling its products at a lower price than U.S. companies do. In the most recent antidumping review, the USITC asserted that "if the order were revoked, significant volumes of subject imports would likely undersell the domestic like product, as they did in the original investigations and prior reviews, to gain market share."[376] As such, China's ball and roller bearing industry has received assistance from the Chinese government to bolster itself, undersell U.S. competitors, and unfairly gain market shares from those competitors.

South Dakota: Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing (NAICS 334416)

A core industry in South Dakota is the capacitor, resistor, coil, transformer, and other inductor manufacturing industry, which "comprises establishments primarily engaged in one or more of the following: (1) manufacturing electronic fixed and variable capacitors and condensers; (2) manufacturing electronic resistors, such as fixed and variable resistors, resistor networks, thermistors, and varistors; and (3) manufacturing electronic inductors, such as coils and transformers."[377] The capacitor, resistor, coil, transformer, and other inductor manufacturing companies in South Dakota include Minntronix, Inc. and Newava Technology.[378] The primary products produced by these companies are electric heating resistors (SITC: 77588), fixed capacitors, tantalum electrolytic, metal case (SITC: 77862), electrical capacitor parts (SITC: 77869), and others.[379]

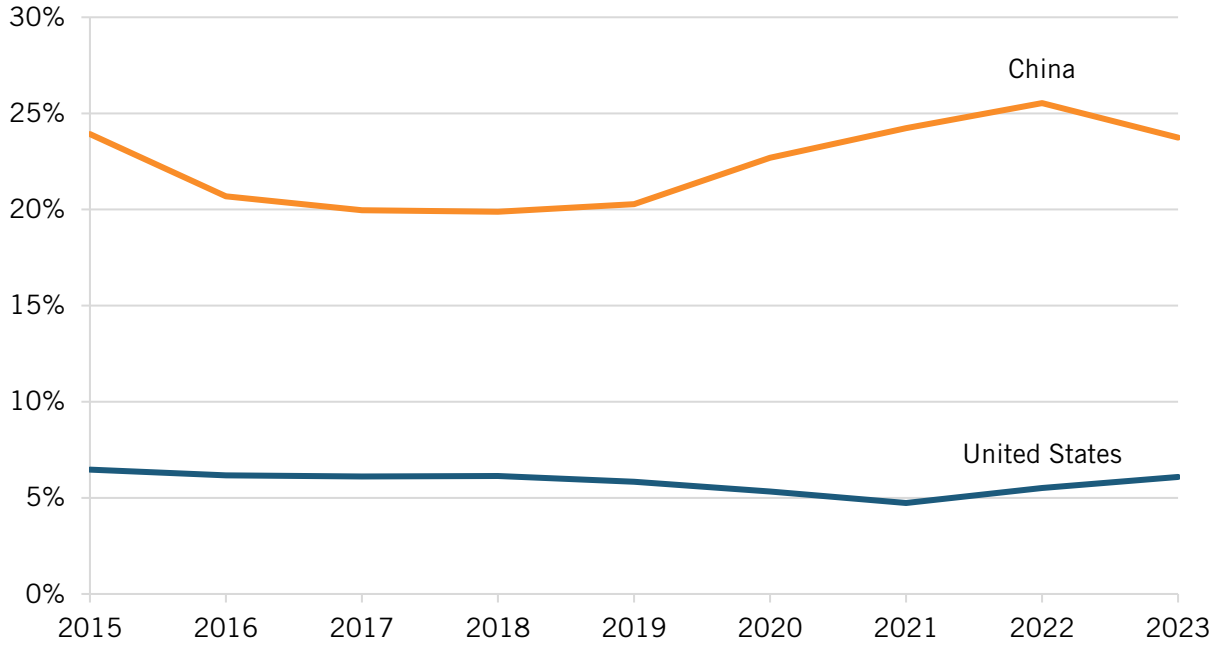
Over the past nine years (available data), the capacitor, resistor, coil, transformer, and other inductor manufacturing industry in South Dakota has expanded. Indeed, from 2015 to 2023, South Dakota's industry's employees grew 40 percent from 407 to 570 while U.S. manufacturing sector's employees rose 6.3 percent. As such, this indicates that South Dakota's industry has surpassed the overall manufacturing sector's expansion and is now a larger share of the sector. When examined closer, South Dakota's industry's growth has outliers. Indeed, from 2021 to 2023, South Dakota's industry saw a large decline of 22 percent (U.S. manufacturing grew 4.1 percent) and then a sudden growth of 58 percent (U.S. manufacturing grew 1.2 percent). When removing these outliers, South Dakota's industry only grew 13 percent while U.S. manufacturing grew 2.5 percent. Although data is limited, the sudden rise in employees from 2022 to 2023 could have been a combination of recovering from the pandemic and structural change, such as a new factory. Indeed, though not the cause of the spike, Presidio Components, a leader in the manufacturing of ceramic capacitor, selected Sioux Falls to expand to in 2023.[380]

Figure 121: Employment in capacitor, resistor, coil, transformer, and other inductor manufacturing in South Dakota



Corresponding with the time period above, from 2015 to 2023, China's exports to the world remained relatively stagnant while South Dakota's industry was expanding. Indeed, while South Dakota's industry was expanding, Chinese export shares remained stagnant at about 24 percent, indicating that China's industry is unlikely to have influenced South Dakota's industry. Moreover, from 2019 to 2023, when Chinese export shares grew, South Dakota's industry saw some of its highest growth, further indicating that Chinese competition is unlikely to influence South Dakota's industry. Even when South Dakota's outlier years are removed, Chinese export shares continued to remain stagnant at about 24 percent while South Dakota's industry grew. In sum, Chinese competition does not seem to have an impact on South Dakota's industry trends.

Figure 122: United States' and China's shares of global exports of the capacitor, resistor, coil, transformer, and other inductor manufacturing industry

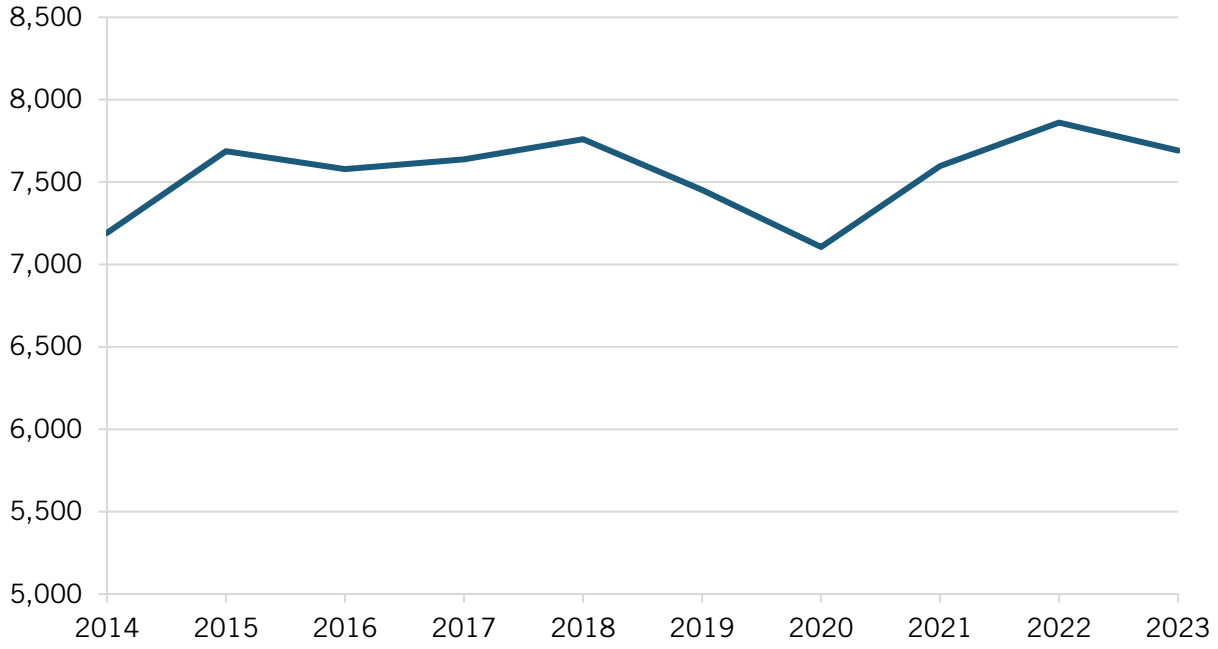


Tennessee: Major Household Appliance Manufacturing Industry (NAICS 335220)

A core industry in Tennessee is the major household appliance manufacturing industry, defined as "establishments primarily engaged in manufacturing household-type cooking appliances, household-type laundry equipment, household-type refrigerators, upright and chest freezers, and other electrical and nonelectrical major household-type appliances, such as dishwashers, water heaters, and garbage disposal units."[381] The major household appliance manufacturing companies in Tennessee include Mills Products Inc. and Zip Products, Inc.[382] The primary products produced by these companies include refrigerators, household, absorption type, electrical (SITC: 77521), instantaneous gas water heaters (SITC: 74181), solar water heaters (SITC: 74182), and others.[383]

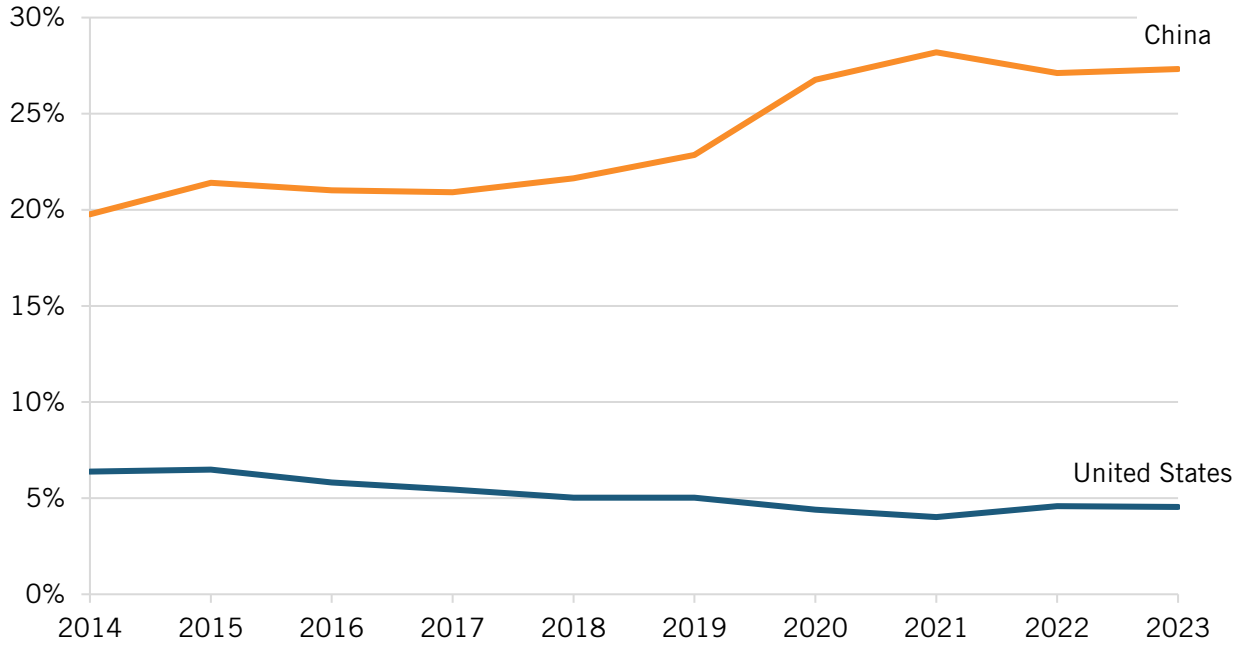
Over the past 10 years (available data), the major household appliance manufacturing industry in Tennessee has contracted. Indeed, from 2014 to 2023, Tennessee's industry's employees grew 7 percent from 7,191 to 7,691 workers while U.S. manufacturing sector's employees rose 8 percent. As such, this indicates that Tennessee's industry has not kept up with the manufacturing sector's growth and was thus a smaller portion of the overall manufacturing sector in 2023 compared with 2014.

Figure 123: Employment in major household appliance manufacturing in Tennessee



Corresponding with the time period above, from 2014 to 2023, China's exports to the world rose while Tennessee's industry experienced a slight contraction. Indeed, while Tennessee's employees contracted, China's exports as a share of the global exports also rose from 19.8 percent to 27.3 percent, indicating that Chinese competition could have impacted the Tennessee's industry's trends.[384] In sum, Chinese exports in the industry are negatively correlated with Tennessee's industry growth and thus could have an impact on its future success.

Figure 124: United States' and China's shares of global exports of major household appliances



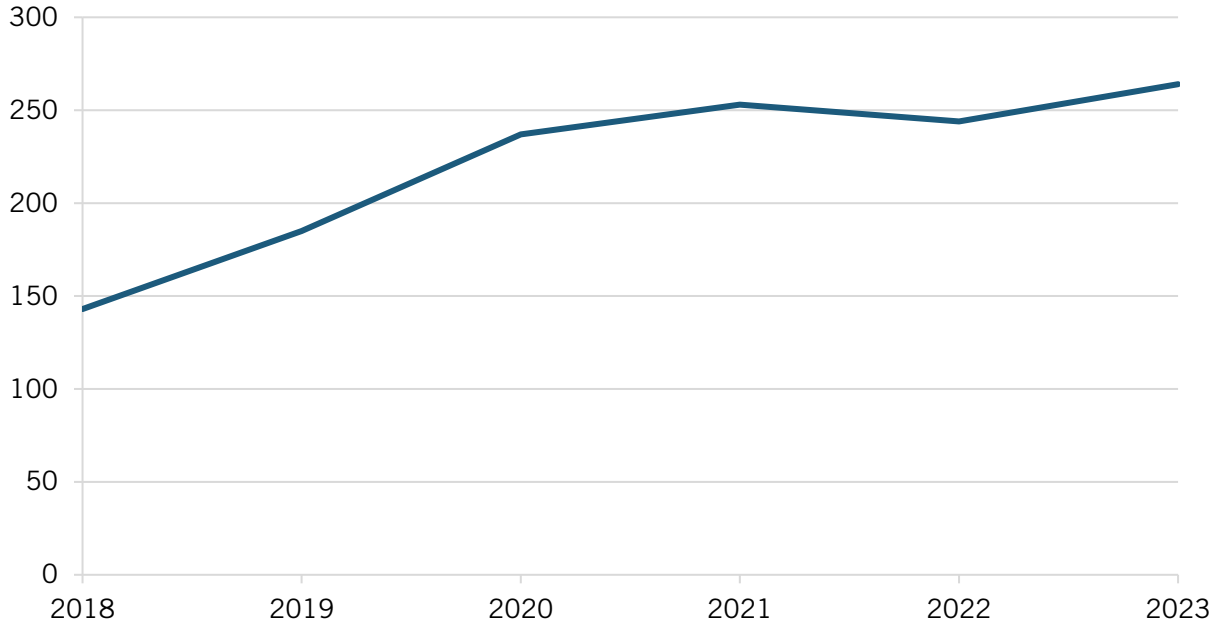
China's major household appliance manufacturing industry unfairly competes with its global competitors. Indeed, the Chinese government has a history of providing demand-side subsidies that bolster the industry. For instance, in 2009 the Chinese government launched the "Home Appliance to Rural Areas" program that exempted 13 percent of the value-added tax for select room air conditioner models that were sold to rural households as a way to bolster domestic sales in household appliances and counter the country's decline in exports.[385] Then in 2012, the Chinese government launched a subsidy program with a budget of $3.8 billion for five household appliances: room air conditioners, refrigerators, TVs, washing machines, and water heaters.[386] At the local level, Beijing's city government also launched a three-year subsidy program for room air conditioners, TVs, and refrigerators that would provide up to $118 per appliance unit.[387] More recently, in 2024, the Chinese government launched a subsidy program worth up to 15 percent of a product's sales price for consumers purchasing energy and water-efficient household appliances.[388] As such, Tennessee's industry may not have declined, but these subsidies likely bolstered the Chinese household appliances industry, leading to its ability to become more competitive and stifle the growth of Tennessee's industry.

Texas: Electric Lamp Bulb and Part Manufacturing Industry (NAICS: 335110)

A core industry in Texas is the electric lamp bulb and part manufacturing industry (NAICS: 335110), defined as "establishments primarily engaged in manufacturing electric light bulbs and tubes, and parts and components (except glass blanks for electric light bulbs)."[389] The electric lamp bulb and part manufacturing companies in Texas include Luminator Holding L.P., Lighting Science Group Corp., and Light Process Co.[390] The primary products produced by these companies include tungsten halogen filament lamps designed for a voltage not exceeding 100V (SITC: 77821), discharge lamps, (ex ultraviolet), fluorescent, hot cathode (SITC: 77822), arc lamps (SITC: 77824), and others.[391]

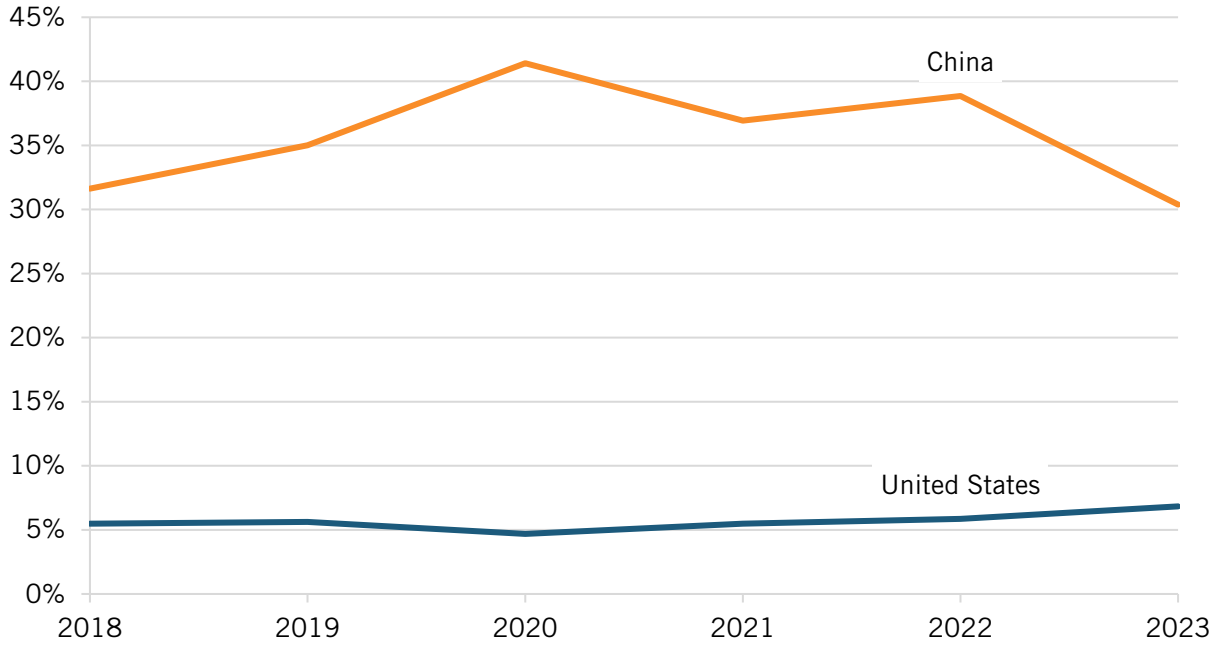
Over the past six years (available data), the electric lamp bulb and part manufacturing industry in Texas has expanded. Indeed, Texas's employees in the industry rose a hefty 85 percent from 143 in 2018 to 264 in 2023 while the overall U.S. manufacturing sector rose only 8 percent.[392] This indicates that Texas's electric lamp bulb industry grew 10 times faster than did the overall U.S. sector.[393] When examined more closely, Texas's industry saw a very slight decline from 2021 to 2022, but has generally trended upward.[394]

Figure 125: Employment in electric lamp bulb and part manufacturing in Texas



Corresponding with the time period above, from 2018 to 2023, China's exports to the world declined while Texas's electric lamp bulb and parts manufacturing was expanding. Indeed, while Texas' industry's employees expanded, China's exports as a share of the global exports declined slightly from 31.6 percent to 30.4 percent, indicating that Chinese competition could have some impact on Texas's industry.[395] However, when examined closer, when Chinese exports rose from 2018 to 2020, Texas's industry also rose.[396] And when Chinese exports declined from 2020 to 2023, Texas's industry continued to rise.[397] As such, Chinese competition may not have any influence over Texas's industry, as Chinese exports change in both directions regardless of Texas's rise.

Figure 126: United States' and China's shares of global exports of the electric lamp bulb and part manufacturing industry

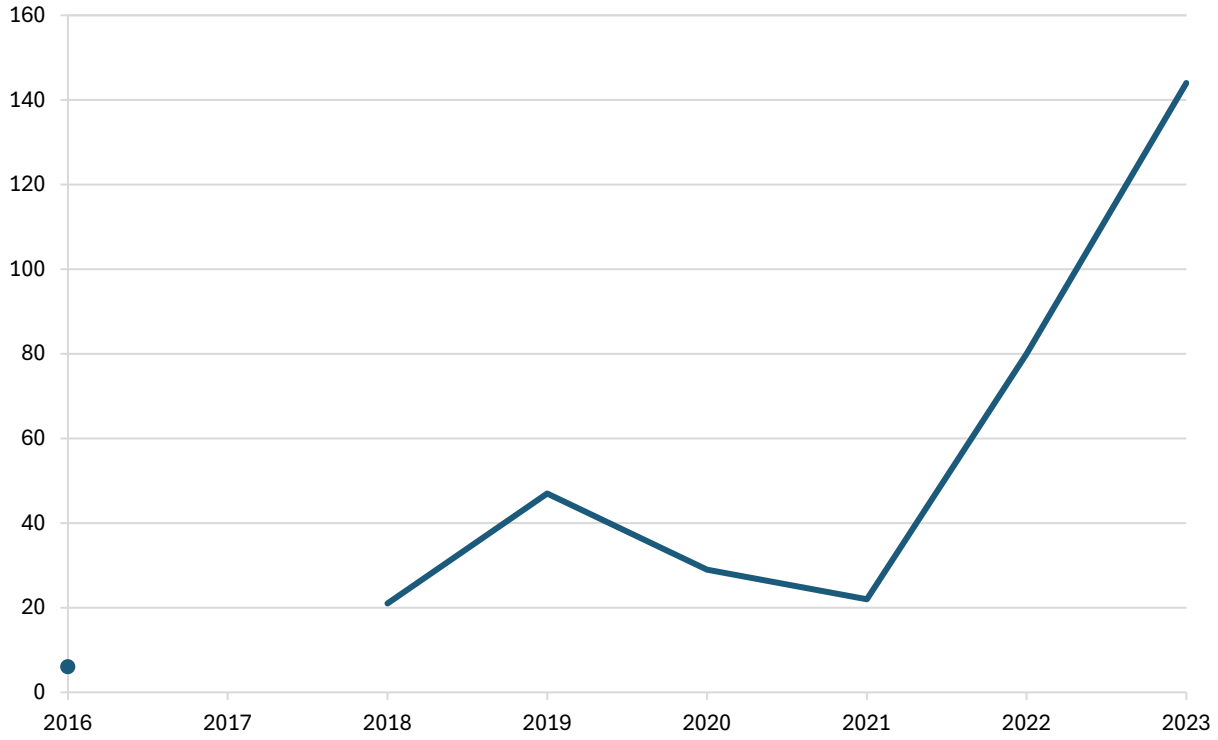


Utah: Photographic and Photocopying Equipment Manufacturing (NAICS 333316)

A core industry in Utah is the photographic and photocopying equipment manufacturing industry, which "comprises establishments primarily engaged in manufacturing photographic and photocopying equipment, such as cameras (except television and video), projectors, film developing equipment, photocopying equipment, and microfilm equipment."[398] The photographic and photocopying equipment manufacturing companies in Utah include Royce Imagining Technologies and Cordin Scientific Imaging.[399] The primary products produced by these companies include thermocopying apparatus (SITC: 75196), instant print cameras (SITC: 88111), and projectors for film over 16 mm in width (SITC: 88122).[400]

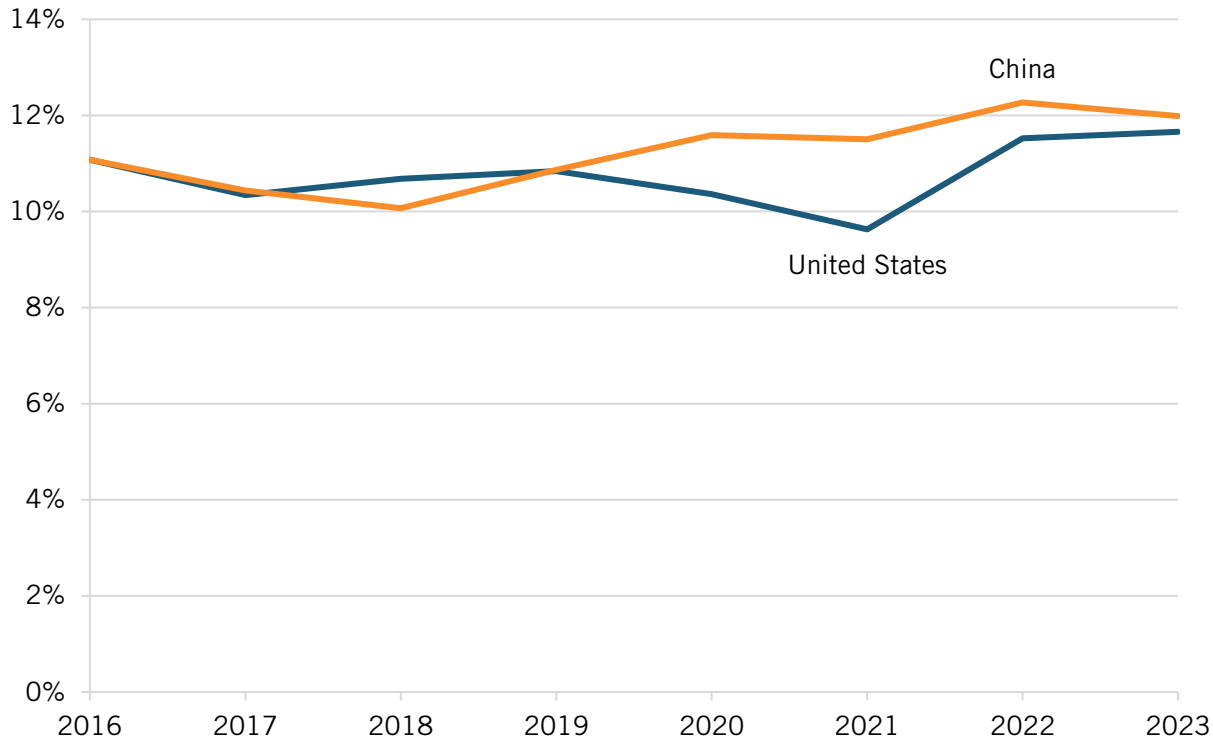
Over the past eight years (available data), the photographic and photocopying equipment manufacturing industry in Utah has expanded. Indeed, from 2016 to 2023, Utah's industry grew 24 times (or 2,400 percent) from 6 to 144 employees while the U.S. manufacturing sector's employees only grew 6.4 percent. As such, this indicates that Utah's industry has far surpassed U.S. manufacturing sector's growth and expanded its share of the overall manufacturing sector. However, it should be noted that Utah's industry's high growth came from 2021 to 2023 when the industry rose 555 percent from 22 employees to 144 employees. Without these three outlier years, the industry would have still significantly surpassed the U.S. manufacturing sector's growth (1 percent growth) but at the lower rate of 267 percent. Although information is limited, the sudden growth could have been a combination of recovering from the pandemic and structural changes (i.e., a new factory) in the state's industry.

Figure 127: Employment in photographic and photocopying equipment manufacturing in Utah (no data for 2017)



Corresponding with the time period above, from 2016 to 2023, China's exports to the world rose while Utah's industry was also rising. Indeed, while Utah's industry's employees expanded, China's exports as a share of the global exports also rose slightly from 11.1 percent to 12 percent, indicating that Chinese competition is unlikely to have impacted Utah's industry trends, as both are positively correlated.[401] Corroborating this, while Chinese exports as a share of the total world exports rose, U.S. exports in the industry also rose 11.1 percent to 11.7 percent, showing that Chinese companies were unlikely to be taking market shares away from Utah and the United States.[402]

Figure 128: United States' and China's shares of global exports of photographic and photocopying equipment

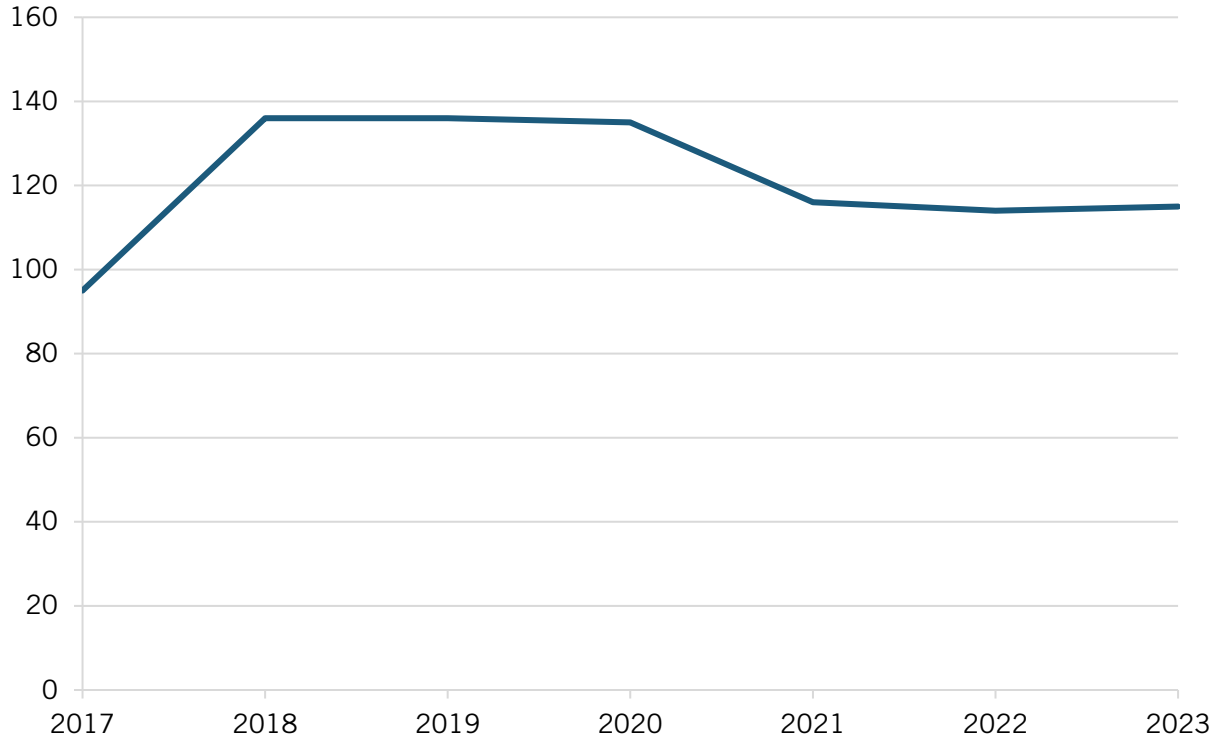


Vermont: Scale and Balance Manufacturing Industry (NAICS 333997)

A core industry in Vermont is the scale and balance manufacturing industry, which "comprises establishments primarily engaged in manufacturing scales and balances, including those used in laboratories."[403] The scale and balance manufacturing industry companies in Vermont include Naepac and Logical Machines.[404] The primary products produced by these companies include scales for continuous weighing of goods on conveyors (SITC: 74531), digital weight indicators (SITC: 74539), weighing machines, nesoi (SITC: 74531), and others.[405]

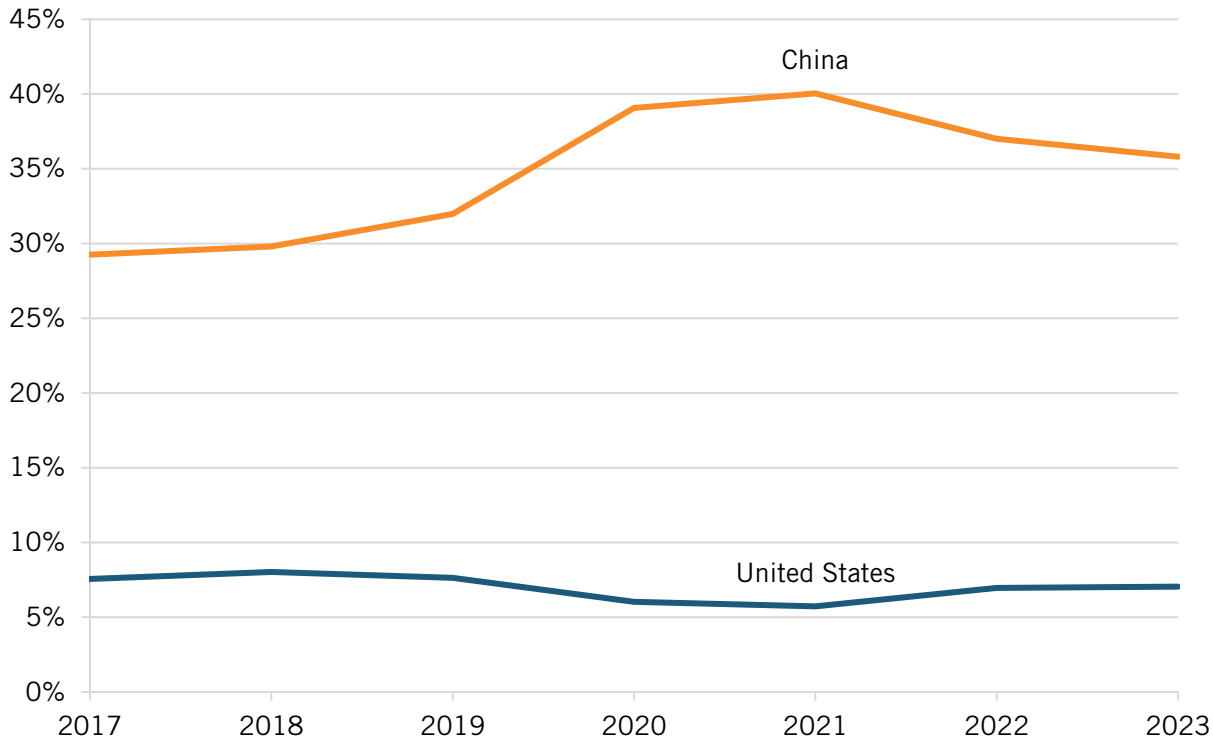
Over the past seven years (available data), the scale and balance manufacturing industry in Vermont has expanded. Indeed, from 2017 to 2023, Vermont's industry's employees grew 21 percent from 95 to 115 workers while U.S. manufacturing sector's employees rose only 5.2 percent. As such, this indicates that Vermont's industry has surpassed the U.S. manufacturing sector's growth and is a larger share of the sector than in 2017. When examined more closely, Vermont's industry has had periods of growth (2017–2020) and decline (2020–2023) but has generally trended upward.

Figure 129: Employment in scale and balance manufacturing in Vermont



Corresponding with the time period above, from 2017 to 2023, China's exports to the world in the scale and balance manufacturing industry grew while Vermont's industry also expanded. Indeed, while Vermont's industry's employees grew, China's exports as a share of the global exports experienced the highest percentage point growth of 178 nations with available data, from 29.3 percent to 35.8 percent. As such, this indicates that Chinese competition is unlikely to have an impact on Vermont's industry trends, as both Chinese exports and Vermont's industry are positively correlated. Further corroborating this, as Vermont's industry expanded from 2017 to 2020—42 percent compared with U.S. manufacturing's 2.4 percent—Chinese export share also expanded, from 29.3 percent to 39.1 percent. And when Vermont's industry trended downward (-15 percent vs. U.S. manufacturing's 2.8 percent growth) afterward, Chinese exports also trended downward from 39.1 percent to 35.8 percent. In sum, Chinese competition is unlikely to have influenced Vermont's industry trends.

Figure 130: United States' and China's shares of global exports of the scale and balance manufacturing industry

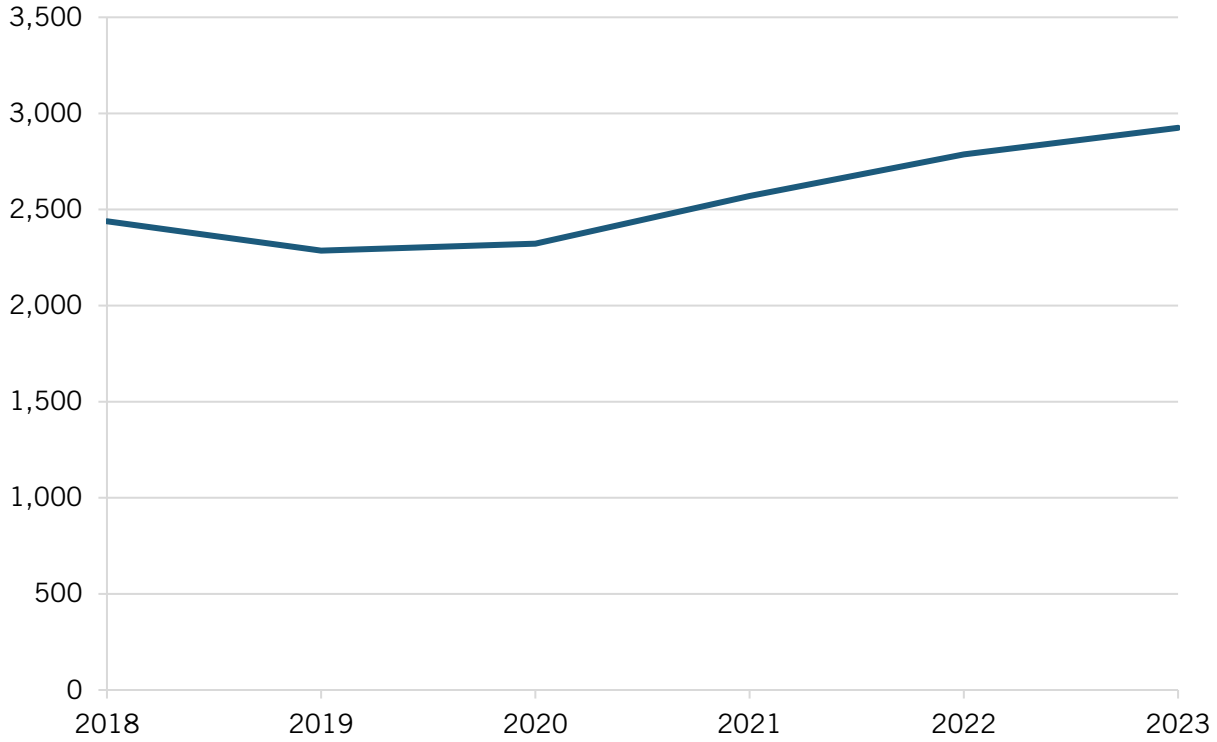


Virginia: Power-Driven Handtool Manufacturing Industry (NAICS 333991)

A core industry in Virginia is the power-driven hand tool manufacturing industry, defined as "establishments primarily engaged in manufacturing power-driven (e.g., battery, corded, pneumatic) handtools, such as drills, screw guns, circular saws, chain saws, staplers, and nailers."[406] The power-driven hand tool manufacturing companies in Virginia include Amthor International Inc., Solution Matrix Inc., and Thomas Systems Inc.[407] The primary products produced by these companies include powder-actuated hand tools and parts, base metal (SITC: 69546), sand blasting machines (SITC: 74563), electric hand drills, rotary, battery powered (SITC: 77841), and others.[408]

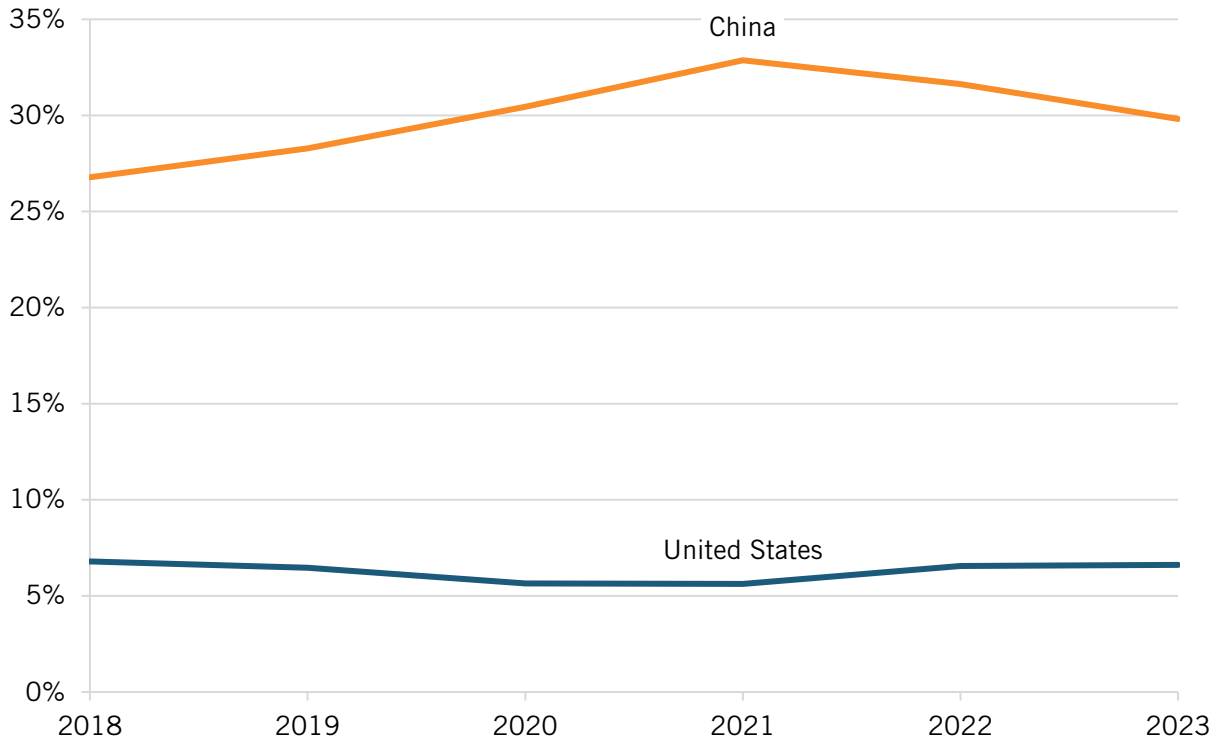
Over the past six years (available data), the power-driven hand tool manufacturing industry in Virginia has expanded. Indeed, from 2018 to 2023, Virginia's industry's employees grew 20 percent from 2,439 to 2,925 employees while U.S. manufacturing sector's employees grew only 3.5 percent. As such, this indicates that Virginia's industry's growth has surpassed the overall manufacturing sector and therefore grown to be a higher share of the manufacturing sector than in 2018.

Figure 131: Employment in power-driven hand tool manufacturing in Virginia



Corresponding with the time period above, from 2018 to 2023, China's exports to the world rose while Virginia's power-driven hand tool manufacturing industry was also expanding. Indeed, while Virginia's industry's employees rose, China's exports as a share of the global exports also rose from 26.8 percent to 29.8 percent, indicating that Chinese competition is unlikely to have influenced Virginia's industry trends.[409] Moreover, while Chinese exports as a share of global exports also grew, U.S. power-driven hand tool manufacturing industry's exports remained relatively stable at about 6 to 7 percent, further indicating that Chinese competition is unlikely to have an impact on its U.S. counterparts.

Figure 132: United States' and China's shares of global exports of power-driven hand tools

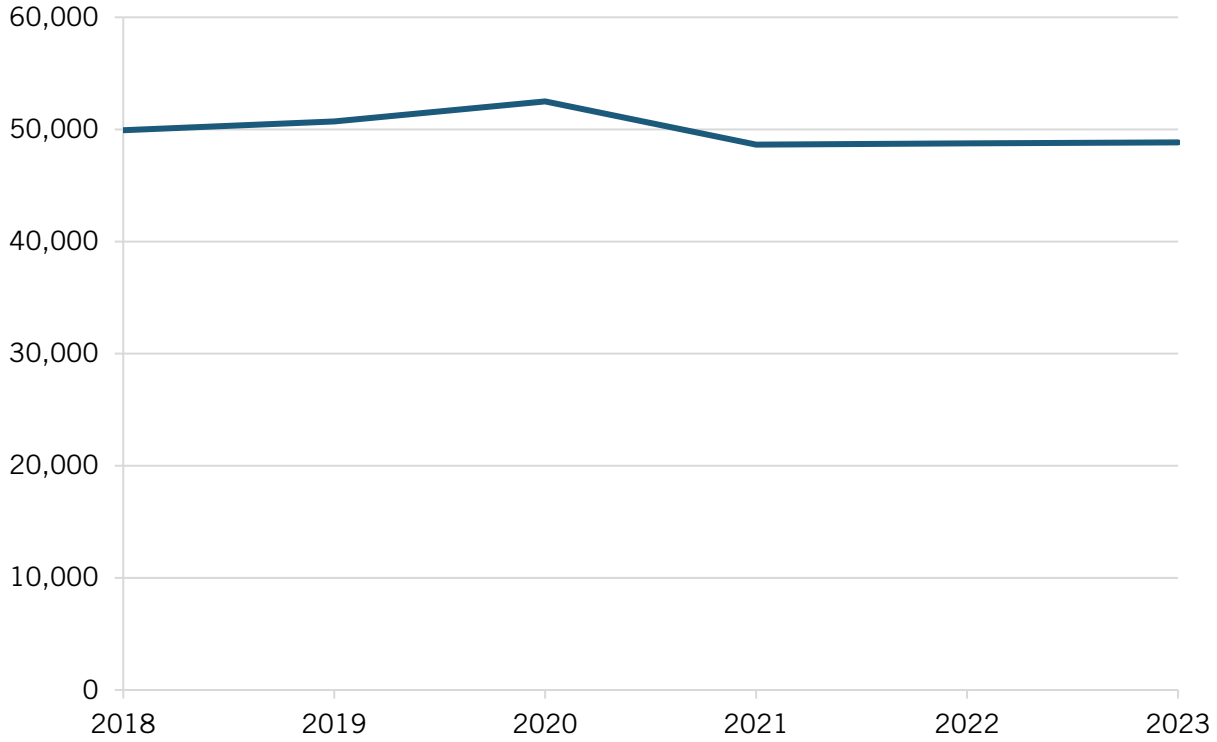


Washington: Aircraft Manufacturing (NAICS 336411)

A core industry in Washington is the aircraft manufacturing industry (NAICS: 336411), defined as "establishments primarily engaged in one or more of the following: (1) manufacturing or assembling complete aircraft; (2) developing and making aircraft prototypes; (3) aircraft conversion (i.e., major modifications to systems); and (4) complete aircraft overhaul and rebuilding (i.e., periodic restoration of aircraft to original design specifications)."[410] The aircraft manufacturing companies in Washington include Aerospace Defense, Inc., Jetoptera, Inc., and Northwest Dynamics, Inc.[411] Historically, the Boeing Company, the United States' major aircraft manufacturer, was also headquartered in Washington, from its founding in 1916 until its move to Virginia in 2023. The primary products produced by these companies include hang gliders (SITC: 79284), airplanes and other aircraft, of an unladen weight not exceeding 450 kg (SITC: 79220), unmanned aircraft designed for the carriage of passengers (SITC: 79240), and others.[412]

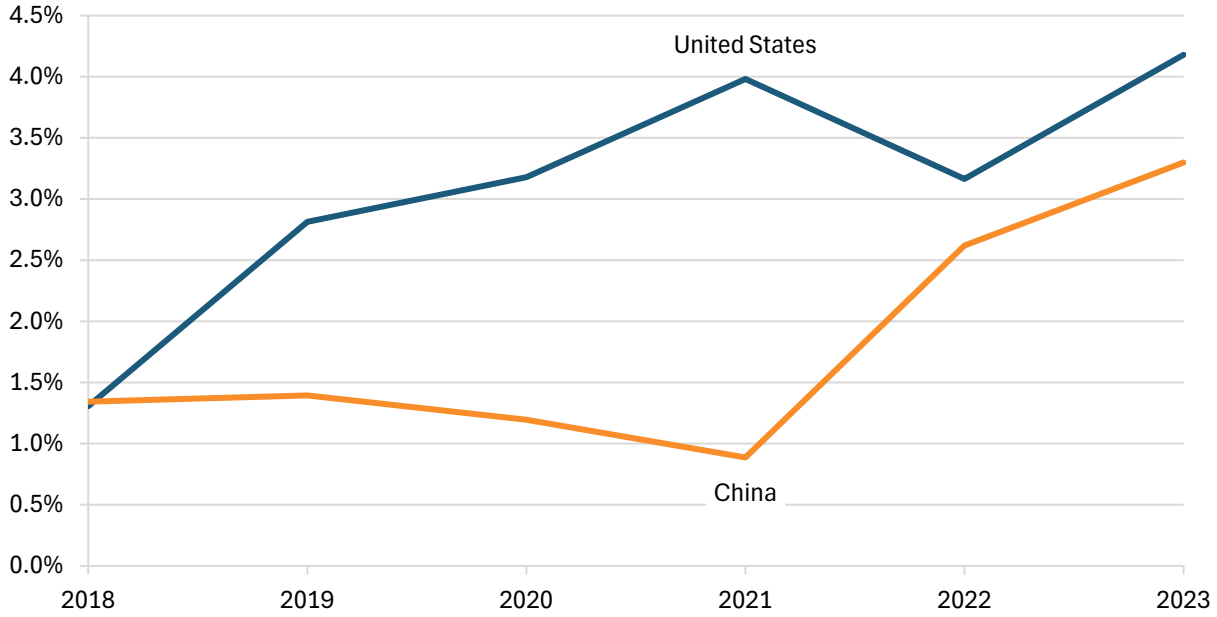
Over the past six years (available data), the aircraft manufacturing industry in Washington has contracted. Indeed, from 2018 to 2023, Washington's industry's employees declined 2.2 percent from 49,923 to 48,843 while U.S. manufacturing sector's employees grew 3.5 percent.[413] As such, this indicates that Washington's industry's growth has fallen below that of the overall manufacturing sector and has therefore shrunk to be a smaller share of the manufacturing sector than in 2018.

Figure 133: Employment in the aircraft manufacturing industry in Washington



Corresponding with the time period above, from 2018 to 2023, China's exports to the world rose while Washington's aircraft manufacturing industry was contracting. Indeed, while Washington's employees contracted, China's exports as a share of the global exports rose from 1.3 percent to 3.3 percent.[414] From this perspective, China may have played a role in the contraction of Washington's aircraft manufacturing industry. However, when examined closer, from 2019 to 2021, Washington's employees contracted while Chinese exports share also declined from 1.3 percent to 0.9 percent.[415] And from 2021 to 2023, when Washington's employees remained relatively stagnant, China's export share rose from 0.9 percent to 3.3 percent.[416] As such, this correlation suggests that competition from Chinese aircraft manufacturers may not have any influence over Washington's industry trends.

Figure 134: United States' and China's shares of global exports of the aircraft manufacturing industry



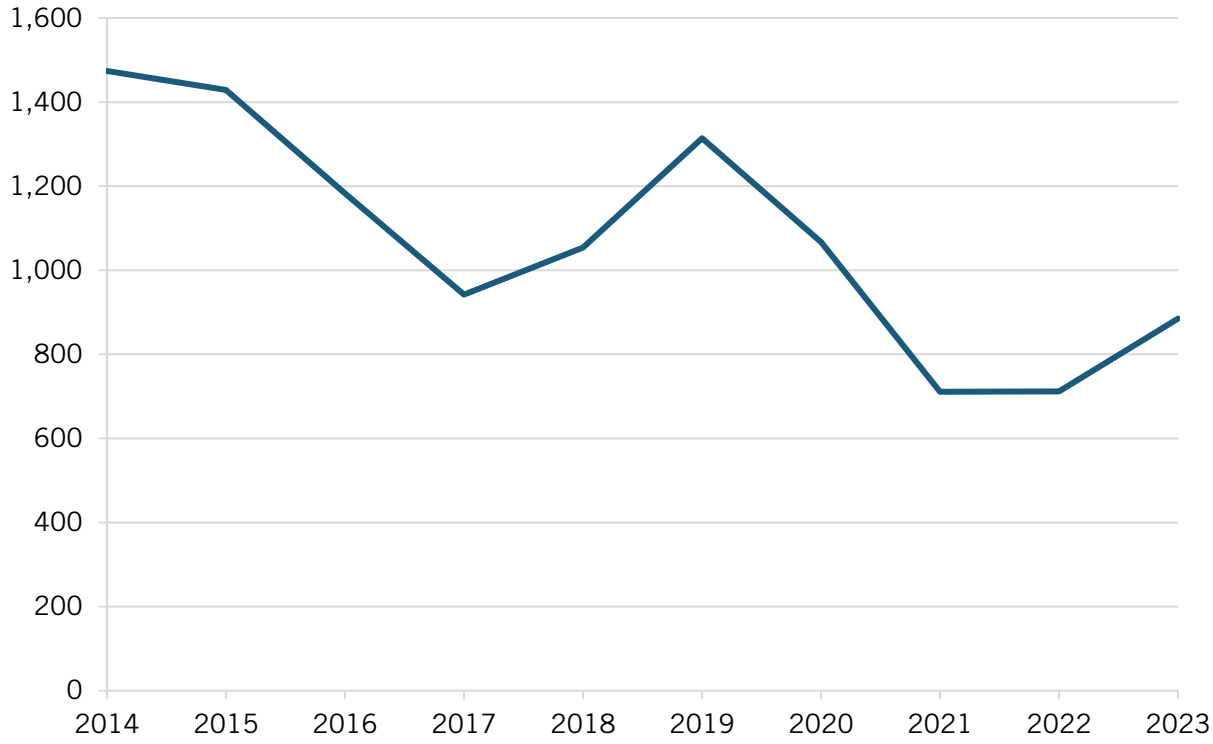
Despite not having much impact on Washington's aircraft manufacturing industry, China's main aircraft manufacturer COMAC does not compete fairly with its global competitors. The company is a state-owned enterprise that regularly receives subsidies from the Chinese government. Indeed, in 2025, COMAC received $6.2 billion in capital injections from eight state-owned shareholders to support the production of C919 aircraft.[417] As a result, COMAC's capital increased to $13.8 billion from $7.4 billion.[418] Historically, COMAC has also received other grants and benefits from the Chinese government to bolster the industry and its exports. A report by the Center for Strategic and International Studies concludes that COMAC received between $49 billion and $72 billion in state-related support through 2020, which has helped it build and sell 148 planes.[419] As a result, COMAC's global competitors Boeing and Airbus have had to put off the delivery of more than 100 planes to Chinese airlines.[420] In sum, COMAC's receipt of state support has led to unfair competition with its global competitors Boeing and Airbus.

West Virginia: Mining Machinery and Equipment Manufacturing Industry (NAICS 333131)

A core industry in West Virginia is the mining machinery and equipment manufacturing industry, defined as "establishments primarily engaged in (1) manufacturing underground mining machinery and equipment, such as coal breakers, mining cars, core drills, coal cutters, and rock drills, and (2) manufacturing mineral beneficiating machinery and equipment used in surface or underground mines."[421] The mining machinery and equipment manufacturing companies in West Virginia include Cogar Manufacturing, FX Mineral Processing Inc, and Petitto Mine Equipment.[422] The primary products produced by these companies are coal or rock cutters and tunneling machinery, self-propelled (SITC: 72335), boring or sinking machinery, self-propelled (SITC: 72337), parts of coal or rock cutters, and tunneling machinery (SITC: 72399), and others.[423]

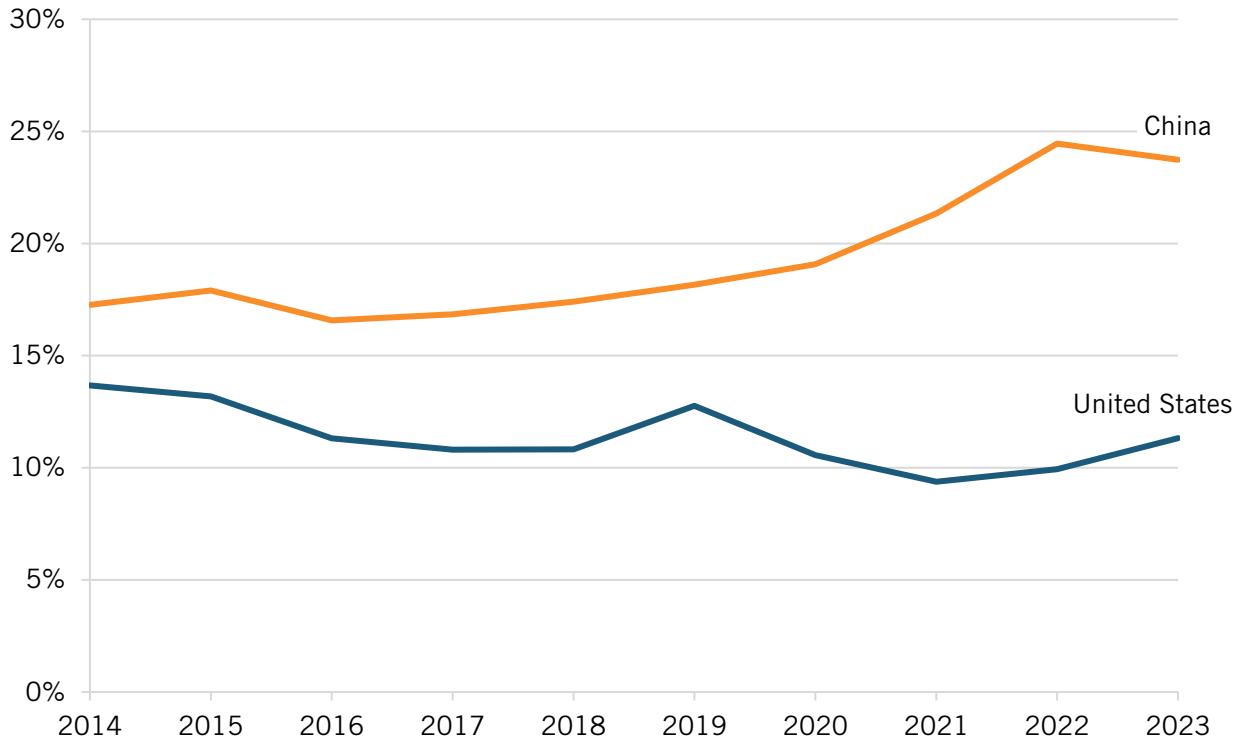
Over the past 10 years (available data), the mining machinery and equipment manufacturing industry in West Virginia has contracted. Indeed, from 2014 to 2023, West Virginia's industry's employees declined 40 percent while U.S. manufacturing sector's employees grew 8 percent. As such, this indicates that West Virginia's industry did not keep up with the manufacturing sector's growth and has therefore reduced its share of the overall manufacturing sector compared with 2014. When examined closer, West Virginia's industry has experienced periods of growth and decline, but has generally trended downward.

Figure 135: Employment in mining machinery and equipment manufacturing in West Virginia



Corresponding with the time period above, from 2014 to 2023, China's exports to the world rose while West Virginia's and the overall U.S. mining machinery and equipment manufacturing industry was contracting. Indeed, while West Virginia's industry's employees contracted, China's exports as a share of the global exports had the highest percentage point growth of 184 nations with available data.[424] Accordingly, China's exports as a share of global exports rose 6.5 percent from 17.3 percent to 23.7 percent.[425] In other words, Chinese firms could have influenced West Virginia's industry decline. Further corroborating this, while Chinese export shares rose, the overall U.S. mining machinery exports declined from 13.7 percent to 11.3 percent, indicating that Chinese competition could have an impact on its U.S. competitors. However, in the short run, Chinese competition likely does not have an impact on West Virginia's industry, as Chinese exports have seen a relatively smooth growth despite West Virginia's industry going through periods of growth and decline.

Figure 136: United States' and China's shares of global exports of mining machinery and equipment



China's mining machinery and equipment manufacturing industry unfairly competes with its global competitors. The Chinese government has historically provided subsidies to upstream industries that rely on mining machinery that have bolstered not only the upstream industries' competitiveness but also the demand and competitiveness of the mining machinery industry as well. Indeed, a report by the International Institute for Sustainable Development estimates that the Chinese government provided about $5.8 billion in government support and between $570 million and $5.8 billion in credit support to the coal production industry, which relies on mining machinery to thrive.[426] Moreover, China provided $9 billion to $10 billion in government support from 2010 to 2019 to rare earth companies, which also rely on mining machinery.[427] As such, this generous subsidy to the coal production industry has likely led to greater demand for mining machinery, thereby bolstering the competitiveness of China's mining machinery industry.

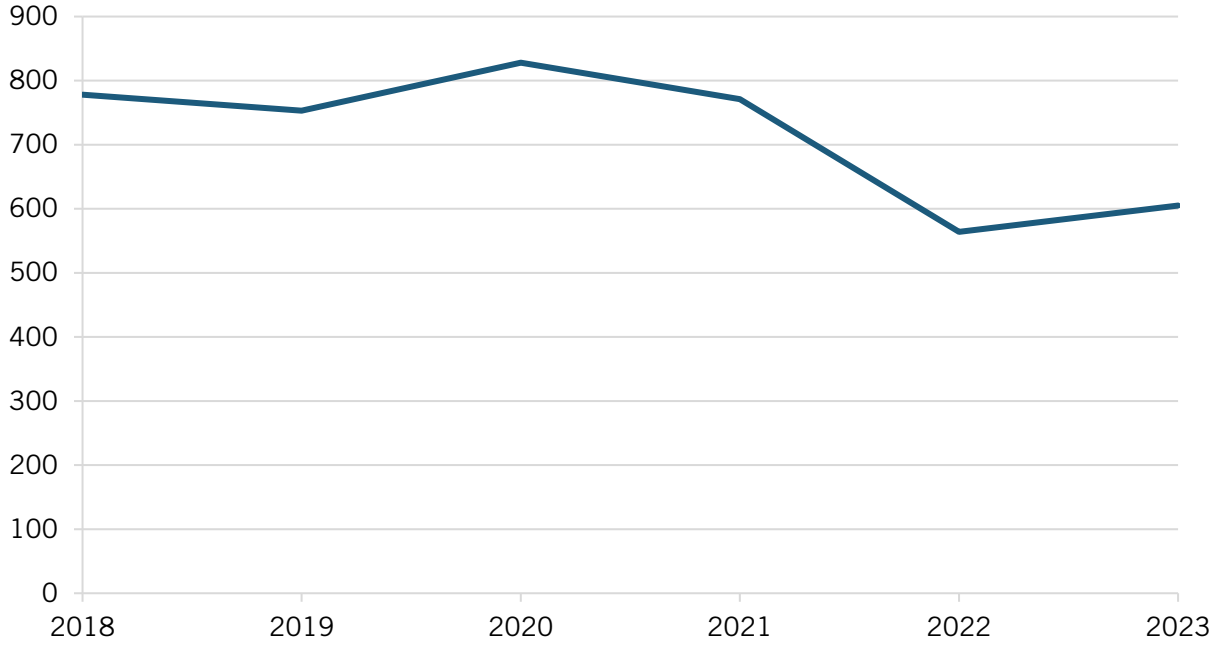
Moreover, the Chinese government has also provided direct support to its mining machinery industry. For instance, in 2019, the Chinese government provided Zhengzhou Coal Mining Machinery Group Co. Ltd. with $23 billion in government subsidies.[428] A report on the mining machinery industry in China also finds that the Chinese government has offered subsidies and incentives for mining machinery companies investing in R&D initiatives.[429] Finally, the Chinese government has also bolstered its mining machinery industry with demand-side subsidies. Indeed, the Chinese government has provided subsidies and tax incentives for mining machinery equipment upgrades, covering 10 to 20 percent of capital expenditures for qualifying projects.[430] As such, the Chinese government has unfairly bolstered the competitiveness of its mining machinery industry and unfairly taken away market shares from West Virginia's industry.

Wisconsin: Scale and Balance Manufacturing Industry (NAICS 333997)

A core industry in Wisconsin is the scale and balance manufacturing industry, which "comprises establishments primarily engaged in manufacturing scales and balances, including those used in laboratories."[431] The scale and balance manufacturing companies in Wisconsin include Rice Lake Weighing Systems Inc., Badger Scale Inc., and Digit-Star Holdings Inc.[432] The primary products produced by these companies include scales for continuous weighing of goods on conveyors (SITC: 74531), digital weight indicators (SITC: 74539), weighing machines, nesoi (SITC: 74531), and others.[433]

Over the past six years (available data), the scale and balance manufacturing industry in Wisconsin has declined slightly. Indeed, from 2018 to 2023, Wisconsin's industry's employees declined 22 percent from 778 to 605 employees while U.S. manufacturing sector's employees grew 3.5 percent. As such, this indicates that Wisconsin's industry has not kept up with the manufacturing sector's growth and therefore reduced its share of the manufacturing sector since 2018. The sector saw its largest decline from 2021 to 2022 with employees dropping from 771 to 564.

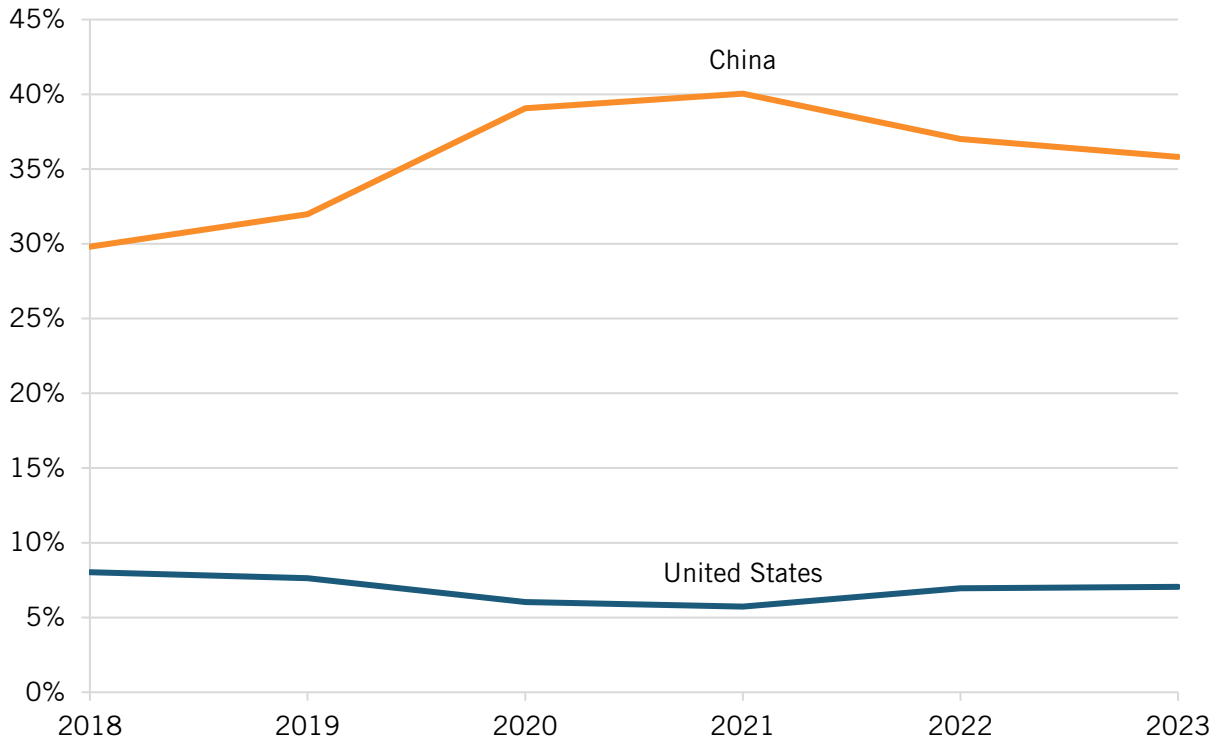
Figure 137: Employment in scale and balance manufacturing in Wisconsin



Corresponding with the time period above, from 2018 to 2023, China's exports to the world rose while Wisconsin's industry was contracting. Indeed, while Wisconsin's scale and balance manufacturing employees declined, China's exports as a share of the global exports experienced the highest percentage point growth of 178 nations with available data. Its exports rose 6.6 percent from 29.8 percent to 35.8 percent, indicating that Chinese competition could have influenced Wisconsin's industry's decline.[434] Corroborating this, Chinese competition could have played a role in the overall U.S. scale and balance manufacturing industry, as U.S. exports share in the industry declined while Chinese exports share rose, and vice versa. From 2018 to 2021, while the U.S. industry's exports share declined from 8 percent to its lowest point of 5.7 percent, Chinese exports rose from 29.8 percent to their highest point of 40 percent.[435] In contrast, from

2021 to 2023, when Chinese exports share declined from 40 percent to 35.8 percent, U.S. exports share rose from 5.7 percent to 7.1 percent.[436] As such, Chinese competition in the scale and balance manufacturing industry could have some influence on Wisconsin and the overall U.S. scale and balance manufacturing industry's growth.

Figure 138: United States' and China's shares of global exports of the scale and balance manufacturing industry

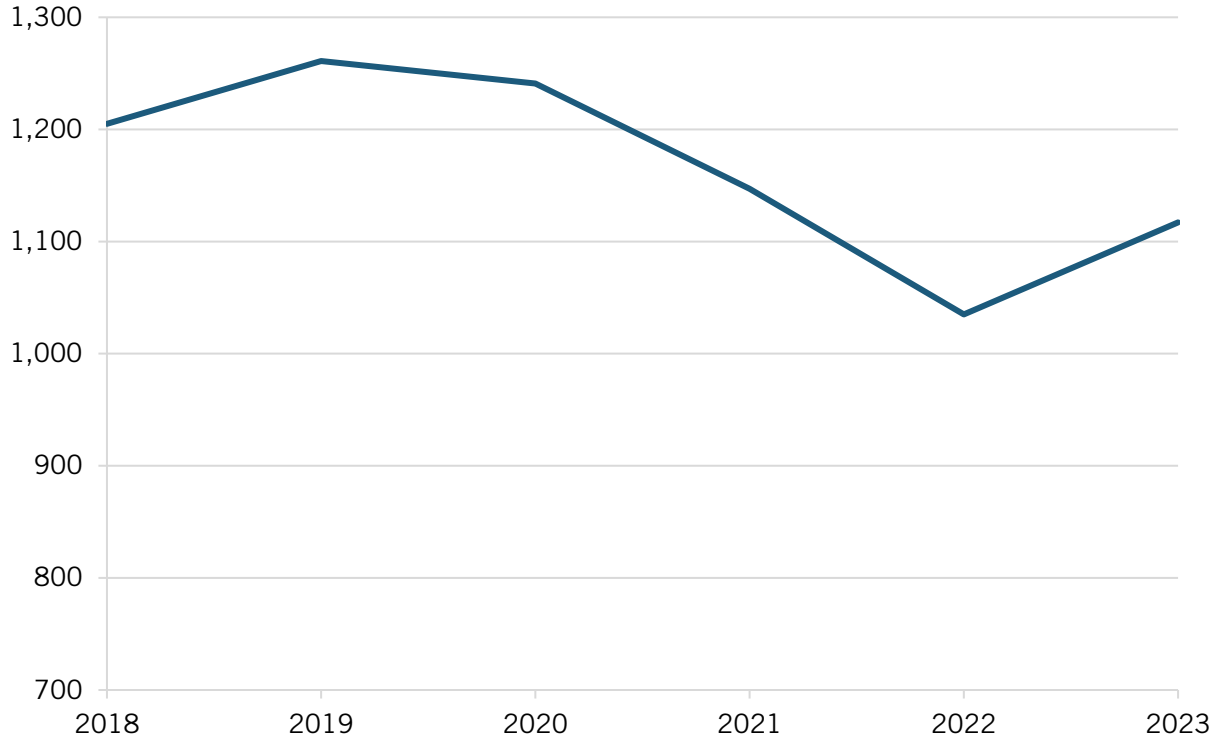


Wyoming: Other Basic Inorganic Chemical Manufacturing Industry (NAICS 325180)

A core industry in Wyoming is the other basic inorganic chemical manufacturing industry, which is defined as "establishments primarily engaged in manufacturing basic inorganic chemicals (except industrial gases and synthetic dyes and pigments)."[437] The other basic inorganic chemical manufacturing companies in Wyoming include Imerys Perlite USA, Inc., Sisecam Wyoming LLC, and Solvay Chemicals, Inc.[438] The primary products produced by these companies include chlorine (SITC: 52224), bromine (SITC: 52225), mercury (SITC: 52227), and others.[439]

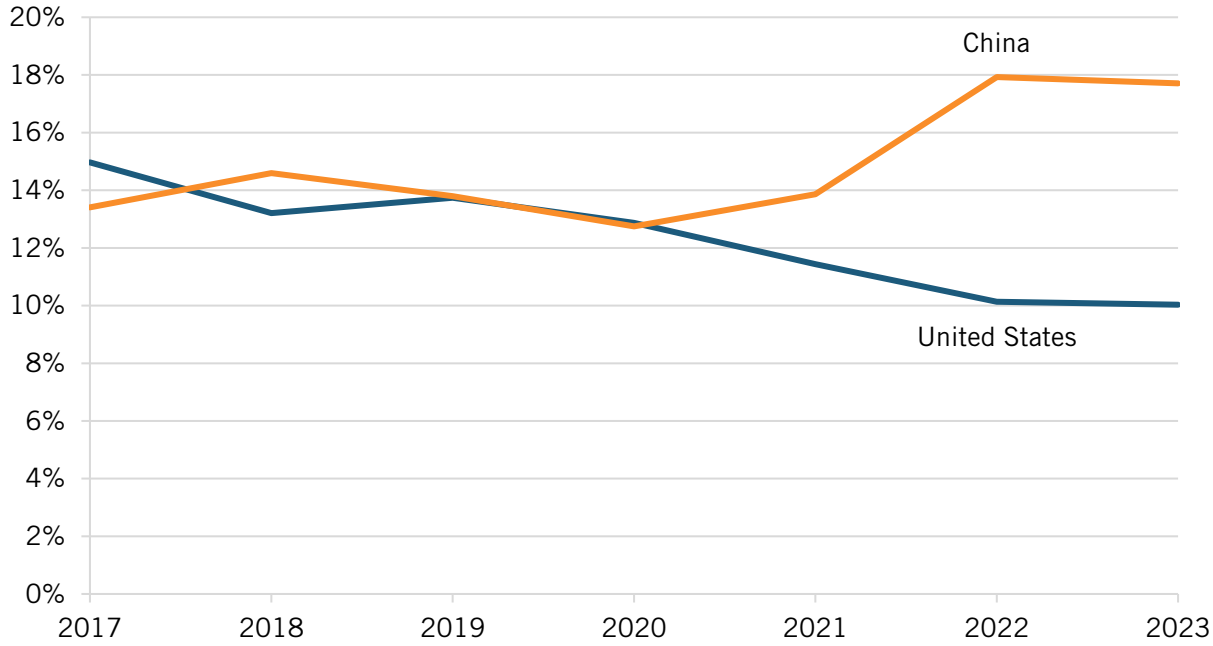
Over the past six years (available data), the other basic inorganic chemical manufacturing industry in Wyoming has contracted. Indeed, from 2018 to 2023, Wyoming's industry's employees declined 7 percent from 1,205 to 1,117 employees while U.S. manufacturing sector's employees grew 3.5 percent. As such, this indicates that Wyoming has not kept up with the U.S. manufacturing sector's expansion and was therefore a smaller share of the manufacturing sector in 2023 than in 2018.

Figure 139: Employment in other basic inorganic chemical manufacturing in Wyoming



Corresponding with the time period above, from 2017 to 2023, China's exports to the world rose while Wyoming's industry was contracting. Indeed, while Wyoming's industry's sales revenue and employees contracted, China's exports as a share of the global exports experienced the second-highest percentage point growth of 4.3 percentage points from 13.4 percent to 17.7 percent—only South Korea's growth surpassed it at 5.7 percentage points.[440] As such, this indicates that Chinese competition could have impacted Wyoming's industry trends. Corroborating this, while China's export share rose from 13.4 percent to 17.7 percent, U.S. export share declined from 15 percent to 10 percent, indicating that Chinese competition could indeed impact its U.S. counterparts.[441] More generally, an ITIF report concludes that China led the world with 29.1 percent of the chemical industry value-added output in 2020, growing from less than 5 percent in 1995.[442] In contrast, the United States' value-added output in 2020 was 18.3 percent, falling from 23.2 percent since 1995.[443] In sum, the growth of Chinese competitors is correlated with both the U.S. and Wyoming's other basic inorganic chemical manufacturing industry's decline and could have an impact on their future growth.

Figure 140: United States' and China's shares of global exports of the other basic inorganic chemical manufacturing industry



China's chemical industry unfairly competes with other global competitors. Indeed, China has historically bolstered its chemical industry in order to compete with U.S. and other foreign counterparts. In China's 12th Five-Year Plan (2011) the government stated that it intended to increase China's self-sufficiency in chemicals by creating national champions through government support.[444] As a result, according to a report by Kearney, state-owned chemical enterprises and private Chinese businesses have received support from multiple levels of government in the form of direct subsidies, low-cost capital with favorable terms, less-stringent enforcement of regulations, and privileges to land, water, waste treatment energy, and raw material access. For instance, an ITIF report has found that the Wanhua Chemical Group received government subsidies of $91.5 million in 2022 and had accumulated $252 million from government subsidies in prior years.[445] Meanwhile, Rongsheng Petrochemical Co., Ltd. received governmental subsidies of $330 million in 2022.[446] This clear advantage provided to Chinese chemical firms undoubtedly tilts the playing field against competitors in the United States and Wyoming, potentially harming their ability to gain and maintain their market shares.

CONCLUSION

The People's Republic of China is not a normal competitor. It does not play by the rules. And it seeks global domination in most advanced and strategic industries. Absent serious policy changes in the United States and among its allies, China will likely gain that domination, with the effects felt across all 50 states.[447] The evidence shows a consistent pattern: state-backed Chinese firms expand rapidly, capture global market share, and place sustained pressure on U.S. producers. While the degree of impact varies by industry, the broader trend points to a gradual erosion of U.S. industrial capacity in sectors critical to economic growth and national security. Absent a more coordinated and strategic policy response, these pressures are likely to intensify, further weakening the foundations of America's industrial competitiveness.

Declining Manufacturing Births Contribute to US Manufacturing Woes

TRELYSA LONG

Manufacturing start-ups, particularly in critical national economic power industries, are essential to the nation's economic and security strength. Yet, U.S. manufacturing start-ups have declined over the last three decades.

KEY TAKEAWAYS

- U.S. manufacturing start-ups are declining at a time when all other start-ups are growing. From 1989 to 2023, U.S. manufacturing start-ups declined 58 percent from an index of 100 to 42.5. All other start-ups grew from 100 to 104.6.
- Most of the decline occurred prior to 2009 and appears related to the significant drop in U.S. manufacturing competitiveness.
- Manufacturing start-ups have declined faster than total manufacturing firms. From 1989 to 2023, manufacturing start-ups declined from an index of 100 to 42.5, while total manufacturing firms declined from 100 to 74.8.
- The average manufacturing start-up is now smaller. Manufacturing start-ups' average number of employees fell from 9.2 in 1989 to 7.7 in 2023.
- Dual-use, enabling, and nonstrategic industries had very similar rates of decline, ranging from 57 percent to 60 percent. In contrast, defense industries had a much smaller rate at 45 percent. The is likely due to facing much less overseas competition.
- Manufacturing start-ups have not declined because of growing industry concentration, as 82.3 percent of manufacturing industries saw a decline or slight increase (< 5 percent) in concentration.
- To avoid losing more manufacturing strength to China in economic power industries, the United States should set a national goal of at least doubling the annual number of manufacturing start-ups in its economy.

INTRODUCTION

Start-ups play a crucial role in the evolution of economies.[1] No matter how healthy incumbent companies are, some will eventually shrink or even die. Moreover, start-ups are critical ways of injecting necessary innovation and enabling creative destruction.

National economic power industries, most of which are in manufacturing, are a cornerstone of national competitiveness and geopolitical independence. Yet, over the past three decades, the United States has seen a steep decline in manufacturing start-ups—a trend that bodes ill for the future of U.S. manufacturing. At one level, the decline should not be a surprise, given that real valued manufacturing output has declined as a share of gross domestic product (GDP).[2] But the decline in start-ups was 10 percent more than the decline in manufacturing output. And the average employment size of manufacturing start-ups has also declined.

Despite proclamations from policymakers and industry advocates—including former Energy Secretary Jennifer Granholm, who claimed that U.S. industrial policy "has revived American manufacturing, created jobs, and made our country more secure"—the underlying data tells a different story.[3] The decline in start-ups in what the Information Technology and Innovation Foundation (ITIF) defines as dual-use sectors and enabling sectors is particularly troubling as China continues to expand production in these critical industries. (See box 1.)

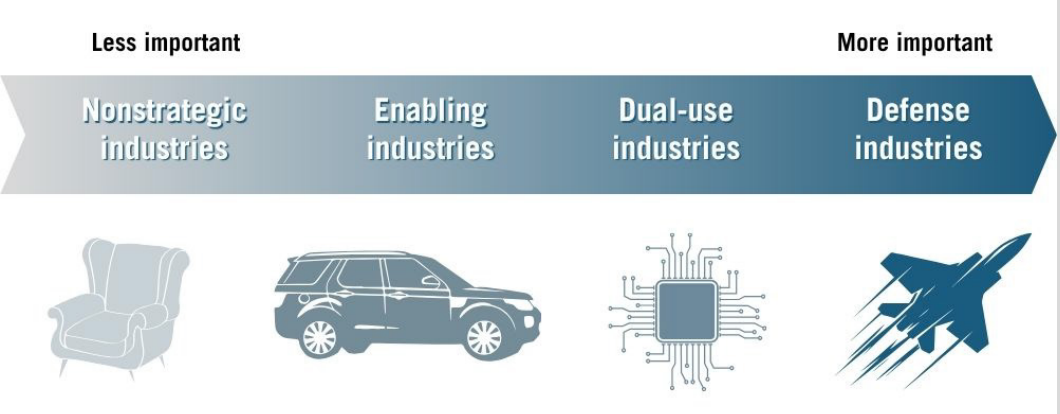
To ensure that the United States slows or, ideally, reverses its relative decline in national economic power industries, policymakers need to promote a more robust manufacturing start-up ecosystem and policy environment.

Box 1: Defining National Economic Power Industries

The conventional view is that defense industries are the only industries that matter to national power. But that is now vastly too limiting. As Corelli Barnett, wrote, "For munitions production for modern war is not primarily a question of specialized armament industries, as some suppose, but of all those varied industrial and scientific resources that in peacetime make for a successful and expanding export trade."[4]

With that in mind, ITIF has developed a classification of U.S. industries for their relevance to national power. This can be viewed as a continuum between defense industries on one side, nonstrategic industries on the other, and strategic industries and strategic enabling industries in the middle. See figure 1.

Figure 1: Industrial power scale



At one end of the continuum are defense industries. Clearly industries such as ammunition, guided missiles, military aircraft and ships, tanks, drones, defense satellites, and others are strategic. Not having world class innovation and production capabilities in these industries means a weakened military capability. Policymakers across the aisle generally agree that these industries are strategic and that market forces alone will not produce the needed results.

At the other end of the spectrum are industries in which the United States has no real strategic interests. These include furniture, coffee and tea manufacturing, bicycles, carpet and rug mills, window and door production, plastic bottle manufacturing, wind turbine production, lawn and garden equipment, sporting goods, jewelry, caskets, toys, toiletries, running shoes, etc. If worst came to worst and adversaries such as China gained dominance in any of these industries and decided to cut America off, we'd survive.

Next to defense industries, dual-use industries are critical to American strength. Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give our adversaries incredible leverage over America. Just the threat of cutting these off (assuming that they have also deindustrialized our allies in these sectors) would immediately bring U.S. policymakers to the bargaining table.

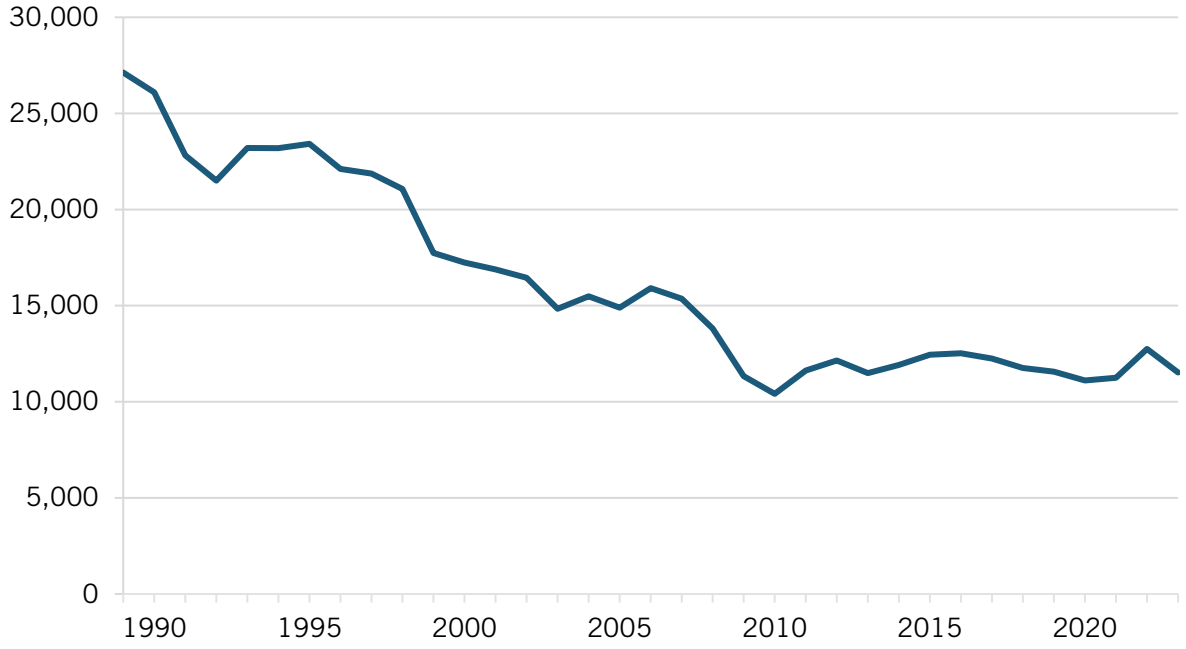
Finally, there are enabling industries. If the United States were cut off from these industries, the immediate effects on military readiness would be small, and the U.S. economy could survive for at least a while without production. America could survive for many years without an auto sector, as we would all just drive cars longer. But because of the nature of these industries—including technology development, process innovation, skills, and supporting institutions—their loss would harm both dual-use and defense industries. That is because enabling industries contribute to the industrial commons that support dual-use defense industries.

MANUFACTURING START-UP FIRMS IN DECLINE

Start-ups in any industry are driven by at least two factors: market potential and policy environment. If anything, the U.S. policy environment has gotten better for start-ups in the last 35 years (lower capital gains tax rates, more state and local programs to help start-ups, and more). What has gotten worse is market potential. With fewer export opportunities due to intense foreign competition, and with fewer domestic opportunities due to increased manufacturing imports, the opportunity for a manufacturing entrepreneur to successfully grow a company appears to have shrunk.

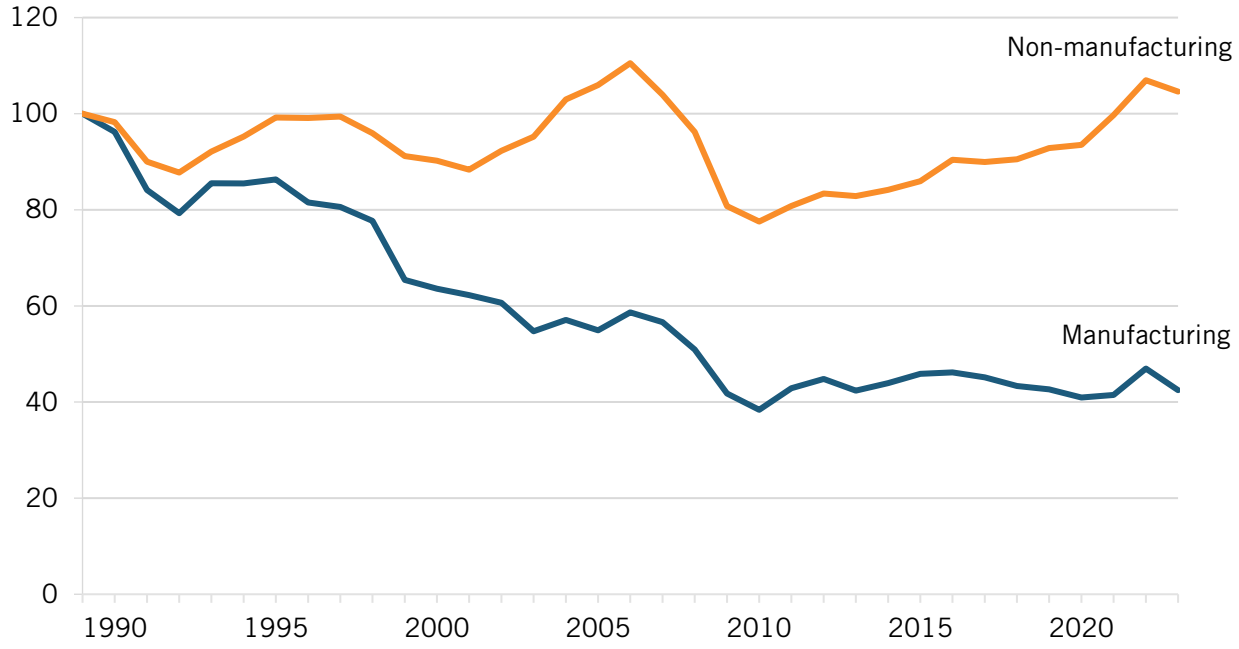
This is likely why manufacturing start-ups have declined 58 percent in the last 35 years, from 27,126 in 1989 to 11,525 in 2023.[5] Manufacturing start-ups first declined partly due to Japanese products entering the United States in the late 1980s and competing with their U.S. counterparts.[6] That effect was evident in the first half of the 1990s, as U.S. manufacturing start-ups fell from 26,099 in 1990 to 23,417 in 1995, never rebounding to their original high.[7] Indeed, a second wave of decline followed, as the number of U.S. manufacturing start-ups slumped to 17,743 by 1999, partly due to the effects of the North American Free Trade Agreement and the appreciation of the dollar's value.[8] Then, in a final wave of decline, U.S. manufacturing start-ups fell further, from 15,912 in 2006 to 12,444 in 2015, likely due to Chinese competition and offshoring.[9] Since then, U.S. manufacturing start-ups have generally fluctuated between about 10,000 to 12,000 per year.[10] (See figure 2.)

Figure 2: New manufacturing start-ups (less than 1 year old), 1989–2023[11]



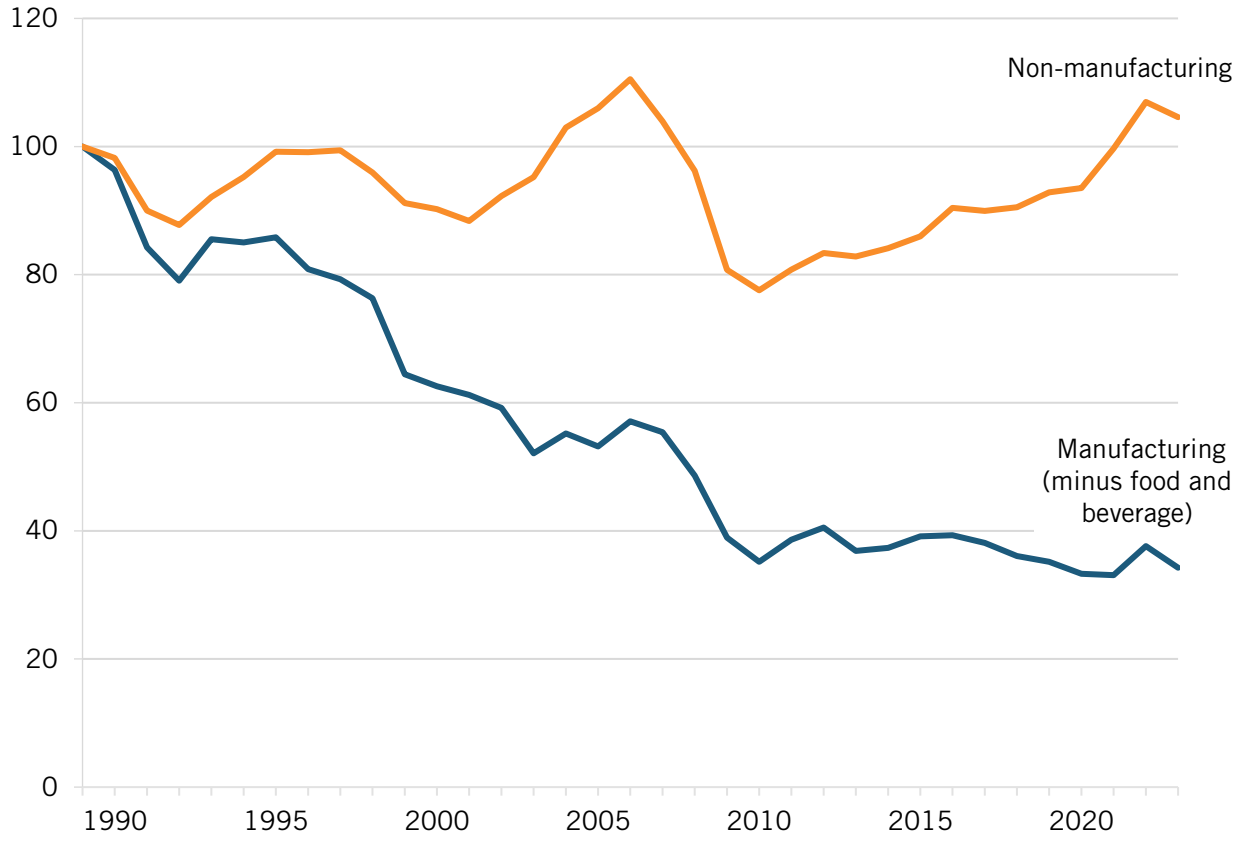
More concerningly, U.S. manufacturing start-ups are not declining because the United States is generating fewer start-ups, but rather because there is something particularly problematic about generating manufacturing ones. Indeed, U.S. manufacturing start-ups are declining while all other start-ups are growing.[12] From 1989 to 2023, U.S. manufacturing start-ups declined 58 percent from an index of 100 to 42.5. In contrast, all other start-ups in the U.S. economy grew 4.6 percent from an index of 100 to 104.6.[13] (See figure 3.)

Figure 3: Start-ups in the U.S. economy, 1989–2023 (indexed)[14]



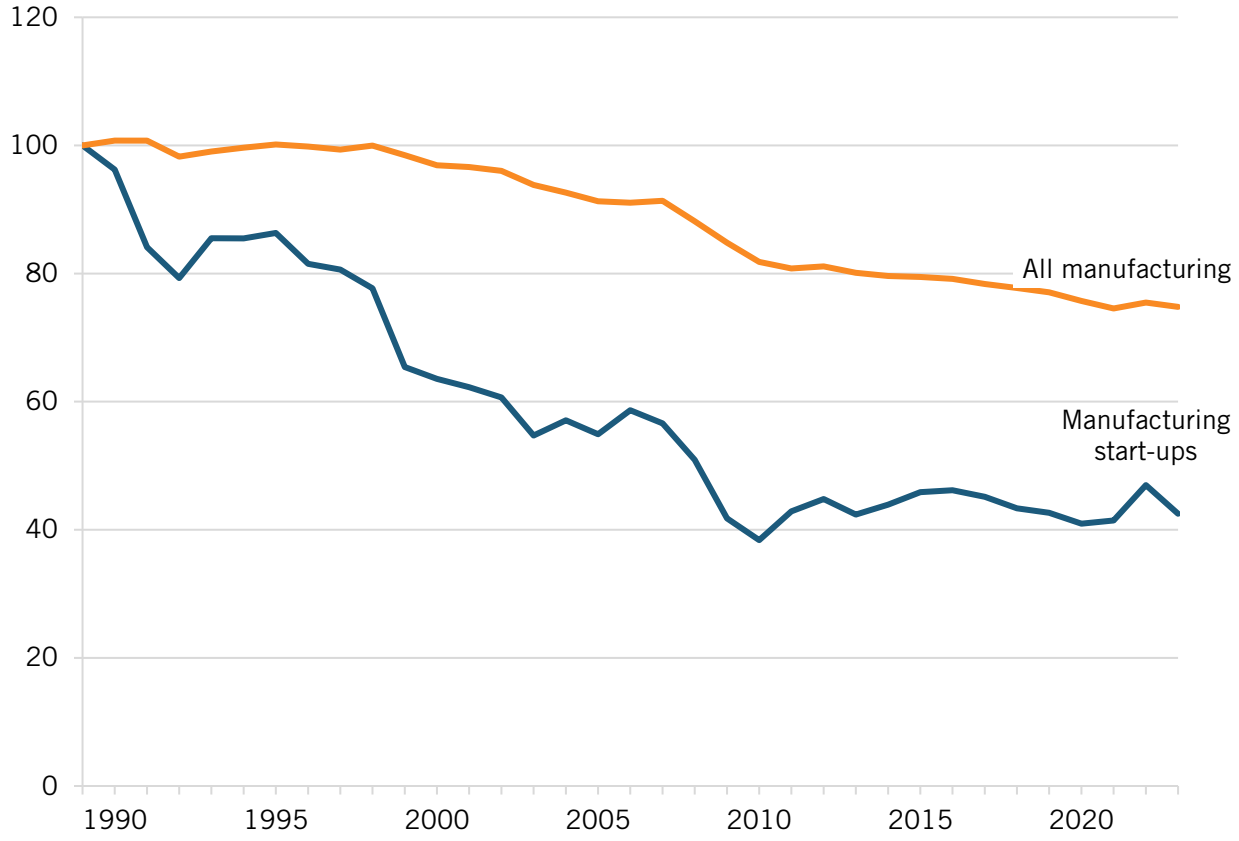
Moreover, manufacturing start-ups have declined even faster when the food and beverage manufacturing subsectors (four-digit North American Industry Classification System [NAICS] level) are excluded. This is because these subsectors tend to have some of the lowest rates of decline compared with overall manufacturing start-ups—these subsectors' start-ups are generally **not** growing. Indeed, from 1989 to 2023, manufacturing start-ups declined 66 percent (compared with 58 percent including food and beverage manufacturing) from an index of 100 to 34.3.[15] In comparison, nonmanufacturing U.S. start-ups increased 4.6 percent from an index of 100 to 104.6.[16] (See figure 4.) In other words, U.S. manufacturing start-ups not in the nonstrategic food and beverage manufacturing subsectors are declining even faster than nonmanufacturing ones when food and beverage manufacturing is removed.

Figure 4: Manufacturing start-ups (less than 1 year old), not including food and beverage subsectors, versus nonmanufacturing start-ups, 1989–2023 (indexed)[17]



This decline could be partly because of less market potential and fewer opportunities for success for new manufacturing firms in the United States. Indeed, manufacturing start-ups have declined faster than total manufacturing firms. From 1989 to 2023, manufacturing start-ups declined from an index of 100 to 42.5 while overall manufacturing firms only declined from 100 to 74.8.[18] (See figure 5.) As such, manufacturing start-ups are declining partly because total manufacturing is declining. But the reality of it is that the United States still has a problem promoting the creation of manufacturing start-ups. This is concerning because as older manufacturing firms exit, new manufacturing start-ups are needed to take their place.

Figure 5: Manufacturing start-ups versus total manufacturing firms, 1989–2023 (indexed)[19]

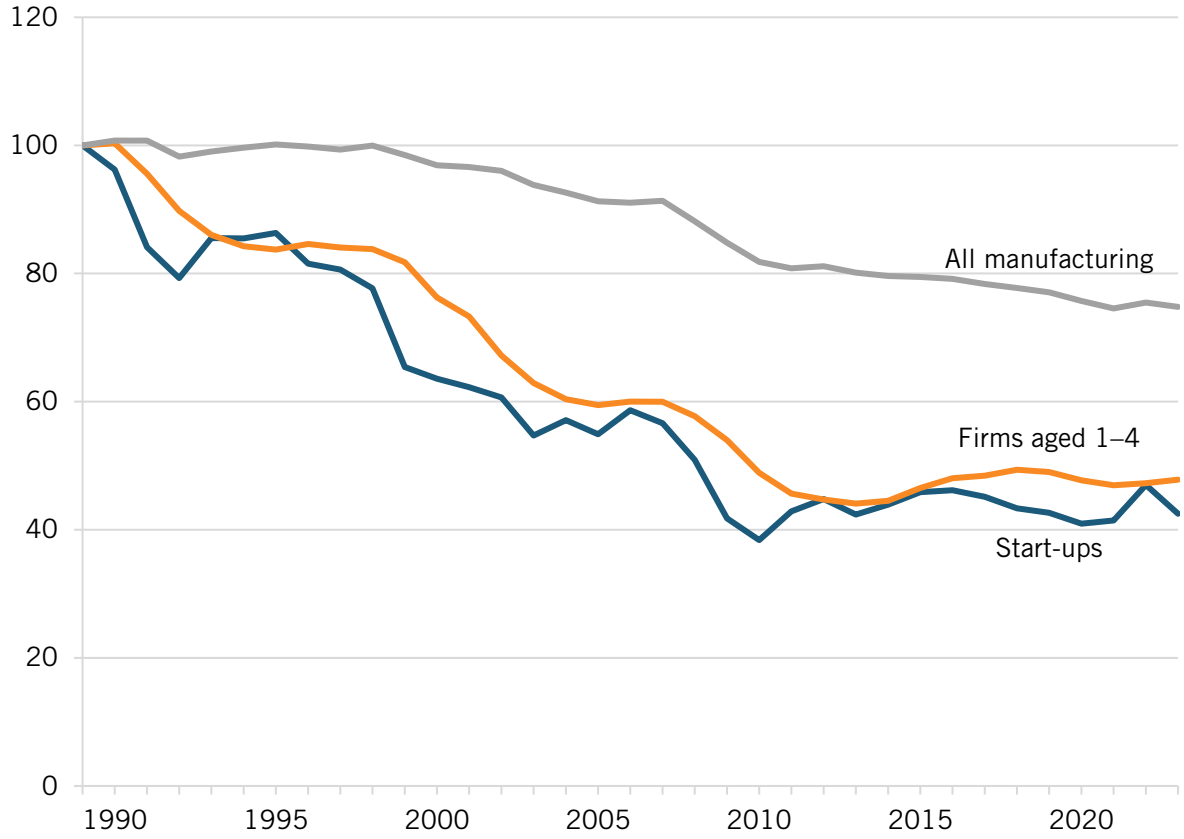


FEWER YOUNG MANUFACTURING FIRMS

It's not just start-ups but also young manufacturing firms that have declined in the last three decades. From 1989 to 2023, manufacturing start-ups declined 58 percent from an index of 100 to 42.5 while young manufacturing firms dropped 52 percent from an index of 100 to 47.8.[20] In other words, while the United States is generating fewer manufacturing firms, their five-year survival rate has increased slightly. (See figure 6.)

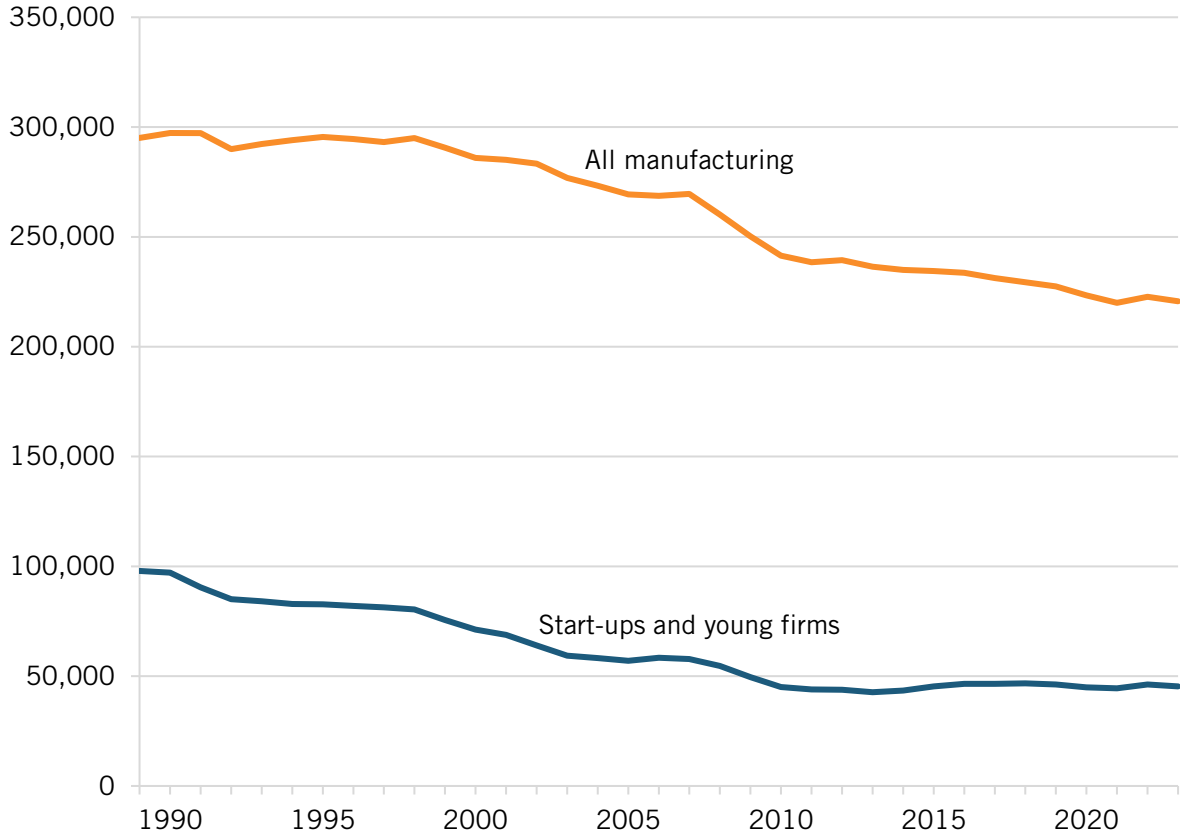
Nevertheless, young manufacturing firms are still declining faster than overall manufacturing firms. Indeed, overall manufacturing firms have only declined 25 percent from an index of 100 to 74.8 during this period.[21] As such, both manufacturing start-ups and young firms are declining not only because manufacturing firms are declining, but also because they may have fewer opportunities to succeed and eventually replace the older manufacturing firms.

Figure 6: Total manufacturing firms, manufacturing start-ups (less than 1 year old), and young manufacturing firms (1–4 years old), 1989–2023 (indexed)[22]



Accordingly, from 1989 to 2023, manufacturing start-ups and young firms declined from 97,899 to 45,363, going from making up 33 percent of manufacturing firms in the United States to only 21 percent.[23] (See figure 7.)

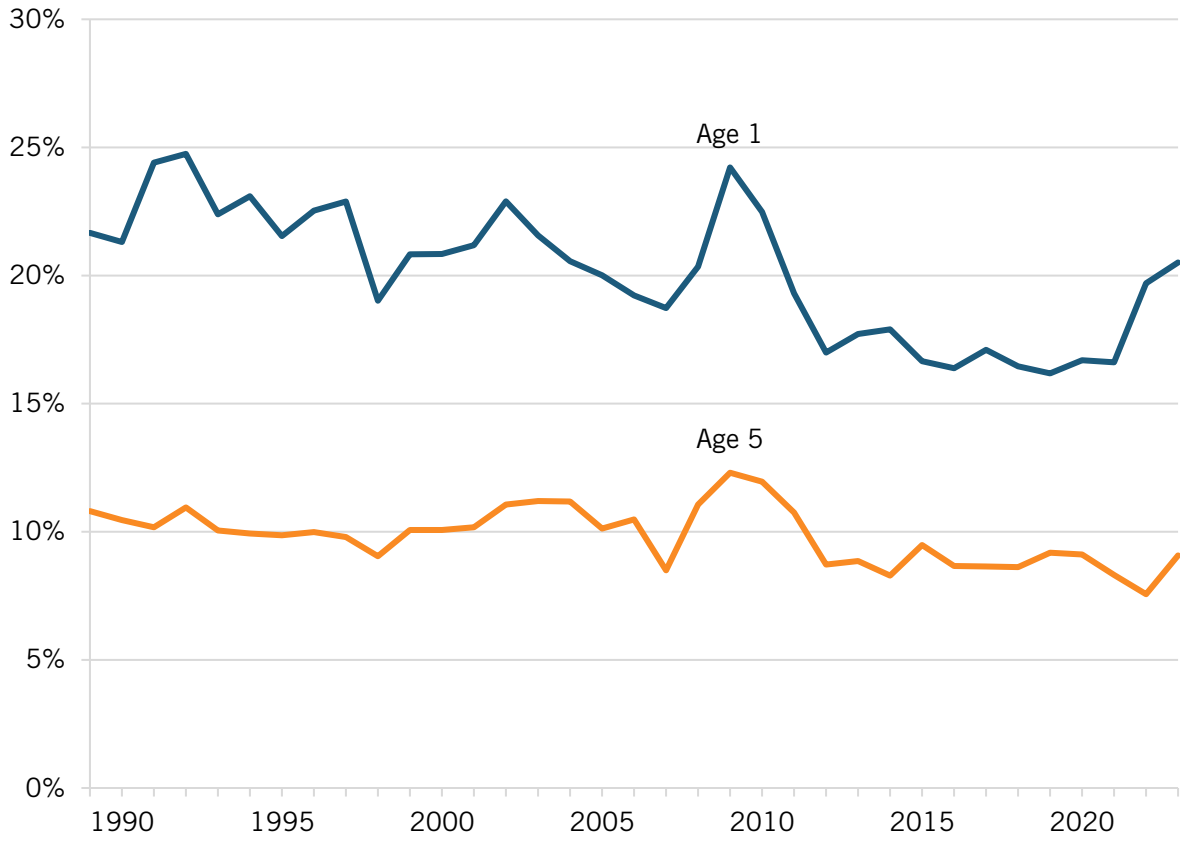
Figure 7: Total number of manufacturing firms versus start-ups and young manufacturing firms (less than 4 years old), 1989–2023[24]



Moreover, the decline of young manufacturing firms is largely a birth rate problem rather than a death rate issue. From 1989 to 2023, manufacturing start-ups declined by about 58 percent, indicating a substantial and persistent reduction in firm entry into the sector.[25] In contrast, firm death rates did not show a corresponding deterioration in survival conditions for young manufacturing firms. Indeed, during this period, the death rate of manufacturing firms one-year old ranged between 16 and 22 percent while the death rate of manufacturing firms five years-old (not including young firms) had even lower fluctuation at between 8 and 12 percent.[26] (See figure 8.)

As such, these patterns suggest that the long-run decline in young manufacturing firms is not being driven by increased failure rates among entrants. Instead, the stability of survival outcomes implies that once firms enter manufacturing, their prospects of surviving the early years have not meaningfully worsened. The dominant driver of the observed decline is therefore a sustained contraction in manufacturing start-up entry rather than rising exit rates, pointing to structural constraints on the formation of new manufacturing firms as the main concern.

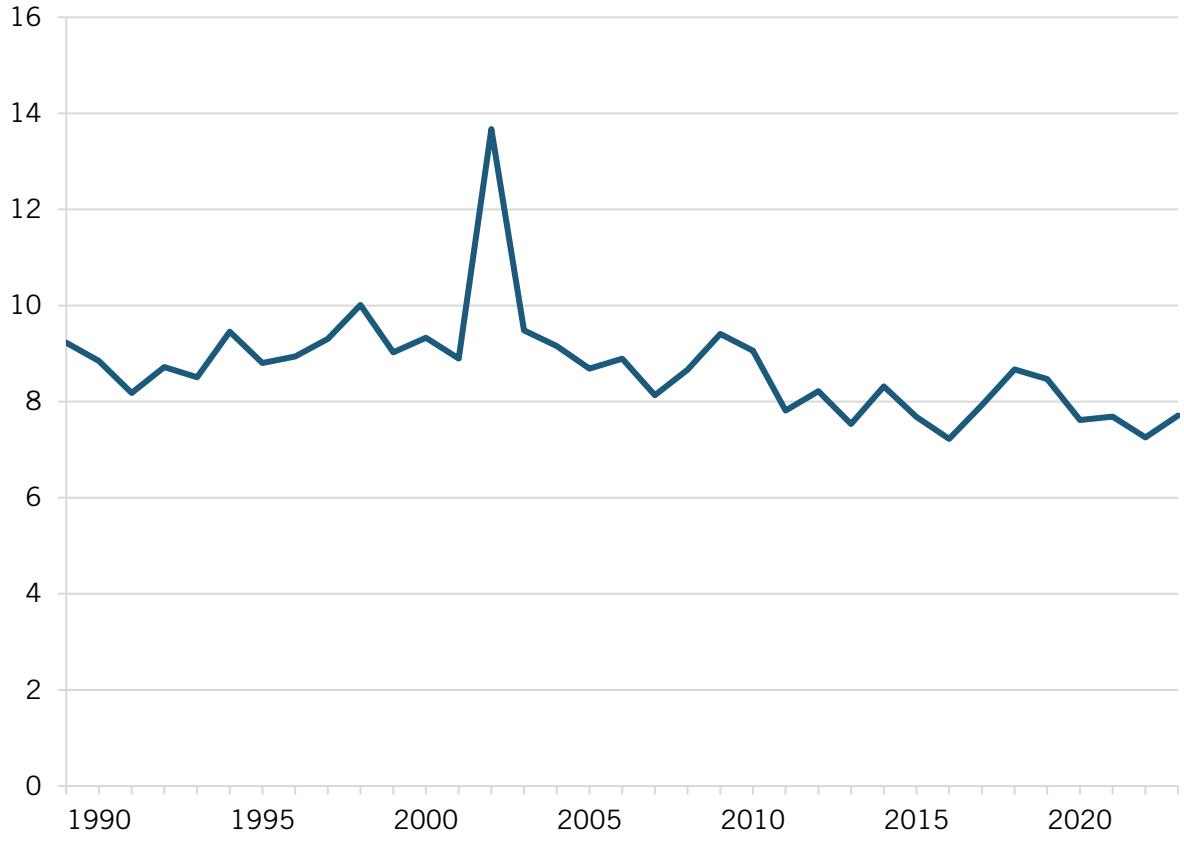
Figure 8: Exit rates of one-year-old and five-year-old manufacturing firms, 1989–2023[27]



START-UPS' AVERAGE EMPLOYEES

The average number of employees in start-ups is a useful indicator because, in theory, start-ups with more employees should be stronger than those with fewer. It may indicate stronger access to capital, greater market opportunities, more scalable business models, and a higher chance of survival. Yet, the data indicates that U.S. manufacturing start-ups are only getting weaker. Indeed, the average manufacturing start-up size is now slightly smaller than before. From 1989 to 2023, manufacturing start-ups' average number of employees fell from 9.2 persons to 7.7 persons, a 16 percent decline.[28] (See figure 9.)

Figure 9: Employees per manufacturing start-up, 1989–2023[29]



MANUFACTURING START-UPS IN DEFENSE, DUAL-USE, ENABLING, AND NONSTRATEGIC SUBSECTORS

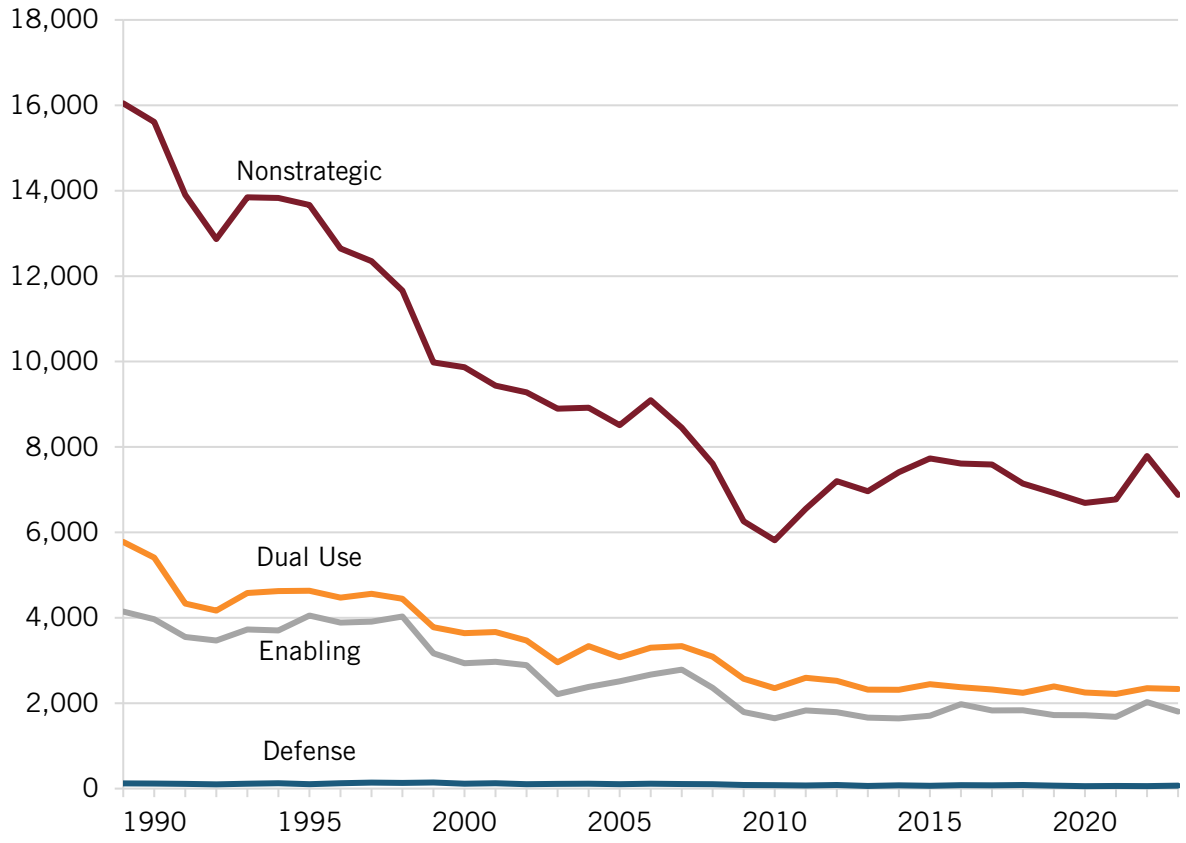
Start-up activity in manufacturing has not declined in a uniform way. Instead, the pattern of change differs significantly depending on the type of industry.

This section disaggregates manufacturing start-ups into the four ITIF national economic power industry classifications: defense industries, dual-use industries, enabling industries, and nonstrategic industries.[30]

Of the four categories, dual-use, enabling and nonstrategic industries had very similar rates of decline from 1989 to 2023. At the highest, dual-use manufacturing start-ups declined 60 percent from 5,776 to 2,334.[31] Following up, nonstrategic manufacturing start-ups declined 57 percent from 16,046 to 6,877.[32] Lastly, enabling manufacturing start-ups declined 56 percent from 4,145 to 1,804.[33] As such, this means that these three categories declined at a very similar rate to the overall manufacturing start-ups' rate of 58 percent.[34] This is quite concerning, as it indicates that key dual-use and enabling industries the United States relies on for defense and economic competitiveness are declining as fast as nonstrategic ones.

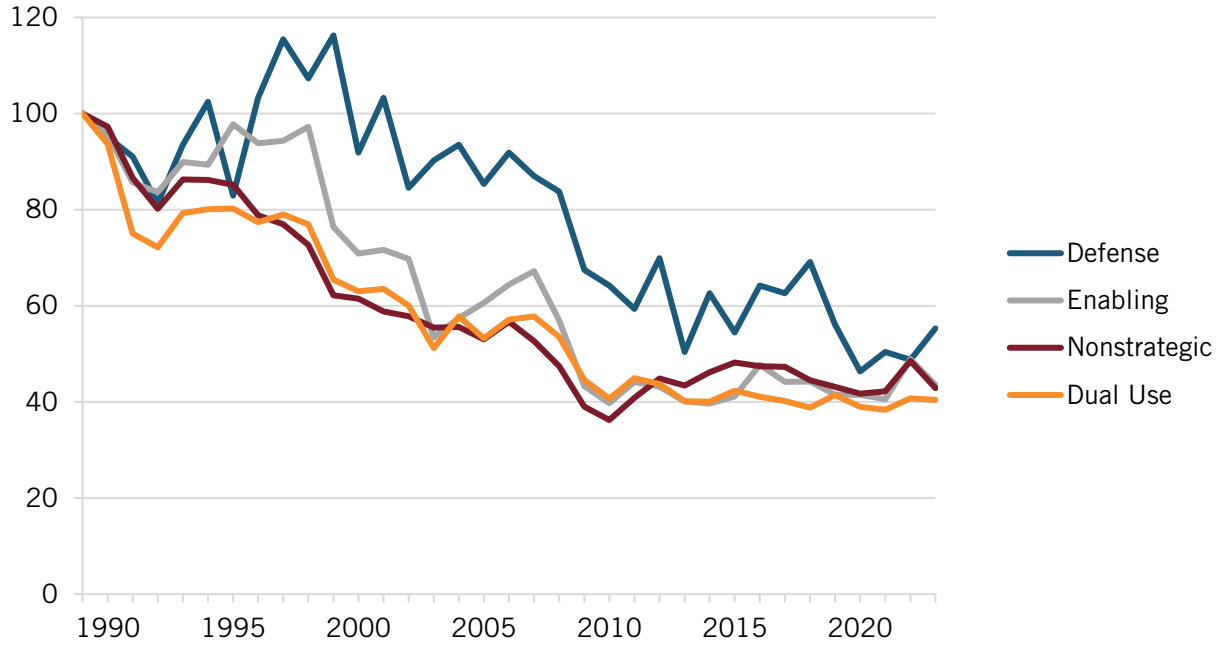
Fortunately, in contrast, defense industries had a much smaller rate of decline than did the other three categories. Indeed, defense manufacturing start-ups declined only 45 percent from 123 to 68 during this period.[35] (See figure 10 and figure 11.)

Figure 10: Number of manufacturing start-ups in defense, dual-use, enabling, and nonstrategic subsectors, 1989–2023[36]



The slower decline is likely to due to facing less overseas competition than the other three categories did. For instance, while the basic chemical manufacturing start-ups have to compete for customers with lower-priced Chinese firms exporting to the United States, the ship and boat building industry faces less competition from China and other foreign nations. This is because the United States government is one of the largest customers of defense industries, and it will always prefer to buy from and rely on U.S. defense companies than foreign companies. In other words, defense manufacturing start-ups have a stable buyer that protects them from foreign competition.

Figure 11: Manufacturing start-ups in defense, dual-use, enabling, and nonstrategic subsectors, 1989–2023 (indexed)[37]



A LIKELY CAUSE IS THE GROWING U.S. TRADE DEFICIT

Most of the decline in manufacturing start-ups occurred prior to 2009 and appears closely tied to the long-running erosion of U.S. manufacturing competitiveness during that period. Indeed, data from the U.S. Bureau of Economic Analysis shows a clear structural shift. From 1989 to 2009, while U.S. manufacturing start-ups declined 58 percent from an index of 100 to 41.8, the U.S. **trade deficit** in goods as a share of GDP **increased** by 69 percent from 100 to 182.2, showing the concurrent movement in the decline of manufacturing start-ups with the increase in competition from imports.[38] From 2009 to 2023, the U.S. trade deficit as a share of GDP became more stabilized, at an index ranging from 182 to 227, while U.S. start-ups also remained more stable at an index range of 38 to 47. (See figure 12.) This trend reflects a broader loss of competitiveness, as domestic production has increasingly been displaced by imports from lower-cost foreign producers. For manufacturing start-ups, this creates a particularly challenging environment as new firms must compete with not only established domestic companies but also overseas producers that can often sell similar goods at lower prices. As imports take up more of the market, it becomes harder for new U.S. manufacturing start-ups to gain customers and grow.

Figure 12: Manufacturing start-ups versus the U.S. trade deficit in goods as a share of GDP, 1989–2023 (indexed)[39]

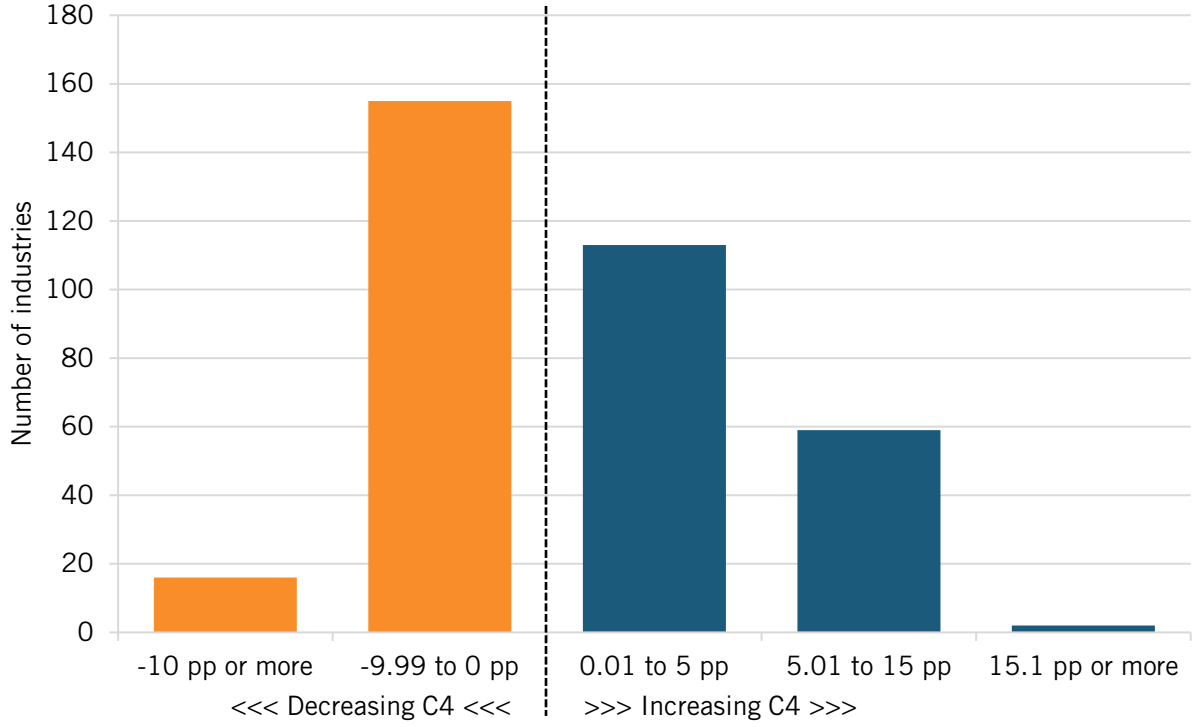


INDUSTRY CONCENTRATION WAS NOT THE CAUSE FOR MANUFACTURING START-UP DECLINE

Some "neo-Brandeisian" antitrust advocates see monopoly in every closet and argue that start-ups have declined because of industry concentration. Big—fill in blank—dominates the sector and not only leaves no room for start-ups, but also actively crushes them. This is not what has happened in manufacturing.

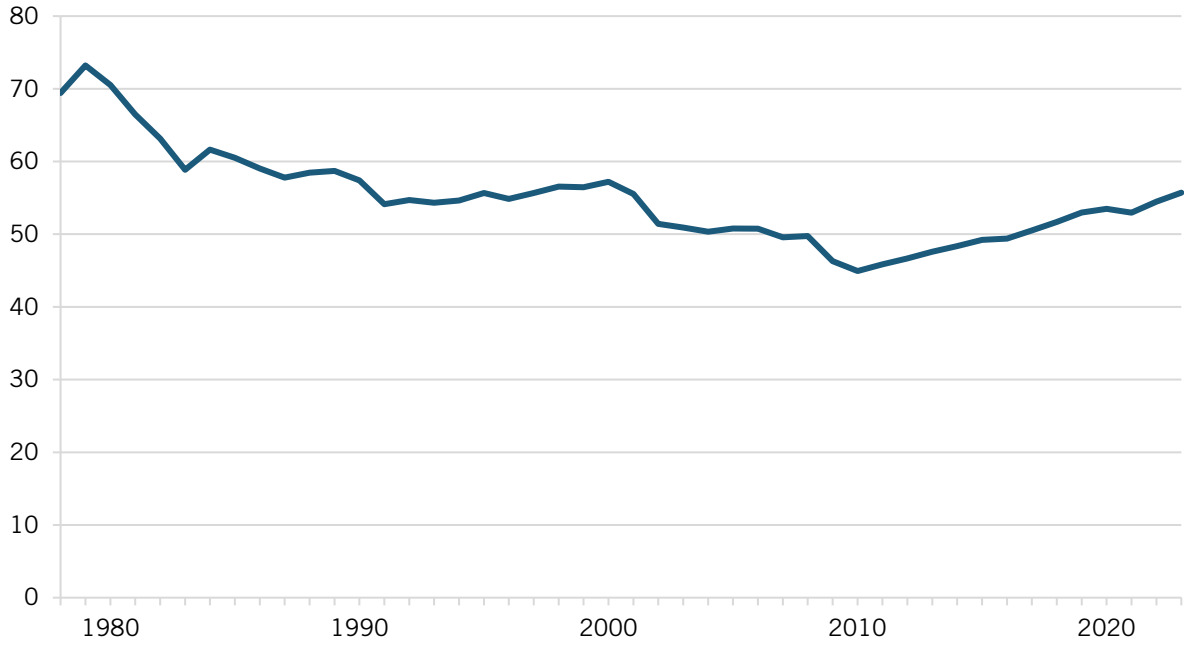
Indeed, the majority of manufacturing industries saw a decline in concentration or only a slight increase of no more than 5 percentage points from 2017 to 2022. Of the 345 six-digit NAICS manufacturing industries (with available data), 16 manufacturing industries' concentration of the top 4 largest firms (C4 ratio) declined by 10 percentage points or more while 155 manufacturing industries' C4 ratio declined between 0 and 10 percentage points.[40] Together, the total manufacturing industries with declining C4 ratios was 49.6 percent of all manufacturing industries with available data.[41] Of the remaining manufacturing industries, another 113 industries' C4 ratios only increased by 0.01 to 5 percentage points, equating to 33 percent of total manufacturing industries.[42] (See figure 13.) As such, 82.3 percent of manufacturing industries (with available data) saw a decline or a slight increase in concentration, meaning an increase in monopoly power is not the cause for a decline in manufacturing start-ups.

Figure 13: Numbers of manufacturing industries grouped by percentage-point change in C4 concentration levels, 2017–2022[43]



Further corroborating this, manufacturing firms have become smaller over the past decades. From 1978 to 2023, the average size of a U.S. manufacturing firms declined from 69.4 workers to 55.7 workers.[44] (See figure 14.)

Figure 14: Average number of employees in U.S. manufacturing firms, 1978–2023[45]



In contrast to neo-Brandeisians' unsubstantiated claims, a potential cause of manufacturing start-up decline, besides poor market potential, could be the that the United States has not built a sufficiently strong ecosystem to support manufacturing start-ups at scale. To be sure, initiatives such as the Manufacturing USA network, which comprises more than a dozen manufacturing innovation institutes, aim to promote advanced manufacturing and accelerate commercialization.[46] Yet these efforts remain insufficient relative to the scale of the challenge. As ITIF has argued, hardware innovations developed in the United States are often not scaled domestically because the financial system is poorly suited to capital-intensive firms.[47] Venture capital in the United States tends to favor "capital-light" sectors such as software and media, wherein firms can scale rapidly with minimal marginal cost, versus manufacturing ventures that require significant upfront investment in physical production.[48] As a result, many promising hardware technologies are effectively orphaned in the United States and ultimately scaled abroad, weakening the country's position in advanced manufacturing, particularly as competitors such as China continue to expand their capabilities in strategic industries.

POLICY RECOMMENDATIONS

U.S. manufacturing start-ups will grow if two things happen. First, overall U.S. manufacturing real value-added output needs to grow faster. That would help generate a healthier manufacturing ecosystem with room for start-ups to emerge. Second, the policy environment for manufacturing start-ups will need to improve. Overall, policymakers should set a goal of achieving at least 23,000 manufacturing start-ups a year by 2030, double from the current 11,500.

Policymakers need to start with a more coherent and strategic national economic power industry strategy, as well as detailed, sector-specific strategies. In addition, they should develop programs that will create more capital for manufacturing start-ups, such as through the Small Business Association or a national industrial development bank, or offer tax incentives for "deep tech" venture investments. Congress should also improve the research and development (R&D) credit to make it easier to use for start-ups. Specific manufacturing technology programs, such as ManTech with the Department of Defense, Manufacturing USA centers, and manufacturing R&D centers at universities, need to expand and place more emphasis on tech transfer and commercialization. Congress should also provide increased funding for manufacturing engineering education programs from high school to college. Finally, Congress should expand funding for the National Institute of Standards and Technology's (NIST's) Manufacturing Extension Partnership program, including for a new manufacturing start-up initiative.

Behind all this, the United States should adopt a fundamentally new framework: a national power industry strategy that focuses on reversing the decline of manufacturing start-ups in strategic, defense, and dual-use sectors. More detailed policy recommendations are provided in ITIF's ongoing Mobilizing for Technology Economic War series of reports.[49]

CONCLUSION

The evidence shows that the United States has been experiencing a decline in manufacturing start-ups. More importantly, start-ups in dual-use and enabling manufacturing industries that the United States relies on for defense and economic competitiveness have declined just as quickly as nonstrategic manufacturing industries. Fortunately, start-ups in defense industries have

declined slower. Nevertheless, this trend weakens the country's industrial base and limits its ability to compete globally. The shrinking share of manufacturing in the overall economy and the decline of strategic manufacturing start-ups highlight gaps in current policy and the urgency of addressing them.

Global competitors, particularly China, continue to expand production in strategic industries, outpacing the United States in areas such as chemicals. As such, policymakers need to focus directly on rebuilding the pipeline of start-ups in sectors critical to economic and national security. They need to provide targeted support for strategic manufacturing start-ups in order to restore industrial capacity, create high-value jobs, and maintain long-term competitiveness against rising international rivals.

METHODOLGY

This report uses data from the U.S. Census Bureau's Business Dynamic Survey to estimate the number of overall and manufacturing start-ups in the United States. Start-ups are firms that are age 0 in the dataset. The dataset also provides the total number of manufacturing firms in all ages. Finally, the Business Dynamic Survey provides data going back to 1978. However, this report predominantly uses data beginning in 1989, as the period between 1978 to 1989 had a relatively stable number manufacturing.

The Business Dynamics Survey does not provide data at the six-digit NAICS level, but rather at the four-digit NAICS subsector level. As such, to classify these subsectors into ITIF's power, dual-use, enabling, and nonstrategic categories, ITIF classified a subsector based on if over 50 percent of the six -digit NAICS under the subsector fell into the power, dual-use, enabling, or nonstrategic category. Once categorized, these subsectors were added together to analyze the changes in start-ups for these categories. It should be noted that some manufacturing subsectors could not be classified into one of these categories, as share of six -digit NAICS under the subsector were not over 50 percent. The sections examining overall manufacturing start-ups do however include these uncategorized manufacturing subsectors.

How America Can Reduce Its Dependence on Chinese Active Pharmaceutical Ingredients (APIs)

SANDRA BARBOSU AND STEPHEN EZELL

Heavy dependence on Chinese APIs creates risks to the drug supply and national security. To reduce dependence, U.S. policy should support domestic and allied production through the advanced manufacturing innovation, tax incentives, import limits, regulatory reforms, improved analysis, and targeted procurement, including strategic stockpiling.

KEY TAKEAWAYS

- In 1981, Europe produced 63 percent of APIs and the United States 25 percent. By 2024, China had produced 45 percent and India 43 percent, as the European and U.S. shares fell to 6 percent and 3 percent, respectively.
- U.S. dependence on China for APIs reflects decades of cost-driven offshoring and upstream concentration, creating structural vulnerabilities in the supply of essential medicines.
- Reducing dependence on Chinese APIs will require a multifaceted strategy that combines strategic stockpiling, increased domestic capacity, allied diversification, and manufacturing innovation.
- Advanced manufacturing technologies, such as continuous manufacturing, offer a pathway to restore competitiveness without replicating China's low-cost model.
- Strengthening oversight of foreign API manufacturing through expanded unannounced FDA inspections is essential to reducing compliance asymmetries and closing national security gaps.
- Demand-side tools, including advance purchase commitments, are important to making new API capacity economically viable and sustainable over time.

INTRODUCTION

The COVID-19 pandemic revealed how exposed the U.S. healthcare system is to fragile global supply chains—particularly its heavy dependence on China for active pharmaceutical ingredients (APIs), the biologically active components in medicines that produce their intended therapeutic effects, and which are a foundational element of drug security and pharmaceutical innovation.[1] But the pandemic exposed more than fragility—it exposed the risks of allowing a geopolitical adversary to control critical pharmaceutical inputs. The core vulnerability is not geographic concentration per se, but dependence on a country that has demonstrated both the willingness and the capacity to weaponize industrial supply chains—creating risks that go well beyond ordinary market disruptions.

Disruptions during the pandemic highlighted how quickly dependencies on a small number of foreign API producers can translate into shortages, exposing vulnerabilities to supply chain resilience and national security. Trade restrictions and geopolitical tensions can similarly ripple through global pharmaceutical markets and contribute to drug shortages.

API dependence on China did not develop overnight, and cannot be solved overnight. Moreover, imposing tariffs on APIs to shift production back to the United States would not solve the problem. Building a more resilient pharmaceutical supply chain that is less dependent on China requires a multifaceted policy approach that combines reshoring and nearshoring/friendshoring strategies with other elements such as regulatory modernization, manufacturing innovation, and demand-side incentives. Such a strategy would address the challenges of not only where APIs are produced but also how resilient, transparent, and diversified the underlying supply chains are.

At the same time, the United States should not ignore the role of Chinese industrial subsidies in creating an uneven competitive playing field. Where Chinese API producers benefit from below-market financing, state land grants, energy subsidies, and preferential tax treatment, the United States and allies should consider targeted trade remedies—including offsetting duties—on APIs produced under such conditions. Addressing unfair trade practices is a complement to, not a substitute for, the broader supply chain strategy outlined in this report.

The Global Geography of API Production

Data from the U.S. Food and Drug Administration Drug Master Files (FDA DMFs) provide insight into the geographic distribution of API manufacturing. DMFs are filings submitted by API manufacturers to the FDA that document the facilities, processes, and materials involved in producing a drug ingredient.[2] Because every API sold in the U.S. market requires an active DMF, the distribution of DMF holders around the world can serve as a proxy for where global API manufacturing capacity is located—and how this distribution has changed over time.

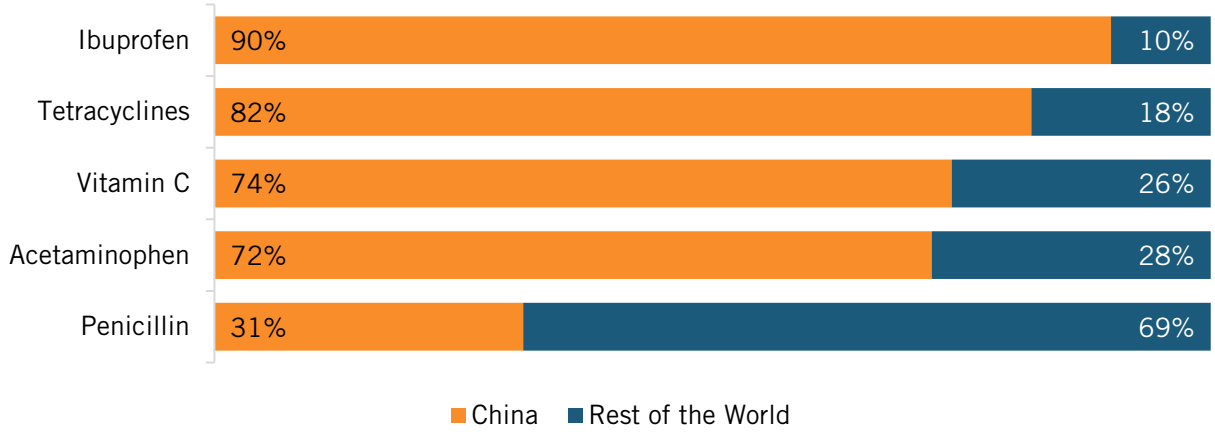
API manufacturing is highly concentrated in China and India, but this has not always been the case. In the early 1980s, most API production took place in Europe and the United States. Data compiled by the U.S. Pharmacopeia from the FDA's active API DMFs shows that, in 1981, Europe held 63 percent of the overall share of DMFs while the United States held 25 percent. India and China held a virtually zero share.[3] Yet, by 2024, that picture had reversed. Europe's share had dropped to 6 percent while the U.S. share had fallen to just 3 percent. Meanwhile, China and India accounted for 45 and 43 percent of active API DMFs, respectively.[4] Today, China plays a key role in the production of basic chemical precursors and key starting materials

(KSMs), while India primarily specializes in later-stage API synthesis and generic drug manufacturing, with much of India's raw material for APIs originating in China.[5]

China increasingly dominates production both of KSMs and APIs.[6] KSMs constitute the upstream building blocks used to manufacture APIs.[7] China is trying to corner production of these KSMs just as it is APIs. Across all medications, nearly 41 percent of KSMs used in U.S.-approved APIs are produced only in China, and 16 percent in India.[8] China controls the raw materials or KSMs for 94 percent of amoxicillin, 74 percent of heparin, and 70 percent of acetaminophen.[9] China also enjoys significant global concentrations for the following KSMs: angiotensin II receptor blockers (100 percent of APIs use China sole-sourced KSMs); blood glucose-lowering drugs, excluding insulins (94 percent); direct acting antivirals (83 percent); antineoplastics (71 percent); antibacterials (66 percent); statins (62 percent).[10]

With China dominating so much of the KSMs that represent the key inputs to APIs, it's no wonder that China is also coming to dominate global API production, making the United States increasingly dependent on China for API imports. Indeed, as figure 1 shows, the United States imports 90 percent of its ibuprofen from China, 82 percent of tetracyclines (a broad-spectrum class of antibiotics primarily used to treat bacterial infections, including acne and Lyme disease), 74 percent of vitamin C, and 72 percent of acetaminophen.[11]

Figure 1: U.S. imports of APIs, 2024[12]



This geographic concentration reflects several factors that have developed over decades. A key driver is cost. Traditional API production depends on capital-intensive facilities that must operate at high, predictable utilization rates to recover their fixed costs, which leaves plants (especially domestic ones) exposed to demand swings and underutilization.[13] Higher domestic labor, regulatory, environmental, and operating costs compound this problem, making offshore production far more economically attractive.[14] These cost differentials are substantial: an IQVIA report notes that API manufacturing costs are about 30 to 35 percent lower in India and 35 to 40 percent lower in China than in the United States.[15]

Moreover, price competition among API producers has at times intensified. Some Chinese producers have in recent years cut prices on key API starting materials by 40 to 50 percent, an aggressive pricing strategy that can squeeze other competitors out of the market.[16] This is not simply a reflection of efficiency gains—it is enabled by Chinese state support. Chinese API

producers benefit from a combination of direct production subsidies, below-market land and energy costs, preferential financing from state-owned banks, and more permissive environmental regulations.[17] State support extends to infrastructure and industrial clustering: government policy has subsidized the creation of dedicated pharmaceutical manufacturing zones, including API "super factories," and explicitly included biomedical technology on the list of high-tech fields supported by key financial subsidies policy.[18] This support allows Chinese producers to sustain prices that would be commercially unviable without government backing. The strategic objective appears to be consistent with predatory market consolidation efforts: by pricing competitors out, Chinese API producers can secure dominant positions in key upstream segments, reducing other producers' ability to compete and increasing global dependence on Chinese supply. This mirrors tactics employed in other sectors, such as solar panels and telecommunications networking equipment, wherein China has pursued national power industry dominance. (ITIF has identified 216 globally traded "national power" industries that serve as the bedrock of U.S. technological leadership, economic power, and national security.)[19]

By pricing competitors out, Chinese API producers can secure dominant positions in key upstream segments, reducing other producers' ability to compete and increasing global dependence on Chinese supply.

China's API Production

China has pursued a long-term strategy to build dominance in API production by leveraging scale, cost advantages, and coordinated industrial policy.[20] Beginning in the early 2000s, Chinese firms expanded rapidly in the production of chemical intermediates and KSMs, positioning China as a foundational upstream supplier not only for its own pharmaceutical sector but also for API manufacturers worldwide.[21] China's dominance in API production is not simply the outcome of cost competition—it is the result of a deliberate, state-directed strategy to build national power through control of critical industrial inputs.

As the Information Technology and Innovation Foundation (ITIF) has documented in its series on national power industries, China sees dominance in strategically important sectors not only as a commercial objective but also as a tool of geopolitical leverage—one that enables the nation to threaten supply disruptions, extract political concessions, and create leverage over trading partners in a crisis.[22] Pharmaceuticals fit squarely within this framework. Chinese leadership has explicitly targeted pharmaceutical and chemical manufacturing for strategic development under initiatives such as "Made in China 2025" and its successor industrial policies. The goal is not merely to capture market share, but also to establish the kind of upstream control over global supply chains that would give Beijing strategic influence over other countries' pharmaceutical supply chains. In an article in *Xinhua*, a Chinese state-run media agency, Beijing claimed that China could impose pharmaceutical export controls that would plunge America into "the mighty sea of coronavirus."[23]

As the Atlantic Council has noted, pharmaceuticals may be China's next trade weapon, following the pattern established in rare earths and other critical materials where China has leveraged market dominance to pressure trading partners.[24] The COVID-19 pandemic further demonstrated that API dependence is not an abstract vulnerability: supply disruptions had immediate

consequences for patients and health systems, and the United States had limited ability to respond.

State support through subsidies, preferential loans, tax breaks, and below-market land and energy costs—combined with more permissive environmental regulations—has enabled Chinese API producers to achieve economies of scale that competitors in higher-cost regulatory environments struggle to match.[25] As a consequence, many global pharmaceutical supply chains, particularly for generic medicines, have become structurally dependent on Chinese inputs, even when final API production occurs elsewhere.[26]

Disentangling genuine cost efficiency from state-subsidized advantage is difficult, but also important for policy. While public estimates of this are not available, marking a significant gap, what is clear is that China's government systematically subsidizes domestic manufacturers, and that this support contributes to both its success and driving other competitors out of key market segments. China's cost advantage likely reflects a combination of genuine efficiency gains and state subsidies—and America's policy response must address this challenge through trade remedies, manufacturing innovation, better analysis, and supply chain diversification.

API manufacturing costs are about 30 to 35 percent lower in India and 35 to 40 percent lower in China than in the United States, creating incentives for offshore API production.

POLICIES TO REDUCE U.S. DEPENDENCE ON CHINESE APIS

Reducing U.S. dependence on Chinese APIs requires more than reshoring production. It demands a coordinated strategy to strengthen supply chain resilience, domestic manufacturing capacity, and technological capabilities. Strategic stockpiling initiatives such as the Strategic Active Pharmaceutical Ingredients Reserve (SAPIR), alongside investments in advanced manufacturing and public-private partnerships (PPPs), are beginning to address critical vulnerabilities. Together, these efforts aim not only to buffer short-term disruptions but also to build a more secure, scalable, and innovation-supportive domestic pharmaceutical supply chain over the long run.

Strengthen Strategic Stockpiling

SAPIR is an initiative the United States has undertaken to begin addressing near-term supply vulnerabilities. It is a federally supported effort led by the U.S. Department of Health and Human Services (HHS), including the Administration for Strategic Preparedness and Response (ASPR) and the Biomedical Advanced Research and Development Authority (BARDA), in partnership with companies such as Phlow Corp., which develops and domestically manufactures APIs and finished drug products that are essential for the United States. This PPP seeks to secure essential medicine manufacturing by building domestic API manufacturing capacity and maintaining a reserve of critical APIs to mitigate supply disruptions in times of emergency. Initial federal support for these efforts has totaled up to $800 million. SAPIR's vision is to serve as a national stockpile to secure key ingredients used to manufacture the most essential medicines in the United States, thereby reducing America's dependency on foreign nations.[27]

SAPIR is not designed as a passive stockpile. Rather, it represents an integrated system for pharmaceutical resilience. Its core components include domestic manufacturing capacity for

critical APIs and inputs, a distributed storage network for rapid response in times of crisis, analytical testing infrastructure to ensure ingredient quality, and conversion capabilities to rapidly turn stored ingredients into finished medicines. These activities are coordinated through a centralized platform for inventory, forecasting, and deployment, leading SAPIR to be a "living" reserve that combines stockpiling with production and logistics.[28]

Phlow's work is a critical part of SAPIR. Through its BARDA-supported contract, the company is working to build an innovative end-to-end domestic supply chain for essential medicines, including the production of chemical precursors, APIs, and finished drugs in partnership with other organizations.[29] This effort combines manufacturing scale-up with upstream research and development (R&D) and process innovation. In particular, Phlow is advancing continuous-flow and green chemistry manufacturing techniques to produce APIs more efficiently, and doing so at a higher quality and a lower cost than with traditional batch production.[30] Such technologies seek to make domestic production economically viable while reducing dependence on foreign suppliers.

At the same time, Phlow is helping to operationalize SAPIR itself by supporting the development, procurement, and storage of key pharmaceutical ingredients, which can be rapidly converted into finished medicines through a distributed manufacturing network in times of disruption. This work has already included supplying millions of doses of essential generic medicines to the Strategic National Stockpile during the COVID-19 pandemic response.[31]

Strategic stockpiling, as a complement to supply chain diversification through friendshoring and domestic manufacturing growth, can serve as an important buffer against disruptions while long-term production and innovation ecosystems are developed. It is important to acknowledge that stockpiling and near-term domestic capacity building are not self-sustaining solutions if the underlying cost difference between American and Chinese producers remains large. The viability of domestic reshoring at scale depends on either closing that gap through manufacturing innovation, offsetting it through policy tools such as advance purchase commitments and tax incentives, or accepting that strategic resilience for a defined set of essential medicines warrants ongoing public investment, much as the United States accepts the cost of maintaining other strategic reserves. Policymakers should be transparent about which of these mechanisms they are relying on for different types of API. Much of the effort depends on advancing new biomanufacturing processes for APIs—including continuous manufacturing and novel synthesis methods—which in turn requires sustained investments in R&D, specialized workforce training, and scale-up capabilities. Therefore, initiatives such as Phlow's work on SAPIR are critical not only for safeguarding near-term resilience but also for catalyzing the technological and industrial base needed for increased domestic production.

Enable Domestic Reshoring Through Manufacturing Innovation

Long-term resilience will also depend on whether U.S. and allied producers can compete technologically and economically with China. Advanced manufacturing technologies—including continuous manufacturing and advanced chemistry—are central to that effort.

Recent advances in biomanufacturing illustrate the potential. As Drew Endy, a member of the bioengineering faculty at Stanford University, has explained, novel bio-based and bio-fermentation processes now "make possible the biosynthesis of active pharmaceutical ingredients through bio-brewing-based processes … we can actually leverage yeast to create a set

of medicinal alkaloids," including for many key APIs.[32] Because these methods rely on engineered organisms such as yeast rather than traditional chemical synthesis, they can reduce environmental impact while drawing on feedstock that is often more readily available domestically.

At the same time, continuous manufacturing offers a pathway to disrupt the batch-based production model that has dominated API manufacturing. Rather than scaling production through large, capital-intensive batch facilities, continuous manufacturing based on flow chemistry enables smaller, more flexible systems that operate continuously and efficiently.

In addition to Phlow's work, other early efforts demonstrate the promise of this approach. CONTINUUS Pharmaceuticals, for example, is developing an integrated continuous manufacturing platform that takes raw materials, synthesizes and purifies APIs, and produces final dosage forms all in a single system that can operate 24/7. Whether advanced manufacturing technologies can help close the cost gap with Chinese production remains an open question. CONTINUUS's prototype results show that it reduces costs by 30–50 percent, solvent use by more than 60 percent, energy costs by 50 to 60 percent, facility footprint by roughly 90 percent, and lead time from months to less than 48 hours.[33] These cost reductions could help reduce the gap if replicated at commercial scale. However, achieving those results outside controlled pilot conditions requires solving challenges in process scale-up, workforce training, regulatory approval, and supply chain integration. The federal government should support independent techno-economic assessments of what cost parity between U.S. advanced manufacturing and Chinese conventional production would require, and at what production scale it becomes commercially viable.

The United States does not need to replicate China's low-cost manufacturing model to compete—it can instead compete through innovative manufacturing.

Even if manufacturing innovation helps to narrow the cost gap, it will not by itself shift procurement decisions. The pharmaceutical industry's purchasing decisions are driven primarily by price and buyers, including generic drug manufacturers and finished drug producers, that will not voluntarily pay a premium for domestically produced APIs absent policy incentives. A strategy to reduce dependence on Chinese APIs therefore requires not only supply-side investments in domestic capacity but also demand-side tools that give buyers a commercial reason to prefer allied supply chains. These include advance purchase commitments, formulary preferences for drugs sourced from non-Chinese API supply chains, and procurement criteria that reward supply chain resilience. Without such tools, new domestic capacity risks being underutilized.

Streamlining the development and deployment of these technologies will require deliberate policy support. PPPs and strategic federal funding for API manufacturing innovation can help move advanced production methods from the lab to commercial scale while strengthening domestic and allied supply chains. Achieving this will also require sustained investment both in R&D and in the scientific workforce—particularly Ph.D.-level researchers capable of developing and refining new biomanufacturing processes.

The National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL) plays an important role in advancing U.S. innovation in biopharmaceutical manufacturing. Policymakers

could also consider establishing a new Engineering Research Center (ERC) or Industry-University Cooperative Research Center (I/UCRC) focused on next-generation biomanufacturing technologies. Such a center could support applied research to develop scalable API production methods such as continuous manufacturing and advanced synthesis, fund pilot and demonstration facilities to bridge lab-scale innovation to commercial production, and create industry-aligned training programs to develop a specialized workforce. It could also facilitate collaboration between universities, manufacturers, and federal agencies to accelerate technology transfer, standards-setting, and the adoption of new manufacturing platforms in domestic production.

Strengthening U.S. pharmaceutical manufacturing innovation and enabling effective reshoring will require coordinated policies across investment, supply chain diversification, and procurement reform.[34] Policymakers could expand the use of direct subsidies, advance purchase commitments, and guaranteed contracts to incentivize domestic API and KSM manufacturing, alongside tax incentives and streamlined permitting to lower barriers to new capacity. Federal efforts, including a 2022 executive order to advance biomanufacturing innovation, represent important steps, but scaling will require additional support.[35]

Consistent with recommendations from the API Innovation Center, reshoring strategies should prioritize modernizing underutilized domestic facilities, accelerating the adoption of advanced manufacturing technologies, and targeting essential medicines for domestic production. Such efforts should be reinforced by procurement reforms such as quality-linked reimbursement and preferential treatment for U.S.-manufactured drugs.[36] At the same time, reshoring must be paired with diversification across trusted partners, given persistent upstream dependencies on foreign sources.

Regulatory timelines also play an important role in determining where API manufacturing investment and innovation occurs. Lengthy or uncertain FDA review processes raise the cost of capital for new facilities, particularly for U.S. and allied producers attempting to develop innovative manufacturing techniques to compete with entrenched Chinese suppliers. As a result, regulatory friction can unintentionally reinforce geographic concentration in pharmaceutical supply chains. Expedited FDA review pathways for API facilities located in the United States or allied countries, paired with proactive FDA technical assistance to help manufacturers meet good manufacturing practice standards, could reduce time-to-market barriers. Recent federal efforts point in this direction. Executive Order 14293, "Regulatory Relief to Promote Domestic Production of Critical Medicines," directs the FDA to streamline review of domestic pharmaceutical manufacturing, including through initiatives such as the agency's PreCheck Program.[37] Such policies could support domestic manufacturing innovation.

More broadly, regulatory timelines are closely intertwined with the FDA's approach to overseeing pharmaceutical manufacturing innovation. As noted in a previous ITIF report, the FDA heavily regulates the manufacturing processes used to produce drugs to ensure safety. Companies seeking approval for a new drug are hesitant to propose new manufacturing methods that lack regulatory precedent. Even after production begins, the FDA must certify any changes to previously approved methods, even those aimed at enhancing efficiency. In part, as a result, pharmaceutical manufacturing has not experienced the productivity and quality improvements seen in other advanced industries.[38]

FDA leadership has acknowledged some of these challenges. Former FDA Center for Drug Evaluation and Research (CDER) Director Janet Woodcock has noted that many existing regulations were developed around "traditional batch manufacturing under a unified pharmaceutical quality system" and are ill-suited to emerging technologies such as continuous manufacturing and advanced chemistry.[39] To address this, the FDA has started working with stakeholders from across industry, academia, and Congress to identify and address regulatory challenges to the adoption of advanced pharmaceutical manufacturing approaches.

Congressional policymakers and the Trump administration should continue to work with the FDA on these issues and streamline and accelerate the FDA's capacity to evaluate and approve innovative pharmaceutical manufacturing processes. This could include expanding expedited review pathways, increasing FDA technical engagement with manufacturers, and ensuring that the agency has the resources and authority needed to evaluate innovative production methods quickly and predictably. Doing so would reduce investment risk while accelerating the diffusion of novel, cost-saving, and resilient manufacturing technologies.

Current U.S. efforts to onshore API manufacturing should be paired with strategies to diversify upstream supply chains, particularly the KSMs that serve as critical inputs for API production.[40] Failure to do so could risk reproducing a fragile dependency if API manufacturing remains reliant on Chinese-sourced precursors, as the United States continues to depend heavily on foreign suppliers for these inputs. Policy incentives should therefore extend beyond APIs themselves to include the domestic production of critical starting materials through efforts including targeted tax credits, investment incentives, or loan guarantees that would help strengthen supply chain resilience.

To bolster U.S. drug manufacturing, the Pharmaceutical Supply Chain Defense and Enhancement Act (sponsored by senators Elizabeth Warren (D-MA) and Tina Smith (D-MN)) calls for lowering the cost of domestic production by providing $1 billion a year for 5 years to BARDA to dramatically upgrade U.S. capacity to manufacture "critical drugs."[41] Funding would be used to contract with U.S. nonprofits and companies to help them invest in the facilities, manufacturing techniques, and drug development processes needed to produce the drugs, APIs, and starting materials included on the "critical drugs" list in the United States.

Support Domestic Reshoring in Puerto Rico

One underutilized opportunity for domestic reshoring is Puerto Rico, which offers a more competitive business environment for pharmaceutical and API manufacturing within U.S. jurisdiction. Under its Incentives Code (Act 60), eligible firms benefit from a 4 percent corporate tax rate, substantial property and municipal tax exemptions, and R&D tax credits of up to 50 percent for qualified activities, typically guaranteed over long-term incentive periods. These provisions are designed to attract capital-intensive industries such as biopharmaceutical manufacturing and have been cited as a mechanism to rebuild U.S. production capacity.[42]

Congress should also leverage the tax code to encourage greater levels of medicines manufacturing in Puerto Rico. For example, Congress should reinstitute Section 936 of the Internal Revenue Code, which, when originally enacted in 1976, released pharmaceutical manufacturers from taxes on profits made in Puerto Rico and other U.S. territories. Section 936 contributed to making Puerto Rico a pharmaceutical manufacturing powerhouse, and while the biopharmaceutical sector does still contribute 30 percent of Puerto Rico's gross state product,

the phase-out of the provision from 2006 to 2016 contributed to a shrinking of the sector and a 40 percent reduction in the territory's manufacturing job base. In 2024, the territory produced $48.3 billion in pharmaceutical exports, representing 74 percent of its total exports, with 60 facilities and 13,917 employees in the sector.[43] Yet this capacity exists despite, not because of, the federal tax environment. **Congress should restore the tax credit in Section 936 for biopharmaceutical production in Puerto Rico and other U.S. territories.**[44] Doing so would signal a federal commitment to expanding this domestic production base, generating additional API and finished drugs within the United States at a scale that no other domestic location could match in the near term.[45]

While Puerto Rico is unlikely to become a full substitute for Chinese API production at scale—as China's dominance over global APIs reflects decades of infrastructure investment and industrial agglomeration—for a defined set of essential medicines, especially those at highest risk of supply disruption, Puerto Rico could plausibly supply a meaningful share of domestic needs. A targeted assessment of which APIs are most critical and amenable to production in Puerto Rico, given its existing capabilities, and what federal investment would be required to bring about that capacity would help policymakers prioritize.

Puerto Rico's advantages extend beyond tax policy. As a U.S. territory, it provides legal and regulatory alignment with the FDA, use of the U.S. dollar, and an established pharmaceutical manufacturing base. Together, these features lower operational and compliance risks relative to offshore production and make Puerto Rico a viable nearshore location for APIs and finished drugs. Federal assessments have highlighted Puerto Rico's existing role in U.S. drug manufacturing and its potential to expand capacity with appropriate policy support, while still being mindful of its vulnerability to natural disasters, such as hurricanes, that may cause damage to manufacturing facilities and thus lead to disruptions.[46]

These incentives make the territory a compelling alternative to foreign API sourcing for certain products, especially complex or high-value APIs and finished drugs. By attracting investment through tax preferences and supporting R&D activity domestically, these measures can help the United States reduce strategic dependence on China for APIs while building resilient capacity within the U.S. jurisdiction.

Expand Nearshoring and Friendshoring to Diversify Supply Chains

The preceding sections have outlined domestic reshoring strategies—including manufacturing innovation, the SAPIR initiative, and Puerto Rico's underutilized capacity—that could expand API production in the United States. These efforts are necessary but not sufficient, as even such a fully executed domestic reshoring agenda would leave the United States short of the supply chain independence needed to withstand a major disruption or a deliberate Chinese supply cutoff. Nearshoring, friendshoring, and allied coordination could complement U.S. production by diversifying supply chains without requiring every stage of manufacturing to occur domestically, while reducing concentration risk through expanded production across trusted jurisdictions.

A U.S.-Mexico collaboration for API and precursor material manufacturing, for instance, could build on Mexico's growing chemical and manufacturing sector while maintaining proximity to U.S. markets, leveraging existing industrial capabilities and strengthening regional resilience.[47] Such a partnership could involve several factors: i) a bilateral working group to identify priority APIs for joint production; ii) financing through the U.S. Development Finance Corporation for

Mexican pharmaceutical manufacturing facilities; iii) harmonized FDA-COFEPRIS (Mexico's health regulatory authority) inspection protocols to streamline market access for Mexican-produced APIs; and iv) joint infrastructure investments in dedicated pharmaceutical manufacturing zones near the U.S.-Mexico border, reducing logistics costs and enabling just-in-time supply chains.

Similarly, friendshoring with allies—such as India and South Korea—could support diversification in both production and innovation.[48] South Korea represents a compelling friendshoring partner not primarily because of cost, but due to its advanced manufacturing capabilities, strong IP protections, and proven capacity in pharmaceutical production. While South Korean wages tend to be higher, meaning that South Korean API production would not be as price-competitive with Chinese production, South Korea's value proposition lies in higher-value, technically complex APIs and advanced manufacturing partnerships—areas where quality, reliability, and innovation matter more than unit cost. Bilateral cooperation should focus on APIs where technical complexity or quality requirements make South Korean producers competitive, and on mutually supporting R&D to develop next-generation manufacturing platforms. South Korea possesses established capabilities in pharmaceuticals and advanced manufacturing, and bilateral cooperation between the two countries could include joint R&D initiatives, coinvestment in emerging manufacturing technologies, and improved data-sharing to map and understand shared supply chain vulnerabilities. These partnerships would help reduce dependence on concentrated sources—especially China—while preserving efficiency and scale through coordinated production across trusted allies.

Nearshoring, friendshoring, and allied coordination could complement U.S. production by diversifying supply chains without requiring every stage of manufacturing to occur domestically, while reducing concentration risk through expanded production across trusted jurisdictions.

The United States should also increase its reliance on India through a coordinated combination of procurement, financing, and regulatory tools. Indeed, drugs and APIs have been identified as a key opportunity for U.S.-India collaboration as part of the U.S.-India "TRUST" initiative.[49] **On the demand side, federal purchasing authorities, including BARDA, the Department of War (DOW), and the Centers for Medicare & Medicaid Services (CMS), could deploy advance market commitments to provide Indian API producers with the revenue predictability needed to justify capacity investments.** A White House determination under the Defense Production Act in December 2023 expanded BARDA's authority to issue such commitments for essential medicines and medical countermeasures, providing a legal avenue for this approach.[50] In parallel, CMS reimbursement policy could prioritize medications for preferred Medicare formulary placement for drugs that source APIs from trusted Indian suppliers.[51]

On the supply side, U.S. development and industrial finance tools could support India's API capacity expansion. **The U.S. International Development Finance Corporation (DFC), which has approximately $3.8 billion already deployed in India—making it the agency's largest single-country market—could provide loan guarantees and political risk insurance for API facilities and chemical-intermediate plants in India, particularly those aligned with U.S. essential-medicines priorities.**[52]

Regulatory cooperation is also critical: expanded FDA technical assistance, faster inspection scheduling, and early scientific engagement can lower compliance costs and shorten time-to-market for Indian producers scaling advanced or continuous manufacturing. Finally, joint U.S.–India initiatives to localize KSM production—supported by tax credits, export-import financing, or allied coinvestment—could reduce India's starting material dependence on China. India currently imports most of its API KSMs from China, with roughly 87 percent of India's imported antibiotic ingredients by value coming from China, meaning that a simple shift in final API assembly without addressing upstream inputs would leave the supply chain exposed.[53] Diversification that includes these materials, not just finished APIs, would be key to turning procurement reorientation into durable supply chain resilience.

Align Demand-Side Incentives to Support Domestic and Allied Production

Demand-side policy tools—some of which have been mentioned in preceding sections—are essential steps in complementing supply-side incentives, as they create predictable revenue streams that reduce risk and improve investment viability. In particular, advance purchase commitments for APIs and essential medicines produced through non-China-dependent supply chains could provide manufacturers with the long-term demand certainty needed to justify investment in new capacity building. These commitments could be deployed by federal U.S. purchasers through multiyear contracts that guarantee minimum volumes or revenues for qualifying suppliers.[54]

The SAPIR strategic stockpiling example discussed earlier is itself a form of demand-side intervention, as BARDA's contracts with Phlow effectively function as advance purchase commitments that secure demand for domestically produced APIs. Broadening this approach across more products and producers requires identifying the appropriate federal buyers and funding sources. The primary federal purchasers with authority to deploy such tools include BARDA and the Department of Defense (DOD) under the Defense Production Act, the Department of Veterans Affairs (VA) for the VA formulary, and CMS through Medicare Part D and Medicaid reimbursement policy. Funding for these commitments should be explicitly appropriated by Congress, potentially through a dedicated pharmaceutical supply chain resilience fund, rather than rely on discretionary emergency authorities that may not be available in noncrisis conditions.

To be effective, such purchase commitments should be tied to clear criteria, including diversified or allied sourcing, strong compliance records, and, where relevant, the adoption of advanced manufacturing technologies. Implementation would require cross-agency coordination. For example, BARDA and DOD could focus on essential medicines and national security priorities, while CMS and the VA could reinforce these signals through reimbursement and procurement policies that favor resilient supply chains. Standardized contracting frameworks could also reduce uncertainty for manufacturers. Together, such demand-side tools could help ensure that new API capacity is not only built but also remains economically sustainable over time.

The proposed Pharmaceutical Supply Chain Defense and Enhancement Act seeks to facilitate development of a market for domestically produced pharmaceuticals by requiring DOW, VA, HHS, and Bureau of Prisons to purchase American-made drugs and providing funding to subsidize the purchase of these drugs. Under the legislation, those agencies would together

receive an additional $1 billion over their current procurement budgets to purchase drugs that utilize ingredients produced exclusively in the United States.[55]

Strengthen Oversight of Foreign API Manufacturing

Another enduring challenge in global pharmaceutical supply chains consists of asymmetries in inspection and enforcement across jurisdictions. While the FDA applies current Good Manufacturing Practice (cGMP) requirements to all facilities supplying the U.S. market, oversight of foreign facilities—particularly in China—has historically been more limited and subject to greater operational constraints than for domestic manufacturers.[56]

Prior to the COVID-19 pandemic, FDA inspections abroad were often pre-announced and conducted less frequently than domestic inspections. The pandemic further disrupted these processes, reducing foreign inspections and increasing dependence on host-country regulatory oversight, resulting in a backlog that constrained U.S. visibility into foreign manufacturing conditions and practices. Although inspections have since resumed, structural factors, including limited staffing, logistical barriers, and broader geopolitical frictions, continue to affect the FDA's ability to maintain consistent, on-the-ground oversight of facilities in China.[57]

The inspection regime's limitations in China are not merely logistical; they reflect a structural information asymmetry with China that is difficult to remedy under current conditions. Unlike domestic U.S. facilities, which can be inspected with no warning, FDA inspectors in China must obtain a business visa and schedule inspections in advance, providing facilities with effective forewarning of oversight visits. This advance notice creates opportunities for facilities to stage compliance by concealing deficiencies, updating incomplete records, and coaching workers before inspectors arrive.[58]

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As Rosemary Gibson, author of *China RX* and a witness before the U.S.-China Economic and Security Review Commission, has commented, the FDA faces a regulator's dilemma: it must choose between allowing potentially defective medicines from noncompliant suppliers to remain on the market or exacerbating drug shortages by banning these suppliers. The dilemma was created because the United States allowed itself to become dependent on a single adversarial source.[59] This cannot be solved through better inspection protocols alone. **Congress should require that all inspections of foreign facilities be unannounced, and that no APIs or finished drugs may be imported from any facility that hasn't passed an FDA inspection within the preceding three years.**

In May 2025, the FDA reported expanded use of unannounced inspections at foreign manufacturing facilities that produce essential medicines intended for American patients. This followed a FDA pilot program in China and India that aimed to ensure that foreign plants are subject to the same level of regulatory oversight and rigor as domestic companies. The FDA also announced that it would evaluate its policies and practices for improvements to its foreign inspection program to ensure that the agency is the gold standard for regulatory oversight.[60]

These inspection asymmetries have important implications. They could affect competitive dynamics, as differences in inspection frequency and enforcement intensity can translate into

variation in effective compliance costs across jurisdictions. At the same time, they could contribute to reduced supply chain transparency, limiting regulators' ability to carefully assess quality risks, production vulnerabilities, and dependencies in upstream inputs such as KSMs.

Addressing these challenges requires greater consistency in how regulatory standards are applied globally. The FDA's own data shows that prior to the pandemic, many foreign facilities had never received in-person FDA inspections.[61] **Congress should authorize and fund a substantial increase in FDA foreign inspection capacity, set a statutory inspection frequency floor for foreign facilities of, at minimum, once every three years for any facility actively supplying the U.S. market, and appropriate funding sufficient to achieve that target.** Also, the FDA should leverage inspection-sharing agreements with trusted regulators such as the European Medicines Agency through its Mutual Recognition Agreement and Japan's Pharmaceuticals and Medical Devices Agency to extend oversight reach.[62]

Complementing physical inspections with remote monitoring tools and improved access to manufacturing data could further enhance visibility into Chinese production facilities specifically.[63] In parallel, greater transparency around inspection outcomes, along with incorporating compliance track records into federal procurement decisions, could help align market incentives with quality and supply chain resilience goals.[64] More importantly, inspection enforcement is itself a supply chain diversification tool. When the FDA bans imports from noncompliant suppliers, buyers must source elsewhere, prompting a shift toward domestic and allied producers that the supply-side policies discussed throughout are designed to support. Incorporating compliance track records into federal procurement decisions would reinforce this dynamic. Therefore, a more rigorous and consistently enforced inspection regime does not merely protect patients from potentially defective drugs—it actively supports the broader goal of reducing U.S. structural dependence on Chinese pharmaceutical production.

Collect Better Data

The United States needs to collect better data regarding U.S. foreign supply chain dependencies for KSMs, APIs, and drugs more broadly. As such, **Congress should pass the Pharmaceutical Supply Chain Defense and Enhancement Act**, which calls for the FDA commissioner and the secretary of Defense to develop a confidential list of drugs critical to the public health or national security, and in doing so identify all APIs and KSMs required for the manufacture of those drugs.[65] The list would be updated every two years. The legislation would further require drugmakers to annually report to the FDA information about the source of APIs and starting materials used to make drugs consumed in the United States; require drugmakers to provide to any federal agency they supply drugs information on the foreign manufacturers that produce those drugs and components; and require the FDA to issue both public and classified reports to Congress on the strength of the U.S. supply chain.[66] The legislation further would require the U.S. Federal and Trade Commission and the Treasury Department to study the role of foreign investment in the U.S. pharmaceutical industry within one year of the act's passage.

CONCLUSION

China is systematically building dominance in biopharmaceutical production, starting with KSMs and APIs, the focus of this report. But as ITIF has written, this dominance is extending along the entire value chain, including in new-to-the-world drugs. The United States and allies cannot continue allowing this to happen.

The United States faces a China problem in pharmaceutical supply chains. The dependence on Chinese API production is not the result of neutral market forces—it reflects decades of Chinese state-directed industrial policy aimed at achieving dominant upstream control over critical inputs the rest of the world relies on. That dominance now gives Beijing leverage over U.S. healthcare: the ability to threaten supply cutoffs, introduce substandard ingredients, or use pharmaceutical access as bargaining in a crisis. Addressing this requires acknowledging that it is a national security challenge that demands a strategic response. Efforts to reduce dependence on China must be grounded in a broader strategy that strengthens resilience across the entire pharmaceutical supply chain.

A robust approach will require aligning supply- and demand-side policies to support investment in domestic and allied production while accelerating the adoption of advanced manufacturing technologies that could improve cost competitiveness. At the same time, regulatory modernization and expanded inspection capacity are necessary to ensure consistent standards and to reduce barriers to innovation. Nearshoring and friendshoring strategies can further diversify risk, particularly when paired with upstream diversification of KSMs. The objective of this multifaceted strategy is to build a more diversified, transparent, and robust pharmaceutical supply chain that is able to withstand future disruptions.

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Section III.
Policy Recommendations



Mobilizing for Techno-Economic War, Part 1: The Case for Policy Transformation

ROBERT D. ATKINSON

The United States is at serious risk of becoming dependent on China for a wide array of key technologies and products, which would significantly shift the global balance of techno-economic power. Only fundamental policy change can potentially keep the United States from defeat.

KEY TAKEAWAYS

- China will soon surpass the United States in critical advanced industries that underpin national security and techno-economic power in the 21st century.
- It's too late for America to win the techno-economic war with China. China is too big, progressing too fast. But America must avoid losing. That will require fundamental policy changes to strengthen the U.S. techno-industrial-economic system.
- The problem is that the policy debate in Washington so far has failed to come to grips with the extent of the challenge America faces from China, much less the magnitude of the policy changes needed.
- Techno-economic war with China demands new paradigms for major U.S. policy realms, including science and research, corporate financing and investment, manufacturing policy, trade, regulation, and more.
- This report provides an overview of the challenge, the current responses, and why more fundamental policy transformation is needed. Other reports in this series will provide detailed recommendations in specific policy areas.

INTRODUCTION

The United States has been the world's dominant techno-economic power for the last 125 years since it overtook the United Kingdom and Germany in the late 1800s. But in recent decades, while being the leader has been better than being a laggard, it also has induced complacency, much as the United Kingdom lost its grip on industrial leadership.

Based on extensive analysis, the Information Technology and Innovation Foundation (ITIF) predicts that China will soon surpass the United States in a broad array of what we term national power industries: advanced, traded-sector industries that are critical to economic strength and national security.[1] (See box 1.) Yet, policymakers in Washington so far have advanced only limited and cautious responses that fail to address the core challenge America faces from China.

Faced with the mounting evidence that America will soon be displaced as the global techno-economic power, policymakers, analysts, and advisers tend to respond in one of three ways. The first and the most common reaction is denial, claiming that the situation is not really that bad. China may be good in steel, consumer electronics, telecom equipment, clean energy, drones, electric vehicles, and high-speed rail, but that's all. So, while America might need to tweak some of its policies and programs to stay ahead, our basic approaches to technological innovation and economic management will largely suffice as they are.

Policymakers in Washington so far have advanced only limited and cautious responses that fail to address the core challenge America faces from China.

Along similar lines, many claim that America will continue to lead because of its basic freedoms, its knack for innovation, its entrepreneurial culture, its research universities, and many other intangibles that constitute the American Way. Together, it is tempting to comfort ourselves assuming that these things are the essential ingredients of America's success as a nation, and China can't emulate them, so we are safe. But the reality is that, absent robust change, we will lose. America is increasingly hampered by structural weaknesses and self-inflicted wounds, including cuts in government research and development (R&D), limited STEM (science, technology, engineering, and math) skills, corporate short termism, institutional resistance to change, rising anticorporate and antitech animus, alienation of core allies, resistance to competitiveness-focused industrial policy, massive budget deficits, political disfunction, and more. Meanwhile, the Chinese Communist Party (CCP) is hyper-focused on global preeminence, and it has enacted powerful comprehensive strategies to achieve that goal.

Given these realities, the second possible response to China's challenge is to accede to being a second-tier power, as the UK did after World War II. In some ways, shedding the responsibilities of global leadership would be a relief. There would be no more need to police the world. We could even reembrace the Monroe Doctrine by withdrawing into a hemispheric cocoon behind tariff walls and two oceans. And if you are on the Left, there would be no more need to worry about the health of business and maintaining a good business climate; we could pursue regulatory and redistributive measures to achieve a post-capitalist Utopia. Unfortunately, this sort of gradual, if grudging, acceptance is most likely to be the order of the day, if for no other reason than inertia: There has been little evidence of political will to reverse America's national decline.

There is, however, a third possible response to the China challenge: to vow that we will not allow America to lose this techno-economic war without a putting up a fight, which requires making fundamental changes in the U.S. techno-industrial-economic system.

This report outlines the overall scope of the challenge and the fundamental policy change that will be required for America to avoid losing. Other reports in this series will lay out in greater detail new paradigms for specific U.S. policy realms, including corporate financing and investment, trade, science and research, manufacturing, social regulation, antitrust, and more.

THE CASE FOR BOLD CHANGE

Make no mistake: The policy changes required to avoid losing the techno-economic war to China will be outside the Overton Window of options that Washington policy elites have traditionally deemed to be acceptable. In fact, few are even considering them. Moreover, the changes ITIF will propose in this series are sure to bring stiff opposition from incumbent and entrenched interests, as well as from ideologues from the Right and Left. Predicable reactions will be that we can't afford to make major federal investments; dramatic change is not needed; it will make things worse, not better; bold, strategic intervention in U.S. innovation and economic systems would violate free markets; federal initiatives of that sort contravene states' rights; it is un-American; and more.

The most important first step the United States can take is to recognize the dire nature of the challenge it faces and accept that it requires bold new approaches. Incrementalism will not cut it.

Furthermore, even if Washington can summon the political courage to take bold steps, America still will likely lose. Even with population decline, China's workforce will remain massively larger than America's for many decades. Even with budget challenges, China's forced high savings rate will allow vastly more investment in national power industry development than the United States can muster. And as long as China remains a one-party authoritarian system, its overarching goal will be amassing national techno-economic power, not consumer or worker welfare. The reality is that the CCP's juggernaut is powerful and insurmountable.

The PRC development juggernaut is set on global dominance of most advanced industries. It is too late to stop China from advancing most of its national power industries to be on par with global leaders, including both mature industries where China has in the past lagged behind (such as software, biopharmaceuticals, aerospace, fine chemicals, semiconductors and semiconductor equipment, and machine tools) and emerging industries where it aims to leapfrog the West (such as AI, quantum computing, and nuclear fusion). But it is not too late to stop the absolute erosion of U.S. and allied capabilities.

To do that, the overwhelming weight of evidence clearly shows that America and its allies must take bold action. Otherwise, they are certain to lose much of their core national economic power industry capabilities and the freedom of action and national security that comes with that. So, bold action is worth the risk. In fact, there is no better option.

And "bold" is the operative term. There was never an official declaration of techno-economic war between China and the United States, but this war has nonetheless been underway for many years, and it has now reached a crisis point, such that reacting with incrementalism will fail.

Given the pace at which China has gained ground on the United States, it would be irrational to assume that if we just do a bit more of what we have already been doing, all will be well. Examples of incrementalism would include expanding high-skill immigration and federal research spending by a bit, reforming regulations such as the National Environmental Policy Act (NEPA) to make them work just a bit better, passing piecemeal bills to address a few narrow issues here and there, and tweaking a few existing programs. Even if the federal government were to *more than* incrementally expand and improve the tools and mechanisms in the current U.S. techno-industrial-economic system, we would still lose. It just might extend the timeline by a few years.

The organizing principle and main objective for U.S. techno-economic and trade policy must be bolstering the competitiveness of our national power industries to confront the China challenge. That objective must take precedence over competing economic goals and principles.

As such, the most important first step the United States can take is to recognize the dire nature of the challenge it faces and accept that the situation requires bold new approaches in response. Incrementalism will not cut it. Doing so leads to a simple but far-reaching proposition: The organizing principle and main objective for U.S. (and allied) techno-economic and trade policy must be bolstering the competitiveness of our national power industries to confront the China challenge. That objective must take precedence over competing economic goals and principles such as allocative market efficiency or redistribution, and it should not be conflated with separate policy principles and priorities such as pursuing racial equity and social justice or addressing climate change. To avoid losing to China, America must put itself on a wartime footing when it comes to matters of technological innovation, economic competitiveness, and trade. That requires compartmentalizing other issues.

We say "avoid losing," as opposed to winning, because China is a formidable competitor with a massive domestic market, beckoning opportunities internationally (e.g., in Belt-and-Road nations), and an enormous "bank account" to subsidize its way to global dominance. It is very likely that it will not be possible to keep Chinese firms from becoming leaders in many national power industries, especially in non-OECD (Organization for Economic Cooperation and Development) markets. But nations in the West can and must avoid losing their own power industry capabilities. Doing so would put the CCP in the driver's seat.

Box 1: National Power Industries

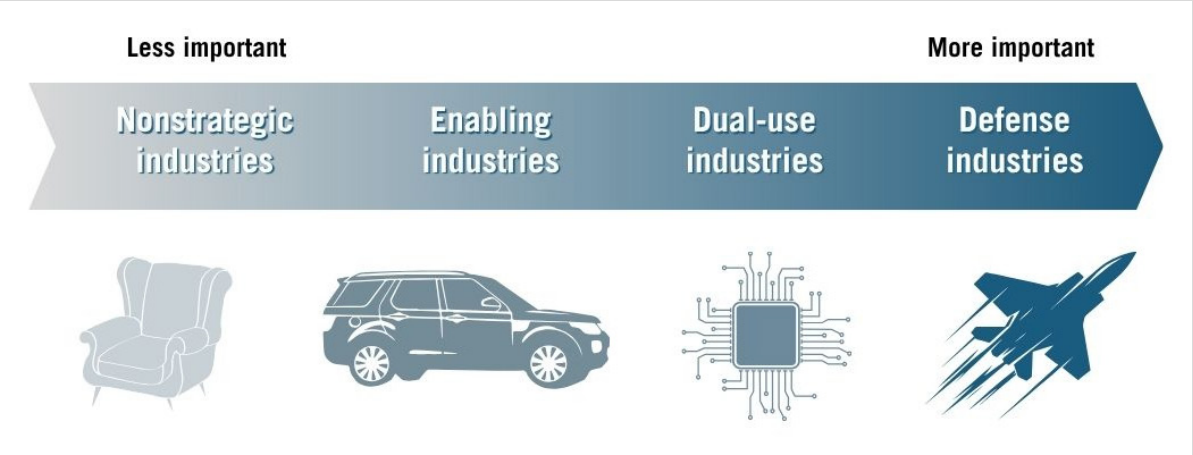
National power industries comprise not just any manufacturing industry, or even any technologically advanced industry. They can be thought of as three categories, from most important to least: military industries, dual-use industries, and enabling industries.[2]

Examples of military technologies and industries are guided missiles and tank production. Examples of dual-use technologies and industries are electronic displays and semiconductors, which are used for both defense and commercial purposes. Imagine, as a thought exercise, that China dominated optics and displays, which are used not just in AR/VR (augmented and virtual reality) headsets for gaming but also in headsets and upright displays for fighter jets. This would give China dangerous leverage over U.S. defense capabilities.

Meanwhile, enabling industries include component technologies and final products such as automobiles and heavy construction equipment, which contribute to the industrial commons that supports dual-use and defense industries.

Finally, there are industries such as furniture, cosmetics, sporting goods, wind turbines, wood products, and toys. These are not national power industries, in part because losing them would not create any serious vulnerabilities to China. Kids might not have many toys, but we can live with that. The same is true for virtually all nontraded sectors (e.g., barber shops, retail, personal service providers, etc.), which by definition are not subject to competition from foreign imports.

Figure 1: Industrial power scale



WHY MARKETS ARE NOT ENOUGH

Because maintaining allied strength in national power industries is critical, policymakers must jettison the deeply held Panglossian view that governments should not pick winners and that market outcomes are the best of all possible worlds. Markets might optimize per-capita GDP growth (although even here, there are market failures that suggest some government intervention is needed to maximize per-capita GDP growth), but only by luck and happenstance will they generate needed power industry capabilities. There is no inherent reason why the United States or its allies will produce leading-edge telecom equipment, semiconductors, electronic displays, jet airplanes, drugs, circuit boards, and more, especially in the face of predatory Chinese competitors that are backed by a deep-pocketed and intently focused Marxist-Leninist state. Other sectors might prove much more profitable for investors.

Moreover, weakness in dual-use and enabling industries would critically undermine the U.S. defense sector, requiring federal defense budgets to be far larger than is otherwise necessary in order to produce weapons systems and everything else the military needs in specialized factories with limited economies of scale. Markets, for all their value, are happy to enable the production of financial advisors, legal services, and high-end garments and let dual-use sectors wither and die in the face of subsidized Chinese production. This is true even with a robust, generic national manufacturing strategy, which generates more production of shoes, golf clubs, and two-by-fours, but not optics, machine tools, or lasers that weapons systems need.

Policymakers understand this when it comes to the production of weapons such as fighter aircraft and guns. While private companies design and build those, they do so under government

contracts. It's time to extend that thinking to dual-use and enabling industries. These industries do not need to be supported by government contracts in most cases. But in all cases, there should be well-crafted and effectively implemented government programs to ensure continued dynamic capabilities in national power industries.

Markets, for all their value, are happy to enable the production of financial advisors, legal services, and high-end garments and let dual-use sectors wither and die in the face of subsidized Chinese production.

The implications of this are simple, yet profoundly important. It is time for the U.S. government to craft a coherent power industry strategy. This does not imply state socialism, cronyism, or corporate welfare; however, it does imply using government policy to help companies in national economic power industries to be successful globally, especially against Chinese companies.

THE OVERARCHING CHALLENGE AND RESPONSE

In military affairs, threat assessment is critical. That's why the Department of Defense (DOD) has an Office of Net Assessment. Similarly, threat assessment is critical in techno-economic affairs and trade policy—specifically, to assess threats to U.S. national power industries. Today that threat comes principally from the People's Republic of China (PRC).

There are five key principles that should guide U.S. techno-economic and trade policy toward China:

1. **China is an adversary of the United States and of Western democracies more generally.** China is seeking to gain significant global market share in virtually all advanced industries that are critical to national power. And competition in these industries is win-lose: To the extent China gains global market share, allied nations lose. That process can and often does end in dominance on the Chinese side and market withdrawal on the allied side.
2. **National power industry capabilities are so critical that losing them to China cannot be an option.** To the extent that U.S. and Western losses grow, allied military strength weakens and PRC leverage over allied nations increases, putting them in a subservient position.
3. **Strong domestic policy actions are necessary but not sufficient to avoid losing production capabilities in national power industries.** China's engine of techno-economic and trade mercantilism is so powerful, and allied nations operate with such significant natural limitations (political and budgetary), that domestic policy actions can only slow down losses, not reverse them, or even stop them. Doing that would require also limiting PRC firms' access to a significant share of allied markets.
4. **Just as domestic action alone is not sufficient to avoid losing the techno-economic war to China, efforts that individual nations undertake on their own will not be sufficient.** China is simply too big and now too rich for any individual country, even one the size of the United States or the European Union, to survive the battle on its own. The West must band together in a national power industry alliance.

5. **Transforming techno-economic and trade policy on both the offensive and defense sides of the equation cannot be done incrementally.** It requires launching a new system of "national power capitalism." This will entail going back to "square one" in a host of policy areas—including business financing and governance, trade, education and training, science and technology, and market regulation—and redesigning to match the CCP challenge. At the same time, governments need to craft analytically based sector strategies for key national economic power industries.

This will be difficult politically, not least because there is little consensus on the nature of the challenge, but also because of longstanding commitments and deeply engrained biases in favor of particular policy solutions.

At the top of the list is the Trump administration's approach to trade policy. While President Trump deserves significant credit for sounding the alarm about China in his first term, his current trade policy will not solve the problem. It does not distinguish between national power industries and other industries. It does not focus on China, but rather alienates most U.S. allies and potential allies, inadvertently driving them closer to China as we have just seen with Canada. Because it invites retaliation, it limits global market access for strategically important U.S. industries that require global scale for survival. And by placing high tariffs on many intermediate goods, it raises costs for many U.S.-based companies trying to sell final goods in global markets. The administration's free-market ideology, coupled with resistance to raising taxes, also means that key proactive advanced industry policies and programs are being cut, not expanded.

Transforming techno-economic and trade policy on both the offensive and defense sides of the equation cannot be done incrementally. It requires launching a new system of "national power capitalism."

Another popular approach is to focus principally on DOD. The idea is that if DOD could procure weapons more efficiently and enable the commercial sector to play a more engaged role, much would improve. The hope is that America could then manufacture the technologies it needs for military power even if its civilian manufacturing base continues to erode. But the military's increasing reliance on "dual use" and commercial off-the-shelf components complicates this strategy, given how weak those sectors are becoming. In addition, even if that strategy worked, it would not prevent China from gaining leverage over U.S. allies because of its increasing dominance in certain key industries.

Perhaps the most popular approach is to try to change or limit China. But one of the key lessons from the first Trump administration is that it's not worth expending any political capital to get the CCP to change course. Its leaders simply won't. And as time has gone on, U.S. leverage over China has continued to shrink.

The view now is that if we can't get China to change, then maybe we can "throw sand in their gears" through export controls. And if that doesn't slow them down enough? Just add more export controls. But as ITIF will show in a forthcoming report on how to slow China's advance, export controls are not enough.

Finally, another approach is to decouple. The problem with that is twofold. While U.S. policy should be focused on getting all U.S. firms in national power industries out of China, that can take time. Forcing it to happen overnight would backfire. But more importantly, every yuan that U.S. firms earn from China is a yuan that does not go to Chinese firms.

THE GUIDING APPROACH

The overarching guiding approach for policymakers seeking to prevent U.S. techno-economic decline and eventual defeat at the hands of the PRC needs to start from scratch and be comprehensive.

It needs to start from scratch because so many of the policies and programs that need to be changed are grounded in core assumptions geared toward the post-World War II era, often from the 1960s and 1970s. These assumptions may have been valid in their day, but they will now only point us toward further decline. They include, among others, the following:

- **Economic growth happens on autopilot, and will continue to be strong on its own.** Therefore, government can impose virtually endless regulations without harming the underlying national economic engine.
- **The United States is globally dominant in military affairs, technology, and GDP.** As such, we can focus on consuming the fruits of America's economic cornucopia, not boosting it. Moreover, trade policy and the interests of firms and workers in America can play second fiddle to overall U.S. foreign policy goals.
- **Under no circumstances should the state play a developmental role.** The prevailing view, especially since the 1970s, when classical liberalism and free-market, consumer-focused economics took hold, has been that the role of the state is on the one hand largely negative—i.e., "keeping the free-for-all of individual competition with the bounds of decorum"—while on the other hand imposing social and environmental regulations on otherwise free-market actors.
- **The overarching goal of policy has been to enable and not interfere with allocation efficiencies in global markets with respect to the production and flow of goods, services, labor, and other factors.** As such, the prevailing view has been that policies should not favor specific industries, regardless of their role in national economic power, because free markets will automatically attend to the national interest, especially when the national interest has been defined narrowly as the aggregate of short-term individual interests.

These and related core assumptions, many of which seemed appropriate for the times in which they took hold, meant that regulation became too heavy and onerous, especially toward national power industries. Too much techno-economic and trade policy was grounded in the principle of competitive neutrality among industries. And the almost religious mission to spread free trade and democracy meant that U.S. trade policy was largely blind to harms that foreign countries might inflict on U.S. national power industries.

The days when policymakers could afford to operate that way are gone. Denying that the world has changed will not bring back the halcyon days of the past. But sticking with the same doctrines, policy frameworks, and programmatic approaches—or even adjusting them through

incremental reform—will not address America's key challenge of maintaining global power, including in national power industries.

Policymakers must start over with a fresh slate because incremental tinkering that merely improves current policy will not be enough, given the scope of the challenge.

Comprehensive transformation must address all major areas of policy that affect the competitiveness of national economic power industries, including securities and investment regulation, tax, technology, trade, talent, antitrust, social regulation, and more. The relative weakness of U.S. power industries today is not due to one deficiency in the U.S. system; it is the result of a massive interplay of subsystems that are each either underperforming or contributing to weakness.

Policymakers must start over with a fresh slate because incremental tinkering that merely improves current policy will not be enough, given the scope of the challenge.

U.S. POLICY PARADIGM SHIFTS

In his classic book *The Structure of Scientific Revolutions*, Thomas Kuhn posited that science proceeds not in a regular path, but rather through periodic revolutions in which new paradigms are proposed and accepted; and then for a period afterward, most "normal science" works to support and fill in the gaps in the paradigm shift.[3] This framework has applications for U.S. policy. While it's beyond the scope of this report to lay out these demarcation points, several are identifiable.

After the War of 1812, federal policy shifted toward stronger nationalism, economic self-sufficiency, and a robust national defense. That led to the so-called "American System" of tariffs, a national bank, and internal improvements, along with a larger military and increased continental focus.

The Civil War brought another major shift, enabled in part because of the withdrawal of Southern agrarian interests from the Congress. This phase included building the transcontinental railroad, establishing land grant universities, the Homestead Act, various banking acts, and the use of tariffs as tools of national industrialization.

The New Deal and the Post-War period ushered in a much larger federal government, including banking and securities regulation, major infrastructure projects, and vast expansion of federal support for science and research, including the National Science Foundation, NASA, and DARPA; the GI Bill; more aggressive antitrust enforcement; the creation of the Small Business Administration; and efforts to establish global free trade.

By the 1960s, the United States was so dominant that policymakers could afford to shift from national developmentalism to a regulatory state, with the creation of new agencies such as the Environmental Protection Agency and a massive increase in federal bureaucracy. Innovation, competitiveness, and economic growth were taken for granted, so the government's job was to regulate capitalism, not strengthen industry.

The late 1980s saw a more modest paradigm change, with the establishment of a host of policies and programs to deal with techno-industrial challenges from Japan and Germany. Those

included the R&D tax credit, new trade rules such as adding Section 301 to the Trade Act of 1974, the establishment of civilian technology programs in what was now called the National Institute of Standards and Technology, and others. Coupled with those came the emergence of free-market economics and financial capitalism, and an even stronger commitment to free trade.

Bold change grounded in a new bipartisan policy consensus may be difficult, but it is nonetheless what is needed.

That brings us to today. Now the appetite for bold change is limited, except among those on the Right who want to return to a McKinley-era America with high tariffs, among other things, and some on the Left who want a second New Deal, but this time focused not on the working class, per se, but on marginalized demographics. That has certainly produced congressional stalemate and extreme swings in the partisan agenda from one presidential administration to the next, depending on which party occupies the White House.

Against that backdrop, bold change grounded in a new bipartisan policy consensus may be difficult, but it is nonetheless what is needed. To that end, coming reports in this series will focus on particular policy areas that policymakers must address for the United States to avoid losing to China. The series will detail current policy approaches and assess their limitations, identify where transformational change is needed, and most importantly, propose what Congress and the White House can do to bring about the change.

Mobilizing for Techno-Economic War, Part 2: Slowing China's Advance

ROBERT D. ATKINSON, RODRIGO BALBONTIN, ELI CLEMENS, AND STEPHEN EZELL

Boosting U.S. competitiveness in national power industries is necessary, but not sufficient to avoid losing to China. America also must take measures to slow the PRC's progress toward global dominance. This report provides more than 100 actionable recommendations for the administration and Congress. Western allies should take many of the same steps.

KEY TAKEAWAYS

- Absent serious policy change in the West, the People's Republic of China will dominate most of the advanced industries that underpin national power in the 21st century, leaving the United States and its allies weaker and more vulnerable.
- While policies to support U.S. national power industries are critical, they are not enough. America and its allies also must work to limit Chinese firms' success.
- Policy should focus on five things: limiting Chinese knowledge acquisition, limiting Chinese imports, reducing the negative impact of Chinese innovation mercantilism, limiting financing for Chinese firms, and contesting Chinese firms in third-party markets.
- Some of the needed policy changes are fairly straightforward, but others will require bold, out-of-the-box thinking that questions the long-established consensus—such as sharing government intelligence on foreign commercial actors with U.S. companies.
- While these recommendations are specific to the United States, Western allies also should adopt them to avoid losing their national power industries to China.

INTRODUCTION

National power is the ability of a country to prevent other countries from taking actions against its core interests and the ability of the nation to impose its will on others. Traditionally, national power was largely determined by military power. In the 21st century, globally integrated economy, a key enabler of national power, has become relative strength in industries that enable leverage over adversaries and limit their leverage over us. These are "national economic power industries," such as semiconductors, machine tools, AI, and aerospace.

As the Information Technology and Innovation Foundation (ITIF) wrote in November 2024, the People's Republic of China (PRC) is focused on gaining global dominance in an array of national economic power industries.[1] And competition in these industries is mostly win-lose, wherein China's gains come with U.S. (and allied) losses. This means that unless the United States and allies are stronger than China in these industries and have more techno-economic leverage over the PRC than it has over us, then U.S. power vis-à-vis China will decline even more, with transformative consequences for the global balance of power. This means that the United States, and key allies, need to implement national economic power industry strategies to strengthen and make these industries more resilient. Other reports in this ITIF series will articulate these policy proposals.

While strong domestic policy actions are not necessary, they are not sufficient. This is generally contrary to the dominant Washington narrative that holds that virtually all U.S. efforts should be on "speeding us up," not slowing China down. Former Obama Treasury official Steven Rattner, in a *New York Times* op-ed, spoke for most when he wrote, "China is just too formidable as a rival—as well as a critical manufacturing powerhouse—to be reined in by diplomacy or an aggressive shift in policy. The only real solution is to get our house in order and beat China at its own game."[2]

Ensuring that we don't lose to China requires limiting the PRC's progress by limiting Chinese firms' access to knowledge and related resources while reducing their foreign market share because both provide "jet fuel" for innovation and expansion.

This is wishful thinking. China's techno-economic-trade mercantilist engine is so powerful, and limitations (political as well as budgetary) of the United States and allied nations so significant, that domestic actions alone will not reverse decline and loss. For multiple reasons, U.S. policy can't match Chinese policy.

Ensuring that we don't lose to China requires limiting the PRC's progress by limiting Chinese firms' access to knowledge and related resources while reducing their foreign market share because both provide "jet fuel" for innovation and expansion.

This report lays out a detailed policy agenda to limit Chinese national economic power industry success, providing a suite of policy options for the United States and its core allies to take, organized into five categories:

1. Limiting Chinese knowledge acquisition from U.S. universities, government laboratories, and businesses

2. Limiting Chinese imports to and investment in the United States
3. Reducing the negative impact of Chinese mercantilist policies
4. Reducing allied production in China
5. Contesting Chinese firms in non-Chinese, non-U.S. markets

PRINCIPLES FOR LIMITING THE PRC'S NATIONAL POWER INDUSTRY ADVANCE

The United States (and other Western democracies, even if most refuse to acknowledge it) and the PRC are adversaries. The PRC is seeking to gain significant global market share in virtually all advanced industries key to national power. And competition in these industries is win-lose. To the extent China gains global market share, allied nations lose. That process can and often does end in dominance on the Chinese side and market withdrawal on the allied side, as we have seen in industries such as solar panels, shipbuilding, high-speed rail, and telecommunications equipment.

But why not just press the Chinese Communist Party (CCP) to change, to backtrack on some, if not most, of its most egregious "innovation mercantilist" policies and practices? The answer is simple: the only way China will change course is if the CCP loses its dominance. These policies are baked into the CCP's global goals of becoming the new hegemon in the service of global socialism.[3] Indeed, one of the key lessons from the first Trump administration's action toward China is that it's not worth expending political capital to get the CCP to change course. It simply won't because it is committed to both the goal of dominating national economic power industries and the means of "innovation mercantilism."

Moreover, as time has gone on, U.S. leverage to get China to change has dramatically shrunk. Perhaps 15 years ago, the West had enough leverage to force China to alter course (e.g., raise the value of its currency, reduce its IP theft, and scale back its industrial subsidies). But it no longer does. If anything, it is China that now holds the leverage, as we have seen with its threats to limit exports of strategic minerals. As such, the goal of efforts directed at China should not be CCP policy change. The CCP has had plenty of opportunities for this in the past and has resolutely and consistently shown that it will not change its overarching goal or playbook.

All proposed actions against the PRC in the techno-economic-trade space should be judged on one factor: do they help or hurt the PRC boost its national economic power industries.

Another approach is to ignore China and decouple, which the Trump administration appears to be doing. The problems with this are numerous. Even if the United States blocked all Chinese imports, thus preserving the U.S. domestic market for firms in the United States, Chinese firms would still conquer "territory" outside the United States—markets that once were the province of U.S. firms.[4] For many, if not most, national economic power industries, the United States cannot hope to have innovative and cost-competitive firms that only sell to U.S. customers. The sales revenue relative to needed levels of fixed cost capital is just too low. Moreover, every yuan U.S. firms earn from selling in China is a yuan that does not go to Chinese firms. So, while production decoupling makes sense (e.g., encouraging U.S. firms producing in China for export to move production to other locations), sales decoupling does not. Cutting off most sales to China just

cedes the Chinese market to Chinese firms (and often other allied nation firms) while reducing revenue to U.S. firms.

That leaves helping our firms advance while making it harder for Chinese firms to advance. But doing the latter effectively means first framing the issue properly in terms of defending U.S. national power industries. Unfortunately, the rationales for much action taken against China is based on other factors. For example, the Biden administration justified its 100 percent tariffs on Chinese electric vehicles (EVs) on the grounds of cybersecurity risks. It's not that this was not an issue, or that the legal means for imposing the tariffs relied on this concern, it's that framing everything in cybersecurity terms limits taking action on the much broader set of industries and technologies that do not bear a cyberrisk. Similarly, the House Select Committee on China uses "fueling the CCP's Military, Surveillance State, and Uyghur Genocide" as rational for criticizing some action by a U.S. entity or set of entities.[5] But for the most part, if U.S. firms didn't do this, firms from other nations or within China would. All proposed actions against the PRC in the techno-economic-trade space should be judged on one factor: do they help or hurt the PRC boost its national economic power industries (including, but not limited to, its military) while not harming U.S. firms.

It is important to note that it is late in the game. If the West had taken the needed steps 20 years ago when the PRC's technological capabilities were much less than they are now, it likely could have significantly reduced the damage from China's techno-economic attacks. But after two decades of massive Chinese government investment and all-of-government commitment to be an independent techno-economic-industrial powerhouse, the best the West can hope for is 1) reducing actions that affirmatively help the PRC's quest and 2) slowing Chinese firms global market expansion.

THE PRISONER'S DILEMMA

One key reason why there has been so little effective action to counter the PRC's national power industry policies is it is often not in the interests of individual actors to do so. Universities want more Chinese students and Chinese research money. Local governments want to buy the cheapest Chinese electric buses. Companies want to sell to China. Even federal agencies want to save money by buying Chinese goods. And countries themselves want to cut the best deals so they can sell to China, as we have seen with Canada's recent actions to get close to China, rather than stand together in a democratic alliance.

In many ways, game theory, and in particular the prisoner's dilemma game, describes this dynamic. The prisoner's dilemma holds that if a prisoner confesses and implicates his partner, then he will get no punishment, and his partner will get the full sentence. If the prisoner does not confess but his partner does, then he will receive the full sentence, and his partner will receive none. If they both confess, then they will receive half the sentence each. And if neither confesses, they will each receive a minimum sentence. So, if they act only based on their own self-interest, the rational move is to confess—they are always better off, no matter what their partner does. But if they stick together and refuse to cooperate, then both will be better off. In the absence of a coordination mechanism, self-interest dictates ratting on one's partner, especially in a low-trust environment.

Applied to China, it should be clear that if everyone, including our purported allies, cooperated against the PRC, collectively there would be a greatly reduced problem. China could not win the war. It would not gain market access. Its access to technology and knowledge would be limited. It would lose foreign direct investment (FDI). But without strong U.S. leadership and a willingness of allies to show courage and accept some limited short-term pain, it's rational for each player to defect.

The prisoner's dilemma holds that if a prisoner confesses and implicates his partner, then he will get no punishment, and his partner will get the full sentence… But if they stick together and refuse to cooperate, then both will be better off.

We see this at virtually every level of competition with China. Most organizations and consumers—cities, federal government departments, companies, countries, international organizations—have every interest to buy the Chinese product since it saves them money, even if it enables a worse global outcome. They all want the best deals. Only laws, regulations, binding agreements, and patriotism devoted to defending Western democracy and freedom will prevent this.

Western allies face a "prisoner's dilemma" dealing with China; sticking together would be mutually beneficial[6]



It's not that countries and even firms cannot cooperate for the greater good. There are a few issues where a majority of countries have chosen to not "rat out the other" and to cooperate instead. The major one is climate change, where most nations, leaving aside China and the United States, have committed to sacrificing for the good of the world (e.g., regulating emissions, spending money on more expensive clean energy, and more). Yet, given that climate change is a global challenge, it is rational for individual countries, especially smaller ones, to keep emitting greenhouse gases because the added cost to them is quite small (a bit less reduction in global emissions), but the benefit is large (the savings they make by not spending more on emissions reduction).[7] But largely because elite views in the West identify climate as an

issue for "cooperation," there is at least an expectation of countries cooperating, knowing that if they act selfishly they would suffer reputational harm, as we have seen as most Western nations' decried President Trump's withdrawal from climate accords.

But not when it comes to China. We can see this by the widespread use of the term "U.S.-China trade war," which implies that the United States is equally if not more to blame, and that it is only acting to benefit itself rather than the West overall. This framing lets other nations free ride on America's sacrifices to limit China's techno-economic power, and even take advantage of the U.S. by replacing American exports to China with theirs, as Europe has done.[8]

In the past, cooperation has come from two sources. First, the United States used hard and soft power to align foreign interests toward global interests of freedom, rule of law, democracy, and free markets. But as U.S. power has weakened, both politically and economically, it has lost a share of its influence, and under Trump, has pulled back even more from this role, especially as that role has imposed costs on the United States (e.g., asymmetrical market access and larger defense budgets than would be case if allies had shared more of the burden).

Because of the capitulation of international organizations, virtually all the issues relating to how to stop helping and facilitating the rise in the PRC's industrial power relate to prisoner's dilemma cooperation issues.

Second, it was the United States that pushed for the establishment of international institutions that should have helped address these challenges. But these institutions have largely failed. The International Monetary Fund, for example, refused to label China a currency manipulator, caving to CCP pressures, so Chinese predatory exports continued to grow. Because of pressure from the PRC, the World Health Organization covered up for China in the COVID crisis. The World Trade Organization (WTO) refused to expel China in spite of the latter's systematic disregard for trade rules and then proved a paper tiger when it came to getting China to play by the rules.

As such, because of the capitulation of international organizations, virtually all the issues relating to how to stop helping and facilitating the rise in the PRC's industrial power relate to prisoner's dilemma cooperation issues. Because it is in the self-interest, particularly the short-term self-interest, of almost all players to cut their own deals with China and to not cooperate in order to limit China's gain, as we have recently seen with Canada's, France's, and the United Kingdom's behavior toward China.[9]

Given the stakes at play, it is a sad commentary that cooperation is lacking, especially among so-called U.S. allies. Internationally, only the United States can induce cooperation—and only by creating "deals" that force other nations to choose either Western freedom or vassal status to China. But that seems off the table, at least for now. Domestically, the only way to induce cooperation of various actors (government agencies, nonprofits, and businesses) is through law, regulation, or incentives.

LIMITS OF EXPORT CONTROLS

To the casual observer it would seem that the only tool the U.S. government employs to limit China's advance is export controls. The thinking goes that the United States mostly successfully imposed export controls on the Soviet Union and limited its defense and commercial advancement, so the same success can be had with China. But while there can be no doubt that

export controls need to be part of the toolbox to limit China, they should be one tool of many—and they should be applied with restraint and consideration of their effectiveness and also their impact on U.S. industry competitive success.

China is not the Soviet Union. First, it is vastly more capable of producing its own, often world-class, technology substitutes in the face of U.S. export controls. Second, China's economy is twice as large as the Soviet Union's was in the early 1970s as a share of global gross domestic product (GDP). As such, it is harder from a competitiveness standpoint for Western companies to abandon that market and still be competitive in the global economy. Third, while COCOM (the Coordinating Committee for Multilateral Export Controls) was never perfect and many members did not comply with the regime fully, it was vastly better than today's informal and ad hoc regime. At its height, COCOM had 17 national members. Today, while some U.S. allies agree to limit exports to China, many, even if they agree on paper, turn a blind eye and are happy to get the export earnings, especially as they come with reduced competitive position of their U.S. rivals.

Finally, giving up sales to the Soviet Union had virtually no risk that Soviet firms would gain and U.S. firms lose global market share. That is not the case with China. The CCP's goal is to replace U.S. and Western national economic power industry firms, and cutting off sales to China, while potentially hurting China in the short run, also hurts U.S. firms by reducing their sales and abilities to continue to invest in the future.

Today, while some U.S. allies agree to limit exports to China, many, even if they agree on paper, turn a blind eye and are happy to get the export earnings, especially as they come with reduced competitive position of their U.S. rivals.

We can see the limits of export controls by examining their minimal impact on Chinese telecom equipment producer Huwaei. (See box 1.) This is not to say that export controls should have no place in the arsenal of limiting China's advance, but they should not be the lion's share of effort.

That means several things. First, **if the Commerce Department is to implement an export control, it should be certain that China cannot get similar technology domestically or from another country.** If it can't be certain, then it is better to not cut off U.S. sales.

Second, if the Trump administration seeks to work with allies, **the White House should establish a modern-day version of COCOM focused on China**.

Third, the Bureau of Industry and Security (BIS) needs to take more proactive steps to investigate export control diversion. It's not enough to ban the exports to China of a particular product if grey market middlemen bypass these controls. There are private providers of software that can track such sales. BIS should be more actively using such systems. And when it identifies such a party, it should refer them to the Department of Justice (DOJ) for prosecution. Also, some have reported that some of these enablers of grey market after-sales to China are U.S. entities that have qualified for a Defense Logistics Agency (DLA) Commercial and Government Entity (CAGE) code designation.[10] BIS should also flag these entities for the War Department (DOW) so that it can restrict these companies from securing government contracts.

Box 1: The Effect of Export Controls on Huawei

Due to cybersecurity concerns, since 2018, the U.S. government has gradually banned the sale of Huawei products for U.S. telecommunications networks and encouraged other nations to do the same. But that was not enough for U.S. policymakers; they sought to kill the company. In 2019, the U.S. government sought to sanction Huawei for doing business with adversaries, such as Iran, by taking judicial actions and adding it to the Commerce Department's BIS Entity List. Entity List-based export controls attempted to cripple the company by disrupting its supply chain, which was heavily reliant on U.S. technologies. The Biden and the second Trump administrations have continued to sanction Huawei, and export controls remain in place.

The export controls backfired. Huawei is the world's largest telecom equipment manufacturer, and its global market share for telecom equipment increased from 29 percent in early 2018 to 31 percent by 2024.[11] At the same time, U.S. technology companies such as Intel, Teradyne, Qualcomm, and others lost more than $33 billion in sales to Huawei between 2021 and 2024—in a conservative estimate—weakening these American companies globally while strengthening Chinese and other nations' tech companies. Additionally, due to the restrictions, Huawei launched its operating system, HarmonyOS, in 2019, which now has nearly a billion users and is compatible with mobiles, tablets, and laptops—a direct threat to Google's Android and Microsoft's Windows global market share.[12] The company is also catching up on chipmaking, claiming that in 2023 it was able to replace more than 13,000 components and redesign over 4,000 different circuit boards.[13] As of August 2025, Huawei claimed to have built an entire ecosystem independent of U.S. technologies.[14]

Huawei was able to do this because it anticipated these U.S. actions as early as 2012 and invested heavily to offset them.[15] It was able to do so partly because its research and development (R&D) investments grew proportionally more than those of any other major technology company—including Alphabet, Apple, and Microsoft—and it increased its reliance on the Chinese market to sustain revenues. In addition, the PRC provided significant support to the company to decouple from the United States after the restrictions were in place.

Arguably, the U.S. government could have crippled Huawei in the late 2000s or early 2010s when its and China's technological capabilities were significantly weaker. But by the late 2010s, it was too late for that. As a result, the only outcome was to weaken U.S. technology companies and strengthen Huawei and China's innovation.

The U.S. government's attempt to cripple Huawei underestimated the extent of the Chinese government's support for the company, Huawei's technological advancements, and its ability to source non-U.S. inputs or develop them domestically. The U.S. government's approach was outdated, not reflecting the current relative power of the United States.

Moreover, export controls accelerated Huawei's innovations and harmed American companies. U.S. firms have been directly affected, with lost sales of over $33 billion between 2021 and 2024 and exposure to retaliation by the Chinese government due to these export controls.

LIMITING CHINESE KNOWLEDGE ACQUISITION

China has advanced economically and technologically at the pace it has in significant part because it has taken knowledge from the leaders without fair compensation. While it's domestic knowledge generation capabilities are now significantly better than they were even a decade ago, China still benefits from acquisition of foreign knowledge. As such, any coherent policy to slow China's advance requires limiting Chinese knowledge acquisition. China gets knowledge from three main places: university, government, and business.

University and Government Research Policies

The framework by which U.S. and Western universities generally govern themselves no longer works. During the Cold War, it was widely accepted that universities should work to limit knowledge transfer to the Soviets. University policies were significantly adjusted to align with national security priorities, spurred by federal funding and public anxiety.

But with the fall of the Soviet Union, universities and even government research laboratories embraced a globalist vision of knowledge, just as U.S. corporations embraced a globalist vision of business and economics. In this vision, science is a global good. More collaboration is better. And universities, especially private ones, owe little allegiance to the nation, but rather much to the world as a whole. This is especially true after the declines in federal and state government support to universities, with most universities now, like most companies, looking out first and foremost for their bottom lines, and not national power.

And that creates problems, including pressures to kowtow to Beijing. A report for the Alexander Hamilton Society states, "Protecting language funding, like access to Chinese students, visas, and satellite campuses, depends on placating Beijing."[16]

The most important change that needs to happen is for widespread acceptance by U.S. universities that China is an adversary, not a customer.

Indeed, the relationship between U.S. universities and China is quite different than it was with the Soviet Union. As the Hamilton Society report notes:

> Soviet students never provided crucial revenue for American universities. There was never a "Pushkin Institute" affiliated with the Soviet Communist Party financing most Russian language training at American universities. Conversely, scholar exchanges with the PRC lack the engagement of the U.S. government characteristic of Cold War exchanges with the USSR. Instead, U.S. institutions today build relationships with the PRC to secure access to China.[17]

At the same time, colleges and universities are desperate for revenue, even if that comes from Chinese students, companies, or the CCP. As such, the most important change that needs to happen is for widespread acceptance by U.S. universities that China is an adversary, not a customer. Because of strong incentives for universities to pursue their own self-interest rather than national interest, the federal government will need to play a stronger role. There are many steps it needs to take.

Limit Chinese Nationals Receiving Postdocs at Universities and FFRDCs

Many Chinese nationals obtaining postdoctoral positions in the United States do so after graduating from a U.S. university. And historically, a high share has stayed in America, contributing to the U.S. innovation base and not contributing to China's. But some Chinese nationals come to study as postdocs after graduating in China. Many of them go back to China, and the United States does not benefit. In fact, key knowledge these students acquire while in the United States is now used in China.

While the National Science Foundation (NSF) does not collect data on the nationality of postdocs (something it should do), many are from other nations. For example, 55 percent of postdocs at federally funded R&D centers are temporary visa holders.[18] **Universities and Federally Funded Research and Development Centers (FFRDCs) should be required to report the country of citizenship of postdocs, and the government should track their later decisions to determine whether they stayed in the United States or went back to home countries, especially China.** At the same time, where universities and FFRDCs are not able to hire Americans, they should try to hire postdocs from allied nations or nonadversary nations such as India, and not from China.

Ban Chinese Funding of U.S. Research Universities

While China has proven that it can innovate, it still steals U.S. intellectual property (IP) and research to advance its own national technology innovations. One way it does this is by funding U.S. university research. Chinese-funded research conducted here is taken back to China, hurting U.S. competitiveness. There is evidence that the CCP funds American universities to advance its agenda—and currently there is no robust legal tool to compel recipients to disclose their funding sources.[19]

Congress should make federal funding of university research contingent on universities not receiving Chinese funding for research.[20] And this ban should also extend to pass-throughs where China funds a U.S. entity that then funds the U.S. research institution.[21] As such, **Congress should pass the Defending Education Transparency and Ending Rogue Regimes Engaging in Nefarious Transactions (DETERRENT) Act** to expand the oversight and disclosure requirements regarding Chinese funds channeled to U.S. universities and research institutions.

The DETERRENT Act will close loopholes in inadequate reporting and enforcement of federal laws on university disclosures regarding gifts and contracts from foreign entities.[22] This bill proposes lowering the reporting threshold to $50,000. The DETERRENT Act also prohibits universities from entering into contracts with a foreign country of concern or with a foreign entity of concern without obtaining a waiver and holds private research institutions accountable for their financial partnerships by requiring disclosure of concerning foreign investments in their endowments.[23]

Require Disclosure of U.S. Faculty Research With Chinese Researchers Related to National Power Industries

ITIF has reported that PRC espionage is a strategy that extends from state intelligence agencies to nominally private firms, and that Beijing coordinates cyber, human, and corporate channels to steal U.S. industrial and defense technologies.[24] The PRC's espionage ecosystem is aided by the U.S. research environment, which privileges the free flow of ideas and researchers, allowing

China to recruit (or coerce) talent trained in America and to have some of this talent engage in IP theft and technology transfer.

A 2024 report from the House Select Committee on the CCP reveals that Georgia Tech received $17 million from an entity affiliated with Tianjin University, while UC Berkeley received nearly $22 million from entities affiliated with Tsinghua University.[25] These contracts were discovered years after they were in place, and both involve advanced research on dual-use technologies. The failure to report is due to weak enforcement of Section 117 of the Higher Education Act. This section requires the disclosure of gifts and contracts over $250,000 from foreign entities. However, the auditing is limited to the Department of Education, and it is possible to obscure the true sources of funding by bypassing funds through intermediaries.[26]

At minimum, **universities should be required to disclose in real time all research partnerships with researchers or companies in China. Where those partnerships are with entities of concern in China, People's Liberation Army (PLA) military institutions, or affiliated institutions (e.g., the "seven sons of national defense"), the researchers should be required to first get permission from NSF.**

Congress should also approve the Securing American Funding and Expertise from Adversarial Research Exploitation Act of 2025 (SAFE Act) to block U.S. federal grants to scientists with a history of collaborating with hostile foreign countries, such as China. This bill is drafted in response to a Select Committee report that identifies over 50 partnerships between U.S. universities and entities associated with the CCP, including joint degree programs with China's Seven Sons of National Defense—a group of Chinese universities selected to focus on military and defense research and research on sensitive, dual-use technologies such as submarine engineering, aircraft power engineering, and mechanical design, manufacturing, and automation.[27] The SAFE Act would ban federally funded science, technology, engineering, and mathematics (STEM) research by researchers with a history of collaborating with PRC-associated entities, ban DOD funding for universities that partner with adversaries, and, similar to the DETERRENT Act, impose stricter disclosure requirements on collaboration with entities associated with adversaries.[28]

In addition, a 2023 Select Committee on the CCP report outlines further recommendations to "strengthen U.S. research security and defend against malign talent recruitment."[29] Among its recommendations, the report suggests **improving cross-agency disclosure guidance produced under National Security Presidential Memorandum 33 (NSPM-33) by NSF.** This would require all recipients of federal research funding—including personnel and contractors—to disclose their relationships with entities and interests with foreign adversaries for a certain period (e.g., the past five years). In addition, the Select Committee, to help agencies in the vetting process, has proposed **the creation of "an unclassified database using open-source information to keep track of PRC research entities that engage in defense and military research and civil-military fusion programs."**[30]

The Select Committee identified 8,800 publications supported by DOD funding published with coauthors affiliated with PRC institutions and more who were directly affiliated with the PRC's defense research and industrial base.[31] **Congress should ban cooperation with CCP/PLA-associated entities, there should be a presumption of research being problematic, and institutions should be required to obtain waivers to proceed.**

Institute Better Screening of Chinese STEM Students

There are vastly more Chinese students studying in the United States than U.S. students studying in China. On the one hand, they gain knowledge here that they can use if they go back. On the other hand, if they stay in the United States (and do not transfer knowledge to China), they are a net plus for the U.S. innovation ecosystem, and conversely, their presence weakens China by reducing talent levels in China. Even if they go back to China, they have been exposed to the U.S. system of freedom and democracy and perhaps would want to support that in China at some point in the future.

However, there are two challenges. The first is that some students return to China. But that does not mean we should cut off flows. If they did not come to the United States, they would likely go to other nations with strong higher education systems, and U.S. research university competitiveness would decline. Moreover, the rate of staying for Chinese STEM students remains quite high. One study finds that of a sample of 100 Chinese AI researchers studying in the United States in 2019, 87 percent remained in the United States in 2025.[32] However, this is still a relatively limited time period, and we don't know how many plan to return in the next decade. One 2024 study of Chinese students enrolled in U.S. higher ed finds that only 43 percent intend to stay in the United States.[33]

At the same time, there is a share of Chinese students who are "bad apples." They pressure fellow Chinese students to toe the CCP party line. They steal U.S. IP. They are closely tied to the Chinese military or intelligence services.[34] Indeed, the porousness between Chinese academic institutions and the PRC government has proven to be an ongoing problem. **The United States in 2025 announced that it would start revoking visas of Chinese students with connections to the CCP or studying in critical fields. This should be expanded.** Multiple cases have highlighted specific Chinese schools whose students have been linked to the theft of trade secrets and proprietary information. **The United States should blacklist these Chinese institutions and reject their students' visa applications.**

One of the reasons why universities are so opposed to any limits on Chinese students is that many rely on them as a source of tuition revenue and low-wage research assistance.

What is the ratio of "bad apples" to "good"? Is it changing? We do not know. But this should not be a binary choice between limiting or banning Chinese students and opening the doors to all with no assessment. Universities and FFRDCs need to do more due diligence on Chinese STEM students coming here, especially for graduate programs. They need to better monitor for risks of IP theft. **The federal government should require universities to be more transparent: how many Chinese are enrolled in what disciplines? And it needs to provide analytical tools to universities and FFRDCs to make better decisions on individual students.**

One of the reasons why universities are so opposed to any limits on Chinese students is that many rely on them as a source of tuition revenue and low-wage research assistance. Given the cuts in state and federal funding for universities, this is understandable. But all else equal, universities and related programs should try to recruit students from other nations, such as India. Related to this, **the U.S. government should pressure foreign fellowship and other tuition assistance programs to not include Chinese students and instead prioritize students from other nations.**

Restrict the U.S.-China Science and Technology Agreement

President Jimmy Carter mistakenly opened up more to China in 1979, and one step was to sign the U.S.-China Science and Technology (S&T) Agreement. The idea was that by sharing S&T, China would move into the U.S. orbit and relations would become friendlier. Like so much of U.S. policy toward China over the last 50 years, it was based on wishful thinking and naïveté. China didn't want to become like us. It wanted access to our science and technology to advance its national power.

Over the years, the S&T agreement—a process whereby federal agencies engage in partnerships with Chinese agencies and scientists—has led to Chinese advances in national power industries. As a 2014 report from the U.S.-China Economic and Security Review Commission notes:

> In contrast to the U.S. approach of utilizing S&T cooperation primarily as a tool of diplomacy, China uses S&T engagement as a component of a national strategy to build scientific capabilities. This has enabled the rapid development of China's S&T capabilities and threatens the United States' status as the world's leading scientific power. The report also identifies some national security challenges, including the transfer of sensitive technology through espionage and other means that have emerged in the context of bilateral S&T cooperation.[35]

Indeed, proponents of the agreement—who are also proponents of engagement with the PRC—point to cooperation on things such as influenza (that clearly did not work out well given China was the source of COVID), birth defects, and air pollution. But they do not mention projects on EVs, agricultural biotechnology, human biotechnology, and nanotechnology and help with technology standards (that China now manipulates).

When the agreement was last up for renewal, the Biden administration negotiated certain changes, but these had nothing to do with preventing transfer of key knowledge to China.[36] To be sure, there may be areas where cooperation is reciprocal and does not lead to advances in key technology areas supporting Chinese national power industries. As such, the Trump administration should not cancel the agreement. But **it should change the agreement to limit it to areas that do not provide China with any assistance in technologies related to national economic power industries.** Endangered species research sharing, yes. EV research sharing, no.

Business Knowledge Acquisition

China relied heavily on foreign business, scientific, and engineering knowledge and technology to become the technology powerhouse it is today. Most of that was acquired unfairly, through cybertheft, forced tech transfer, and domestic production in exchange for market access, breaking and entering, insider threats, and attracting talent holding stolen information. There is no doubt that China relies less on this than before. But it still benefits from it. As an ITIF report by commercial counterintelligence expert Darren Tremblay, states, "China's espionage ecosystem is systemic and strategic. From state intelligence agencies to nominally private firms, Beijing coordinates cyber, human, and corporate channels to steal U.S. industrial and defense technologies."[37]

The report goes on to note:

> In 2008, the PRC launched its Thousand Talents Program with the intent of enticing scientists to bring their research to China. Economic espionage was a significant aspect of the Thousand Talents Program. Although in many of the cases that the Department of Justice brought against talent plan participants involved academia, the private sector was not immune. In 2019, The New York Times reported that 600 recruits worked for U.S. companies. These penetrations of the private sector, including Xiaoqing Zheng at General Electric and Xiaorong You at the Coca-Cola and Eastman Chemical, have included attempts to steal trade secrets on behalf of Chinese entities… Therefore, it can be assumed that any expertise applied on behalf of—or technology provided to—a PRC entity will support that country's ability to counter the United States and its allies militarily.[38]

As such, U.S. and allied policies need to do more to limit this flow of knowledge and technology.

Restore the White House IP Enforcement Coordinator

Although the erstwhile Office of the Intellectual Property Enforcement Coordinator (IPEC) lacked direct enforcement authority, its annual reports served the important function of providing Congress and the public with a consolidated, cross-agency picture of U.S. government efforts to combat IP theft.[39] Piracy and counterfeiting are interdisciplinary crimes and thus require an interagency approach to enforce against. IPEC's reports were the only documents that systematically compiled enforcement actions, seizures, prosecutions, diplomatic engagements, and capacity-building efforts across all the federal agencies—including U.S. Customs and Border Protection (CBP), U.S. Immigration and Customs Enforcement (ICE), DOJ, the Food and Drug Administration, the U.S. Patent and Trademark Office, the U.S. State Department, and the U.S. Trade Representative (USTR)—with a focus on piracy and counterfeiting.

"China's espionage ecosystem is systemic and strategic. From state intelligence agencies to nominally private firms, Beijing coordinates cyber, human, and corporate channels to steal U.S. industrial and defense technologies."

An ITIF investigation of how Chinese online marketplaces list and sell counterfeit products corroborated U.S. government enforcement gaps using empirical evidence of test purchases conducted on Temu, AliExpress, and SHEIN.[40] With IPEC dormant in the Trump administration, the United States lacks a standing mechanism to integrate such evidence into a government-wide enforcement narrative, track implementation of executive and agency recommendations, or ensure coordinated accountability across the interagency. **Reinstating a White House-level IP enforcement reporting function would restore the institutional continuity necessary to translate isolated agency actions into a sustained strategic response.**

Limit Chinese "False Flagging"

Certain Chinese companies operating in the United States and other economies mask their national origin, presenting themselves as American corporate citizens—sometimes complete with patriotic branding—even while Beijing retains ultimate control over their ownership and strategic direction. This phenomenon of false flagging is favorable to the CCP: these obscured companies

benefit from their obfuscation by gaining privileged access to the U.S. market, IP, talent, and even generous government funding to support China's strategic industrial and military priorities.[41]

In order to strengthen U.S. systems to reduce vulnerabilities to Chinese techno-industrial predation through false flagging, Congress and the Trump administration should take the following steps.

As of 2020, the Committee on Foreign Investment in the United States (CFIUS) is implementing the Foreign Investment Risk Review Modernization Act of 2018 (FIRRMA) in its screens.[42] The FIRRMA states that CFIUS should also factor into its reviews "whether a covered transaction involves a country of special concern that has a demonstrated or declared strategic goal of acquiring a type of critical technology or critical infrastructure that would affect United States leadership in areas related to national security."[43] ITIF has found evidence of CFIUS permitting Chinese companies with ties to the PLA to acquire U.S.-enabling industry companies, even following this rule change.[44] **Congress should strengthen and broaden CFIUS screening and oversight.**

Congress should also direct CFIUS to create a comprehensive registry of all Chinese-origin companies operating in the United States, including subsidiaries, joint ventures, firms with Chinese financing, and entities with partial Chinese government ownership. To ensure that the list is accurate and up to date, CFIUS should leverage private sector open-source intelligence providers to both identify Chinese-controlled entities that may otherwise evade detection and ensure that the registry remains accurate and up to date.

Congress should expand the Corporate Transparency Act to require Chinese-origin companies operating in U.S. power industries to report beneficial ownership and operational control, including minority stakes, joint ventures, offshore subsidiaries, and IP transfer rights.[45] Using CFIUS's registry, the Securities and Exchange Commission should collect detailed information on ownership and decision-making structures, while DOC should verify compliance and monitor access to dual-use technology and strategic assets. Companies that fail to provide full transparency should be barred from doing business in America, and CFIUS and DOC should have authority to enforce restrictions or divestment wherever necessary to protect U.S. national security.

Federal agencies such as the departments of Energy, War, and Transportation; NSF; and federally linked consortia such as the United States Council for Automotive Research, should also implement pre-award due diligence to screen for Chinese ownership, operational control, or dual-use access before awarding grants or cooperative agreements. This would ensure that U.S. taxpayer funds support domestic innovation rather than foreign industrial strategy.

The administration should clarify brand obscuration practices. False-flagging companies maintain U.S. branding to obscure foreign ownership, misleading stakeholders and regulators.[46] The Federal Trade Commission (FTC), with congressional authority as needed, should issue guidance on truth-in-branding and ownership disclosure by requiring companies in defense, dual-use, or enabling industries to clearly disclose foreign state ownership or control in marketing, websites, and communications.

In addition, for Chinese companies operating in defense, dual-use, or enabling industries, **Congress should pass legislation or FTC should engage in rulemaking to mandate disclosure of foreign state ownership or control in a standardized and visible manner**.[47] This requirement would not apply

to benign consumer sectors, where branding obfuscation poses minimal national security or economic risk, but would prevent companies in critical sectors from misleading U.S. consumers, investors, or regulators about their foreign affiliations.

Limit Assets Going to Chinese Firms in U.S. Bankruptcy Proceedings

China gains access to U.S. intellectual capital in bankruptcy proceedings. Case in point, about a decade ago, assets, including patents, from bankrupt U.S. solar firms were acquired by Chinese solar firms, precisely the firms that had put the U.S. companies out of business through unfair means, such as massive subsidies.

Congress should pass legislation that requires bankruptcy courts to consider U.S. national security and competitiveness interests as a factor when approving asset transfers so that the "highest or otherwise best" standard would include more than just the price (right now, it can include other factors such as certainty of closing). The Commerce Department should be able to suggest an alternative that preserves U.S. or allied ownership/control. The threshold for these decisions should be even higher when it involves an acquisition by a Chinese firm.

Pass a New FIRRMA That Is Tougher on China

Even with the changes made in FIRRMA, CFIUS is still designed around the Soviet Cold War challenge and focuses too little on acquisitions in dual-use and enabling industries. **Congress should also expand FIRRMA to widen the definition of what would affect U.S. leadership. CFIUS's mandate should encompass threats to not only U.S. leadership "in areas related to national security" but also industries critical to economic and strategic competitiveness, including dual-use and enabling industries.**[48]

In addition, PRC companies, including tech heavyweights Baidu and Huawei, have engaged in R&D in the United States. The presence of such firms amounts to helping Beijing innovate against Washington. Currently, despite FIRRMA, CFIUS is still not able to block certain types of greenfield investments (i.e., nonacquisition) that would empower a foreign adversary such as China. At the same time, both Chinese firms and government venture funds invest in U.S. technology company start-ups and are usually able to avoid CFIUS scrutiny. **New CFIUS legislation should expand its coverage to include not just acquisitions but also investments, including venture capital investments, in U.S. firms by entities from China.**

In addition, in statute, CFIUS treats all nations the same, regardless of their threat to U.S. security. This results in resources that should be spent on addressing the China threat spent on less-risky transactions. **Congress should reform CFIUS by adding a "whitelist" for approved nations**—ideally ones that join U.S.-allied strategic trade and technology partnerships (the subject of a forthcoming ITIF report).

CFIUS is designed to limit adversaries' investments in key U.S. companies because that is a way foreign companies gain access to knowledge and technology. But China can gain access to U.S. firm technology by requiring a joint venture for any sales or production in China. Congress needs to close this loophole. But just like export controls, unilateral action is not only limited in its effect, but also is likely harmful to U.S. national interests. If American companies cannot sell in China, our competitor nations will, and the only result will be lost U.S. sales. As such, **any legislation requiring CFIUS approval for Chinese joint ventures needs to ensure that at least Europe and Japan have adopted similar rules.**

Finally, **the Treasury Department, through CFIUS and working with funding agencies, should require companies that receive U.S. federal funding to obtain explicit approval before relocating operations or substantial portions of their workforce or IP to China, or to accepting any investment from Chinese entities.** This requirement should be designed not to prevent legitimate global business activity, but rather to ensure that taxpayer-funded investments are not diverted to China in ways that could undermine U.S. strategic industrial capabilities.

Limit Chinese Companies Doing Business in the United States

As ITIF has reported, "Chinese companies in the United States act as collection platforms. Subsidiaries and 'consulting' fronts recruit American talent and channel proprietary know-how back to PRC state-owned enterprises."[49] Currently, there are no mechanisms to even determine the number of these companies, much less limit their activity.

The U.S. Intelligence Community (IC) is essential to identifying foreign developments that will inform economic espionage. For instance, determining Chinese geopolitical objectives will help the United States to understand what capabilities it needs and what it will likely target. The President's Intelligence Priorities (PIPs), conveyed through the National Intelligence Priorities Framework (NIPF), inform "resource allocations to ensure collection and analysis of intelligence that provides insights, warning or other illuminating information on the priorities."[50] The NIPF in turn translates and implements national intelligence priorities "to ensure the IC is focusing its collection, analysis, and operational resources on the most urgent and important national security issues."[51] **Topics that help the United States forecast trends in economic espionage and trade secret theft by the PRC should be incorporated into the PIPs and cascading NIPF if they are not already included.** Multiple topics could help the U.S. government disrupt economic espionage and trade secret theft before they manifest themselves in specific crimes that harm the private sector. Collection should include Chinese innovation strategies such as the Made in China 2025 plan; geopolitical objectives including a focus on the South China Sea that new capabilities such as syntactic foam might support; relationships with third countries through which China might already be obtaining technology; China's intelligence services' methodologies and tactics; and security vulnerabilities in U.S. industry's business practice. Analysis should turn this data into an awareness of how these variables might interplay to create risks and, from there, provide recommendations for solutions.

U.S. counterintelligence capacity is eroding. Shifts in FBI and DHS priorities have weakened the government's ability to detect and disrupt Chinese theft just as Beijing's efforts intensify.

Expand the FBI's Commercial Counterintelligence Budget and Capabilities

The FBI is the main government organization working against Chinese IP theft, but historically, especially after the fall of the Soviet Union, this function has been underfunded and not a central focus. As that same ITIF report states, "U.S. counterintelligence capacity is eroding. Shifts in FBI and DHS priorities have weakened the government's ability to detect and disrupt Chinese theft just as Beijing's efforts intensify."[52] Senator Mark Warner (D-VA) recently noted that the Bureau had reassigned approximately 25 percent of its total agents to immigration enforcement (with the largest field offices dedicating more than 40 percent of their allotment to this challenge).[53] Some of these agents were drawn from counterintelligence and cybercrime. As such, **Congress should significantly increase the FBI's commercial counterintelligence budget.**

Expand the DHS Cybersecurity and Infrastructure Security Agency and Homeland Security Investigations Group

The Cybersecurity and Infrastructure Security Agency (CISA) and Department of Homeland Security (DHS) play key roles in limiting Chinese IP theft. A significant CISA function, often in collaboration with the FBI, is warning the private sector about network vulnerabilities. Such awareness helps the government get in front of PRC cyberactors before they can exploit information technology systems to pilfer private sector secrets.

Unfortunately, CISA lost approximately 1,000 employees to buyouts and layoffs during the first few months of the second Trump administration. Congress needs to ensure that this office has greater, not fewer, capabilities.

Another DHS component, Homeland Security Investigations (HSI), plays a sometimes-overlooked role in combating Chinese theft against the U.S. private sector. The Trump administration, according to the Cato Institute, has opted to reorient HSI agents from their investigatory activities to focus on immigration enforcement.[54] **Congress should increase DHS funding for limiting Chinese IP theft.**

Limit Chinese Firms From Using the Courts to Gain Access to U.S. IP

Third-party funding in judicial cases is when external parties fund cases to obtain a share of the settlement, the benefit of the judgment, or information. In IP-related litigation, foreign entities can interfere in judicial proceedings to obtain licenses or strategically divert a rival company's resources. There are cases of Chinese entities acting as third parties in patent litigation in the United States—for example, the Shenzhen-based company Purplevine IP funding cases against Samsung Electronics Co. and a subsidiary.[55] The case of Purplevine IP was discovered only because the judge ordered the company to disclose its true origin, but that's not the norm.[56] **Congress should reintroduce and pass legislation similar to the Protecting Our Courts from Foreign Manipulation Act of 2023 to stop foreign entities from using the U.S. judicial system to obtain sensitive IP.** This bill increases transparency and oversight of third-party funding by foreign persons and prohibits such funding by foreign states and sovereign wealth funds.[57]

Increase Criminal Penalties for IP Theft

Technology espionage is not uncommon, including by Chinese nationals working in the United States and then moving to China. While it can be hard to stop this, one step that can be taken is to increase the chances a person will be prosecuted and face stiff penalties. For example, one Chinese national, Hao Zhang, left the U.S. company Skyworks on June 9, 2009. The United States subsequently arrested him when, on May 16, 2015, he re-entered the United States.[58] In 2020, Zhang was convicted on charges including economic espionage and theft of trade secrets and ordered to pay nearly half a million dollars in restitution, but he served no jail time.

One study examining prosecutions of Chinese for not disclosing their involvement in China's Thousand Talents program finds that sentencing was mostly a slap on the wrist.[59] Instead, wrongdoers need to know that if they facilitate illegal support and transfer of knowledge to the PRC that their risk of getting caught is not minimal and that if caught, their punishment will be more than merely six months of home confinement and a $50,000 fine.

Szuhsiung Ho was the owner and president of Delaware-based Energy Technology International (ETI) and served as a senior advisor to the China Guangdong Nuclear Power Company (CGNPC).

It was apparent that Ho was targeting expertise in a specific U.S. company. The FBI brought a case against Ho, and he pled guilty to the special nuclear material charge and was sentenced to just 24 months in prison. Similarly, Shan Shi became president of CBM International (CBMI), which was established in Houston, Texas. In 2019, Shi was convicted on one count of conspiracy to commit theft of trade secrets related to deep sea drilling technology. He received just a 16-month prison sentence and was ordered to forfeit $330,000. Xiaolang Zhang, a former Apple employee who was accused of stealing computer files with trade secrets about Apple's secretive car division, pleaded guilty in federal court in San Jose in 2022.[60] He was sentenced to just 120 days in jail, 3 years of supervised release, and paying a restitution of $146,984.[61]

As such, **Congress should pass legislation increasing criminal penalties for IP theft by adversaries so that the punishment serves as a stronger deterrent.** In addition**,** Congress should reform the Protecting American Intellectual Property Act of 2022 (PAIPA) to include a presumption of refusal to foreign persons who have engaged in significant theft of trade secrets. The PAIPA allows the federal government to impose sanctions on "foreign individuals and entities involved in the theft of trade secrets belonging to a U.S. individual or entity."[62] These sanctions can take the form of blocking property, inclusion on the Entity List, or denial of credit access from the Export-Import Bank or any international financial institution.[63]

In addition, the PAIPA allows broad presidential authorities to determine and sanction individuals who engage in trade secret theft, even in the "absence of any criminal or civil charges, judicial determination, or even evidence that a theft of trade secrets has occurred."[64] This allows for a rapid response, but the lack of a judicial determination can lead to discretionary actions, further judicialization of the process, or invite retaliation from third countries against American citizens.[65] **Congress should reform the PAIPA so that the executive branch can work with the judiciary to identify individuals engaged in trade secret theft and respond promptly to such theft.**

Entities or individuals that have committed sustained theft of U.S. IP rights or have refused to compensate U.S. firms for unlicensed use of their IP do not necessary go on the BIS Entity List. The current legal framework allows BIS to add companies to the list, as such sustained, state-sponsored activities can qualify as a "foreign policy risk."[66] **However, BIS is not mandated to do so—a mandate from Congress would close that gap.**

Assist Nations in Modernizing Their Export Control Regimes

The State Department's Export Control and Related Border Security (EXBS) program works with partner governments to identify regulatory and institutional gaps and provide technical and capacity-building assistance. While the EXBS program has traditionally been more focused on export controls around weapons of mass destruction (WMDs) and national security-related technologies, its remit should be expanded to assist allied nations in further developing their capacity to evaluate export controls on technologies related to national economic power. **Congress should expand the remit and funding for the EXBS program at the State Department.**

LIMITING CHINESE IMPORTS

The United States needs to do more to limit Chinese firms' advancement. This means limiting not only their imports to the United States but also U.S. investment and financing of them.

There are a wide range of steps the United States can take to limit imports of Chinese goods in national power industries. For every dollar of sales to the United States, Chinese firms gain resources and, in turn, capabilities. And to the extent these sales replace U.S. firm sales, they reduce U.S. firm resources and capabilities. To be sure, there is no need to limit imports from China of items that are not related to national power industries. More plastic toys and "salad shooters" from China are not a problem.

There are two political challenges to doing this, however. The first is that consumers may complain that they want cheap things—so, why can't they buy unfairly subsidized Chinese products? The second is that companies will likely complain, too. We may see this soon if companies that consume DRAM computer chips demand that Congress allow imports of Chinese memory chips, given the current shortage. In all cases, the Congress and the administration will need to put the long-term national interest above short-term self-interests.

Stop Imports From Chinese Companies on the Entity List

U.S. trade restrictions can be contradictory: a foreign entity banned from purchasing U.S. products and technologies under Entity List restrictions can still enter and compete in the U.S. market. This is the case, for example, with the Chinese telecommunications company Huawei. Huawei has been on the Entity List since 2019 and subject to de facto export restrictions from U.S. providers and to the use of U.S. technologies.[67] However, consumers and companies in the United States can still purchase Huawei telecommunications equipment.

There is no reason for the federal government to permit imports from companies it designates as part of the Entity List. A company is designated as being on the Entity List because the U.S. government has determined that it poses a "significant risk of being or becoming involved in activities contrary to the national security or foreign policy interests of the United States."[68] Those risks are pervasive if an Entity List-designated company enters the U.S. market.

The United States needs to do more to limit Chinese firms' advancement. This means limiting not only their imports to the United States but also U.S. investment and financing of them.

Reform Section 337 of the Tariff Act

Section 337 of the 1930 Tariff Act allows the U.S. International Trade Commission (USITC) to bar imports when domestic industries suffer harm due to unfair competition. This legislation was designed to address and enforce laws against specific infringing companies. However, legislators did not consider that an entire economy could be an infringer, making the tool insufficient and outdated. Congress should expand the law to better address the unfair trade practices China uses to capture market share in advanced industries at America's expense.

The reform of Section 337 should be oriented toward making it a better tool to ban imports from Chinese firms—not from multinational firms operating in China—where there is a reasonable assurance that they have benefited from unfair practices. In addition, ITIF has previously proposed amendments to Section 337.[69] Among those recommendations were the following:

Make explicit that unfair trade practices are eligible for Section 337 investigations. Currently, Section 337 is used mostly to resolve patent or registered trademark infringement cases. Section 337 investigations can also include other forms of unfair competition, such as misappropriation of trade secrets, trade dress infringement, passing off, false advertising, and violations of the antitrust laws. Yet, the existing legislation does not incorporate practices at the core of the PRC's mercantilism, such as forced technology transfer, closed domestic markets, or subsidies. All of these practices should be explicitly eligible for Section 337 investigations.

Eliminate the requirement for injury for unfair trade practices claims. To succeed in a 337 case, a company has to show harm in the U.S. market. Too often, especially in technologically complex industries, by the time harm is determined, the damaged company has already suffered an irreversible decline in its competitive position. In other cases, the Chinese company takes the growth in the market, not directly reducing U.S. company sales. In other cases, while the company may not have significant production in the United States, it is a core ally that produces for the United States.

Allow any federal entity to file a complaint to initiate a Section 337 unfair trade investigation against innovation mercantilists from nonmarket, non-rule-of-law economies. This should include an increase in funding for the departments of Commerce and Justice to file Section 337 unfair trade practices cases with USITC and increase its funding to handle these cases.

Allow broader exclusionary orders to classes of products, including digital products, as currently there are different standards for unfairness or IP violations to tangible products than for intangible (often digital) products.

Mandate that lower standards of evidence apply to cases involving nonmarket, non-rule of law economies. One way to do this is to apply a "rebuttable presumption," something the Uyghur Forced Labor Prevention Act (UFLPA) contains. In this case, Section 337 would require the U.S. government to shift the burden of proof to companies whose supply chains include products from Chinese companies engaged in unfair trade practices. This would not necessarily ban imports, but it would shift some of the burden of proof to a Chinese firm facing a 337 exclusion order.

Other ITIF proposals to reform Section 337 include allowing cases to proceed before USITC even if they are eligible under dumping or countervailing duty cases at the Commerce Department, and providing a tax credit to companies for the costs of bringing Section 337 unfair trade practices cases against nonmarket, non-rule-of-law economies.

Rely More on BIS Bans Based on Cyberrisks

Federal authorities need to address Chinese mercantilism pragmatically, using the tools at their disposal. For example, the executive branch has more tools to address national security risks relative to other threats to U.S. national power industries, such as unfair trade practices or Chinese state-directed mercantilism. In practical terms, if something is deemed a cyberrisk, it can open more legal channels and tools for remedy at the federal government's disposal—including the option of banning domestic transactions.[70] The Information and Communications Technology and Services (ICTS) regulations (15 CFR Part 791; EO 13873) allow Commerce to prohibit or condition information and communications technology (ICT) transactions involving foreign adversary suppliers on national security grounds. Under this authority, Commerce can

impose sector-wide prohibitions on ICT products containing PRC-origin hardware, firmware, or software, unless the foreign technology is transferred under verification-based licensing terms.

In December 2024, BIS ratified its authority to "investigate, mitigate, and prohibit ICTS transactions involving foreign adversaries."[71] This is particularly relevant in an environment where Congress does not modernize the mechanisms by which the U.S. government can protect the American national power industries—for example, through the aforementioned reform of Section 337 of the 1930 Tariff Act.

A cybersecurity risk creates the possibility that the executive branch can invoke the International Emergency Economic Powers Act (IEEPA). For example, the 2019 executive order Securing the Information and Communications Technology and Services Supply Chain, "prohibits certain transactions that involve information and communications technology or services designed, developed, manufactured, or supplied by persons owned by, controlled by, or subject to the jurisdiction or direction of a foreign adversary."[72] This rationale has also been used to protect U.S. EV manufacturers. In January 2025, BIS announced it had the authority to ban "certain transactions involving the sale or import of connected vehicles integrating specific pieces of hardware and software, or those components sold separately, with a sufficient nexus to the People's Republic of China (PRC) or Russia," proving that the cyber security risk serves as flexible mechanism to address the protection of industries beyond information technologies.[73] **The Trump administration should liberally use BIS cybersecurity authorities to ban certain Chinese imports.**

In addition, **BIS should limit the ability of PRC companies to license their technology to U.S. companies for sale in the United States if a Chinese company maintains control over a U.S. company.** If a PRC company licenses its technology to a U.S. company and maintains no connection to that PRC company this should be seen as generally acceptable. However, if the U.S. is under control of the Chinese company it should not be generally unacceptable. BIS should be examining these licensing deals to discern which is which and, in the case of the latter, prohibiting them.

Strengthen Government Procurement Restrictions

The federal government has a robust stated policy to prioritize purchasing supplies sourced locally; however, there are still carve-outs and loopholes that allow Chinese companies to serve as vendors to the U.S. government. The main policy for federal procurement, the Buy American Act, prioritizes the domestic source over ownership of a product. The current policy requires a 65 percent threshold for costs and production made in the United States, which is set to increase to 75 percent in 2029.[74] That still allows Chinese companies to serve as federal contractors, albeit at the expense of U.S.-headquartered companies whose supply chains include overseas components.

In addition, the Trade Agreement Act of 1979 (TAA) requires that products sold to the U.S. government under specific contracts, such as those under the General Services Administration Schedule, be manufactured or "substantially transformed" in the United States.[75] China is not a designated country under the TAA, so Chinese-origin end products are generally not eligible for this type of government procurement.[76] This rule applies to contractors and subcontractors.

There are other tools that limit public procurement of goods from Chinese vendors, for example:

- The 2023 National Defense Authorization Act (NDAA) frequently updates a list of specific Chinese manufacturers deemed security risks, restricting federal agencies and contractors from procuring telecommunications, video surveillance, or semiconductor equipment from them.[77] (The NDAA does not necessarily prohibit an entire company from public procurements.) This is also known as DOD's 1260H List, which is a repository of Chinese military companies "operating, directly or indirectly, in the United States," updated annually.[78]
- The Federal Communications Commission publishes a list, the Covered List, for "communications equipment and services that are deemed to pose an unacceptable risk to the national security of the United States."[79] The Covered List includes companies such as Huawei, ZTE, and China Telecom; however, the purchasing prohibitions apply only to a specific category of products or services—not necessarily to an entire company.[80]
- DHS released the "Uyghur Forced Labor Prevention Act Entity List" (UFLPA Entity List), a list of companies associated with human rights violations in the PRC that are fully prohibited from entering the U.S. market or exporting goods to the United States.
- BIS's Office of Information and Communications Technology and Services (OICTS) frequently assesses cybersecurity risks and outlines foreign companies and technologies of concern, banning transactions. This tool was previously addressed in this report as a more flexible approach than declaring unfair trade practices.[81]
- Treasury's Office of Foreign Assets Control (OFAC) administers and enforces economic and trade sanctions against targeted foreign jurisdictions and regimes. These authorities go beyond public procurement.[82] OFAC sanctions take various forms, from blocking the property of specific individuals and entities to broadly prohibiting transactions with an entire country or geographic region, such as through a trade embargo or prohibitions on particular sectors of a country's economy. OFAC controls the Specially Designated Nationals and Blocked Persons List, a repository of individuals and entities acting on behalf of targeted countries, terrorists, or narco-traffickers.[83] All U.S. citizens and entities are prohibited from engaging in transactions with anyone on this list.

While federal procurement restrictions on Chinese entities are broad—and have increased in recent years—there are some adjustments that can improve the system. First, **if a specific product is deemed inadequate by federal contractors, the entire company that manufactures it should be banned.** There is no practical reason to determine that certain products pose a cybersecurity risk or that some supply chains have ties to the PLA yet not to ban the entire company from federal contracts.

Second, **federal procurement rules should be enforced in states with stronger pressure**; the federal authority should incentive state governments to adopt procurement rules aligned with U.S. national power, regardless of whether the funding comes from the federal government.

Third, **there should be full alignment across different lists of Chinese entities**—for example, a Chinese company deemed involved in IP theft through Section 337 investigations should not be eligible for federal contracts.

Lastly, public procurement prohibitions should include carve-outs—rarely used and time-limited—for specific products and inputs that are available only from Chinese vendors.

Require Products Made by Chinese Companies to Be Labeled As Such

In a 2020 survey, 40 percent of Americans said they would not purchase goods made in China.[84] But while the law requires labeling to show where products are made, shoppers cannot easily discern if a product is made by a Chinese company.[85] For example, many American consumers are likely unaware that their Blue Bottle coffee, their GE Appliances microwave, their Smithfield Foods deli meats, or their Wilson Sporting Goods tennis racket are all products sold by Chinese-owned companies.[86] The same is true of longstanding, distinctly American brands, such as Milwaukee Tool, that are owned by companies located in China or Hong Kong.[87]

To determine if Milwaukee Tool is Chinese-owned, a consumer would have no luck on the company's webpage, which explains its history and mentions that a company called Techtronic Industries Co. (TTi) acquired it in 2005.[88] A consumer would then need to go to TTi's website, which only states that TTi is publicly traded on the Hong Kong Stock Exchange.[89] With Hong Kong's legal autonomy from China evaporated, the U.S. government generally views Hong Kong as jurisdictionally part of China, and so a Hong Kong-incorporated company like Milwaukee Tool could be viewed as Chinese-controlled depending on a consumer's perspective.[90] But regardless, that information is not easily identifiable.

A patriotic-minded American consumer may not wish to purchase from Milwaukee Tool for either privacy or national power reasons. First, with the development of the Internet-of-Things (IoT), even a table saw can collect data, which Milwaukee Tool's products do—and China's government can compel companies to share data under its National Intelligence Law.[91] Second, the United States is in industrial competition with China, and the power-driven hand tool manufacturing industry is an enabling industry that supports U.S. national competitiveness and power.[92] Moreover, Milwaukee Tool's parent company TTi has manufactured components for technology used by Russia in the Russo-Ukrainian war, according to Ukraine's government.[93] So, a manufacturer ownership label would likely be of more use to a consumer than current country-of-origin manufacturer labels; some of Milwaukee Tool's products are labelled "Made in USA with Global Materials."[94]

Congress needs to take steps to allow consumers to easily identify if they are buying a product owned by a Chinese company. Three difficulties would exist for a manufacturer ownership policy: defining ownership, thinking through liability, and choosing scope.

For ownership, defining what "Chinese-owned" or "Chinese-controlled" means in an era of complex global corporate structures is difficult. ByteDance is incorporated in the Cayman Islands.[95] Shein is headquartered in Singapore.[96] A binary yes-or-no label cannot capture these distinctions without misleading consumers in the process. A better approach would be to differentiate between shades of gray, such as a subsidiary of a Chinese parent versus a company where Chinese mutual funds hold a minority stake in publicly traded shares. In the subsidiary case, the Chinese parent company could fire the board and direct the company's decisions. In the investment case, shareholders benefit from returns but do not govern operations. For the most complicated cases, where elaborate financial arrangements obscure effective control, the Department of Treasury could investigate. Milwaukee Tool is an example of a company that might not qualify as Chinese-controlled.

A threshold of 25 percent beneficial ownership is a reasonable starting point, consistent with standards used in anti-financial crime law.[97] But rather than embedding a rigid threshold in statute, Congress should direct the Department of Commerce, working with industry, to develop a tiered classification framework that distinguishes between majority Chinese-owned, Chinese-controlled-with-minority-stake, Chinese-invested-but-not-controlled, and no material Chinese ownership. Milwaukee Tool is precisely the kind of complicated case a tiered framework should be designed to consider.

With the conceptual piece of control in place, the U.S. government would then need to implement a China control regime. Importers of record—the entities that interact with customs at the border—should bear the disclosure obligation, consistent with how existing country-of-manufacture labeling works.[98] A safe harbor should accompany that obligation. Importers should not need to independently verify ownership structures across layers of holding companies but should have to verify where they got that information, such as from a commercial database, government database, or the manufacturer. Importers who conduct due diligence, use approved data sources, disclose in good faith, and update filings when material information changes should not face liability for inadvertent errors. Importers that do not meet that bar should face civil fines, as they already do for inaccurate or misleading country-of-origin markings.[99]

Sellers who make false ownership claims should bear a higher legal risk than importers. They should face a ban on importing goods into the United States, a power that Customs and Border Protection already holds.[100] Finally, regulators should identify country-of-control at the time of import, accounting for the possibility of post-import changes to corporate structure, which would likely only apply to a minimal amount of goods.

Finally, the scope should be limited to China. Undoubtedly, other countries present similar ownership transparency questions, but none combine China's scale as an exporter to the United States, its government's aforementioned legal authority to compel data sharing from private companies, its stated industrial policy goals targeting American competitiveness, and its poor track record on product safety and counterfeiting.[101]

Additionally, not every imported product needs this treatment from day one. The right approach should begin with pilots and eventually move to a volume threshold regime. Regulators could limit the obligation to the top 100 to 200 importers from China, use a price threshold such as consumer goods retailing above $50, or only focus on sectors with clear national interest implications of dual-use and enabling industries. That scope could cover a substantial share of the relevant import value while keeping compliance costs manageable. A machine-readable database of Chinese-controlled manufacturers built on Commerce's classification tiers would allow consumers to build this into their preferences when shopping online through agentic commerce in the future.

This proposal covers consumer goods in the U.S. retail market only, not business-to-business transactions. It would not ban Chinese products, nor would it restrict foreign investment; it would simply give consumers a piece of information they currently have to dig for, place the obligation on the party best positioned to provide it, and let consumers decide what to do with that information.

Build an "Inspection Wall" Against Counterfeit and Pirated Chinese Goods

China accounts for 87 percent of counterfeit goods seized each year, with the combined value estimated to be between $30 billion and $40 billion. Chinese counterfeit goods jeopardize U.S. consumer safety, erode public confidence, reduce U.S. jobs, and unfairly support Chinese economic growth. The U.S. government unfortunately struggles to stop many counterfeit shipments.

To address this problem, **Congress should increase the CBP budget and ensure that the director collaborates with private-sector stakeholders, including brand sellers, online marketplaces, and shippers, to establish real-time information sharing and analytics about potential counterfeit shipments that would allow them to better detect and seize more imported counterfeits.**

Furthermore, the CBP director should improve CBP's ability to enforce counterfeit and pirated Chinese goods by leveraging AI. CBP already deploys AI solutions to boost numerous e-commerce enforcement issues, such as procuring the supply chain start-up Altana's software to assist CBP analysts in "determin[ing] high risk areas for trade targeting in the forced labor mission set."[102] According to CBP's AI Use Case Inventory, the agency has an institutional appetite to utilize AI and—through procurement power—shape the development of AI tools for assisting its mission. However, there is no mention of the counterfeit issue in the AI Use Case Inventory.

CBP should procure an AI-driven software solution that systematically "crawls" e-commerce platforms and essentially replicates what ITIF conducted in a test purchase by identifying suspicious listings. The procurement should instruct the software solution to detect a manufacturer's suggested retail price and list price discrepancies, compare product images and descriptions for inconsistencies (e.g., "cold relief" as a product description but the listing's photo clearly displaying a well-known pharmaceutical brand), and analyze user reviews for red flags.

Initially, this tool could serve as a lead generation system to prioritize and guide CBP analysts toward high-risk shipments and sellers, such as how CBP currently uses Altana's product, in which "no decisions or actions come directly from the information presented by Altana."[103] And, over time, there should be potential for more autonomous, agentic AI systems to take a primary role in identifying counterfeit operations at scale while more manual capabilities focus more on disrupting said operations.

Expand Section 5949 Purchases From Entity List to More Products

Section 5949 of the NDAA prohibits federal agencies from purchasing any electronic equipment that uses semiconductors from certain Chinese companies.[104] The list of companies includes Semiconductor Manufacturing International Corporation (SMIC), ChangXin Memory Technologies (CXMT), and Yangtze Memory Technologies Corp (YMTC).[105] This rule is considered to have the "most comprehensive supply chain restrictions applied to U.S. government contracts."[106] Section 5949 prohibitions take effect in the 2028 fiscal year.

Congress should expand this rule to include all technology products related to national power industries and manufactured in China. The operationalization of this ban should be product-specific—not only company-specific. To do so, BIS and the International Trade Administration should jointly develop and update the list of specific national power goods using the Harmonized System (HS) codes. That list of national power goods should be included in each year's NDAA.

Similar to Section 5949, the list of products banned from public procurement should be phased in over three or five years to offset the increased costs of not buying from China.

LIMITING FINANCING TO CHINESE FIRMS

It makes little sense for the United States to provide financing of any kind to Chinese firms. There are a number of steps needed to limit this.

Penalize States and Localities That Provide Incentives to Chinese Companies

While Washington is working to help U.S. companies compete with China, state and local governments are doing the opposite by subsidizing Chinese companies in order to attract investments. As such, **Congress should pass legislation prohibiting cities, states, and the federal government from providing any funding to Chinese companies investing in the United States.** Lawmakers can start by prohibiting any federal financial aid from being awarded to firms with more than de minimis Chinese interests. This should include federal loans and grants, along with state and local assistance tied to federal programs. At minimum, lawmakers should make federal aid contingent on a state and all its local jurisdictions not providing funding to Chinese companies investing in the United States. The Trump administration should also issue an executive order preventing any federal aid from going to Chinese companies in the United States.[107]

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Stop Public Pension Funds From Investing in China

A 2024 study finds that U.S. public pensions have invested more than $68 billion in Chinese and Hong Kong-based entities.[108] Americans holding pension assets in Chinese markets is problematic—it creates dependencies on the Chinese mercantilist system, potentially funds Chinese national power, and leaves U.S. citizens subject to economic coercion. **Congress should codify what states such as Arizona, Florida, Indiana, Iowa, Kansas, Missouri, Tennessee, and Texas are already doing: creating mechanisms to restrict public pension fund investments that require divestment from China.**[109]

There are several congressional initiatives aimed at banning pension funds from being channeled to the Chinese ecosystem, but they do not include equity firms. For example, the 2023 Protecting Americans' Retirement Savings Act prohibits retirement fund investment in foreign adversaries and sanctioned entities, and proposes alternatives to improve the disclosure of existing investments.[110] **Congress should also approve a broader initiative banning all types of retirement funds being channeled to the PRC or Chinese-based entities.** In addition, **it should urge private equity firms and employee retirement plans governed by the Employee Retirement Income Security Act (ERISA) to disclose their ongoing investments in companies based in or controlled by foreign adversaries.**

In addition, federal agencies, led by the Office of Management and Budget, should bar U.S.-based companies with PRC financing from receiving U.S. government funding, tax incentives, or other financial support. The same should apply to companies with involvement in China's military or dual-use programs. These checks should span both national and subnational levels, with CFIUS

coordinating with state-level economic development offices. U.S. state policy has proceeded on foreign adversary defensive regulation, but in many cases, these laws are flawed and could be better harmonized to national-level security priorities.[111]

Congress should direct NDAA authorities for FY 2027 to mandate that agencies expand Section 1260H and related authorities to ensure that Chinese-origin companies in defense, dual-use, and enabling industries cannot indirectly advance military capabilities.[112] This should include explicit prohibitions on contracting, technology sharing, and participation in federally funded programs. The NDAA should also direct agencies to require ongoing reporting for Chinese companies, covering IP transfers, supplier relationships, and workforce development activities.

The Trump administration should centralize interagency due diligence. The departments of Treasury, Commerce, War, and other relevant agencies, with oversight from the House and Senate intelligence committees, should establish a single, interagency due-diligence database that integrates CFIUS, DOC, and federal grant-funding data to screen all potential recipients of federal awards, contracts, and research grants. As the Select Committee on the CCP's *Fox in the Henhouse* 2025 report and a recent article, "Why Is the U.S. Defense Department Funding China's Military Research?" underscore, a lack of data interoperability has enabled Chinese defense-linked institutions to receive U.S. funding through loopholes in agency coordination.[113] A unified system bringing together in-house capabilities and outsourced procured capabilities would automatically flag any entity on federal restriction lists (e.g., Entity List, Section 1260H list, or NS-CMIC list) before awards are approved.

Better Identify Chinese Interests in U.S. Research Funding to Business

We need to stop Chinese firms from obtaining U.S. government funding. One place to start is the Small Business Administration's Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) programs that help small businesses and start-ups cross the so-called "valley of death."[114] In recent years, it has become clear that SBIR and STTR are vulnerable to PRC influence and thus require more guardrails.

The Department of Defense admitted in an April 2021 report, "Survey of PRC State-Sponsored Technology Transfers Affecting SBIR Programs," that its own administered SBIR programs "lack capabilities to conduct adequate due diligence to assess national security risks associated with firms applying for SBIR funding" and that "[t]his leaves SBIR programs vulnerable to unauthorized or undesirable technology transfers by adversarial nations, especially China."[115] The report additionally gives examples of how "China, not the U.S., is the ultimate beneficiary of [DOD] and other US government research investments," such as successful PRC talent recruitment of key employees at U.S. firms receiving SBIR funding coupled with subsequent IP theft.[116]

In response to the DOD report, Congress passed the SBIR and STTR Extension Act of 2022, which explicitly required small businesses applying for SBIR or STTR awards to disclose any Chinese ownership, talent program participation, technology licensing arrangements, and other information about foreign adversary affiliations.[117] While this law was a step in the right direction, it kept risk mitigation compliance-based, with companies self-reporting risk factors. The success of keeping out PRC statecraft abuse of SBIR and STTR funding, therefore, rested on agencies' ability to evaluate applicants' disclosures.

In this regard, federal agencies were unsuccessful. A November 2023 Government Accountability Office (GAO) report investigating federal agencies' readiness to implement the newly created law's due diligence program finds concerning inconsistencies between agencies: "Some agencies plan to adapt existing due diligence review processes. Others plan to apply reviews based on different phases of technology development or require disclosures from a wider range of individuals who can significantly influence the research on a particular project."[118]

Further, in May 2025, Senator Joni Ernst (R-IA), as chair of the Senate Committee on Small Business & Entrepreneurship and cosponsor of the SBIR and STTR Extension Act of 2022, released oversight data on the law's newly created due diligence program.[119] The findings were stark: of 835 applications flagged for a foreign risk, federal agencies had only denied 303.[120] And in 2023 and 2024, DOD funded nearly $180 million to six recipients of SBIR-STTR funding at DOD with "clear links to countries like China."[121]

In response to these identified, continued vulnerabilities, Senator Ernst introduced the INNOVATE Act in March 2025, which proposes multiple SBIR-STTR reforms, including measures aimed at addressing the exposed vulnerabilities in the due diligence process:

> Defining foreign risk to provide a consistent baseline for agencies' evaluation of potential awardees, implementing a clear list of ties to foreign countries of concern that deem a small business ineligible for awards, and strengthening federal agencies' ability to claw back award dollars if a small business exposes SBIR-STTR-funded intellectual property to adversarial influence.[122]

The bill would strengthen federal agencies' authority to evaluate applicants' disclosures, which would likely help address the inconsistencies across federal agencies that GAO's report identifies. It also correctly puts more emphasis on ongoing compliance, placing liability on agencies' ongoing enforcement in 5 years, 10 years, or indefinite periods following the granting of an award. **Congress should pass the national security and foreign risk proposals in the INNOVATE Act.**

Yet, the INNOVATE Act likely still does not go far enough to fully protect PRC predation of SBIR-STTR funding. A February 2025 House hearing titled "Fostering American Innovation: Insights into SBIR and STTR Programs" gave Cyrus Miryekta, CEO of Ravelin US, a platform to share PRC tactics, techniques, and procedures (TTPs) on intelligence operations toward SBIR-STTR small companies.[123] Miryekta, a former Air Force Office of Special Investigations agent who was assigned to conduct counterintelligence in Silicon Valley between 2014 and 2021, stated:

> By the virtue of being innovators, the way that companies are set up, nothing is classified yet. So, it is very easy if a CCP-affiliated investor puts even a tiny amount of capital in, not just as the investor themselves but even as one of the limited partners, the fact that they have any affiliation or access to the company means that they can start collecting on the people in it.[124]

Miryekta went on to explain that through human intelligence (HUMINT) operations, the PRC is able to subsequently leverage small companies' IP and talent, either through further HUMINT TTPs or through cyber means. In Miryekta's opinion, "There is this misconception that cyber exploitation vastly outweighs HUMINT exploitation, which couldn't be more wrong."[125] Given his background, Miryekta's opinions on this matter should carry significant weight.

The SBIR and STTR Extension Act of 2022 and INNOVATE Act enacted and proposed security measures that remain fundamentally compliance based. They will not address the core HUMINT vulnerabilities Miryekta explained in his testimony. Early-stage, unclassified innovation ecosystems cannot realistically compartmentalize information, do not have strong counterintelligence awareness, and cannot meaningfully protect against any single employee.

A solution to build on the INNOVATE Act's security proposals to protect SBIR-STTR research funding from PRC attacks would borrow from modern cybersecurity frameworks that begin with the premise that compromise is inevitable. In the private sector, this "assume breach" model has driven adoption of zero-trust architectures, continuous monitoring, and post-compromise containment strategies that focus less on perfect prevention and more on limiting damage after a threat actor has gained access.[126]

Applied to SBIR-STTR firms, these frameworks could take the form of lightweight, standardized security baselines tied to award funding; zero-trust architecture controls for sensitive research data and identity-based permissions that limit any single employee's visibility into core IP. Complementing these technical measures, agencies could fund shared secure research enclaves, managed security services, and basic counterintelligence awareness training rather than expecting small firms to independently develop defenses.

To further harden SBIR-STTR research security against PRC predation, **Congress should introduce a targeted SBIR–STTR research security bill that builds on Senator Ernst's INNOVATE Act.** The bill should require SBIR-issuing agencies to condition awards on lightweight, standardized security baselines, including zero-trust architecture controls for sensitive research data and identity-based permissions that limit any single employee's visibility into core IP. To avoid burdening small firms, the legislation should require relevant agencies to provide shared secure research enclaves and managed security services rather than forcing each company to build defenses independently. **Congress should also direct DHS and the FBI to deliver basic counterintelligence and foreign talent recruitment awareness training as an eligible, fundable SBIR support activity**. The House and Senate Small Business Committees should oversee implementation to ensure that these safeguards strengthen research security without slowing innovation or commercialization.

REDUCING THE NEGATIVE IMPACT OF CHINESE MERCANTILIST POLICIES

There are a number of steps the U.S. government can take to reduce the negative impact of Chinese mercantilist policies.

Bring a WTO Case on Subsidies

The USTR, ideally with the European Union, should bring a WTO case against China for its ongoing failure to publish thousands of trade-related final measures, including subsidies, in a single official journal as it's required to do under WTO rules. One reason it's been difficult to bring subsidy cases against China at the WTO is that China fails to properly publish its subsidies. Getting the WTO to enforce China's publication requirements would make it possible to bring additional WTO cases for subsidy or other violations, such as forced IP or technology transfer.

Limit Chinese Funding of Third-Party Litigation

If national competitiveness were based on the extent of litigiousness, America would dominate. Too often, individuals and lawyers take advantage of the U.S. system to bring relatively minor suits that only extract resources from national economic power firms.

America's courts should not become a backdoor for foreign adversaries and competitors to undermine U.S. technology leadership. But that is exactly the risk posed by third-party litigation financing (TPLF), a fast-growing financial practice that allows outside investors to bankroll lawsuits in exchange for a share of the proceeds. TPLF has evolved into a sophisticated investment strategy that claims to treat lawsuits as financial assets. Hedge funds and opaque investment vehicles now routinely finance litigation, using America's judicial system like a casino by betting on large settlements or verdicts. And by asserting that these returns should get capital gains treatment, the foreign investment fund pays less in taxes (often zero) on any award or settlement than the actual plaintiff does.

The amount of capital deployed in the United States for TPLF has been recently estimated to be north of $16.1 billion. That number does not even include mass torts or class action lawsuits. The practice is growing so fast that the leading firm saw a 355 percent increase in its assets over the last several years.

One notorious abuser of TPLF is the Chinese government, which uses it as a tool to damage U.S. tech companies in multiple ways. First, TPLF creates a pathway for China to gain access to sensitive American technology through litigation's discovery process. When a U.S. tech company is sued, it can be compelled to produce internal documents, source codes, business strategies, technical designs, and proprietary communications. If a lawsuit is being funded by Chinese capital, the litigation process itself becomes a mechanism for extracting valuable information that would otherwise be tightly protected.

Second, litigation funding enables the Chinese government to use courts to weaken competitors. By bankrolling lawsuits, foreign-backed funders can tie up American tech companies for years, drain capital, distract leadership, and damage reputations. Even meritless claims can impose enormous costs. For Chinese companies that benefit from state support and industrial policy, this tactic offers a way to tilt the competitive playing field.

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There are at least three solutions that Congress should pursue. First, **mandate disclosure of third-party financers to the judge and defendants in any civil case**. Sunlight is the best disinfectant. Many nefarious actors do not want it to be known as abusing the U.S. legal system. Second, **ban sovereign wealth funds' litigation financing activity.** There is no justification for allowing foreign sovereign wealth funds to be able to pay to sue U.S. companies in U.S. courts. Third, **ban Chinese-firm and Chinese-government participation in TPLF.** If a Chinese firm wants to bring a case against an American company, it has every right to do that now—certainly more rights than American firms have in China.

Use Antitrust Law to Combat China's Anticompetitive Practices

China engages in a number of anticompetitive behaviors that harm U.S. firms and competitiveness. These include subsidies to favored firms to help achieve global economic dominance. Indeed, a study from the Kiel Institute for the World Economy finds that over 99 percent of a sample of 5,260 listed Chinese firms received government subsidies totaling €35.3 billion in 2022, double the amount from 2015.[127] As a recent report issued by the House Select Committee on China titled "Predatory Pricing: How the Chinese Communist Party Manipulates Global Mineral Prices to Maintain Its Dominance" confirms, in critical areas such as rare earths, "The PRC government subsidizes its state mining champions with tens of billions of dollars including zero-interest-rate loans to support its global acquisition of mining assets."[128]

This subsidization by the Chinese government is compounded by downstream predation by Chinese state-owned or controlled firms, especially in key sectors such as rare earths and other critical minerals. As the report continues, not only has the "[t]he PRC government engaged in a decades-long strategy to dominate the rare earth supply chain but, "[s]tarting in 2021, the PRC government engaged in a coordinated effort to artificially depress global lithium prices that had the effect of preventing the emergence of an America-focused supply chain."[129]

Another common strategy employed by the PRC is not allowing American firms to achieve global scale through mergers and acquisitions while at the same time bolstering the global competitiveness of Chinese firms by encouraging consolidation. As the House Select Committee on China report further concluded with respect rare earths:

> To further cement government control over the industry, in December 2021, the PRC announced more industry consolidation in rare earth mining and processing from six to four enterprises. The new China Rare Earth Group would control about 70% of the nation's rare earth element production. To date, this gigantic company wields significant control over rare earth pricing according to the Rare Earth Exchanges. This dominance is expected to continue, unless there is a meaningful challenge. The International Energy Agency estimates the PRC will control 77% of rare earth refining by 2030.[130]

This state-sponsored or directed anticompetitive behavior by the Chinese government through subsidies, predatory practices, and anticompetitive consolidation to undermine U.S. competitors should no longer be given a pass under U.S. antitrust law. Unfortunately, two sets of legal hurdles exist that serve to protect China and its firms from being found liable.

The first are limitations on suing Chinese state-owned enterprises (SOEs) or affiliated firms. These include foreign sovereign immunity, which is a jurisdictional doctrine that generally prohibits foreign states from being sued in the courts of another country. It is codified by the Foreign Sovereign Immunities Act (FSIA) and encompasses within its protections Chinese SOEs. To be sure, while the FSIA contains an exception for commercial activity that will cover many forms of anticompetitive behavior, it does not invariably apply. Given that the Supreme Court has recently made clear that the FSIA does not provide immunity from criminal prosecution, **DOJ should use its authority to bring criminal monopolization cases against Chinese state-backed entities that engage in predatory behavior and seek heavy penalties, as well as, when appropriate, jail time for guilty executives.**

Another similar limitation is the act of state doctrine, which provides that courts will not assess the legality of the sovereign act of a foreign state. That is, even where U.S. courts can exercise jurisdiction over Chinese state-owned entities to challenge anticompetitive behavior, the act of state doctrine provides a formidable barrier to obtaining relief where they are seen as acting in the Chinese public interest or where the issue may be particularly sensitive to foreign relations. As a result, **the State Department should, in connection with antitrust cases brought against Chinese SOEs, be prepared to issue "Bernstein letters" to courts stating that the act of state doctrine is inappropriate when it comes to challenging anticompetitive practices by Chinese state-owned entities.**[131] In response, courts should in turn broadly preclude defendants from making the defense.

Finally, there is the related foreign sovereign compulsion doctrine, which gives firms a defense against anticompetitive behavior if they were compelled to do so to comply with foreign governmental requirements. This is important, as not all firms acting under Chinese influence may be state owned, and indeed, as ITIF has found, the "PRC's industrial strategy encourages embedded footholds within the U.S. economy through a deliberate, state-directed strategy of obfuscation."[132] Companies that may not be SOEs but are nonetheless also furthering China's strategic interests through anticompetitive behavior should not be able to hide behind the foreign sovereign compulsion doctrine. Just as Congress restricted foreign sovereign immunity in enacting the FSIA, **Congress should consider legislation that limits the foreign sovereign compulsion defense to ensure Chinese firms can be held liable for their anticompetitive behavior when it is directed by the PRC**.

As a second set of barriers, even if U.S. courts are able to adjudicate antitrust claims against Chinese state-owned or affiliated entities, there still needs to be a plausible antitrust theory of anticompetitive harm. In fact, with respect to state aid, there is currently no recognized way to challenge this conduct under the U.S. antitrust laws. This is in contrast with the European Union, whose rules prohibit firms from receiving government support that gives them a distortive advantage over their competitors unless an exemption applies. Indeed, the European Union's Foreign Subsidies Regulation (EU) 2022/2560 expressly covers subsidies from non-EU firms. As such, **FTC should make clear that Chinese companies receiving subsidies might be violating antitrust laws as an unfair practice under Section 5 of the FTC Act and spearhead an intergovernmental task force analyzing in what areas Chinese subsidies are having a direct, substantial, and reasonably foreseeable anticompetitive effect on U.S. commerce.** There are other actions that the antitrust agencies can take to push back against China's behavior. In response to China or other governments discriminating against American mergers and acquisitions (M&A) by blocking strategic transactions that do not pose any legitimate competitive concerns, the **International Section of the DOJ Antitrust Division and FTC's Office of International Affairs should actively advocate for these deals to be approved abroad and, where appropriate, recommend potential 301 actions to the USTR where there is substantial evidence that a merger control regulation is being used to discriminate against American firms.**

Another procedural barrier to antitrust action is that acquisitions made by foreign governments are subject to exemptions from the notification requirements under the Hart-Scott-Rodino (HSR) Act, providing DOJ and FTC with a reduced ability to prevent anticompetitive consolidation by Chinese state-owned firms. To address this quasi-loophole that exists under the HSR Act in allowing state-owned entities to avoid having to file when "[t]he acquisition is of assets located

within that foreign state or of voting securities or non-corporate interests of an entity organized under the laws of that state," **FTC should issue an HSR rulemaking that provides that such an exemption will not apply to Chinese state-owned entities.**[133]

Push Back Against SEP Abuse

Technology standards are essential to enable interoperability and compatibility among products and facilitate downstream innovation and technological diffusion. This is especially true for communications standards such as Wi-Fi and cellular communications, the standards for which are led by the U.S.-based IEEE and EU-based European Telecommunications Standards Institute (ETSI), respectively. These standards are comprised of a variety of key technologies that innovators license under standard essential patents (SEPs) on fair, reasonable, and non-discriminatory (FRAND) terms. Innovators compete to have their patented innovations included in a standard, and engineers and businesses in the relevant fields determine which technologies to include based on their technical and commercial merits. This allows the best technologies—developed by the companies making the most significant and meaningful investments in R&D—to be adopted into the standard.

That is how the process is supposed to work. But as in so many other areas, China manipulates the standard-setting process unfairly to its advantage. China has long weaponized antitrust laws against Western SEP holders, most notably through a $975 million fine in 2015 against Qualcomm for allegedly charging excessively high FRAND rates and other practices. In addition, Chinese courts, which are an institutional arm of the CCP's techno-industrial strategy, have issued rulings that have disproportionately found Chinese firms acting consistent with FRAND against foreign counterparties—regardless of whether the Chinese firm is the licensee or SEP holder. Indeed, just a few years ago, Chinese courts lowered the FRAND rates that U.S.-based Advanced Codec Technologies was able to charge Chinese companies Oppo and Vivo—despite the fact that it was asserting Chinese patents.[134] By contrast, when Chinese companies are the SEP holders, Chinese courts overwhelmingly side with them. A recent example was a decision in favor of Chinese company IWNCOMM against Apple. It held that IWNCOMM had acted consistent with FRAND terms and Apple had not.[135]

Moreover, besides "flooding the zone" of standards bodies with weak Chinese patents, Chinese courts (and courts in some other nations) have asserted jurisdiction to set global licensing terms for U.S. and other Western firms' patents while preventing them from exercising their patent rights, even in other countries. This began with *Oppo v. Interdigital*, where China's Supreme People's Court affirmed Chinese courts' ability to set global FRAND rates.[136] And, in the *Oppo v. Nokia* case just a few months later, a Chinese court set a global FRAND rate differentiated by region (with a 61 percent discount for China relative to the U.S. and other nations).[137] Chinese courts also influence global FRAND terms by issuing injunctions prohibiting foreign firms from winning FRAND determinations in other jurisdictions without facing penalties. These include notable actions against Interdigital, which has seeking to enforce patents against Xiaomi, and Netgear, which was being sued for infringement by Huawei.[138] If the past is any guide, China will continue to favor its own companies through rulings such as these, which then risk setting de facto FRAND licensing rates for global patent portfolios. China is thereby attempting to rig the rules of the game to dominate technology standards.

As a result, among other steps, **the administration should require USTR's Special 301 report on IP abuses to include these practices.**

REDUCING ALLIED PRODUCTION IN CHINA

Even though the CCP's ultimate goal is to replace foreign production in China with domestic, it is far away from being able to do that. As such, the Chinese economy is strengthened by foreign production for export located in China. U.S. policy should encourage U.S. (and other foreign) firms to move their export production out of China.

Create a North American Integrated Market

The United States can never expect to reshore all U.S. production in China to the United States because business costs are too high. However, it is in U.S. interests to have companies move this kind of production to Mexico.

The United States-Mexico-Canada Agreement (USMCA)—while needing adjustments to improve the agreement, for example, in IP protection, rule of origin, and digital trade—is a powerful tool to integrate the North American economy and improve the U.S. position to compete with China.[139] The United States is much better positioned to compete globally against China if North American economies—Canada, Mexico, and the United States—are treated as a single economic bloc.

A stronger North American production system enhances U.S. techno-economic power by expanding regional manufacturing capacity and reducing dependence on China through reshoring and shifting trade flows away from China. The three neighbors should work together to proactively support a North American production system, as investments, R&D, and trade among these countries are more likely to benefit North America than production networks based in China.

The United States also needs to stop reflexively opposing U.S. firms that move to or expand production in Mexico. That's because production in Mexico is fundamentally different from that in China. For example, 40 percent of the inputs to finished manufactured goods in Mexico come from the United States.[140] By contrast, for China, that figure is a mere 4 percent. In essence, unlike trade with Mexico (and Canada), when production goes to China, the United States loses out on much more of the production process and interlinkages, not to mention enabling a potent adversary. To be sure, it is often better to keep the production in the United States, but if it must be offshored, Mexico is the best place from a U.S. perspective.

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The USMCA strengthens North America's ability to leverage its complementary supply chain advantages. For example, while the United States depends on Mexico for a lower-cost production environment, Mexican firms source many inputs from U.S. firms, as evidenced by robust intra-industry trade surpluses. For example, a 2019 ITIF report finds that, in trade with Mexico, tech-based industries accounted for 42 percent of gross exports, 56 percent of gross imports, 45 percent of value-added exports, and 49 percent of value-added imports.[141] These figures show that exports to Mexico are more tech-based and imports are less tech-based (i.e., complex and

R&D-intensive) than gross values suggest. In general, trade with Mexico is less tech-based, but the United States relies on Mexican production facilities in large part to supply consumers with cheap tech-based products.

Canada complements the United States' lead role in knowledge-intensive and value-added manufacturing. However, looking ahead, Canada can specialize in the mining and processing of the critical minerals needed in many advanced technologies, such as EVs. Canada also brings distinct strengths in the aerospace, quantum, and ICT services sectors, and Mexico is growing in sectors such as ICT manufacturing and services and automotive supply.

During the mandated USMCA renegotiation process, set to begin in July 2026, the Trump administration should strengthening specific chapters.[142] **The new USMCA agreement needs concrete rules to shield the regional economy from Chinese predatory practices, including implementing more standardized investment screening practices, strengthening rules of origin, definitions, and enforcement, and reinforcing the USMCA's non-market clause.**

Chapter 14 of the USMCA addresses investments, but it needs to establish coordination mechanisms to prevent Chinese investment in strategic industries, including greenfield investments. The USMCA should establish mechanisms that enable the United States to coordinate screening of FDI in North America, providing it with tools to identify and potentially ban Chinese investments in the region, such as Chinese EVs factories.[143] **Chapter 14 should outline mechanisms to share information on foreign investment screening from "countries of concern," with clear objectives, responsibilities, and a mandate to report to the three partners.**

In addition, **the USMCA should improve rules of origin (ROO) definitions to help prevent Chinese companies that benefit from mercantilist policies from getting their final products (or even inputs) into the U.S. market.** ROO definitions of tariff-free USMCA benefits should incorporate the firms' nationality and exclude companies headquartered in nonmarket economies. Currently, a Chinese company investing in North America is treated the same as any other and is given potential tariff-free access to the U.S. market. This framework ignores the mercantilist nature of the Chinese economy. Any company competing against Chinese counterparts faces potentially significant disadvantages, since the latter often receive numerous forms of support from China (e.g., massive subsidies, extensive IP theft, barriers to competing in China's market, etc.).

In addition, **the USMCA should reinforce the nonmarket clause.** The current USMCA (article 32.10) includes a clause that allows countries to terminate the agreement if another party signs a free trade agreement (FTA) with a nonmarket country, including China. This safeguard should cover all trade deals and arrangements, not just full FTAs, to prevent USMCA partners from entering into any trade arrangement with a nonmarket country—particularly China—without prior consultation and alignment with the other partners. Revising this clause would prevent, for example, Canada from considering lifting its 100 percent tariffs on Chinese EVs, which could undermine North America's auto industry.[144]

Allies Should Agree on Several Non-Chinese Production Hubs

It is in the U.S. and other democratic nation's interests to have their companies move out of China production that is used to export to other nations. Doing so would weaken the Chinese economy. But we shouldn't expect them to reshore all or even most of that to high-cost developed nations. But they can and should move to other low-cost developing nations.

One argument against this idea is that the United States should be doing all it can to create manufacturing jobs at home, not in low-wage nations that compete with U.S. labor. This is misguided. First, federal policy can and should do both. Second, it is naïve to believe that significant low-skilled manufacturing will return to the United States, as U.S. costs are too high. Finally, the main goal should not be boosting U.S. jobs (unemployment is quite low, after all). The goal should be to slow China's continued rise.[145] If 25 million manufacturing jobs could be moved from China to one or two new hubs, that would break China's manufacturing monopoly in many sectors. Moreover, if Mexico were a winning hub, the benefits to the United States would be significant, as there would be significantly less incentive for illegal immigrants to enter the United States—and, because U.S. trade linkages with Mexico are significantly higher than with China, it would lead to considerably more U.S. exports.

But that process will be slower than needed without a focus on a few key China-alternative hubs. The core concept of regional economics is agglomeration, the idea that the economic strengths of a region are greater than the sum of its parts. Companies benefit from being in places such as Silicon Valley because of interactions with other companies, good international airports, skilled workers, venture capital firms, strong research universities, and the like.

The same concept is true for manufacturing economies. For almost 75 years, American manufacturing hubs such as Detroit, Clevland, St. Louis, and Chicago thrived and grew because of agglomeration: skilled workers, rich supplier networks, training institutions, specialized infrastructure, etc.

Think about agglomeration as a centripetal force, keeping activities clustered, limiting outward movement, and attracting or growing new activity. But centrifugal forces work as well—either the attraction of another stronger agglomeration economy or other regions with lower costs. Spatially, economies are in constant tension between these two forces. A combination of lower costs outside the U.S. manufacturing belt and strong agglomeration economies in other places have led to significant weakening of U.S. manufacturing agglomerations.

How does a region or country with little activity build a strong agglomeration economy? This was China's dilemma in the 1970s when Deng Xiaoping decided it had to industrialize. But how could China compete against manufacturing leaders that were vastly more productive with higher-quality output? Low costs helped, but they were not enough. There were lots of countries in the 1970s with costs as low as China's, and few of them succeeded.

Creating a robust manufacturing alternative to China is a chicken-or-egg process. Companies may not invest in a particular country because manufacturing is not strong enough, and therefore a country does not build up its manufacturing resources and attractiveness.

Chinese leaders understood this, so they developed an incremental strategy: First, attract foreign manufacturers by dangling incentives of grants, tax holidays, and the like. But at the same time, work hard to build agglomeration effects by supporting domestic suppliers to large multinational factories, boosting technical training in specific skill areas, and attracting similar kinds of manufacturers to certain places, especially special economic zones, each one specializing in various parts of the supply chain.

China doubled down on this strategy in the 1990s, and with its accession to the WTO signaling to foreign investors that the Chinese market could be used as an export hub, manufacturing grew even more. As a result, China accounted for 35 percent of global manufacturing by 2023, up from around 5 percent in 1995.[146]

That share grew and consistently improved over time, to the point where China developed the strongest manufacturing agglomeration pull in the world. The range and depth of its manufacturing capabilities cannot be equaled anywhere in the world. This is why, even with the tariffs placed on Chinese exports in the last seven years, plus the increased pressure on Western multinationals to diversity out of China, the process has been quite slow. And even with China's increased wages and growing political tensions with the West, it will be hard to erode this world-beating manufacturing hub.

Perhaps certain production moving to places such as Africa, India, Mexico, and Vietnam will cause some Chinese deindustrialization, but that is likely to be a long, slow process. The West needs to accelerate that process by focusing on building up one or two alternative global manufacturing hubs outside China. The reason is that creating a robust manufacturing alternative to China is a chicken-or-egg process. Companies may not invest in a particular country because manufacturing is not strong enough, and therefore a country does not build up its manufacturing resources and attractiveness.

To overcome this, **the United States and core allies should establish a joint global manufacturing hub competition.** The idea would be that countries would compete for designation, in part by reforming restrictive regulations, boosting skill development, ensuring adequate financial incentives, reducing corruption, and ensuring adequate infrastructure. The one or two winning countries would then benefit both from more aid from the United States and allies and agreements that governments would craft with their leading manufacturers to concentrate their foreign manufacturing investment in the winning nations. Perhaps as a test case, the initial hub competition could be focused on electronics manufacturing.

To date, most allied nations have focused principally on boosting their own capabilities vis-à-vis China. It's time for a new approach to build up some other countries' capabilities and erode China's centrifugal advantage.

Likely candidates would need to have several characteristics, including a sufficiently large population so that companies would not run out of available workers, as seems to be the risk in places such as Vietnam. Table 1 lists several nations with populations over 130 million. In addition, winning countries should have reasonable business regulations and adequate overall innovation environments. And of course, they should be friendly to the West, which should entail removing most trade barriers with Western nations. Promising candidates could include Bangladesh, India, Indonesia, and Mexico.

Table 1: Current and potential manufacturing hubs

Country	Population (Millions)	World Bank Doing Business Rank	Global Innovation Index Rank
China	1,400	31	12
India	1,400	63	40
Indonesia	283	73	61
Nigeria	232	131	109
Bangladesh	173	45	105
Ethiopia	132	159	125
Mexico	130	60	58

Some might argue that these hubs would end up being used by Chinese firms to avoid U.S. tariffs. But that issue can be addressed by ensuring that any tariffs on Chinese industries apply to Chinese firms, regardless of their location.

To date, most allied nations have focused principally on boosting their own capabilities vis-à-vis China. It's time for a new approach to build up some other countries' capabilities and erode China's centrifugal advantage.

Establish a Reshoring Incentive Fund

A number of countries—including Japan, South Korea, Taiwan, and the United Kingdom—have established reshoring incentive funds that help offset the cost companies incur when relocating their manufacturing activities to their home-headquarter nation. To be sure, it is likely that, even with incentives, it makes little economic sense to reshore significant export-focused production back to the United States, but some can. **To do that the United States could create a $10 billion fund companies can apply for to pay for a portion of their expenses in repatriating manufacturing operations.**[147] Such a program could be run by the Commerce Department, and companies could apply quarterly for the incentive as a reverse auction, with the companies bringing the most jobs back to the United States with the lowest received incentives getting awards.

Establish a Tax Incentive for Firms to Move Chinese Production to Labor Surplus Areas

Companies should be able to receive a tax incentive if they move production that is in China to chronically high-unemployment counties in the United States. This would be a win-win-win whereby China is weakened, the U.S. economy strengthened, and lagging regions get a job-creating boost. As such, **Congress should pass a time-limited tax incentive for firms that move Chinese production to U.S. Labor Department–designated "labor surplus areas."**[148]

Have Companies List Their Reduction of Production in China as Part of ESG Reporting

Environmental, Social, and Governance (ESG) is a framework used by investors, banks, and producers to evaluate a company's sustainability and ethical impact, focusing on how it manages climate impact, treats people, and governs itself. Many companies seek good ESG performance

not only to have favorable perception by current and potential shareholders, but to be seen by their employees as a good place to work, and generally to maintain a good reputation.

But in large part that's because those external stakeholders simply did not care about national economic power. In fact, some, if not many ESG programs, explicitly state that investing in defense companies is contrary to ESG goals.[149] **To the extent governments impose ESG disclosure requirements, they should require disclosure of production in China.**[150] At the same time, we need a broader conversation with financial institutions, corporations, and government about why expanding ESG to ESGP (Environmental, Social, Governance, and Power) is needed. Companies should get ESG credit if they take steps to move production out of China.

Establish Escalating Long-Term Tariffs on Final Goods Imports From China

Congress should establish a predictable, consistent, and gradual set of conditions for determining whether Chinese goods enter the U.S. market. Currently, there is no legislation determining specific tariff rates for products made in China.

The tariff rate for most goods coming from China, as of January 2026, is over 37 percent. This rate comes from a combination of executive tools used by the federal government, including a 10 percent baseline "fentanyl tariff" under the IEEPA, Section 301- and Section 232-related tariffs, and most-favored-nation tariffs, which vary by product.[151]

Congress needs to codify the tariffs imposed on Chinese products by legislating a predictable, incremental pathway. The objective should be escalating long-term tariffs to prevent Chinese national power industry products from entering the U.S. market. A starting point should be establishing the current tariff rate of 10 percent under the IEEPA—which is the baseline the Trump administration is using for tariffs across all jurisdictions—and gradually increasing it until it reaches a point where importing national power goods from China is no longer a cost-effective option for American buyers—for example, an 11.25 percentage-point increase in year 2, with a 100 percent tariff by year 10. This tariff should stack on other sector-specific tariffs, such as those related to Section 301 investigations.

Box 2: The Myth That Chinese Racism Is the Cause of U.S. Toughness Toward the PRC

During the Cold War when U.S. policy and overall U.S. attitudes were suspicious of the Soviets, no one accused people holding this view of Soviet racism, partly because racial sensitivities were less and because most of the Soviets America dealt with were white. But now that America is in a new cold war with China, the CCP and many Americans play the racism card, asserting that any actions targeting China are grounded in racism. This is nonsense for the simple reason that there are many Asian nations U.S. policy is favorable toward, including the Chinese nation of Taiwan.

However, examples of this racism claim are numerous. For example, Rep. Chu (D-CA) stated:

Anti-Asian xenophobia and prejudice existed before the past year. The Trump administration's anti-China rhetoric and FBI and DOJ's China Initiative [an initiative in the first Trump administration to investigate potential Chinese spies in U.S. industry and academia] have resulted in the racial profiling of Chinese and Chinese American students, researchers, engineers, scientists, and even federal employees. While we should acknowledge our policy differences with the Chinese Communist Party, we should not target all Chinese people and

promote China-bashing that puts Asian American lives at risk. Such behavior is not only counter-productive to American scientific advancement and economic progress, but also contradictory to American core values.[152]

Many academics, often Chinese by race, make the same claim. Jessica J. Lee, a senior research fellow in the East Asia program at the pacifist Quincy Institute stated:

U.S. foreign policy is influenced by underlying racial components; U.S. foreign policy can widely vary depending on who has a role in the decision-making process. The stigmatization of Asian Americans in government and concerns of dual loyalty make it difficult for patriotic Asian Americans to feel accepted, and to be able to do the work they want to do and are capable of doing.[153]

Kerry McInerney, a left-wing academic at Cambridge, even argued that fear China may win the technology war is racist:

[T]he rhetoric of an AI arms race builds upon the myth of a 'Clash of Civilizations' between the West and the East. This civilisational rhetoric constitutes China and the United States as distinct and mutually opposed cultural entities, thus foreclosing the possibility of more peaceful and cooperative alternatives to the AI arms race. Second, I demonstrate how the US–China AI arms race specifically draws on previous racialised configurations of anti-Asian sentiment, such as techno-Orientalism and the Yellow Peril. I coin the term Yellow Techno-Peril to connote how older European and Americans fears of being overrun or controlled by China are reproduced in the AI arms race.[154]

Many liberal advocacy groups see this claim of racism as fertile ground for agitation. The American Civil Liberties Union (ACLU) wrote:

[I]n the past decade, we have continued to see federal agencies use race, ethnicity, national origin, and/or religious beliefs to profile and target Asian Americans, particularly Chinese American scientists and academics. Racial bias against persons of Asian descent permeated federal agencies and influenced the investigations and prosecutions of Asian Americans and immigrants across the country, including Professor Xiaoxing Xi and Sherry Chen. This discrimination intensified under the Justice Department's now-defunct "China Initiative," allegedly intended to combat economic espionage and trade secret theft.[155]

Just to be clear, the FBI initiative to root out Chinese spies—of which anyone with any knowledge of commercial counterintelligence will tell you is a very real threat—was not called the "Asian initiative." It was not targeted against Koreans as the evidence that Koreans in America are spies is almost non-existent.

Indeed, the simple answer to these claims is if anti-Chinese racism is fueling these policy changes, why do the new policies not apply to Taiwanese people? Or Korean, Japanese, Thai, Cambodians, and all the other Asian nations? It is for the simple reason that these are not run by a Marxist-Leninist authoritarian party bent on global hegemony.

A Johns Hopkins School of Advanced International Studies (SAIS) report states:

There is some evidence that a sizable constituency in U.S. domestic politics might be moved by anti-Chinese Othering to support more illiberal policies. For example, surveys by the Committee of 100 indicate that almost one third of respondents believe Chinese Americans are more loyal to the People's Republic of China (PRC) than to the United States. The trope of disloyal members threatening ingroup cohesion is common when groups police against threats from an Other.[156]

The view clearly is that these Americans are racists. The report goes on to note:

CCP discourses under Xi Jinping have emphasized the obligation of the "sons and daughters of China" in realizing the rejuvenation of the nation. This rhetoric aims to mobilize Chinese people worldwide, regardless of their citizenship. As such it blurs the distinction between nationality and ethnicity, and thus increases the threat that some hawks perceive from Chinese Americans. More empirical research is needed, therefore, into the relationship between Xi's statements about the children of China and discourses about Chinese American loyalty.[157]

In other words, any American who thinks that the risk profile of a Chinese person in America is higher than that of a non-Chinese person in America is a racist, but the CCP is doing everything it can to encourage Chinese disloyalty to the United States. To be clear, it appears that the vast majority of Chinese Americans are patriotic Americans. But that does not mean that the United States should not oppose Chinese attempts to gain national power and weaken America. That is not racist. It is rational.

Yet, when policymakers or others state this, the racist card is usually played. When former Democratic member of Congress Tim Ryan was running for Senate in Ohio, one of his campaign ads stated, "It is us versus China." The entire theme of the ad was the economic threat China was to Ohio's workers.[158] Yet, that did not stop Congresswoman Grace Meng (D-NY), vice chair of the Congressional Asian Pacific American Caucus, to call on Ryan to stop airing it.[159]

Shekar Narasimhan, chairman of AAPI Victory Fund, a super PAC, tweeted that Ryan's ad "stirs up a racist pedagogy vis-a-vis China and makes Americans of East Asian descent vulnerable to attacks."[160]

And the Chinese government amplifies these messages to tell the Chinese diaspora that they are not welcome and that they should be loyal to the motherland.[161]

While policymakers and politicians should not conflate being tough on China with being racist toward Chinese people, alienating Chinese Americans as a group would inflict real strategic costs on the U.S. ability to durably compete with China in the long term. Patriotic Chinese Americans are an important part of the citizenry not only as STEM talent, but also for their knowledge of China.

As U.S.-China people-to-people exchanges, academic cooperation, and professional mobility have declined, the United States has lost many talent pipelines of Americans who have a lived understanding of China linguistically, politically, economically, socially, and culturally. The U.S. policy ecosystem tasked with countering China, including intelligence, law enforcement, civilian agencies, and broader thought leadership, needs more of this expertise, not less.

American-born and naturalized Chinese Americans, particularly those who have lived or worked in China, possess a uniquely deep understanding of China. There is, unavoidably, more counterintelligence risk with Chinese Americans: while the PRC's intelligence apparatus targets both ethnic Chinese and non-ethnic Chinese alike, it is generally able to exert greater leverage over many Chinese Americans. The United States should aim to manage these risks with stronger counterintelligence rather than exclusion. Overcorrecting to avoid all risk would sideline a critical talent pool and risk larger strategic failure in the long run. And finally, whenever policymakers discuss the PRC challenge, they need to go out of their way to make it clear that they are not talking about all Chinese or Asians as a group.

CONTESTING CHINESE FIRMS IN NON-ALLIED MARKETS

If the United States is to win the techno-economic war instigated by China, then trade and export policy must prioritize fighting for global market share against China, especially for advanced industries with high fixed costs, such as aerospace, software, biopharmaceuticals, and semiconductors.

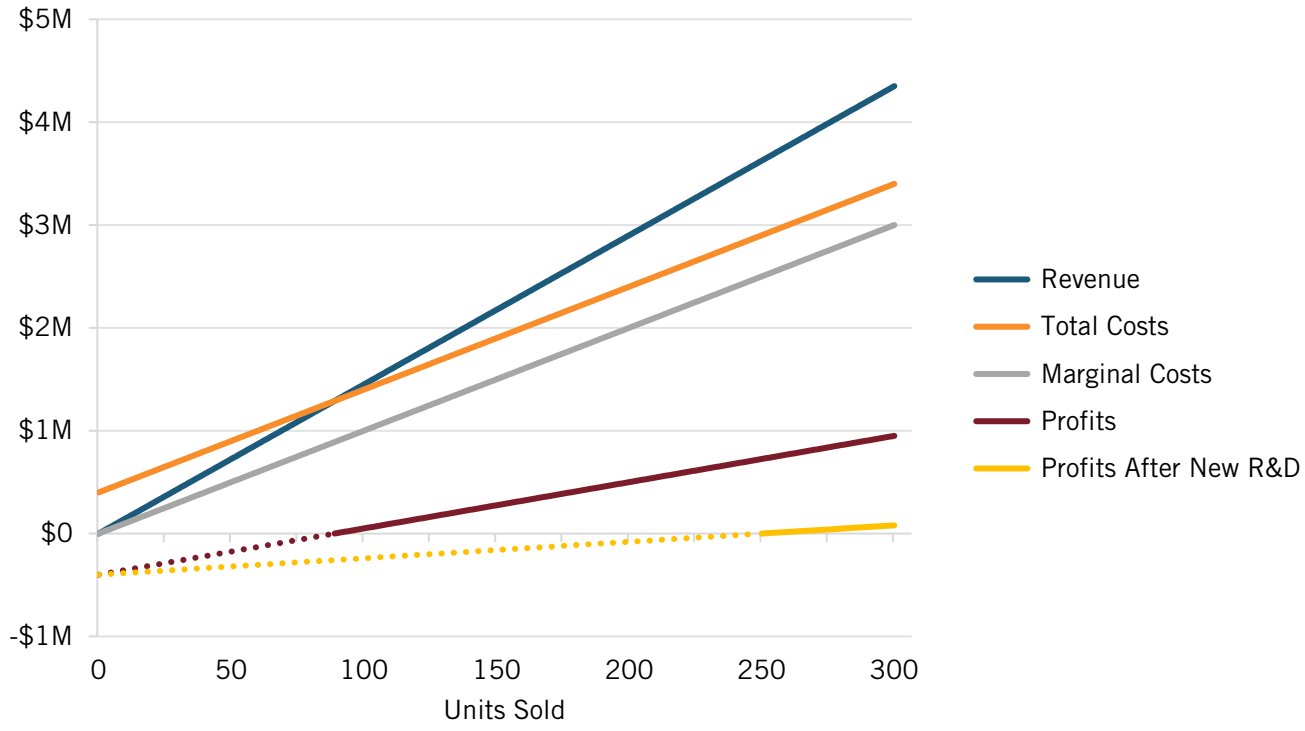
Advanced technology industries are characterized by high fixed costs compared with marginal costs. That means they must incur very high upfront costs before they can even produce the first chip for sale. For example, the average cost of a computer chip significantly exceeds its marginal cost. Economists describe such industries as experiencing increasing returns to scale, meaning that each additional unit sold yields a higher rate of profit because costs decline.

Global market access is existential for industries with high fixed costs. Otherwise, costs won't fall, R&D won't increase, and competitors will gain structural advantages that can ultimately lead to the demise of advanced U.S. firms and industries with high fixed costs.

Figure 1 illustrates the cost structure of a hypothetical firm for which fixed costs are 40 times marginal costs—$400,000 and $10,000, respectively. In other words, the company must spend $400,000 on R&D, design, machinery, and other fixed costs before it can produce its first unit. It then costs $10,000 to make each unit in terms of energy, materials, and labor, and the company can sell them for $14,450 per unit. Because of its high fixed costs, the company loses money until it sells at least 88 units. At that point, it makes an increasing profit on each additional unit sold. For these industries, scale is everything. Imagine if, because of export controls, the size of the market were limited to 75 units. In this case, the company would suffer a loss of $62,500. But if there are no export controls, then the company could earn a profit of $50,000 after selling 100 units. Meanwhile, whereas the total cost for producing the 75th chip would be $15,333, the total cost for producing the 100th chip would drop to $14,000. Now imagine the company needed to invest 20 percent of its revenues in new R&D to remain competitive. That would move the goalpost; it would require selling more than 250 units to become profitable.

Global market access is existential for industries with high fixed costs. Otherwise, costs won't fall, R&D won't increase, and competitors will gain structural advantages that can ultimately lead to the demise of advanced U.S. firms and industries with high fixed costs. Conversely, U.S. sales of advanced goods and services outside the United States take market share from the Chinese, and limit its capacity to reinvest and expand. This is especially true in emerging markets where China is targeting much of its export-based "going out" strategies.

Figure 1: Hypothetical firm with fixed costs 40 times greater than marginal costs



Expand and Reform EX-IM Bank

The Ex-Im (Export–Import) Bank of the United States plays a key role in helping U.S. exporters gain sales.[162] The bank provides financing for export transactions that might not otherwise occur when private commercial lenders are unable or unwilling to provide financing to foreign purchasers of U.S. exports and plays a key role in leveling the playing field for America's exporters by matching the credit support that other nations provide, ensuring that U.S. exporters are able to compete based on the price and performance features of their products.[163]

In FY 2024, the Ex-Im Bank approved 1,424 transactions worth a total of $8.4 billion, which supported an estimated $12.4 billion in U.S. exports and 38,000 jobs.[164] However, Ex-Im Bank funding has declined dramatically in recent years. For instance, in FY 2011, the Ex-Im Bank authorized $32 billion in transactions; in FY 2012, $35.8 billion. But Ex-Im Bank authorizations haven't eclipsed $10 billion since FY 2015. Meanwhile, global export credit expenditures grew from $71 billion in 2015 to $115 billion in 2024. China—the leading provisioner of export credit—extended $24 billion in export credit in 2024, almost three times the U.S. amount.[165]

Congress will need to reauthorize the Ex-Im Bank by December 31, 2026 (on February 6, 2026, Senators Kevin Cramer (R-ND) and Mark Warner (D-VA) introduced reauthorizing legislation), and this should be supported fully by the Trump administration.[166] **Congress should significantly increase Ex-Im lending levels. It should also permit that Ex-Im's China and Transformational Exports Program workstream accept greater loan-loss risk across its portfolio and expand its transformational export areas** to include cloud services and infrastructure; civil nuclear facilities, material, and technologies; and critical minerals, materials, and rare earth element mining, concentration, separation, refining, alloying, fabrication, and end use.

The Ex-Im Bank has achieved very low default rates for many years—just 0.91 percent in FY 2024.[167] While that's laudable, it can prevent the Bank from taking on somewhat riskier, yet worthy, investments. As such, **in reauthorizing legislation, Congress should increase the permissible Ex-Im Bank default rate from 2 percent to at least 4 percent**.[168] Congress could also exempt nuclear energy projects from default risk calculations to encourage more risk-taking. **Reauthorization should also permit Ex-Im to finance weapons exports to U.S. allies (with approval from the Pentagon).**

Expand the International Development Finance Corporation

The International Development Finance Corporation (DFC) is the international investment arm of the U.S. government, partnering with the private sector to mobilize capital for strategic investments around the world.[169] DFC currently boasts a global development portfolio exceeding $40 billion, with active projects in over 100 countries.

DFC celebrated nearly $12 billion in commitments in FY 2024—a highwater mark for this decade. Unfortunately, DFC issued around $3.5 billion in new commitments in FY 2025.[170] In December 2025, however, Congress reauthorized DFC, increasing its maximum contingent liability to $205 billion from $60 billion previously, a $145 billion increase, hopefully setting the agency up to make much more significant investments in the future.[171] If DFC is able to do so, Congress should increase its contingent liability even more.

The vast majority of DFC activity comes in the form of direct financing or loan guarantees. Direct equity investments were historically a small component of DFC's commitments due in part to its nonsensical treatment in budget scoring—which assumed that an equity investment yielded a total and immediate loss.[172] To address this, the December 2025 congressional reauthorization created a $5 billion revolving equity fund, but this will have to be capitalized through the appropriations process. These efforts are a step forward to promote U.S. technologies and standards overseas, but DFC's equity tools are still far from comparable to those of peer institutions around the world and will be insufficient to counter Chinese investments. So, the government should continue the reform of the U.S. development assistance system.

The administration should use the DFC as a centerpiece of a coordinated engagement strategy with allies in Global South countries. If the DFC is going to represent an effective counterweight to China's global initiatives, it must collaborate with development finance entities from like-minded nations and co-invest in development initiatives that support supply chain diversification efforts of mutual interest. Here, for instance, the United States can invest alongside allies to create alternative suppliers of critical minerals and other strategic resources in developing economies. Announcements of new DFC critical minerals investments in Congo, Brazil, and Kazakhstan, alongside the ministerial meetings Secretary of State Marco Rubio held on critical minerals in February 2026, represent significant steps in this regard.[173]

Congress should increase development finance investments. China has become the world's leading source of international development finance, with some $1.34 trillion in loans and grants disbursed over 22 years for 20,985 projects in 165 low- and middle-income nations.[174] Over that period, China's state-run banks and companies have channeled nearly six times as much money into projects as the United States has allocated.[175] Since DFC's main financial mechanisms are equity and loan guarantees, a large share of increases in the federal budget can be recovered through repayments, fees, and investment returns.

Congress should expand DFC's institutional capacity and expertise. Congressional reauthorization of DFC has given the entity a large remit and important flexibility. But if it's going to fulfill its potential to mobilize private capital and scale development impact, it's going to need a clear strategy and effective leadership to professionally restaff the organization. (DFC lost almost 200 career specialists amid federal workforce reductions last year.)[176]

Congress should require DFC to use its financial tools to explicitly reduce third countries' reliance on PRC investments, technologies, or standards, and to the extent possible, focus on national economic power industries. DFC should also produce annual reports explaining how much of its maximum contingent liability—its "credit card"—has been committed to countering the PRC, including descriptions of those projects and the sums committed to each.

Congress should make it clear that recipients of DFC funding are not permitted to expend resources on products or services made by Chinese companies (unless there is no feasible alternative). So far, DFC has been subjected to general restrictions on federal procurements—for example, restrictions on telecom and surveillance technologies from companies on the Entity List such as Huawei, Hytera, and ZTE.[177] This is insufficient, particularly because these are federal funds spent overseas. As market share in foreign markets is a zero-sum dynamic, DFC funds should not be allocated to Chinese national power industries, which would help them gain market share in third markets.

Lastly, while DFC plays an important role in competing with Chinese development financing, it needs to do so in ways that do not reward nations with digital policies harmful to U.S. techno-economic interests. **Congress and the administration should create explicit criteria for DFC to use in assessing how a country's trade and technology policies affect U.S. interests.** Countries that negatively affect the ability of U.S. firms to enter and compete in foreign markets by supporting trade barriers or substandard IP rules should not be recipients of U.S. development finance aid.[178]

Foster a National Export Promotion System

There is no national export strategy or system, while various federal agencies have their own export programs. GAO wrote about this more than 30 years ago, and little has changed.[179] At the same time, most state governments, some city governments, and other subnational organizations have export promotion agencies. This is a jumble of different programs at different levels of government that is disorganized and uncoordinated, making it difficult for exporters to get the information and assistance they need. There is not comprehensive list of these programs. There is no attempt to create a coordinate network of all these organizational efforts to at least identify synergies. **Congress should charge the Commerce Department with establishing a national, inter-agency, and inter-governmentally aligned trade promotion system.**

Promote National Power Exports to the Global South

An ITIF report shows that economies in the Global South will account for over 45 percent of the global economy by 2050.[180] The five largest Global South countries—Brazil, India, Indonesia, Mexico, and Turkey—account for a large share of the population and economies of developing countries—42 percent and 47 percent, respectively.[181] Other relevant economies in the Global South include Argentina, Nigeria, Saudi Arabia, South Africa, Thailand, the UAE, and Vietnam.

Gaining market share in national power industries in these countries should be a top priority for U.S. foreign and trade policymakers.

Access to developing economies matters so national power industries can reach scale. China's exports, sales, and investments are growing faster in these markets than those of the United States. Federal support for export promotion in countries in the Global South can help counter this trend.

The Trump administration announced in October 2025 that it is seeking to launch an export program to "full-stack AI export promotion program to advance America's global leadership"—the American AI Exports Program.[182] While the program is still in its design phase—with the scope, focus, priorities, and instruments to be defined—the stated objective to advance U.S. leadership in a strategic, general-purpose technology such as AI is commendable. It is what is expected of the federal government to lead technologically. However, these efforts would be insufficient if limited to a single set of technologies.

The U.S. government needs to support an export program for all national power industries, particularly in the Global South. This should be a multi-agency effort that overlaps the execution of U.S. grand strategy through diplomacy, and U.S. economic priorities through trade negotiations.

In addition, **the State Department should lead a coalition of Western countries to increase allied market share in national power industries in Global South markets.** At first, it will be challenging to establish common goals among economies that are competing for market share in third markets—for instance, American and German carmakers would each benefit if the other had more difficulties expanding its footprint in Global South markets. In this context, the first approach should be to address how Chinese mercantilism is expressed in the Global South—with dual-use infrastructure projects and flooding markets to block potential competitors, what is called the "premature deindustrialization" in developing economies. This coalitional work should encompass all areas of foreign affairs—from securing safe supply chains through loans and development assistance to people-to-people exchange programs that raise awareness of the consequences of Chinese mercantilism for the development paths of emerging countries.

Make It Easier to Export Weapons to All Nations in the Foreign Military Sales Program

While competition in national economic power industries, including dual-use industries, is critical to national security, productive capacity in weapons systems is clearly the most important for safeguarding the nation. And like virtually all national economic power industries, greater global sales enable lower marginal production costs and more R&D to invest in next-generation systems. Plus, limiting China from gaining market share is equally valuable to slow its own expansion of weapons systems production.

With countries around the world increasing their defense budgets in a time of geopolitical turmoil, this is an opportune time for the United States to increase its exports of defense equipment. And indeed, U.S. defense sales to foreign nations reached an all-time high of $120 billion in 2025, building on sales of $117.9 billion in 2024, which represented a 46 percent increase from the year prior.[183] But if the United States is to sell more weapons in this moment, then it must improve the speed, predictability, and transparency of its Foreign Military Sales (FMS) processes.[184] Systemic process improvements—not necessarily more staff—will be needed to address this challenge.

However, China has grown its arms exports, selling to 44 nations, including traditional U.S. customers such as Argentina, Malaysia, and Thailand.[185] From 2015 to 2024, China ranked fourth in global arms sales, with about 6 percent global market share.[186] There are several reasons, including lower prices, fewer political strings attached, a noninterference policy that doesn't impose sanctions or ask questions about how weapons will be used.[187] China's Ex-Im Bank plays a significant role in financing the country's defense exports, as do China's state-owned banks. China regularly offers loans at below-market rates or with extended payment terms that can be make its financing be more attractive than what other nations can provide. As Merics wrote, "Competition between Chinese and Western providers will only intensify in years to come as China tries to boost its exports and expand its global influence."[188]

On February 6, 2026, the Trump administration introduced a new America First Arms Transfer Strategy, an executive order that seeks to "ensure that future arms sales prioritize American interests by using foreign purchases and capital to build American production and capacity."[189] The strategy centers on boosting the manufacture of weapons most important to the U.S. military and prioritizes sales that will help revitalize the American defense industrial base.[190] The strategy will further give defense export priority to foreign nations that are taking on more burden sharing and lifting their defense expenditures closer to 5 percent of GDP. The executive order further calls on the departments of War and State to create "a sales catalog of prioritized" weapons the United States will encourage partners to purchase.[191] The order further establishes an End Use Monitoring coordination group, which will ensure that foreign purchasers are complying with U.S. requirements to reduce the risk of weapons diversion.

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The executive order represents the biggest modernization of U.S. defense export policy since 2023, when the U.S. State Department's Bureau of Public-Military Affairs unveiled a 10-point plan to accelerate the approval of FMS by developing a new approach to FMS strategic planning.[192] That plan sought to streamline U.S. arms sales processes to ensure that the vast majority of sales were approved withing 48 hours.[193] The approach called for developing a regional approach to arms transfers, in part by anticipating comparable equipment requests from regional partners, and prioritizing FMS requests based on national security goals. It called for promoting proactive, forward-looking use of the Special Defense Acquisition Fund, which allows for the rapid delivery of selected defense articles and services in advance of normal procurement lead times. Other steps included refining implementation of the Unmanned Aerial System export policy, improving Security Cooperation Officer training, and modernizing congressional notification processes. Through the FMS Strategic Plan, the State Department sought to reduce arms delivery time to select U.S. allies by up to two years.[194]

Yet, Congress still wants to limit sales of weapons to nations that have questionable human rights records. Just like concerns over bribery in other nations to get contracts, the concern is legitimate. But if the alternative is Chinese sales to these countries, then China's defense industry benefits at the expense of America's. And for those who say that this shouldn't be a race to the bottom and we can't let China dictate U.S. policy, those sentiments were valid when China was not a military and techno-industrial rival. Now it is completely in the interests of the United

States, within normal military security concern parameters, to sell as many defense goods as possible in a zero-sum competition with China.

There are several steps to take. **Congress should remove the limitation of financing weapons exports that it placed on Ex-Im Bank.** Since 1994, Congress authorized Ex-Im to facilitate financing of U.S. exports with both civilian and military applications, provided the bank determines such dual-use items are nonlethal and primarily meant for civilian end use. This was a luxury that the United States can no longer afford. If we don't sell in international markets, China will.

The Arms Export Control Act, as amended [22 U.S.C. 2751, et. seq.], authorizes the president to finance procurement of defense articles and services for foreign countries and international organizations. Foreign Military Financing (FMF) enables eligible partner nations to purchase U.S. defense articles, services, and training through either FMS or, for a limited number of countries, the foreign military financing of direct commercial contracts program.[195] Three changes are needed.

Congress should significantly increase the lending authorities for the FMF program. The FMF program received $6.16 billion in FY 2026, representing a $25 million (0.4 percent) increase compared with FY 2025. Congress should provide at least $15 billion in FMF loans and $50 billion in loan guarantees each year so that financing does not become the barrier for foreign weapons sales. Expanding FMF loans and loan guarantees would enable allies in the Indo-Pacific, Africa, and the Americas to enhance their military readiness and interoperability by facilitating more rapid procurement of U.S.-manufactured defense weaponry. This is key because, as with so many other technology products, China competes on price and quality that is good enough. And for many lower- and middle-income countries, that is a compelling value proposition. Low-cost financing can help the higher cost, but higher-quality U.S. weapons have a better chance of being chosen.

The Trump administration should reinstate the ability of the program to make grants. In some cases, grants can make the difference between U.S. sales and Chinese sales, and the price is a small one to pay for that market share difference and the ability to interoperate with partner nations during a conflict that may potentially involve China as an adversary.

The FMF program is limited mostly to NATO countries, but **FMF should be broadened to all FMS countries.** In addition, **DOW should review its FMF guidelines to reduce or eliminate barriers to foreign sales**.[196]

The Under Secretary of War for Acquisition and Sustainment needs to establish an office whose mission is to focus winning the techno-economic weapons industry war with China by boosting foreign weapons sales. This should be more than simply something DOW does to strengthen our allies; it should be a coherent strategy to boost U.S. defense industry sales and competitiveness, while at the same time limiting PRC weapons sales. Such an office should bolster transparency by providing a "one-stop location" foreign buyers could contact to understand exactly where their orders stand in the review or fulfillment process (e.g., it's at the State Department for review, or at the Defense Technology Security Administration, or in Congress for pre-notification). This matters, because presently a lack of transparency (and speed) regarding both review processes and order status has played a role in certain foreign nations choosing to procure weapons systems elsewhere.[197]

In 2024, the Defense Acquisition University released a memorandum that detailed eight internal, technical, and procedural improvements DOW could take to accelerate FMS, such as leveraging training and tools for DOW personnel, revising checklists to better define FMS requirements, adopting tools and processes to enhance prioritization of FMS requirements, providing contract order-period information, including FMS case identifiers in contracts, developing priced options in contracts, using undefinitized contract actions for urgent FMS requirements, and expanding the use of data and analytics tools.[198] Most of this is "inside baseball" procedural improvements, but as noted, they could play an important role in accelerating the speed, predictability, and transparency of FMS activity.

Congress should also be more supportive of foreign weapons sales, even to countries that are problematic from a human rights perspective, as long as they are not military adversaries. Taking such higher ground is noble, but at the end of the day, it us unlikely to keep these countries from acquiring weapons systems. They will just get them from China, and the U.S. will be relatively weaker. In addition to doing that, **Congress should increase the reporting thresholds for sales the administration must use to report sales to Congress.**[199] Currently, any major defense equipment sales valued at $14 million or more must be reported. This threshold should be significantly increased. **Congress can also take steps to accelerate internal review and approval of proposed FMS by streamlining deal approval** among the so-called congressional "Four Horseman": Senate and House Foreign Relations minority and majority staff directors.[200]

Finally, some will argue that it makes no sense to boost exports if there are production bottlenecks at home. But these bottlenecks emerged in large part because defense companies did not believe that they could sell more weapons, so they scaled back production capabilities. If they know that the foreign markets represent greater opportunities as rational, for-profit actors, they should be willing to expand domestic production.

Reform the Foreign Corrupt Practices Act to Allow Bribes When Competing With China

The Foreign Corrupt Practices Act (FCPA) was passed in 1977 to make it unlawful for certain classes of persons and entities to make payments to foreign government officials to assist in obtaining or retaining business. In other words, no bribes to obtain contracts in other nations. The Organization for Economic Cooperation and Development (OECD) Anti-Bribery Convention is similar and includes all EU countries, the United Kingdom, Japan, Singapore, Australia, and a few others, but not China.[201] While China has a similar law, it is mostly for show.[202]

Indeed, Chinese companies routinely bribe officials in foreign countries in order to win contracts or gain business advantages. An article by the Forensic Risk Alliance found multiple instances of Chinese firms bribing foreign officials for business advantages.[203] For instance, it found that the China Harbour Engineering Company Ltd. bribed the Bolivian Highway Authorities with $2.7 million in exchange for a road-widening contract worth $95 million.[204] Moreover, in 2022, Chinese state-owned hydropower company Sinohydro Corp allegedly paid bribes to a friend of Ecuadorian government officials to win the Coca Codo Sinclair hydroelectric project contract.[205] In addition to bribing Latin American officials, Chinese firms have also bribed foreign officials in other nations. For instance, China's ZTE has faced probes by foreign authorities in multiple nations over alleged bribes to obtain telecom contracts.[206] They have similarly offered bribes to EU and African officials.[207]

The Trump administration recently issued guidelines to reduce the unfair competitive advantage this gives to China, in part by stepping up enforcement against Chinese companies.[208] At the same time. the administration issued a temporary pause on enforcement of the FCPA against U.S. companies.[209]

Chinese companies routinely bribe officials in foreign countries in order to win contracts or gain business advantages.

The focus on the FCPA and the OECD Convention were both from an earlier era when the United States and the West generally were working toward a better world governed more by the rule of law. That attempt has failed, and it instead created a two-tier system wherein the United States and allied companies are competing with one arm tied behind their back, including winning contracts in China. Not only bribery, but also a one-sided prohibition of it only hurts American interests and helps Chinese companies gain advantage. It particularly makes no sense to prosecute U.S. companies making bribes in China in order to obtain business. Presumably, in most cases, increased U.S. sales are in the U.S. national interest. If the CCP does not want bribes paid in the PRC, it can bring its own cases.

As such, **Congress should pass legislation that exempts U.S. firms' bribery in China and also allows U.S. firms to get a timely exemption to the FCPA from DOJ if they can show that the bribe is needed to win a contract in a foreign country against a Chinese competitor.**

Allow U.S. Intelligence Services to Give Insights Into Chinese Company Bids

The U.S. IC has long collected what it calls "economic intelligence." A 1953 CIA memo defined economic intelligence as "analysis and evaluation of a foundation of economic information, mostly quantitative, with the object of solving problems related to national security."[210] In a 1996 testimony, then-Director of Central Intelligence (DCI) John M. Deutch further described the IC's economic intelligence collection requirements:

> We monitor threats to international financial stability and U.S. interests. We alert policymakers when foreign firms use questionable business practices, such as bribery, to disadvantage U.S. firms. Economic intelligence reporting helps us expose activities that may support terrorism, narcotics trafficking, proliferation, and grey arms dealing. Finally, as I mentioned earlier, we also monitor compliance with economic sanctions.[211]

The IC's economic intelligence regime presents a longtime debate: To what extent, if any, should the IC offer the private sector access to the economic intelligence it collects, effectively thawing the longstanding firewall between economic intelligence collection and U.S. commercial goals?

Those in opposition of breaking the firewall have identified foreign intelligence collection on foreign companies as a red line on moral or normative grounds while maintaining the continued importance of intelligence resources on companies in defensive and counterintelligence capacities.[212] For example, former senator and ambassador to China Max Baucus (D-MT) testified in 1993 that while "we should be prepared to retaliate against those countries who refuse to refrain from using their intelligence services for these unethical purposes," ultimately, "it is improper for the United States government to be spying on foreign companies."[213]

Another common refrain from those who oppose breaking the firewall has been that the United States is ahead and thus has little commercial benefits to gain from changing collection requirements and dissemination practices for economic intelligence. As former senior CIA officer Diane C. Snyder wrote in 1997:

> A United States industrial espionage plan would be akin to fighting fire with fire. There is a reason why we are targets - we have the most advanced technology. The secrets we would be stealing may have already been stolen from us. The gain would be minimal, while the diplomatic and even life risks would be substantial.[214]

In contrast, supporters of breaking down the longstanding firewall have a variety of rationales.[215] Former senator Dennis DeConcini (D-AZ), a proponent of limited use of U.S. intelligence assets to assist U.S. firms' competitiveness, rhetorically asked the following question in 1994: "As long as other countries use their intelligence services to support their domestic industries, why should the United States hamstring itself?"[216]

Baucus's, Snyder's, and DeConcini's opinions from the 1990s are all relevant today. However, two major events have changed the calculus since then. The first is that China has become highly innovative in advanced industries and has even surpassed the United States within numerous sectors.[217] This renders the argument that the U.S. economy is so far ahead and stands to comparatively gain little by conducting economic espionage less applicable.[218]

"As long as other countries use their intelligence services to support their domestic industries, why should the United States hamstring itself?"

The second event is that since the 1990s, China has pivoted to a strategic campaign to dominate advanced industries that serve as the wellsprings of national power and security for 21st century nations, leaning on its increasingly strong innovation base.[219] This event has in effect launched an industrial war between a China on the attack and the United States, along with its allies and partners, in vulnerable, defensive positions. While China's continued innovation gains contribute to a long, slow war, China's government has fueled its strategy to dominate key industries through a bevy of isolated attacks, from mercantilist trade policies to economic espionage.[220]

With this context, it is at the very least worth revisiting the debate on whether the U.S. IC should change either or both of its collection requirements and dissemination of economic intelligence.[221] Indeed, former NSA General Counsel Stewart Baker recently revisited the debate, writing in *Lawfare* in 2025 in support of breaking the firewall, arguing that "a lot of the reasons given in support of the ban are looking a little threadbare."[222] Baker's argument offers strong rebuttals of many of the historical arguments against economic intelligence reform. His analysis, however, concluded that any reform would require serious collaboration between the IC and U.S. private sector: "The question 'Who gets the intel?' must be answered in a way that is fair and resistant to favoritism, that ensures an active and demanding customer, and that doesn't cheapen the sacrifices made by intelligence professionals."[223]

Baker considered the debate from a perspective looking squarely at China's engendered change to the global world order. If nothing else, additional public thought exercises on this question in

the context of China's industrial war is worth further consideration. Following in Baker's example, two hypothetical examples show some benefits and drawbacks of economic intelligence reform.

First is the DeepSeek example. On January 27, 2025, the Chinese company DeepSeek's large language model (LLM) app, also called DeepSeek, became the most downloaded free app on Apple's U.S. app store.[224] This market movement, in addition to the news that DeepSeek's LLM operated at a much lower cost than leading U.S. LLMs, caused the Nasdaq to fall nearly 600 points.[225] Clearly, investors and Wall Street did not see DeepSeek coming. At least publicly, U.S. tech executives also seemed to be surprised, with former Scale AI CEO Alexandr Wang calling DeepSeek's LLM "earth-shattering."[226]

It is unknown whether the U.S. IC knew about the extent of DeepSeek's prowess in advance. If it had, it is still impossible to know what difference it would have made in the U.S.-China industrial war if the IC had subsequently shared that intelligence with U.S. AI firms. This counterfactual blurs the line between a competitive asset for U.S. firms and counterintelligence; OpenAI later claimed that DeepSeek used its proprietary models for training purposes, thereby breaching OpenAI's terms of service.[227] While the answers to these questions are unknown, they demonstrate the range of potential benefits to thawing the IC-private sector firewall on economic intelligence.

Assuming DeepSeek has not evaded U.S. sanctions, contributed to developing weapons of mass destruction, or involved itself in corrupt practices in the United States, the IC under current norms would have no mandate to collect DeepSeek's source code or other proprietary technical artifacts. In a world where the IC had that mandate, managed to collect that intelligence, and disseminated that intelligence to U.S. firms developing LLMs, the question would become, "Would that have improved those companies' ability to compete against China in advanced AI systems?" Any gains would be offset by raised reciprocity risks and damaged U.S. claims of rule-based competition. At this stage, value from such appropriation of foreign commercial IP would likely not outweigh the risks.

Furthermore, much of what shocked U.S. markets and tech leaders regarding DeepSeek was already visible in open-source discussions well before the company's commercial release, meaning economic intelligence would have wasted taxpayer money and government resources.[228] James Lewis commented in *Lawfare* in 2016 that "economic intelligence collected by government agencies will always be of lesser value than what is available to commercial actors."[229] Perhaps economic intelligence reform might be better spent more on the IC lending its growing open-source intelligence (OSINT) capabilities—the IC strengthened OSINT to "a core intelligence discipline" in 2024—to the U.S. private sector to better track developments emerging from China's research base.[230]

A second hypothetical example is if the IC were to collect information on a Chinese firm that was bidding on a major foreign government contract in competition against a U.S. firm. If the IC collected intelligence indicating that the Chinese bidder benefitted from opaque state subsidies or other Chinese government benefits or direction, were engaged in dual-use technology diversion, or had corruption risks tied to the bid, a breach of the current firewall would entail the IC sharing that intelligence with the U.S. firm competing for the contract. This could help the U.S. firm level the informational playing field in contests wherein Chinese firms operate as

extensions of state strategy, but could alternatively expose IC sources and methods or entangle the United States in accusations of economic coercion.

As in the DeepSeek case, this would go well beyond leveling the informational playing field and into the direct transfer of commercial IP. While such an approach could materially alter outcomes in high-stakes infrastructure, telecom, or energy procurements, it would also significantly heighten diplomatic fallout, expose intelligence sources and methods, and blur the line between defensive economic intelligence and offensive economic warfare.

Taken together, these examples underscore that the core policy challenge is not whether economic intelligence can confer advantage, but where reform should draw and enforce the boundary between strategic awareness and outright espionage. Any change would require change to the Obama administration's 2014 Presidential Policy Directive PPD-28 that explicitly states:

> [T]he collection of foreign private commercial information or trade secrets is authorized only to protect the national security of the United States or its partners and allies. It is not an authorized foreign intelligence or counterintelligence purpose to collect such information to afford a competitive advantage to U.S. companies and U.S. business sectors commercially.[231]

The Biden administration similarly stated in a 2022 executive order that "it is not a legitimate objective to collect foreign private commercial information or trade secrets to afford a competitive advantage to United States companies and United States business sectors commercially."[232]

Congress and the Trump administration should establish a narrowly tailored pilot authority that allows the IC to share classified assessments with vetted U.S. firms competing with Chinese firms for third-country contracts. Included information in the disseminated intelligence could include a Chinese firm's ties to PRC subsidies, coercive practices, sanctions evasion, corruption, or dual-use diversion tied to specific bids, but not cross the firewall to collect or disseminate foreign commercial trade secrets for the purpose of conferring a purely commercial advantage. Such a framework should require clear national security objectives, interagency review, strict source-and-methods protections, and congressional oversight, thereby enabling defensive economic intelligence support in power industries without crossing the line into offensive industrial espionage.

Expand Training and Other Outreach to Government Officials in Contested Nations

The U.S. government, mostly through State Department operated or funded programs works to help foreign government officials to better understand key components of the U.S. policy system. For example, the PTO's Global Intellectual Property Academy (GIPA) brings foreign IP officials—prosecutors, judges, executive branch officials—to Alexandria, Virginia, to learn about IP protection and enforcement best practices.[233] Attendees meet with U.S. officials across the government, as well as private sector experts. GIPA has been a real success story, identifying and cultivating IP champions in foreign markets.

In other cases, the State Department funds organizations to work with other nations, such as meeting with officials to talk about components of innovation policy.

In both kinds of actions, face-to-face relationship building is crucial to helping countries resist falling into the PRC's orbit. Investment in this kind of soft power education and training is critical if we are to slow China's encroachment in these other nations. As such, **Congress should ensure that agency budgets, especially the State Department's, include expanded funding for these kinds of relationship building and education efforts.**

CONCLUSION

The United States has faced competitiveness challenges in the past, particularly in the 1980s and early 1990s, and especially against Japan and Germany. But they and other similar competitors at the time differed from China in four key ways:

1. While these nations engaged in some protectionist behavior, compared with China's behavior, it was relatively limited.
2. Both nations were allies and so had to take U.S. concerns at least somewhat seriously. China is an adversary seeking global hegemony and displacement of America from that role. And it is ruled by a Marxist-Leninist authoritarian regime, not a democratic one. As such, it ignores U.S. concerns with impunity.
3. These nations were bound by the rule of law and administrative law requirements, which limited the capriciousness of law, regulations, and enforcement. China is not bound by any limitations other than what the State Council and Xi dictate.
4. These nations sought comparative advantage in certain sectors the United States competed in, but at the end of the day, their ambitions were limited, and they were willing to import some U.S. goods and services. The PRC's ambitions for industrial dominance are unlimited, and it seeks autarky, not interdependence.

As such, unlike the competitiveness challenge of the 1980s and 1990s, this is less a competition and more a war; less about fighting over a few industries and more about fighting for all national economic power industries.

The United States and other democratic nations need to stop being the prisoner who rats on their partners and start sticking together to achieve a cooperative win-win outcome.

If the United States (and allies) do not want their national economic power industries hollowed out, creating crippling dependency on the PRC, it needs to step up its actions. That means putting in place an array of bold new ideas to support national economic power industries, as further ITIF reports in this series will do. But it also means taking an significant array of steps to limit China's advantage. Not losing depends on both.

And perhaps most importantly, it means that the United States and other democratic nations need to stop being the prisoner who rats on their partners and start sticking together to achieve a cooperative win-win outcome. Allies should not break ranks to join up with China, because China is not a reliable partner. It has shown again and again that it is selling out advanced nations, and doing what is good for its own self-interest, not the collective global good. Maybe someday we can convince China to cooperate and we'll all be better off. But today isn't that day, and the United States and allies should act accordingly with courage and integrity.

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Mobilizing for Techno-Economic War, Part 3: Transforming Financial Capitalism Into National Power Capitalism

ROBERT D. ATKINSON

To avoid losing the techno-economic trade war with China, U.S. policymakers must rewrite the social contract at the heart of America's 50-year-old system of financial capitalism by rebalancing the incentives to drive long-term investments in U.S. national power industries.

KEY TAKEAWAYS

- The single most important policy area in the U.S. techno-economic trade war with China is influencing how firms make investment decisions. Policymakers must shift the balance between earnings that firms reinvest and profits that go to shareholders.
- Since the early Republic, the capitalist investment system has evolved through four stages, culminating in today's system of financial capitalism, which privileges short-term shareholder interests over long-term enterprise and national power interests.
- Progressives' preferred alternative to financial capitalism—and to neoliberalism writ large—is a quasi-socialist market system that maximizes redistribution. That would be even worse when it comes to supporting national power.
- To avoid losing the techno-economic war to China, policymakers should instead usher in a new system of "national power capitalism" that better balances shareholder interests with the national interest.
- That requires major tax reforms to incentivize retained earnings and investment, and to disincentivize profit payouts; spurring "double bottom line" investment behavior that values national power; and creating targeted public sector investment vehicles.

INTRODUCTION

The United States has been the world's dominant techno-economic power for over 125 years. That has induced complacency. As the Information Technology and Innovation Foundation (ITIF) has written, China is hungry and determined not only to displace American techno-economic leadership, but also to make America dependent on China.[1]

ITIF predicts that China will soon surpass the United States in what we have termed "national power industries": advanced traded-sector industries that are critical to national security or sovereignty.[2] (See box 1.) The inherent weaknesses of the U.S. innovation and production system (e.g., cuts in government research and development (R&D), limited STEM (science, technology, engineering, and math) skills, corporate short-termism, an overly strong dollar, institutional resistance to change, etc.) coupled with a Chinese Communist Party (CCP) hyper-focused on victory, suggests that, absent major structural change in U.S. policy, relative decline and loss of techno-economic competitive position and power are inevitable.

The first report in this series addressing the China national economic power industry challenge laid out the context for this, including what is at risk and the need radically new approaches in a host of key policy areas.[3] Not small steps, but big ones.[4] Not tinkering, but transformation. "Bold" is the operative term here. The crisis is at such a point that incrementalism will fail.

And while reforms in a variety of areas, including federal research policy, regulation, education and skills training, and budget, are important, the most significant reform needed is in the nature and operation of the U.S. capitalist system itself because it is the decisions firms make that will determine survival or defeat. Influencing how they do that, particularly in terms of the current social contract regarding how much of earnings firms retain and reinvest versus how much flow to owners (and workers), is the single most important policy area for Congress and the administration to focus on.

While reforms in a variety of areas are important, the most significant reform needed is in the nature and operation of the U.S. capitalist system itself because it is the decisions firms make that will determine survival or defeat.

This report discusses the evolution of the U.S. capitalist investment system, why the system has serious flaws when it comes to ensuring U.S. techno-economic power, and what alternatives experts consider. It then lays out a vision for a "national techno-economic power system of capitalism" and three complementary paths to get there:

1. Tax policies to ensure that more earnings are retained to invest in activities to boost national economic power industries
2. Actions to spur private sector investment supportive of national techno-economic power
3. Public sector investment vehicles to do the same

THE EVOLUTION OF AMERICAN CAPITALIST INVESTMENT SYSTEM

Despite what many free-market advocates claim, capitalism is not the same in all places and at all times. Different countries have different varieties. And those varieties evolve over time, as it has in the United States.[5]

Indeed, U.S. capitalism was not always the way it is now. As eminent business historian Alfred Chandler noted, capitalism in America has gone through major stages, and to avoid losing to China it must go through another.[6]

Market Capitalism: 1788 to the Civil War

At the risk of oversimplification, from the time of the revolutionary war to just after the Civil War, market capitalism dominated. For the most part, enterprises were small and local in nature, and owned and managed by individuals. Banks were one of the few sectors with publicly traded companies, with shipping and railroads later joining this list. Most companies were self-financed, or "angel financed," with expansion coming from retained earnings. "Wall Street" played only a limited role in the economy.

Owner Capitalism: the Civil War to the 1930s

After the Civil War as technology enabled the rise of large corporations that required substantial amounts of capital, companies became much bigger and relied more on equity markets. Even so, these companies were mostly still managed by their founders/owners and a small management group. Think of companies such as Carnegie Steel, Standard Oil (John D. Rockefeller), McCormick Harverster, American Tobacco Company (J. B. Duke), Singer Sewing Machine, New York Central railroad (Cornelious Vanderbilt), and later Kodak (George Eastman), Firestone Tire, Ford Motor, General Electric (Thomas Edison and Owen D. Young), and IBM (Thomas Watson, Sr.). While these companies were all publicly traded, their core strategic decisions were made by their founders, who largely ignored short-term investor concerns in favor of building unbelievably innovative manufacturing enterprises that enabled America to lead the world. They unabashedly put their firms' long-term interests first, and there was a vast overlap between their interests and the U.S. national interest.

Indeed, many owners/CEOs actively rejected the idea that shareholders come first. One article notes that "these industrialists verbalized their displeasure with shareholders who confused owning a business' stock for which they were due a fair return, with business ownership which meant prioritizing and balancing investments from earnings to ensure a firm's high performance and long-term survival."[7]

When Henry Ford announced the groundbreaking decision to pay his workers five dollars a day, he stated in response to Andrew Carnegie's assumption that he asked for his shareholders' permission, "I made the announcement without consulting the other stockholders … If the other stockholders do not agree … I will pay the money promised out of my own share of the profits."[8] Henry Ford even called his investors "useless parasites." As one article explains, "Ford noted they provided no value for his company, and they sucked out much of the profit, money that could benefit the company."[9] John D. Rockefeller agreed, stating, "I think a concern so large as we are should have its own money and be independent of the 'Street.'"[10] As Chandler often noted, American industrial greatness came from entrepreneurs and managers, not shareholders.[11]

In short, these pioneers that built American industry and American power put their companies first and their shareholders second. This did not mean shareholders got nothing—they certainly made good returns. But it did mean that growing the firm on a long-term, sustainable path came first. These corporations could do this because shareholders were largely dispersed and not institutionalized, and as such, had much less power than they do now. And because the widespread societal view at the time was that America needed to industrialize, doing so was more important for advancing the national interest than short-term shareholder value.

Managerial Capitalism: 1930s to Late 1970s

As companies got even larger and bigness spread to more sectors than core industrials after the 1920s, Chandler argued that managerial capitalism, wherein ownership was separate from management, gradually replaced owner capitalism. Most founder-managed companies realized that they needed to employ professional managers to run them, especially as founders retired.

This became expressed in Adolph Berle's articulation of the "separation of ownership and control"; the recognition that the corporation, while technically owned by shareholders, was run by its managers. Berle, a Columbia professor and FDR "brains truster," wrote in his 1932 book *The Modern Corporation and Private Property*:

> The stockholder is therefore left as a matter of law with little more than the loose expectation that a group of men, under a nominal duty to run the enterprise for his benefit and that of others like him, will actually observe this obligation. In almost no particular is he in a position to demand that they do or refrain from doing any given thing. Only in extreme cases will their judgment as to what is or is not to his interest be interfered with.[12]

Such a framing is almost unimaginable in today's era. Indeed, as one article describing the corporation and investors of the time notes, "Managers now had control of the corporate purse strings, and shareholders, who had been accustomed to masters' rights, were reduced to the status of hopeful and servile clients."[13] Now, if anyone is servile it is the CEO hoping that shareholders will not call for his or her ouster or attempt a hostile, extractive takeover.

Because many corporate leaders in the 1920s could think as capitalists, defending the overall system, as opposed to individual CEOs having to please the stock market mob, they would take the long view and share more with workers and other stakeholders.

The result meant that managerial corporations became attuned to more than just expanding and making profits for reinvestment. Indeed, in the 1920s, before FDR's New Deal, many corporate leaders were worried about growing labor radicalism. As a result, they cooperated to establish a movement of "Welfare Capitalism" wherein they agreed to boost wages and provide retirement benefits, paid vacations, employee stock ownership, and other benefits—something that today's shareholders would punish. They could cooperate to do that because shareholder power to resist was minimal. Indeed, the rational step for an individual company might have been to not go along with this. They would save money and gain market share, while the overall capitalist system would be saved from revolt.[14] But because they could think as capitalists, defending the overall system, as opposed to individual CEOs having to please the stock market mob, they would take the long view and share more with workers and other stakeholders.

As business professor Marina Whitman has noted, during the heyday of the corporate economy, between 1950 and 1973, America's large corporations became private institutions endowed with a public purpose.[15] They provided stable jobs, supported the arts, encouraged employees to become involved in their communities, and assumed leadership positions in civic organizations. There was a widely shared sense that the corporation was committed to the local community, that the corporation's goals, the workers', and the community's were in sync. Because managers had almost unlimited discretion, with less pressure both from financial markets and global competition than today, they could afford to view their role this way. As Michael Useem has observed, "Managerial capitalism tolerated a host of company objectives besides shareholder value."[16]

Financial Capitalism: 1980s to the Present

At least until the mid-1970s, capitalism was able to better balance multiple goals, including profits but also capital investment and worker and community welfare. Until the late 1970s, there was a general view held by corporate managers that their mission was not just to increase stock price, but also to serve other constituencies, including the workers, the communities in which the companies were located, and the nation as a whole. And before the 1980s, most U.S. corporations made investment decisions on the basis of expectations of long-term returns.

But by the mid-1970s, that system had come under sharp attack from two sources. Intellectually, the attack perhaps started with free market economist Milton Friedman and his highly influential essay, "A Friedman doctrine—The Social Responsibility of Business Is to Increase Its Profits." Published in 1970 by *The New York Times*, he wrote, "There is one and only one social responsibility of business—to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception fraud."[17]

This soon became an appealing anthem to corporate leaders besieged by radicals, powerful unions, and liberals pressing for vastly more regulation and limits on corporations. Now they could justify ignoring and pushing back against this anticorporate movement on more than self-interested grounds. Boosting profits was indeed in the public interest.

On top of that, the shift in business schools and economics programs from training-enlightened leaders on the one hand and Keynesian economists on the other to neoclassical self-interested, market-orientated disciplines helped buttress this new intellectual consensus. Indeed, the rise of neoclassical economics in the late 1970s defined a well-functioning economy as one in which everyone pursued their self-interest in price-mediated markets, and the principal role of government was to get out of the way. And not only that, but corporate managers could no longer be trusted. As Professor William Lazonick wrote, "Rooted in the neoclassical theory of the market economy, MSV assumes that markets, not organizations, allocate resources to their most efficient uses. But lacking a theory of innovative enterprise, agency theory cannot explain how the 'most efficient uses' are created and transformed over time."[18]

Jensen and Meckling's seminal 1976 article "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure" became the bible of agency theory.[19] Where Alfred Chandler had seen corporate leaders as almost heroic figures driving long-term growth and national greatness, Jensen and Meckling portrayed managers as self-interested rent seekers, playing with other people's money for their own aggrandizement. Indeed, Jensen and Meckling approvingly quoted

Adam Smith: "Like the stewards of a rich man, they are apt to consider attention to small matters as not for their master's honour, and very easily give themselves a dispensation from having it. Negligence and profusion, therefore, must always prevail, more or less, in the management of the affairs of such a company."

This new intellectual consensus grounded in agency theory quickly became dominant in business schools across the nation. But it was not based on actual study of firms and managers confronting uncertainty and regulation, but rather on "the theory of agency, the theory of property rights, and the theory of finance" sprinkled with a dose of Pareto optimality. Now managers were villains, shareholders heroes. Astoundingly Jensen and Meckling wrote, "We seldom fall into the trap of characterizing the wheat or stock market as an individual but we often make this error by thinking about organizations they were persons with motivations and intentions."[20] In the words of U.C. Berkely Professor David Teece, the corporation came to be seen as an empty shell, simply a system of organizing people into a mechanism to turn capital into profits, especially net-present-value profits.[21]

And of course, people took the article seriously because it had complicated equations and graphs with all sorts of variables, describing in one case, "the market value of the stream of manager's expenditures on non-pecuniary benefits." Indeed, by the 1970s only highly quantitative work grounded in formal modeling was seen as "science." Older "institutional work" grounded in softer, more qualitative—and more accurate—assessments, analysis, and conclusions was rejected as mere opinion.

Maverick investors on Wall Street changed what had been a stable system, largely constrained by ethics and good-old-boy norms of supporting long-term capital formation and strong corporations, into a dog-eat-dog win-at-all-costs model.

Jensen and Meckling's key recommendation was to load up firms with debt so managers' discretion was limited, while giving managers stock options. For them, the only purpose of the corporation was to provide a structure by which capital holders could maximize their returns.

As Teece wrote, their intellectual advocacy led to the view that, "The modern corporation is merely a nexus of contracts. The corporation's only responsibility is shareholder wealth maximization. [and] Efficiency is paramount."[22] The "empty shell" theory of the firm. This is how the view of "potato chips, computer chips: what' the difference?" could be taken seriously.[23] Firms and industries do not differ except in their rate of profitability. Indeed, the logical extension of this view is "poker chips, computer chips, what's the difference?" In other words, the corporation is no longer an entity with which society organizes production to meet its citizens' needs; it is an entity through which owners of capital can earn returns.

The view that companies had any goal other than shareholder value was not only not rejected as strange, but was also actively embraced as genius—and anyone who didn't embrace it was either anticapitalist or a deluded moss back. This is also why so many free-market conservatives embrace unfettered globalization. Because in that world, there is no spatial divergence. Investing in China is no different than investing in Chicago; it was all about value extraction by owners of capital.

Adding fuel to the neoliberal fire, economic stagnation and increased foreign competition in the 1970s made the previous, broader view of corporate social responsibility seem impractical to many, leading to a focus on efficiency and short-term performance. Cost cutting, even if it did not raise productivity, was now a duty. Pleasing shareholders, an imperative.

At the same time, the Celler-Kefauver Act of 1950, which authorized antitrust prosecution for mergers of firms in related businesses, inadvertently triggered a wave of conglomerate mergers among companies in unrelated lines of work. Because antitrust law now made it much harder for companies to gain scale with horizontal or vertical mergers, managers seeking to grow their companies through acquisitions increasingly sought conglomerate mergers, which were allowed. So, much of the bad management that Jensen and Meckling described was actually spurred on by bad federal policy.

Perhaps most importantly, maverick investors on Wall Street changed what had been a stable system, largely constrained by ethics and good-old-boy norms of supporting long-term capital formation and strong corporations, into a dog-eat-dog win-at-all-costs model. Once a few mavericks broke out of the system, the dam gave way and now everyone had to push for short-term profits if they were to survive. Traders such as Ivan Boesky, Michael Milken, Victor Posner, Nelson Peltz, Carl Ichan, Harold Simmons, T. Boone Pickens, and Kirk Kerkorian all pushed the boundaries—often beyond what was legal—but in doing so, they broke the bonds that had constrained Wall Street.[24] Now if companies did not keep up their stock price by disgorging cash to shareholders or buying their own shares, corporate raiders would launch attacks. These investors cared less about the health of the capitalist system than they did about their own individual returns. This meant that CEOs that did not "get with the new program" were either thrown out by their board or fired when their firm got bought out by shareholder activists. And as anyone could have predicted because maintenance of the capitalist system was no longer the goal—benefiting a few individual investors was—anticapitalist sentiments mushroomed.

A few years later, the massive growth of institutional investors shifted power to them rather than mangers.[25] Indeed, large institutional investors nearly doubled their share of the common-stock market from 1980 to 1996.[26] And the average U.S. firm went from having 20 institutional shareholders owning 13 percent of shares in the early 1980s to 152 institutional shareholders owning 55 percent of shares outstanding by the early 2010s.[27] As Allen D. Boyer wrote in 1993:

> The size of institutional investment means that institutional investors have the power to dethrone corporate directors, upsetting the traditional regime of corporate governance. The investors' mandate to pursue high returns supplies them a motive to take such action. In these changed circumstances, shareholders' freedom to pursue their own interests is a divisive force. It opens the door for institutional investors to liquidate corporate wealth.[28]

How investment funds were structured and their managers were rewarded meant that funds moved money around in search of the quickest returns, regardless of where long-term value might be found. How managers were compensated—increasingly with stock options that were not always related to actual managerial performance—reflected this new view that a manager's job was to maximize value for the shareholders. And because managers themselves became key short-term stockholders (through the significant growth of stock options), they made even more

effort to enhance the welfare of short-term stockholders, including by boosting dividends and through stock buybacks.

Before this, the balance of power was more equal, especially as many shareholders were individuals. But with the rise of 401(k)'s and large institutional investors, the balance of power changed. Andrew Smithers has noted that "the growth of fund managers and the entire 401(k) system has really pushed short-term thinking within markets, and hindered growth producing innovation."[29] In theory, these institutions could have been a force for longer-term investing, but as each one sought market advantage, they all pushed for short-term results and their heft often overwhelmed individual companies.

The rise of the shareholder value movement and its later evolution into corporate short-termism, or what some call quarterly capitalism, meant that CEOs were rewarded for downsizing firms, limiting investment in capital stock (in order to maximize return on net assets), and paying attention solely to the bottom line. All this enabled the rise of the shareholder value movement—financial capitalism—which tolerates no other corporate purpose than producing short-term profits.[30]

But this was also enabled by a host of regulatory changes. Any regulations standing in the way of firms not efficiently maximizing share price were dismantled one by one. William Lazonick wrote:

> Fundamental to this reversal was the capture of the U.S. Securities and Exchange Commission (SEC) by free-market Chicago economists in 1981, following the election of Ronald Reagan as president of the United States. Reagan's appointment of E. F. Hutton executive John Shad as SEC chair put the agency that was supposed to eliminate fraud and manipulation from the nation's financial markets under the leadership of Wall Street banker for the first time since Joseph Kennedy was the inaugural holder [but Kennedy saw his role as policing fraud] of that position in 1934–1935. In the second year of Shad's chairmanship, the SEC promulgated Rule 10b-18, which gives a company a safe harbor against manipulation charges in doing open-market repurchases.51 Rule 10b-18 states that a company will not be charged with stock-price manipulation if, among other things, its buybacks on any single day are no more than 25 percent of the previous four weeks' average daily trading volume (ADTV). Under Rule 10b-18, moreover, there is no presumption of manipulation if the corporation's repurchases exceed the 25 percent ADTV limit.[31]

All this enabled the rise of the shareholder value movement—financial capitalism—which tolerates no other corporate purpose than producing short-term profits.

In 1993, the Clinton administration pushed for changes to executive compensation, concerned that CEO pay was excessive and poorly tied to performance. The result was Section 162(m) of the tax code, which limited corporate tax deductions for executive compensation above $1 million per year. But the law included an exception: "performance-based" compensation remained fully deductible with no cap. The intent was to encourage pay tied to company performance rather than guaranteed salaries. Stock options qualified as performance-based

compensation because they only have value if the stock price rises. The perverse result was that companies shifted massively from cash salaries to stock options to maintain tax deductibility.

Not surprisingly, with the rise of the shareholder value movement came a shift in the political role and orientation of the corporate community. Prior to the mid-1980s, many CEOs, such as GM's Charlie Wilson, GE's Reginald Jones, Hewlett-Packard's John Young, and DuPont's Irving Shapiro, saw their role not just as CEO but as corporate statesman. But around that time, the role of "business statesman" began to fade. Executives came under increasing pressure to focus ruthlessly on boosting profits and share prices. Those who didn't risked losing their jobs or seeing their companies swallowed up in hostile takeovers. This is not to say that some of today's CEOs don't try to play some broader role, but overall, U.S. corporate leaders have abdicated their roles as statesmen for that of CEOs alone. In his book, *The Fracturing of the Corporate Elite*, Mark Mizruchi observed:

> [After] World War II, American business leaders hewed to an ethic of civic responsibility and enlightened self-interest.... In the 1970s, however, faced with inflation, foreign competition, and growing public criticism, corporate leaders became increasingly confrontational with labor and government. As they succeeded in taming their opponents, business leaders paradoxically undermined their ability to act collectively.[32]

Indeed, a 2013 survey by the corporate organization Committee for Economic Development supported this observation, finding that the three biggest barriers to business leaders who took a more active role in public issues were "concern about criticism others have experienced; shareholder pressure for short-term results; and belief that a CEO should focus on his/her company."[33] For the CEOs, it became a collective action problem. Why step up and fight for corporations and the U.S. economy generally when it only meant taking valuable time away from your company that is constantly under threat by "activist" investors?

Policy neutrality means losing the techno-economic war.

As such, in financial capitalism, the main, if not only, factor determining investment (either to a firm or in a firm) is market-based return on capital. Any tax or other policy provisions that distort that are generally seen as bad because they violate that principle of policy neutrality. But policy neutrality means losing the techno-economic war.

Alan Boyer summed up the issue we face today:

> For too long we have approached problems of corporate governance by asking how shareholders can better protect their interests. We may get better answers, answers which deal more effectively with more aspects of the business corporation's role, if we ask a different question—how investment can best be used to finance technology. The rules which govern institutional capital should reflect this understanding of the firm's societal role.[34]

To be fair, this system produced benefits. It forced companies to focus on components of their business where they had competitive advantage. It forced them to reduce waste and not seek bigness for the sake of empire building. It forced them to seek out lower-cost options. It enabled

capital to flow to new, high-margin opportunities. And all that boosted market returns. But it came at a price, as we discuss next.

DIVERGENCES BETWEEN THE SHORT-TERM PROFITS AND NATIONAL TECHNO-ECONOMIC POWER

Many will argue that financial capitalism maximizes profits, and that itself is in the national interest. But sometimes it does and other times it does not. The answer depends. Doctrinaire views that unfettered capitalism is best or that capitalism is fatally flawed are distractions from real analysis. But overall, the current financialized version of capitalism, while possessing strengths, is not likely to enable continued U.S. strength vis-à-vis China.[35] The current model, where, at best, government intervention is episodic and on the margins, will not succeed in addressing the China challenge.

Why not just rely on the first bottom line—profits—to achieve national techno-economic power? The reason is that profit maximization can diverge from the goal of techno-economic power in at least six ways:

1. The overall balance between reinvesting in the firm and passing earnings to shareholders
2. Temporal considerations
3. High investment hurdles
4. Spatial location of investment
5. Sector and technology invested in
6. Organizational

The current financialized version of capitalism, while possessing strengths, is not likely to enable continued U.S. strength vis-à-vis China.

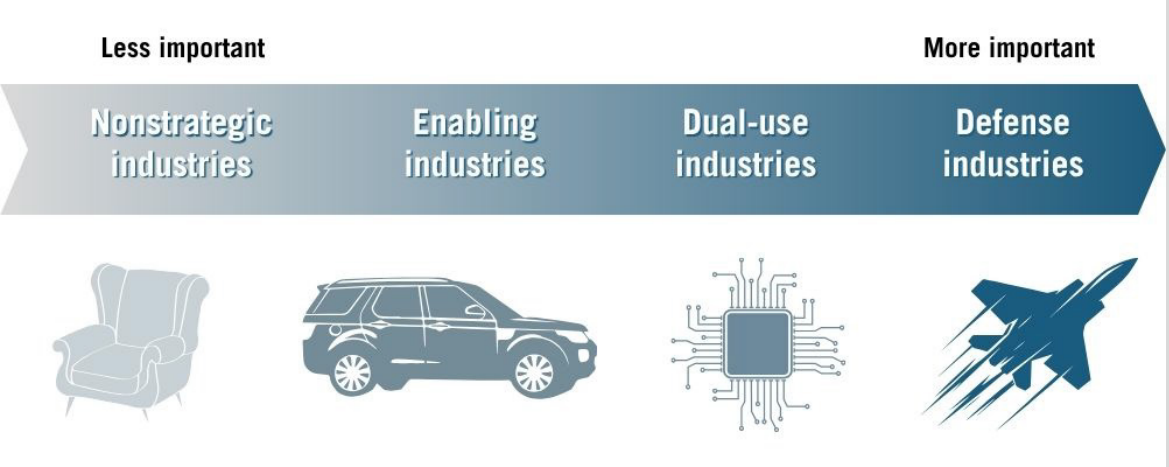
It is the national power interest for firms to prioritize more capital investment, with a focus on long-term firm capabilities, in the United States; on national power industries; and on production, but just design and sales. Relying on free markets alone to reduce these divergences is wishful thinking.

Box 1: Defining National Economic Power Industries

The conventional view is that the only industries that matter to national power are defense industries. But that is now vastly too limiting. As Corelli Barnett, wrote, "For munitions production for modern war is not primarily a question of specialized armament industries, as some suppose, but of all those varied industrial and scientific resources that in peacetime make for a successful and expanding export trade."[36]

With that in mind, ITIF has developed a classification of U.S. industries for their relevance to national power. This can be viewed as a continuum between defense industries on one side, nonstrategic industries on the other, and strategic industries and strategic enabling industries in the middle. See figure 1.

Figure 1: Industrial power scale



At one end of the continuum are defense industries. Clearly industries such as ammunition, guided missiles, military aircraft and ships, tanks, drones, defense satellites, and others are strategic. Not having world class innovation and production capabilities in these industries means a weakened military capability. Policymakers across the aisle generally agree that these industries are strategic and that market forces alone will not produce the needed results.

At the other end of the spectrum are industries in which the United States has no real strategic interests. These include furniture, coffee and tea manufacturing, bicycles, carpet and rug mills, window and door production, plastic bottle manufacturing, wind turbine production, lawn and garden equipment, sporting goods, jewelry, caskets, toys, toiletries, running shoes, etc. If worst came to worst and adversaries such as China gained dominance in any of these industries and decided to cut America off, we'd survive.

Next to defense industries dual-use industries are critical to American strength. Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give our adversaries incredible leverage over America. Just the threat to cut these off (assuming that they have also deindustrialized our allies in these sectors) would immediately bring U.S. policymakers to the bargaining table.

Finally, there are enabling industries. If the United States were cut off from these industries, the immediate effects on military readiness would be small. And the U.S. economy could survive for at least a while without production. America could survive for many years without an auto sector, as we would all just drive cars longer. But because of the nature of these industries—including technology development, process innovation, skills, and supporting institutions—their loss would harm both dual-use and defense industries. That is because enabling industries contribute to the industrial commons that support dual-use defense industries.

Too Much Cash to Owners

Capitalism is not a universal constant. It is a form of economic organization societies choose. It is obviously better than all the alternatives, including socialism, communism, feudalism, small business capitalism, and anarchism. But a core issue for capitalism is how much of the benefits flow to shareholders versus the firm itself. There was a reason why Henry Ford called shareholders parasites: he believed that they wanted too much of the profits from selling cars,

while Ford believed that more of the profits should be reinvested into building an even stronger and more dynamic company. This tension is never resolved; it is always present, and must be managed.

If it resolved too much in either direction, problems emerge. A capitalist system that allows firms to retain too much earnings can lead to waste and reduced capital availability for new investment. But a capitalist system that over-privileges shareholders reduces investment in firm capabilities, resulting in weakened long-term viability and losses to national techno-economic power.

We see this with individual companies. Companies that were once darlings of Wall Street because they retained less earnings for the companies' future and gave much more to investors, including HP, GE, IBM, and of course, Intel. William Lazonick wrote that former Intel CEO Pat Gelsinger:

> recounted how, before taking the CEO job, he had written a strategy paper for Intel's board, for which he got their unanimous agreement. "I was concerned," Gelsinger said in the interview, "about how we get the process roadmap back in shape." He continued: We underinvested in capital. I went to the board and said: "We're done with buybacks. We are investing in factories." And that is going to be the use of our cash as we go forward. And they aggressively supported that perspective; that we needed to just start investing, and those investments would start creating a cycle of momentum that would get our factory teams executing better.[37]

A capitalist system that over-privileges shareholders reduces investment in firm capabilities, resulting in weakened long-term viability and losses to national techno-economic power.

Indeed, one can make a strong argument that the current financial capitalism version has tilted the balance too far in the direction of shareholder interests. Not that profits are too high, but investment is too low. According to one study:

> Total spending by all publicly traded companies on stock buybacks between 2010–2019 totaled $6.3 trillion, according to their 10-K and 10-Q public filings. Shareholder payments––stock buybacks plus dividends––have on average totaled 100 percent of nonfinancial corporations' corporate profits over the last decade.[38]

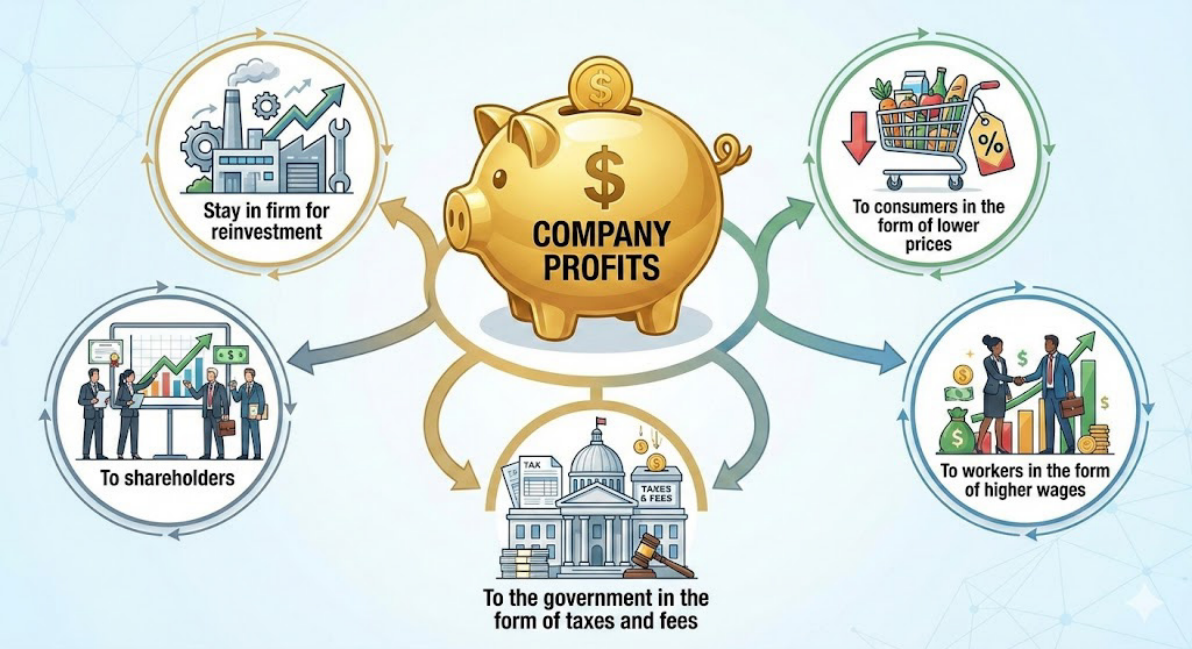
In 2014, in an open letter to Fortune 500 CEOs, Blackrock CEO Larry Fink reiterated this concern: "Too many companies have cut capital expenditures and even increased debt to boost dividends and increase share buybacks."[39]

Clearly, investing an additional trillion dollars on new business development, R&D, and capital equipment during this period would help American national economic power industry advancement.

Box 2: Where Should Profits Go?

If you accept capitalism, which an increasing number of progressives do not, then the $64,000 question is, where should profits go? As figure 2 shows, there are only five possibilities.

Figure 2: Five places where profits can go



1. Investors: As noted, in financial capitalism, shareholders, including executives with owning shares, deserve the lion's share of profits. To achieve that, firms should go "asset light," maximizing return on net assets by reducing the number of executives with owning shares.

2. Workers: Most opponents of financial capitalism, including progressives and national conservatives, want workers to get more. In their thinking, shareholders are too rich and workers too poor, so boosting wages and reducing profits is in order. This would reduce inequality. But it would have no different results on national techno-economic power than maximizing shareholder value. The money still would not be retained to fight for global market share, either by reducing prices or boosting investment. Even more problematic is if a company is highly productive, why should most of those gains go to workers rather than to consumers in the form of lower prices? This would mean that workers in a low-productivity company would make less than in a high-productivity one. If this were the case, blue collar workers in tobacco factories should be highly compensated. When unions force companies such as Boeing and Ford to boost wages far above normal market realities, that does not help competitiveness any more than these company-stock buybacks do.

3. Government: Many liberals want shareholders to get less, with the idea that government will get more. They want to do this by raising corporate taxes. There are several problems with this. First, doing so would make U.S. companies less competitive globally against foreign companies, especially People's Republic of China (PRC) companies. Second, at the end of the day, the main effect is to raise prices, as companies will largely pass on these tax increases to consumers. And of course, that certainly does not boost retained earnings and investment. If anything, it reduces them.

4. Consumers: Many liberals and progressives want to reduce corporate profits by boosting competition and presumably getting lower prices, a form of "pre-distribution" that helps middle-class and below Americans.[40] While lower prices can and often should be a strategy to not lose market share in global national economic power industries, low prices for the sake of low prices are just another vehicle to move money outside a corporation.

5. The Company: At the end of the day, it is companies (and other kinds of organizations) that determine living standards, innovation, and national techno-economic power. To the extent they can retain more earnings to reinvest in capital equipment, R&D, and lower-margin products to gain market share, that is in the national interest.

Short-Termism

It's not just the imbalance between retained earnings and shareholder payments; it's also the time horizon for company investment. Too many companies prioritize immediate earnings over longer-term benefits. This pressure to achieve short-term profits all too often has meant sacrificing long-term investment. The British CFA Centre for Financial Market Integrity and the Business Roundtable reported that "the obsession with short-term results by investors, asset management firms, and corporate managers collectively leads to the unintended consequences of destroying long-term value, decreasing market efficiency, reducing investment returns, and impeding efforts to strengthen corporate governance."[41]

In a survey of more than 400 financial executives, 80 percent of the respondents indicated that they would decrease discretionary spending on such areas as R&D, advertising, maintenance, and hiring in order to meet short-term earnings targets—and more than 50 percent said they would delay new projects even if it meant sacrifices in value creation.[42] McKinsey chairman Dominic Barton stated that foreign firms "are just working with timeframes of a totally different order. They simply do not have the same short-term pressures that American businesses do."[43]

Too many companies prioritize immediate earnings over longer-term benefits. This pressure to achieve short-term profits all too often has meant sacrificing long-term investment.

This is not a new concern. A 1991 study by the U.S. International Trade Commission commissioned by Congress in response to its prescient concern that the divesture of AT&T would reduce U.S. competitiveness states:

> The causes of this problem include the quarterly demands of stockholders, an overabundance of managers trained in finance rather than engineering, and differences in company structure. In general, members of the industry said that firms with long planning horizons and little pressure from stockholders for immediate profits would be more competitive in the long run because these firms would be able to invest more in research and development and would enjoy more flexibility in marketing strategies.[44]

It was prescient in that, a decade later, Lucent, the equipment spinoff from AT&T, was defunct, largely because of short-termism.[45]

To be sure, family capitalism and founder capitalism do better at this challenge.[46] Family-owned firms, as many small and medium-sized "Mittelstand" enterprises are in Germany, tend to take a

longer time horizon because they know that the next generation of families will need to be able to manage strong businesses. Likewise, many founder-run firms (e.g., Microsoft in the era of Bill Gates, Apple with Steve Jobs, Amazon with Jeff Bezos, Qualcomm with Irwin and Paul Jacobs) tended to take a longer-term view because it was "their" firm, just as Henry Ford and others of his era did.

It is in the national power interest if firms prioritize more capital investment now in the United States and on national power industries and technologies. Relying on free markets to optimize these three goals is wishful thinking.

High Investment Hurdles

Most firms and investors have excessively high investment hurdles and return expectations relative to what is in the national interest. If particular investments have a payback after a certain number of years, even if the net-present-value returns are positive, many firms will not invest in them. Similarly, companies have return expectations for parts of their businesses and, for many, if a company is not meeting that return on invested capital, even if it is still profitable, they may try to shed that business, either by selling it or shrinking it.

For the last three decades, the advice to corporate leaders, as well as pressure from investors, was to shed low-margin businesses and functions and specialize in core competencies. For example, in 1998, PWC advised CEOs to break up their companies: "Our research indicates that $1 trillion of extra value could be released in the United States and Britain alone by companies that embrace the breakup regime."[47] And when they did, the broken-off units were sold either to foreign buyers who were willing to accept lower returns or to short-term financial "vultures" who stripped the assets for a quick return, ignoring the long-term viability of the company.[48]

In 1983, former GE CEO and corporate guru Jack Welch famously declared, "Be number one or number two in every market, and fix, sell, or close to get there." That quickly become a market mantra. At the time, virtually no one pointed out that the emperor had no clothes and that this was a devastating strategy not only for GE but also for the nation as a whole. But as Thomas Gryta and Ted Mann wrote in *Lights Out: Pride, Delusion, and the Fall of General Electric*, this was not good for GE.[49] The company sold its appliance business to Chinese-company Haier, which itself received a $3.3 billion loan from the Chinese government-owned China Development Bank, and it now markets its products under the GE brand. Arguably the greatest U.S. company of the 20th century and founded by Thomas Edison, GE became a shell of itself.

Harvard Business School's Clayton Christensen has raised a related concern: the aggressive pursuit of short-term profitability—which is taught in American business schools mostly as profitability understood in percentage rates of return (because evaluating rates of return in percentages allows easy comparisons with other investment alternatives)—is actually harming American innovation. He's noted that many American firms focus on Return on Net Assets (RONA) as a key measure of performance. But doing so often leads them to focus on reducing the denominator (assets), as many U.S. companies have done in outsourcing much of their manufacturing plants to Asia. Another example, as Steve Denning has noted, is firms':

> pernicious methodology for calculating the internal rate of return (IRR) on an investment. It causes you to focus on smaller and smaller wins. Because if you

> ever use your money for something that doesn't pay off for years, the IRR is so crummy that people who focus on IRR focus their capital on shorter and shorter-term wins.[27]

Christensen has excoriated mainstream thinking about profitability in U.S. business schools and on Wall Street: "We measure profitability by these ratios. Why do we do it? The finance people have preached this almost like a gospel to the rest of us that if you describe profitability by a ratio you can compare profitability in different industries. This 'neutralizes' the measures so that you can apply them across sectors to every firm."[28] Christensen has noted that Asian enterprises explicitly reject this type of thinking and are much more focused on accumulating assets that can build future wealth, and that the outsourcing that has occurred in many U.S. manufacturing industries—from autos and steel to semiconductors and pharmaceuticals—has been driven in part by this overzealous and misguided focus on profitability measures such as RONA.

If there is one U.S. sector that is not succumbing anywhere near as much to high hurdle rates and short-termism as most firms are, it is "Big Tech."

Indeed, most U.S. companies have investment hurdle rates (the internal rates of return they require before making an investment) that are substantially higher than their costs of capital. A Morgan Stanley report notes that:

> about 80 percent of companies adopt a hurdle rate that is substantially higher than the cost of capital. In the period of easy money, for instance, the researchers estimate that the average hurdle rate was 16.8 percent, more than double the average perceived cost of capital of 8.3 percent. And when taking into account that not all projects meet expected returns, Morgan Stanley finds that in the U.S. do earn an ROIC in excess of the actual cost of capital. The average spread between the ROIC and WACC was 2.6 percentage points in the easy money era and 1.7 percentage points in the prior period. [50]

In contrast, it appears that more foreign firms are able to accept lower returns, in part because of government subsidies and more of them are more debt financed—and in the case of China, pressure and aid from the government. Favored Chinese firms can borrow at roughly half the cost of U.S. firms. Lower returns mean both more efforts to go after market share through price reductions and more investment in capital equipment since the hurdle rates can be lower.

However, to be clear, if there is one U.S. sector that is not succumbing anywhere near as much to high hurdle rates and short-termism as most firms are, it is "Big Tech." As ITIF has written, these companies invest massive amounts in R&D, and take big bets, many of which have not come to market fruition.[51]

Too Little Investment in National Power Industries

It is in the national interest for firms and investors to prioritize investing in national power industries. Investors might be able to maximize returns (at least in the moderate term) by investing more business services and accommodations than in aerospace and electronics. But the latter is more important than the former. And the current financial capitalism system makes

no real differentiation between the two: a dollar of profit is the same regardless of what sector it comes from.

And many firms and investors choose sectors with little national power while disinvesting in ones critical to power. Former CEO of GE Jack Welch, who helped destroy what was once the greatest company in America, wrote:

> My gut told me that compared to the industrial operations I did know, this business seemed an easy way to make money. You didn't have to invest heavily in R&D, build factories, and bend metal day after day. You didn't have to build scale to be competitive. The business was all about intellectual capital—finding smart and creative people and then using GE's strong balance sheet. This thing looked like a "gold mine" to me.[52]

And it was a gold mine, until it wasn't.

But unlike many digital ventures, deep tech demands high capital investment and extended timelines before returns, which is why there is a capital shortage there.

We see this dynamic play out in the current discussion of "deep tech": areas of technology more focused on the physical world rather than the digital world.[53] An MIT report notes that "deep tech ventures have emerged as a special type of startup venture dedicated to taking ideas from the lab bench to scaled global impact while recognizing the added time, capital, and risk required for the venture journey compared to their digital counterparts."[54]

But unlike many digital ventures, deep tech demands high capital investment and extended timelines before returns, which is why there is a capital shortage there.

Too Much Offshoring

Even if firms kept more retained earnings, had a long-term horizon, and invested in national power industries, it might all be for naught if they invested in other countries, especially China. To be sure, it can make sense for firms in the United States to invest outside the United States, including better competing with foreign firms, gaining local knowledge, and reducing costs. And this can boost innovation and productivity, and some of the foreign earnings flow back to the United States, not only in the form of profits but also to support U.S. corporate activity (e.g., design, marketing, executive functions).[55]

However, too much offshoring, especially when it can be avoided with slightly lower returns, is often harmful to the national interest. Foreign recipients for U.S. companies as a share of gross domestic product (GDP) has grown significantly since the mid-1970s (although it declined slightly after 2010).[56] The issue is not binary—offshore as much as possible or offshore almost nothing. Rather, more firms should seek to make domestic production profitable, including accepting lower rates of return. A number of years ago, when a group of Austrian manufacturing CEOs were asked why they didn't offshore more production to China, they responded that they did move some work there to cut costs, but they also worked to reengineer processes to better boost productivity and keep production in their home country. That is the kind of balance we need more of in the United States.

Too Little Investment by Firms in Production

Finally, even if firms invest in the United States, in national power industries, and with a long-time horizon, there can still be a disjuncture between shareholder interests and the national interest, which can play out in two ways. The first is the extent of investment in production. The second is the extent of investment at various levels of type of product based on degree of commodification.

For the first, U.S. firms tend to invest in either ends of the "smile curve." This is a hypothesis that suggests that it is the upstream and downstream parts of a product's value chain that are the most profitable. For upstream, these are activities such as R&D, product design, and conceptualization. For downstream, they include branding, marketing, sales, and after-sales services. The midstream activities such as the manufacturing and assembly phases typically generate lower returns, so American firms invest less in them. As many industry scholars have noted, that tends to reduce innovation, as production is separated from R&D and design.[57] Moreover, this midstream activity is key to national techno-economic power. For example, if the U.S. designs chips but they are mostly made in China, that gives the Chinese key leverage over us.

In contrast to Asia's bottom-up model, U.S. technology firms have focused on the upper ends of the value chain: system design, software, customer experience, etc. They have all too easily given up the lower and middle ends of the value chain, capitulating at the first sign of blood.

The second is where, in the overall product portfolio, companies invest. As IT expert David Mochella has noted, Japan, Singapore, South Korea, Taiwan, and China all adopted bottom-up industry strategies initially focused on low-end commodity products. This approach was particularly well suited to electronics-related markets, where there was a growing need for inexpensive keyboards, mice, printers, cables, modems, monitors, speakers, and similar commodities. The Asian Tigers then leveraged this diverse base of business to steadily move up the value chain into semiconductors, network equipment, storage devices, flat-panel displays, fully assembled smartphones, tablets, personal computers, and other forms of advanced, high-volume, higher-margin production.

Asia, especially China and Taiwan, now dominates most of these markets, with deep expertise in the complex minutia of advanced, large-scale manufacturing. This unmatched foundation of production capability is now transforming other strategic industries, as electronic components become the building blocks of electric vehicles, solar energy, robotics, drones, telecom, defense, and other sectors. This is the essence of China's hi-tech leadership challenge.

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Although this top-down approach has been extraordinarily successful in leveraging Asian manufacturing and dominating the most profitable market segments, it is inherently vulnerable to supply chain dependencies, ecosystem bottlenecks, manufacturing skill shortages, and intentionally imposed embargoes—weaknesses now obvious to all.

Unfortunately for the West, history shows that it's much easier for companies and nations to move up the value chain than down it. Asia's bottom-up approach was initially a humble one, with small profit margins and little market influence. But as businesses have moved up the value chain, they've gained confidence, ambition, skills, scale, and profitability. Moving down the value chain tends to generate the opposite dynamics. It's mostly done out of a sense of necessity, with lower levels of enthusiasm, confidence, know-how, and profitability. Students of disruptive innovation will recognize that the ease in which bottom-up strategies move upward versus the difficulty in moving downward is a classic Innovator's Dilemma, as famously articulated by Clayton Christensen back in 1997.[58]

Box 3: Chinese Competition and American Deindustrialization: A Financial Framework[59]

Different financial systems help determine the outcomes of the techno-economic war. China's system is designed to aggressively destroy Western company value. The U.S. system is designed to maximize short-term wealth creation and is agnostic toward national industrial power competition.

The U.S. Economic Model

Publicly traded corporations in capital-intensive sectors (e.g., industrials) optimize three key variables.

The first is economic value added (EVA). EVA equals return on invested capital (ROIC) minus the weighted Average Cost of Capital (WACC) times the amount of invested capital (IC). The weighted average cost of capital for U.S. firms is around 8–10 percent. ROIC equals net operating profit after tax Net Operating Profit After Tax (NOPAT) divided by invested capital.

Profit margins are calculated in various ways. Gross margin is sales minus the cost of goods and production labor. From an industrial standpoint, the most relevant profit margin is the gross margin. The others are influenced by a firm's overhead expenses and its tax, investment, and capital strategies.

The U.S. model is more financialized and focuses on higher, short-term returns than other capitalist economies do. But China is in a completely different model.

The Chinese Economic Model

Chinese firms systematically generate ROIC well below American WACC thresholds. The Chinese semiconductor firm SMIC, for example, posts approximately 4.5 percent ROIC versus around 12 to 16 percent global semiconductor industry WACC, creating negative EVA by American standards. Chinese EVA = (4.5% – 12%) × IC = -7.5% × IC.

In other words, Chinese firms can survive on ROIC that is less than the cost of capital in the United States. This economic value destruction manifests as the "China price"—aggressive pricing that destroys gross margins industry-wide. Chinese firms partially compensate through higher capital turns (sales/IC), enabled by rapid market expansion and debt-financed growth.

Chinese firms can do this because of overall financial repression in China. The PRC prevents savers from getting normal returns, and its capital controls on foreign investment preclude outside options. Both lower the cost of capital.[60] At the same time, Chinese companies are pressured by the PRC to accept low returns and provided with low-cost capital from state-owned banks in order to gain market share.[61]

American Industrial Response

Faced with Chinese "scorched earth" competition, U.S. firms can generally only pursue two strategies that make up essentially the mirror image of Chinese value destruction.

Strategy 1: Asset-Light Retrenchment
Given this unbeatable competition, one strategy is for U.S. firms to reduce their IC base through outsourcing of production assets to someone else's balance sheet, at the same time focusing on capital-light activities with higher margins, such as design, sales and market, and software. And they tend to limit expensive investments in capital equipment.

Strategy 2: Cost Reduction for Margin Protection
A second strategy is to offshore supply chains and production of lower-cost inputs in order to preserve gross margins, while at the same time being forced to press for lower prices from domestic suppliers and workers.

Capital Allocation Logic: Both of these strategies are additionally supported by a capital strategy that increases earnings per share. In particular, the companies use freed-up cash for share buybacks. Since earnings per share (EPS) equals net income divided by the number of outstanding shares, EPS can go up with stock buybacks.

With Chinese competitors destroying economic value while gaining market share, new productive investments cannot be justified. The rational response for these companies is returning cash to investors through share buybacks, inflating EPS even as the industrial base shrinks.

Deindustrialization Outcome

Both strategies hollow out domestic industrial capacity. Strategy 1 directly reduces the manufacturing base, while Strategy 2 degrades supplier ecosystems and workforce capabilities. The result is a self-reinforcing cycle wherein American firms lose the ability to scale innovation and compete in advanced manufacturing, validating Andy Grove's 2010 warning about the strategic risks of abandoning production competencies.

While some populists both on the Right and the Left decry U.S. industrial corporations for taking these steps, accusing them of being profit hungry, this is too narrow a focus. The standard rate of capital returns in normal market economies is above 8 to 12 percent, given the cost of capital. No company can survive earning less than the cost of its capital. As such, if these companies tried to do that in order to meet the China price, rational shareholders, including labor union pension funds, would invest in other sectors and companies that do not face this constraint, such as insurance and banking, logistics, and entertainment.

Rather than engage in emotionally satisfying and politically rewarding hectoring of selfish U.S. capitalists, a better strategy is to limit Chinese scorched earth competition while providing targeted incentives for national power industries to stay in the fight and keep investing.

ALTERNATIVES TO FINANCIAL CAPITALISM

The key question thus becomes, what version or variety of capitalism will maximize national techno-economic power? As long as elite opinion (and vested interests of many equity investors) favors a pure capitalist model—firms as processing units to transfer input capital into output earnings—change will be minimal. So what are the alternatives on the table?

Chinese Party Capitalism

China's one-party-directed capitalism has its attractions. Chinese state-owned enterprises and even many private companies are pressured/incentivized to reinvest heavily rather than distribute profits. Companies invest large amounts in automation, including robotics, and R&D. Companies are willing to accept lower returns on capital for strategic positioning globally. And the CCP channels capital and other resources into national economic power sectors, while other sectors, such as services and farming, remain far from the global modernization frontier.

But this cannot be the model for America, as it depends on an absence of rule of law and democratic processes. Not only is giving up these keys to freedom a stiff price to pay for national power, but it is also not necessary.

As long as elite opinion (and vested interests of many equity investors) favors a pure capitalist model—firms as processing units to transfer input capital into output earnings—change will be minimal.

Coordination Capitalism

A model that many favor can be called "coordination capitalism," as practiced by nations such as Germany and Japan.[62] This system involves more nonmarket coordination wherein firms coordinate through networks, industry associations, and collaborative relationships and don't just respond to price signals. There is a focus on stable, long-term connections between businesses, workers, and banks, with greater importance placed on commitments to employees (training, job security) and suppliers. And state-directed or influenced banks play a larger role in corporate financing, with more patient debt than impatient equity.

Such a system has numerous advantages, especially in enabling firms to compete more on the "high road" (more skills and capital equipment), but its main disadvantage is that it is less supportive of disruption innovation. The influence on companies of unions and the state can limit needed corporate restructuring—and compared with the U.S. system, less capital flows to high-growth start-ups. Moreover, transitioning to such a system in the United States would be difficult because of a lack of institutional culture and knowledge of its operations.

Worker Capitalism

For decades, critiques of the financial capital system—what many refer to as "neo-liberalism"—has been the province of the Left. Countless books, articles, speeches, conferences, and the like have railed against financial capitalism on the grounds of oligarchic inequality.

But even Republicans have responded to the excesses of financial capitalism, embracing, for the most part, not national power capitalism but worker and family capitalism wherein the goal is to disgorge profits not to shareholders but to workers so they can support strong families.[63] Emblematic is the work of American Compass as well as Sohrab Ahmari, whose book *Tyranny* claims that decades of neoliberalism have resulted in a "private tyranny" in which large corporations effectively dominate political and economic life.[64]

They both reject financial capitalism because they believe that the capitalists get too much money and power and workers and their families too little. Their concept is not that the current version fails core state interests of global power—an issue few even focus on—rather, it is that it

leads to inequality, disruption, climate change, and other socio-economic problems.[65] And a growing share of these critics have moved from reform to replacement—in other words, to anticapitalism and versions of socialism.

Indeed, when progressives use such terms as "rethinking capitalism" and other alternatives to neoliberalism, they actually mean a system that tilts in the direction of socialism.[66] Most advocates know that using the "s" word (socialism) would cause discomfort, so they use terms such as "people's democracy" to signal their socialist intentions and they aim "to set guardrails and rules for the market, to provide goods and services directly; [and] to set economic goals and catalyze change."[67]

But this framing of worker capitalism is wrong for two reasons. First, the solutions to the challenges critics articulate don't lie in radical restructuring or even overthrowing capitalism. China has higher income inequality than the United States does and vastly more carbon pollution, but theirs is not a financial capitalist system. The solution to these challenges is to change policy, not systems. This can include a higher minimum wage, higher taxes on the rich, a carbon tax, more funding for health care, and the like. But the Left understands that, in a divided Congress, with a conservative Right focused more on ideological commitments to small government than national compromise, achieving this agenda is all but impossible, so they seek system change.

The debate over financial capitalism is whether the firm and investors get the money or consumers and workers. But that is the wrong debate. The debate should be whether the firm gets more of the profits to use for investment or the other claimants—investors, workers, and consumers—get more.

Second, and more importantly, replacing financial capitalism with socialism or a quasi-socialism based on so-called "worker capitalism" that many now support—such as worker ownership, state ownership, price controls, corporate codetermination, ESG (environmental, social, and governance) mandates, big company breakups, strangling regulation of markets, and the like—would stifle growth and innovation. Americans would become poorer and the nation would become weaker.

Third, the core problem with the Left's critique of "neo-liberal" financial capitalism is that it crowds out rational considerations of alternatives. If the choice is between financial capitalism and progressive capitalism, many people will default to the former. If the Left had put its efforts into reforming capitalism for more long-term investment and business dynamic capabilities, as opposed to anti-capitalist attacks that alienate moderates and conservatives, we'd be farther along with needed reform.[68] Indeed, attacks on capitalism only serve to have defenders of financial capitalism dig in even more. We see this with how the U.S. Chamber of Commerce talks about this. In her keynote at the Chamber of Commerce State of American Business Remarks, Chamber CEO Suzanne Clark argued that "this is a year for choosing between capitalism and socialism."[69] She went on to say, correctly, that "free enterprise isn't a perfect system, but it's the best one we've got—the best one that's ever been tried." The polarization in American politics has forced each camp into its corners; one seeing any expansion of the role of government into corporate activity as socialism at best, Marxism at worst; and the other, well,

looking at New York City Mayor Mamdani as the future. That makes consideration of a variant of capitalism, national economic power capitalism, as a threat to all sides.

In short, the debate over financial capitalism is whether the firm and its investors get the money or consumers and workers do. (See box 2.) But that is the wrong debate. The debate should be whether the firm gets more of the profits to use for investment or the other claimants—investors (including CEOs), workers, and consumers—get more of the money. In fact, what difference does it make who gets the money, investors, consumer, or workers? In all three cases, it leads to more consumption and less investment. The most important question is whether the firm gets more than it gets now and if it invests to support the national interest, including productivity and national economic power.

TOWARD NATIONAL POWER CAPITALISM

What is needed is a new variety of capitalism fit for the new age of China competition and the unique capabilities and strengths of the U.S. system, including entrepreneurial dynamism. The U.S. financial capitalist system does a good job on enabling entrepreneurial creative destruction. But as noted, it is not as well aligned with the goals needed to enable national economic power as it should be. In particular, it does a less-good job at enabling domestic scale-up, especially of national power industries. We need something along the lines of "nudge capitalism" wherein the state, and other actors, nudge capitalist firms to take state techno-economic power concerns more into account.

Another way to put this is that we need double bottom line (DBL) capitalism in which investors don't just prioritize profits, but also take into account national techno-economic power and building what Teece refers to as dynamic capabilities, in this case the capabilities to constantly innovate to avoid losing to PRC firms.[70] In other words, we want firms that see their job as to not maximize shareholder revenue but rather to balance long-term net present value creation with national economic power interests. In this ideal world, some capital would go to shareholders (in the form of stock buybacks and dividends), but less than what is now the case. And conversely, more of the earnings would be retained for the battle with Chinese firms, either to lower prices or boost capability-increasing investment.

The problem, of course, is that once the Pandora's box of anything more than single-line capitalism (pursuit of profits alone) is opened, out will swarm the hordes that say that *their* second bottom line should prevail: labor interests, consumer welfare, climate change, small business, domestic businesses over foreign, and the like.[71]

Still, the challenge is such that the Pandora's box needs to be opened, but with a strong consensus around key players, including the White House, that the second bottom line needs to be national power. This means that what national economic power capitalism seeks to do is achieve a balance between free markets and the pursuit of shareholder value and national interest related to techno-economic power.

There are three main possible ways of increasing alignment: regulation; public investment, and changing capitalist financing and incentives. Regulation, such as banning stock buybacks or limiting worker layoffs, is a blunt instrument that not only would lead to a host of negative unintended consequences, but would also be extremely difficult to achieve politically.

Public investment, such as the CHIPS Act, is more promising. Why not just copy the CHIPS program and provide direct grants to firms in key industries? Two reasons: First, unlike tax incentives, grants bring with them a host of federal regulatory constraints, including prevailing wage rules (Davis Bacon), National Environmental Policy Act (NEPA) rules, and the Fly America Act. These rules accrued "brick by brick" in an era when few cared about U.S. competitiveness. But they simply don't work for industrial competitiveness initiatives.

Second, operating grant programs is expensive. The CHIPS program office had a mind-boggling administrative budget of $780 million, which means that each award costs at minimum $23 million to administer.[72]

Third, programs get politicized. Democratic administrations want these programs to achieve other goals in addition to competitiveness, such as good wages for construction workers or DEI (diversity, equity, and inclusion) advancement. Republican administrations (as we see with the Trump administration) don't support grant programs. And companies rightly wonder about uncertainty, including the federal government coming in later with new conditions or scrapping the programs altogether.

Fourth, grant programs come with a massive amount of federal regulatory strings attached, as, over the years, Congress has added law by law a multitude of rules to accomplish what at the time seemed like worthy goals. The problem is that not only do some, if not many, of these goals now act counter to a national economic power strategy, but also the applications of the rules are like sand in the gears.

This leaves changing the incentives for what firms invest in. And that means moving away from the current 50-year-old system of financial capitalism to national economic power capitalism.

At its core, doing that requires addressing the fundamental tension: whose money is it? Shareholders argue that they own the company and deserve access to profits. But is an activist investor who forced a company to shell out earnings to boost stock prices really an owner? They did not start the company and build it. They did not put up the original capital. They simply played the "Wall Street casino" to make a fast buck.

In a world with existential competition between systems—the democratic West and the Marxist-Leninist authoritarian China—this tilt to shareholder interests has gone too far.

Society might argue that those profits should be reinvested for broader economic benefit. Most tax systems try to balance these competing interests rather than strongly favor one side. However, in the last half century, U.S. federal policy has decided to favor shareholders more—not simply because of self-interested lobbying by wealthy shareholders, although that has played a role, but more importantly because it was widely believed that this was the way to maximize growth. For the sake of argument, let's assume that was correct. But in a world with existential competition between systems—the democratic West and the Marxist-Leninist authoritarian China—this tilt to shareholder interests has gone too far.

As such, there are three broad paths, all of which should be used, to move to a system of national economic power capitalism: using the tax code to shape corporate investment, spurring private investment vehicles, and expanding and reforming public investment vehicles.

Using the Tax Code to Foster National Power Capitalism

The tax code can make it more profitable for firms to invest in key national power building blocks such as R&D, international standards setting, and machinery and equipment. Those are tools to make it more likely that firms will retain and reinvest earnings than send the earnings to a share folder.

But the tax code can and should also help by making it more expensive to send capital to shareholders.

Under current tax law, when a company earns profit, it pays corporate income tax on that income. The federal corporate tax rate is currently 21 percent, with the average state rate around 6 percent.[73] What remains becomes retained earnings: after paying corporate tax, the company can either distribute profits to shareholders as dividends (or stock buybacks) or keep the money in the business (retained earnings).

If the company later distributes those retained earnings as dividends, shareholders pay personal income tax on the dividends they receive, thus leading to double taxation, a cardinal sin among conventional economists who prioritize allocation efficiency. In 2003, Congress passed tax reform to reduce this so-called problem by reducing taxes paid on dividend payments to 20 percent. But this encouraged companies to pay dividends rather than reinvest in growth-enhancing activities.[74]

The better solution would have been to reduce the taxes companies pay on profits so they would have been more likely to retain them. This should have been done by telling companies that if they invested in building blocks of innovation, productivity, and national power, particularly R&D and machinery and investment, they would have received generous tax credits. This could have been paid for by imposing higher taxes on dividends and capital gains.

The tax code can and should also help by making it more expensive to send capital to shareholders.

The economic rationale for the R&D tax credit is that companies do not capture all the benefits from their research and therefore underinvest in it from a societal welfare maximization point of view. But even if there were no externalities, policy would want to spur more business R&D because otherwise, U.S. firms would lose to China, an externality in itself. Unfortunately, the U.S. R&D credit is quite small. **To match China's incentive generosity rate, the federal rate would have to be raised by 2.7 times, increasing the Alternative Simplified Credit (ASC) from 14 percent to 38 percent.**[75] Doing so would cost approximately an additional $25 billion to $30 billion annually. **Congress could also allow expenditures on workforce training and global standards setting to also qualify for the credit.**

At the same time, if first-year expensing in the Big Beautiful Bill were retained and a 25 percent quasi-incremental tax credit on new capital investment (modeled after the ASC) were created, this would cost approximately $90 billion per year. An alternative would be for Congress to **institute a national power industry tax credit, modeled on the CHIPS tax credit law, that would only apply to national economic power industries.**

But it's not enough for there to be incentives to retain and invest capital; we need negative incentives for distributing capital. **Congress should start by taxing dividends as normal income.** At the margin, this would make dividend payments less valuable to shareholders, and would raise another $60 billion to $70 billion in tax income.

One effect of increasing taxes on dividends is that it would lead companies to expand stock buybacks. Congress needs to do the same for capital gains from stock buybacks. To address that, **Congress should boost the capital gains tax rate and extend the time horizon for lower returns.** For assets held for more than one year, gains are taxed at a maximum of 23.8 percent. Congress should boost the top rate to 45 percent for taxpayers earning more than $1 million a year for assets held less than two years, with that rate going down 7 percentage points each year until the top rate is 20 percent. This would not only increase patient capital, but also raise approximately $70 billion to 80 billion per year. At the same time, it would effectively close the carried interest loophole, as this income would be taxed at a higher rate. This would bring in additional tax revenues (perhaps $30 billion).

Congress should also reduce the incentives for companies to buy back their own stock by increasing the buyback tax rate. Currently there is 1 percent excise tax on stock buybacks. A 5 percent stock buyback tax would generating approximately $30 billion–$40 billion annually (accounting for behavioral responses). A buyback tax could theoretically push companies to reconsider marginal projects or lower hurdle rates somewhat. If the alternative to a 12 percent return project shifts from "return cash via untaxed buyback" to "return cash via 5 percent taxed buyback or higher-taxed dividend," that 12 percent project looks relatively better.

It's not enough for there to be incentives to retain and invest capital; we need negative incentives for distributing capital.

At the same time, incentives need to shift to encourage companies to pay executives more in cash and benefits, and less in stock. The 2017 tax reform actually eliminated the performance-based pay exemption so that stock options are also subject to the $1 million deduction limit. But, by then, the equity-heavy compensation culture was already deeply entrenched. **Congress should instead allow corporate tax deductions for executive compensation above $20 million per year.** Doing so would help make CEOs less focused on short-term stock price performance.

Combined, these proposals are close to neutral revenue, but companies would have more capital and investors less, at least in the short term. But it would lead to significantly more investment in capital equipment and R&D, which in turn would boost innovation, productivity, and competitiveness. It would also lead to a fairer system in which most taxes would be levied when an entity receives income, not on paper profits sitting in a corporation. Provisions would likely need to be put in place to limit tax avoidance through living off of loans secured by stock holdings in order to defer capital gains.

Of course, this set of proposals would face resistance from both the Right and the Left. Most shareholders would oppose it because they'd earn less money, at least in the short term. However, it would boost economic growth, thereby increasing stock valuations in the long run. And it certainly would boost national techno-economic power.

Free market supporters would say that the government would be distorting the free flow of capital. Indeed, business tax policy remains shaped by neoclassical economics and the passage of the 1986 Tax Act, which, like many tax bills since, worked to reduce the statutory rate while eliminating specific tax incentives. Business tax policy remains guided by the framework of "lower the rate and broaden the base." Guided by a view of economics that holds that market forces should predominate in allocating investment, the idea is that the tax code should be neutral when it comes to different firms and industries. There is, however, one exception and it's to favor small firms, which are seen as inherently deserving.[76] This system might work in a world without great power competition. But it would fail in today's world.

In contrast, progressives would love the higher taxes on investors but hate the idea of using the money to lower net business taxes. They would argue that such provisions benefit executives and shareholders, and moreover don't increase wages.[77]

Both would be right: neither workers nor investors would benefit in the short run. The nation, however, would.

Spurring Private Vehicles to Support National Power Capitalism

Another way to better align company interests with the national interest is to encourage investors to prioritize national power goals.[78]

Use the Bully Pulpit

One way to do that is for the president and others to **use the bully pulpit to encourage investors and investment managers to take into consideration national economic power goals.** There are already a host of organizations and companies that state that they promote DBL investing, including the U.S. Impact Investing Alliance, Principles for Responsible Investment, the Institutional Investors Group on Climate Change, Impact Capital Managers, Global Impact Investing Network, Intentional Endowments Network, Climate 50, ImpactAssets. Some venture capital firms do something similar now, although their focus tends to be on the DBL of social and environmental policy to attract investors who want to make money but also "improve the world."[79]

Similarly, one of the arguments made for why investors should invest in "Deep Tech" is because it can help the planet. A recent MIT report on deep tech argues, "Deep tech ventures may help to drive sustainability goals and support corporate aims to significantly enhance ecological performance."[80]

The problem is that these focus on social policy, equity, and environmental concerns and are not only agnostic about the location of investments, but also often prefer investments outside the United States to help disadvantaged populations in the developing world. It is time for leaders to challenge these organizations to also take into account national power when making investment decisions.

The bully pulpit of leading policymakers can also help, especially to press firms to keep more retained earnings and invest them in activities that spur national economic power. President Trump's recent statement regarding defense contractor Raytheon is an example of that. Trump threatened Raytheon with reduced military contracts if it did not invest more in plant and equipment and spend less on shareholders via stock buybacks and dividends.[81]

In addition, **patriotic, high-net-worth individuals should be encouraged to target more of their investments to firms in national economic power industries and take a longer-term investment horizon.** This is the case in some other nations. Sweden is an example. As recently as 2000, while Ericsson was 51.4 foreign-owned, foreigners had only 1.2 percent of the votes, and today the bank and the Wallenberg family own most of the company's voting stock.[82] This let Ericsson focus on long-term value creation. Indeed, as one study of the Wallenberg family notes, "They act in the long term and have not succumbed to chasing after profits for each quarter of the financial year."[83] The study goes on to say that "the Wallenbergs could cash in their chips at any time, as most other wealthy and powerful families have done. Nothing stops them from selling off and moving somewhere with a better climate than Sweden, and lower taxes."[84]

But they don't because they and the bank are committed to the economic welfare of Sweden. This is presumably why, when asked in 1996 if his family has too much power, family head Peter Wallenberg said, "What is bad about that? Is there not value in somebody hanging around when times are poor."[85]

The problem is that these focus on social policy, equity, and environmental concerns and are not only agnostic about the location of investments, but also often prefer investments outside the United States

America needs more "Wallenbergs." The problem is that most wealthy Americans either are agnostic toward the national interest, or to the extent they care about a DBL, they are focused on social and environmental goals. As such, the president and other leaders should ask high-net-worth individuals such as Bill Gates and Warren Buffet to fund a Wallenberg investment fund rather than give away all their money to left-wing charities. Elon Musk has been doing that to some extent with his investments in hard-tech industries such as space exploration.

Fortunately, there are steps already being made in this direction. One example is the American Frontier Fund, established by several patriotic high-net-worth individuals to invest in companies and start-ups that will help the United States maintain its lead in advanced technologies.[86] While the funding is mostly private, there are public monies involved, including from the U.S. Small Business Administration's Small Business Investment Companies (SBIC) program. JPMorgan Chase recently announced a $1.5 trillion security and resiliency initiative to boost critical industries.[87] It will make equity investments and provide debt financing across four areas: supply chain and advanced manufacturing, including critical minerals, pharmaceutical precursors, and robotics; defense and aerospace, including defense technology, autonomous systems, drones, next-gen connectivity, and secure communications; energy independence and resilience, including battery storage, grid resilience, and distributed energy; and frontier and strategic technologies, including AI, cybersecurity, and quantum computing.

These are important steps forward, but more is needed, including greater investment in technologies and firms that are not "Silicon Valley cutting-edge firms" but rather more traditional advanced industry firms. The president can play a role using the bully pulpit. In addition, **the federal government should provide at least some support for strategic capital funds, or make subsidiary investments to support firms backed by strategic capital funds.**

Redefine Fiduciary Duty for Institutional Funds

Duty is currently interpreted narrowly as "maximize financial returns." It could be made clearer that this means long-term, net-present-value returns. In addition, considering that 30-year national competitiveness is consistent with fiduciary duty, **rules could be established to prohibit measuring pension fund managers on quarterly or even annual performance and instead on longer-term performance (e.g., three or more years).** This would be similar to how some state pension funds have in-state investment requirements and ESG mandates. **Congress could tie federal funding to states based on whether their state pension funds include some kind of national economic power investment mandates. The same could be done with the Federal Thrift Savings Plan.**

During the Biden administration, the Department of Labor issued a rule allowing retirement plan fiduciaries to consider climate change and other ESG factors when selecting investments and exercising shareholder rights such as proxy voting. The rule clarified that ESG factors could be considered if they were financially material. This made little sense for several reasons, including that there was virtually nothing an individual firm could do to materially affect global greenhouse gas emissions. Under the Trump administration, the Labor Department stated it would cease defending the 2022 rule and initiate new rulemaking. But the point is that governments can make it easier for retirement funds to consider issues behind the immediate bottom line.

As noted, a number of "blue" states, including California, Oregon, New York, Colorado, Connecticut, Maine, and Maryland and the District of Columbia have all imposed green mandates. **Congress or the administration should limit federal funding to states that do not have a national economic power mandate for their government pension funds.** And they should work collectively to press companies to prioritize R&D over buybacks and to push for long-term capital investment.

Duty is currently interpreted narrowly as "maximize financial returns." It could be made clearer that this means long-term, net-present value returns.

Reduce the Power of Extractive Investors to Press Companies to Disgorge Cash

The rise of institutional investors should have led to long-termism. But it did not. And the reason is that individual managers have strong incentives to beat the market each quarter. Reducing the power of institutional investors to press for profit transfer would go a long way toward giving executives more leeway to think long term.

In his book *Investing in Innovation,* professor Willian Lazonick wrote:

> In 1992 and 1999, SEC amendments to its proxy regulations enabled asset managers to communicate freely among themselves and with corporate management concerning issues of corporate control. As a result, it became much easier for hedge funds to form de facto cartels for activist campaigns.[88]

Congress should take steps to limit the power of hedge funds to force short-termism and capital extraction. Again, as Lazonick wrote:

> The NSMIA augmented the regulatory power of the federal government, and especially the SEC, vis-à-vis the states in amending the Investment Company Act

> and Investment Advisers Act, both of 1940, and removed the size restrictions on hedge funds and private-equity funds that had previously been limited to ninety-nine investors to be eligible for exemption from regulation under these Acts. As a result, assets under management by unregulated hedge funds (and private-equity funds) soared from the late 1990s, augmenting the financial power of hedge-fund activists to engage in predatory value extraction while giving fund managers of pensions and university endowments, among others, stakes in activist campaigns in their quest for higher yields on their financial security portfolios.[89]

He went on to note:

> In 1988, the US Department of Labor issued what has become known as the "Avon letter," which deemed it a fiduciary obligation for pension funds to vote the shares in their asset portfolios. In 2003, a ruling by the SEC extended this fiduciary obligation to mutual funds,171 thus making it much easier for a hedge fund activist with only a small percentage of a company's shares outstanding to line up a large block of proxy votes for board elections and thus pose a credible threat to incumbent management's strategic control. In mobilizing the proxy votes, the activists can get help by lobbying the two major proxy advisory services companies, ISS and Glass Lewis, which emerged, unregulated, to dominate this specialized segment as a result of the 2003 SEC ruling, to recommend to institutional investors a slate of value-extracting candidates for election to the corporate board. [90]

Congress should reconsider these legislative and regulatory changes.

Congress should also pass legislation to penalize organizations that allow their investments to be used in the service of "activist investors" who own a small share of a company's stock but enlist institutional investors to join their demands for the corporation to transfer cash from the corporation to the shareholders. States whose pensions funds side with these kinds of aggressive investors should lose federal funding—the same with university endowments. Any university that allows its endowment to side with short-term extractionist investors would see its federal funding cut. The goal is to reduce the asymmetry in power wherein activist investors can own a small share of a company's shares but convince institutional investors to pressure management for short-term returns.

Have CFIUS Review Hostile Takeovers in National Power Industries

The Committee on Foreign Investment in the United States (CFIUS) can review acquisition of U.S. firms by foreign firms for national security considerations. The U.S. government did that with regard to Broadcom's attempted hostile takeover of Qualcomm in 2017–2018. President Trump issued an executive order blocking it in March 2018 before Broadcom could complete its move to redomicile from Singapore to the United States. The order cited national security concerns—specifically that the takeover might reduce Qualcomm's R&D spending in 5G technology, potentially allowing China (specifically Huawei) to gain leadership in 5G standards.

This was notable because it was essentially a preemptive block of what would have been a domestic deal (since Broadcom was planning to redomicile to the United States). The

government used CFIUS authority even though it was stretching the "foreign" aspect, arguing that Broadcom was still technically foreign at the time of review.

But **Congress should make it clear that, in national economic power industries, CFIUS should be able to block domestic hostile takeovers if there is a risk that they would weaken firms' dynamic capabilities, especially vis-à-vis China competition.**

Spurring Public Vehicles to Support National Power Capitalism

Finally, there is a role for more public kinds of investment vehicles to support national power industries.

Early Stage Capital Investors

There are already several early stage investing organizations focused on national security, including InQTel, the Defense Innovation Unit's National Security Investment Capital program, the Air Force's AFWERX Stratfi-tacfi program, the War Department's Office of Strategic Capital, and DOD's Accelerate the Procurement and Fielding of Innovative Technologies program.[91] These programs are all a step in the right direction, but they are mostly focused on early stage capital for start-ups and are somewhat narrowly focused on defense technologies and industries rather than national economic power industries more broadly. Nonetheless, **Congress should provide funding to expand all these programs.**

Industrial Development Bank

There also need to be public vehicles that provide patient capital for existing firms in a broader array of national power industries, including enabling industries, and for production, not just R&D. This points to the need for a national industrial development bank or banks.

Such a bank would fill gaps in the financial system by providing financing that commercial banks typically won't offer due to long payback periods, higher risks, or lower profitability. It would focus on sectors considered crucial for economic development such as manufacturing, infrastructure, technology, and exports. Many other nations have long-standing industrial development banks, including South Korea (Korea Development Bank), Germany (KfW), and Japan (Japan Finance Corporation).

One bill introduced in Congress in 2021 proposes an Industrial Finance Corporation.[92] Congress would make a one-time appropriation to the corporation, which would then make more patient capital investments in national economic power industries. The legislation would provide it with the authority to issue and guarantee loans, purchase equity stakes, issue bonds, acquire assets, create investment facilities and enterprise funds, and securitize its investments.

Others have argued for a more distributed model with perhaps 9 regional industrial development banks—one for each Federal Reserve Region. One advantage of this is that it would ensure that funding is widely distributed geographically.

Either way—one national bank or multiple regional banks—there would need to be strict accounting rules built into the legislation and governing structure so that the bank is not whipsawed in its expected investments depending on who is in the White House—and that deals are based on national power, not political interference or mission drift. Moreover, the enabling legislation should make it clear that the scope of firms able to be supported is quite narrow and limited only to national economic power industries.

Why not sovereign wealth funds? Some nations, such as Norway and Singapore, have established sovereign wealth funds, often out of mineral-extraction royalties. These explicitly balance financial returns with national strategic interests, and take a long view on investments.

Some, including President Trump, are considering such funds for the United States. It's not clear that this would be the right vehicle to support national techno-economic power. First, many of these funds come from dedicated revenue sources, which the United States does not have. Using general fund revenues for such a bank would make little sense. Second, nations with them appear to have more Right-Left consensus for competitiveness and how to achieve it than the United States does.

CONCLUSION

System change is hard and usually only occurs not only when the current system has not been performing but when there is a crisis. That was the case with the rise of neo-liberalism with the slow growth and stagflation of the 1970s and the serious economic recession of the early 1980s.

So far, financial capitalism has limped along (notwithstanding the perfectly avoidable 2008 Great Recession), certainly still producing high returns for shareholders and low unemployment rates—the only factors now used to judge economic policy success. But when it comes to competitiveness—especially in national economic power industries and against China—and productivity growth, the current system has underperformed. Productivity has been anemic for at least 15 years, and as ITIF has documented in numerous places, the United States is losing ground to China. One could imagine any number of crises that might spur more appetite for more serious reform, including a Chinese invasion of Taiwan with losses to U.S. defense forces, and a federal budget default.

But even with a crisis, arguments against the kinds of change proposed will be powerful: the system is working fine and any deviations are suboptimal; these proposals violate shareholder rights; the role of companies is to maximize profits; this is picking winners and inappropriate government involvement in private decision-making; the China challenge is irrelevant; other challenges (e.g., climate, economic opportunity, etc.) are more important; and more.

What we need is a capitalism that supports national power. … Whether Washington and the business and intellectual leadership of the nation can effectively advocate for this remains to be seen.

The reality is that many of these reforms are not about substituting political judgment for market signals in capital allocation. Rather, they try to change the time horizon and reinvestment incentives within which market actors make decisions, so that firms with genuine competitive advantages in national power industries are not systematically stripped of investment capital by financial extractors who are indifferent to productive capacity.

As long as the debate is about maintaining the current system of financial capitalism or moving to a more quasi-socialist worker, family, and small business capitalism, needed change will not happen. Companies still won't be investing internally the way they need to in order to not lose to China.

In conclusion, it's time for a renewed pragmatic approach to rethinking capitalism. Unfortunately, the free-market Right would say that they want capitalism that maximizes investor freedom. What we need is capitalism that supports national power. The redistributionist Left would say that they want capitalism that creates warm, personal security. What we need is a variety of capitalism that creates cold, national security. Whether Washington and the business and intellectual leadership of the nation can effectively advocate for this remains to be seen.

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Mobilizing for Techno-Economic War, Part 4: Transforming Education and Workforce Policy

ROBERT D. ATKINSON

The U.S. education and workforce development system is ill-suited to winning the economic power industry war with China. It's time for systemic reforms to produce students and workers with skills and capabilities that national power industries need.

KEY TAKEAWAYS

- China is on course to amass greater capabilities than America and its allies in advanced, traded-sector industries critical to economic power and national security. Bold education and workforce reform must be part of a robust U.S. policy response.
- The current system has little pedagogical innovation or diversity in K-12 education, a bias toward four-year colleges and universities that overemphasize humanities and social sciences, and workforce training that doesn't provide what industries need.
- To transform K-12 education, pedagogy should enable greater student engagement, policymakers should quadruple the number of STEM high schools, and technical education should be expanded in both middle school and high school.
- Higher ed needs more accountability—including a well-designed credentialing system that applies market pressure to produce skilled graduates. Government agencies and the private sector should then recognize alternative certifications.
- Congress should restructure land grant universities around technical skills industries need, support creation of industrial colleges, shift colleges and universities toward teaching tangible skills, and expand critical technology degree programs.
- Finally, states and school districts should be required to identify gifted students and provide them with appropriate learning environments, and Congress should turn O-1A visas into "intelligence visas" to attract the best and brightest immigrants.

INTRODUCTION

The United States has been the world's dominant techno-economic power for more than 125 years. That has induced complacency. As the Information Technology and Innovation Foundation (ITIF) has written, China is hungry and determined not only to displace American techno-economic leadership, but also to make America and the West depend on Chinese production.[1]

On its current trajectory, it is likely that in the next decade or two China will amass significantly greater capabilities than the United States and even its allies have in national economic power industries: advanced, traded-sector industries that are critical to national security and sovereignty. With those greater capabilities will come geostrategic hegemony over the West unless the United States forestalls that outcome by adopting a new, transformative national power industry strategy that goes beyond a simple competitiveness or national innovation strategy. This techno-economic war is not one the United States and its allies can win in the sense of significantly weakening or retarding the growth of China's own national power industries. The only way China's mercantilist attacks on U.S. techno-economic leadership will end is if China becomes a free, democratic country, which is highly unlikely. But the United States and its allies can avoid defeat—by keeping their national power industries relatively strong—if they work together and adopt national power industry strategies.

However, the inherent weaknesses of the U.S. innovation and production system (e.g., cuts in government research and development [R&D], limited STEM [science, technology, engineering, and math] skills, an overly strong dollar, institutional resistance to change, corporate short-termism, etc.) coupled with a Chinese Communist Party hyper-focused on victory, suggests that, absent major structural change in U.S. policy, relative decline and loss of techno-economic competitive position and power is inevitable.

Changing the U.S. system will not be easy. In fact, it might be nearly impossible given the deeply entrenched interests and the dominant view that education and training should maximize individual rather than societal welfare. Nonetheless, system change is not possible unless there is a vision of the kind of system we need.

This report is part of a series delving into the techno-economic war China is waging to take over national power industries. The first report in the series laid out the context for this, including what is at risk and the need for radically new approaches in a host of key policy areas.[2] Not small steps, but big ones. Not tinkering, but transformation. "Bold" is the operative term. The crisis is at such a point that incrementalism will fail. Other reports in the series address specific policy areas.

This report focuses on education and workforce policy, which many argue is the most important factor determining U.S. success or failure. But that claim is significantly overstated. To be sure, there are real challenges with the U.S. education and workforce system, and many employers complain about the quality of workers. But while these issues are not insignificant, there are other issues that are more important in determining U.S. survival, particularly the incentives for companies to invest in ways that successfully defend against Chinese techno-economic industry attacks.[3]

Nonetheless, far-reaching and bold education and workforce change needs to be a component of a robust U.S. policy response. The U.S. system suffers from a number of challenges, including a one-sized-fits-all K-12 public education system that underperforms; a lack of nurturing and appreciation for gifted and talented students; too many students going to four-year colleges and learning liberal arts while too few study technical fields and go to two-year schools; too few institutions focused on teaching needed technical skills; and an immigration system not optimized to attract the smartest workers in the world.

Changing the U.S. system will not be easy. In fact, it might be nearly impossible given the deeply entrenched interests and the dominant view that education and training should maximize individual rather than societal welfare. Nonetheless, systemic change is not possible unless there is a vision of the kind of system we need and specific proposals to achieve it. That is the goal of this report. It first discusses the shortcomings of the current U.S. education and workforce training system and then focuses on the following 12 key areas for policy transformation:

1. Changing K-12 pedagogy to enable greater student engagement
2. Quadrupling the number of specialty STEM high schools
3. Expanding technical education in high schools
4. Fostering more accountability for results in higher education
5. Encouraging government agencies to hire people with alternative certifications
6. Encouraging the private sector to recognize alternative certifications
7. Aligning post-high school education and training to the needs of national economic power industries
8. Passing a third "Morrill Act" to restructure land grant universities to technical skills in alignment with industry needs
9. Supporting the creation and expansion of industry-focused and -led industrial colleges
10. Supporting expansion of critical technology degree programs
11. Expanding support for gifted students
12. Creating an "intelligence visa" focused on attracting the best and the brightest

WHAT'S WRONG WITH THE CURRENT SYSTEM?

The U.S. education and workforce development systems, developed largely incrementally over the last 150 years, are not fit for winning the national economic power industry war. To be sure, there are strengths here and there, and many promising institutional innovations are being experimented with. But these are largely episodic, with the dominant system unchanged and poorly suited to the task at hand.

The K-12 system remains modeled on a factory, with little pedagogical innovation or diversity. Pretty much everyone is required to learn the same thing in the same ways (sitting in rows of desks listening to teachers lecture on required subjects) whether they have any passion or even

interest in what is taught. As a result, too many students tune out and only learn what they are forced to in order to pass tests, if even that.

Gifted students, who need to be nurtured as a key, scarce national resource, are for the most part ignored, tolerated, or even disparaged. To be sure, there is the occasional well-crafted gifted and talented program, but these are modest in scope. And often gifted programs are nothing more than a faster pace of the existing constraining curriculum. In contrast to some nations, including China, which seek out gifted students for special support because they recognize the "secret weapon" they are, the American system, especially as it focuses largely on bringing up the "bottom," looks down at gifted students, mocks them for being nerds or worse, and sees gifted programs as racist.

The field is innovation resistant. Massive lobbies descend on Washington to preserve the status quo, usually with only one ask: more funding and fewer restrictions. Virtually no one advocates for a system that can be a critical component of a national economic power industry policy.

Four-year colleges and universities now educate far too many students, especially in areas such as the humanities and social sciences. America would be better off if the four-year system were shrunk by at least 25 percent, with more students getting high-quality technical degrees, especially at two-year colleges, or obtaining certificates of competence. But there has been significant "degree inflation," with employers expecting applicants to have four-year degrees, even if a position doesn't require it. Students realize this and feel that they must complete a four-year degree in order to have a chance at a decent job. This is rational for each participant in the system, but it is irrational at the societal level, as it leads to societal overspending on education.

And more troublingly, a significant share of college graduates lack the capabilities and skills one would expect after spending four years in college. Many, though, have had plenty of time to enjoy campus social life and sports. Indeed, one wonders if the true purpose of colleges and universities is sports. As the quip goes, the faculty pretend to teach and the students pretend to learn. (See box 1.)

The workforce training system also fails the task at hand. It is focused almost exclusively on equity: helping socially disadvantaged individuals gain the capabilities to do better in the workplace. While this is needed, the system is not designed to produce key resource inputs needed by industry that's competing in tough global competition. And it is anything but industry led.

And while many in industry complain about the state of the workforce, few do anything. And why should they? They have companies to run. This is why education reform and workforce development are low on the totem pole of industry's DC policy priorities.

On top of that, partisan politics makes structural change extremely difficult. The progressive Left focuses almost exclusively on education and training for opportunity, especially for the socially disadvantaged. Industry competitiveness is an afterthought at best, or an unwarranted subsidy to industry at worst. Helping talented students in STEM or other fields is seen as helping the already advantaged. This is why progressives have sought to weaken traditional math and science

education, seeing it as reinforcing white supremacy, while seeking to prioritize social justice themes over computational skills and problem-solving.

In contrast, the conservative Right assumes, as they do for most matters, that the market will take care of it, and where it won't, that local and state government action will suffice. And many on the Right reject the idea that the government should prioritize certain educational areas over others. For them and many conventional neo-classical economists, French literature is equally as valuable as computer science. What right does the government have to put its thumb on the scales of what an individual wants in the marketplace, and education is simply another industry and market?

On top of this, the entire field is innovation resistant. Massive lobbies descend on Washington to preserve the status quo, usually with only one ask: more funding and fewer restrictions. Virtually no one advocates for a system that can be a critical component of a national economic power industry policy.

It's time for an education and workforce system that's designed as a key complement and input to a national economic power industry strategy.

It should not then be a surprise that the education and the workforce systems are so far divorced from the needs of national economic power industries, especially given that techno-industrial policy is generally ignored and even decried in the United States. Policy areas such as education and training, according to the prevailing view, should help individuals, not the state's need to not be a vassal state to China.

The result is a system that in some ways is very much like the U.S. financial capital system: one focused on maximizing investor rates of return, in this case, individuals investing in their human capital. In other ways, especially K-12 education, it's like government-directed central planning wherein bureaucracy and uniformity dominate. And so we have the worst of both worlds: market forces divorced from the national interest combined and innovation-stifling guild-like interests and bureaucracies.

Some nations have a different approach. They take national development and winning the international advanced industry competitiveness race seriously. These nations, such as Singapore, Germany, South Korea, Taiwan, and China, see education and training, at least in part, as a core component of their national development systems.

As such, it's time for an education and workforce system that's designed as a key complement and input to a national economic power industry strategy. While the reforms discussed herein would enable that, it's important to note that they would also improve education and training generally, even for workers not going into the national economic power industries.

K-12

K-12 education is principally the focus of state and local governments. As such, they should be leading change that is aligned with the need for stronger national economic power industries. But without federal leadership, that is not likely to happen, as techno-economic power is a national issue. This section lays out three proposals for improving K-12 education.

Changing K-12 Pedagogy to Enable Greater Student Engagement

It is far beyond the scope of this report to lay out a comprehensive assessment and set of recommendations for K-12. But one key change is within scope: K-12 needs much more flexibility in pedagogy.[4]

The federal government and states have focused on improving K-12 education for more than three decades, but they have been doing so on the faulty assumption that the issue to be addressed is a "performance problem" that can be solved by pushing the existing educational model to do better. Over that period, two approaches to educational reform—standards-based reform and charter schools—have been relied on. Standards-based reform—particularly No Child Left Behind—has dominated, in part because of teacher union opposition to charter schools, but even charter schools have been limited in developing new ways of pedagogy learning.

Indeed, the principal means of improving educational performance has been standards-based reform, coupled with stricter curriculum requirements and more homework. Initially designed in 1990, standards-based reform was based on the idea that school districts would respond to the call to improve as "objective" standards highlighted progress or lack thereof. However, when schools and states did not improve as much as was expected, policymakers became impatient and moved to "require" improvement through measures such as the federal No Child Left Behind Act (NCLBA), which imposed sanctions on unimproved schools.

And of course, when the system did not show the results advocates promised, the excuse became money. Just spend more money, and all would be well. But that does not seem to be the decisive factor in outcomes. While there may be some benefit to more funding for schools in low-income communities, overall, the correlation between spending and educational improvement is weak.[5]

And when that didn't work, the solution turned to more. More hours in the school day. More days in the school year and no more summer vacations. More homework.[6] But more didn't work either.

It is time to consider that the failure to improve learning might lie precisely in the assumption that the problem is one of performance to be solved by pushing the existing model to do better—more tests and more consequences for not doing better on said tests.

Rather, the issue is a design problem—a need for radically different forms of schooling that can better educate the majority of students who, relative to their potential, are underachieving in the factory model of school.

Most efforts to improve American schools take the existing model of education as a given. The existing "mass production" model of education—named after the similar model of production that predominated in most U.S. factories in the 1980s—looks little different than it did 100 years ago. The mass production model in American education has several features: school is defined by time, space, and its organizational form. A traditional school is a building to which children come for certain years of their lives, months of the year, days of the week, and hours of the day. There, they are grouped by age into "grades" to be instructed by adults. The school itself is not a discrete organization but a unit of a larger organization that owns its facility, employs its teachers, generates its revenue, sets its methods of operation, and designs its curriculum. The teachers, unlike professionals in many white-collar occupations, are not in charge of the administrators but work for the administrators. Schooling, the process of learning,

is conceived of as instruction. Learning is thought of as the result of teaching; it is quite common to hear people talk about "delivering education." Indeed, school is designed around the adult, not the student. Young people sit at desks, in rows, while an adult imparts information.

There is limited, if any, opportunity for customization or personalization of the learning process, as student interests are treated as largely irrelevant to what *has* to be taught. Adolescents study disciplines disconnected from their lives—English, history, civics, physics, and mathematics. Their studies are divided into courses, most of which are required for all students. Courses are taught in classes, with teachers instructing 25, 30, or more students who move week by week through the subject and chapter by chapter through the same text. The idea is for teachers to instruct and students to master the particular subject matter of the course rather than the generic transferable skills (e.g., the ability to analyze and to solve problems, to comprehend complex situations, to think critically, to be creative, to be adaptable, to work with others, and to learn and relearn over a lifetime). The assumption is that all students will know all subjects.

Secondary students are tested mainly on their ability to recall factual knowledge. Success is defined as scoring well on tests of that knowledge, most of which involve discrete, right-or-wrong answers. Conventional school is like a school bus rolling along the highway, with the teacher standing at the front and pointing out interesting and important sights, but telling the passengers that, no, we cannot let you get off to explore what's down that side road. As a result, students who want to pursue their interests and passions must do so on their own time and energy if, after completing all the required homework, they have any left.

The issue is a design problem—a need for radically different forms of schooling that can better educate the majority of students who, relative to their potential, are underachieving in the factory model of school.

In industrial organization terms, the model of educational production just described is termed "batch-processing." Batch-processing refers to a production process in which batches of items (e.g., specialty chemicals or biologic pharmaceuticals) are processed in a standardized way, each going through the same processes collectively and sequentially. When applied to education, batch-processing has obvious limitations. It requires all students in a class to proceed through the full term at the same pace, affording little opportunity for those who need it to take more time, and little opportunity for those who could move faster to do so. In the typical mixed-ability classroom, this confronts the teacher with a difficult, almost impossible, task. Moreover, educational courses and content requirements too often tie the hands of students who want to pursue different or more sophisticated curricula. Four years of English is not inherently superior to two years of English and two years of philosophy or two years of journalism, but in almost no American high school today does the student have a choice.

Is it any wonder, then, that so many young people drop out, with many of the students who stay doing so only because they see the link between putting up with a relatively unengaging process now in exchange for the rewards stemming from a high school diploma later in life?

Indeed, in virtually any other industry in America, customer needs and satisfaction are critical. Companies with unsatisfied customers go out of business, unless they are public schools, in which case they just get more money.

In a 2024 survey that The Harris Poll conducted for Discovery Education, 83 percent of students said that there are not enough opportunities at school for them to be curious. The findings suggested that "keeping students interested in school has continued to be a major challenge post-pandemic for teachers, who are struggling to meet students' complex academic, behavioral, and social needs."[7] Could it be that much of what is taught and how it is being taught is just not very interesting or engaging? Three out of four students said that self-paced learning would help them feel empowered in school and more prepared for the future, while 93 percent of teachers said adaptive learning would help. And most of those surveyed, 87 percent, agreed that digital tools are essential for optimizing content for individual learning.[8] 2006 medicine laureate Craig Mello stated that "too much of our education is focused on memorizing facts and not enough on the exploratory process of science."[9] Indeed that's true, but facts are what can be easily tested, and testing is what schools are forced to care about most.

Yet, despite these dismal responses from students—the ones who ultimately must decide to learn—we continue almost unquestioningly with a batch-processing model of schooling and teaching that is not designed to motivate either students or teachers. Instead of innovating to find new approaches, we try to improve performance by pushing ever harder to standardize and perfect the old technology of textbooks and teacher instruction.

New technologies, including AI, virtual reality, educational gaming, and other information technologies, make it more feasible for education to become more customized and suited to the needs of students. For example, Google has developed an AI application, "Learn Your Way," that transforms standard school content into a "dynamic and engaging learning experience tailored for each learner."[10]

Change will be hard. Congress should see its job in education policy for the next decade as supporting bold institutional innovation. To do that, **Congress should establish and fund a New Schools America Fund to encourage state legislatures to create these specialized organizations that are independent of traditional school management.**

It should allow new innovative schools to be evaluated outside the framework of the federal NCLB. It should require exemptions and adaptations to state and federal course and content requirements. Alternative modes of assessment, as funded by foundations or state innovation authorities, must have room to gain legitimacy.

New technologies, including AI, virtual reality, educational gaming, and other information technologies, make it more feasible for education to become more customized and suited to the needs of students.

Finally, one more change will be required for this new model to work: **States will have to dramatically reduce the course mandates they have all imposed over the last several decades.** These mandates are so extensive that high school students have few opportunities to take electives that they might actually be interested in.

Take Maryland, for example. To graduate high school, students must take four years of English, four years of math, three years of science, three years of social sciences (U.S. history, world history, and local/state/national government), one year of fine arts, one year of

computers/technology, and two years of a foreign language.[11] And of course, note the complete absence of courses that deal with the physical world, such as engineering, machining, and robotics.

Why? Why a foreign language? Presumably, so that students can travel to other nations. But few Americans do, and most people they will encounter speak English. Four years of English—why? What is actually being offered: reading literature. But why is literature more important than, say, logic, philosophy, or creative writing? Why three years of social science? Why not the history of sports or the history of the civil rights movement? And four years of math—unless the student intends to go into engineering, science, or computer science, which are less than 10 percent of jobs—they don't need to know calculus. It's not as if these subjects are not useful. If kids had unlimited time, it might be good to learn these. If they had the same motivation to learn things they were not interested in as things they were, then requirements like this might be okay.

This gets perhaps to the key fault of high school education. It is designed to teach things, not skills. The government has decided that English is so important that it must be taught for four years and that every student must learn physics. But the reality, especially in an Internet-connected, AI-powered world, is it's less important what content students learn (obviously, beyond some basics in math and a few other subjects). What is most important is that they are engaged and want to learn. That is what matters. And then they learn to think, to do research, to write, to speak publicly, to work in groups, and to build on their curiosity. That can be learned just as easily through a Sports Statistics class as through an Algebra 2 class. Or through a debate class as through an English literature class.

In an Internet-connected, AI-powered world, it's less important what content students learn.

In addition to high schools radically paring down these choice-inhibiting requirements, colleges must do the same. Too many state universities make admission contingent on these requirements, such as four years of math. For example, the University of Maryland has the following admissions requirements:

- English: four years
- Mathematics: four years
- Science: three years
- History or Social Science: three years
- Foreign Language: two years

This of course just forces high schools to impose this distribution requirement. Does anyone really think that a student at the University of Maryland would be less successful if, God forbid, they only had three years of English and no years of a foreign language?

As such, **Congress should make federal higher education funding contingent on state colleges and universities eliminating specific course requirements beyond a minimum** (such as two years of math). Rather, Colleges should be looking to see if students take and pass intellectually challenging classes, regardless of what information the classes seek to impart to the student.

Quadrupling the Number of STEM High Schools

Some will argue that reducing math and science requirements in high school will hurt, not help, competitiveness, especially in advanced technology industries. But it's important to remember that only around 5 percent of workers are in occupations that require science, technology, engineering, and math degrees.[12] Most students will never use anything beyond Algebra 1. Moreover, students interested in these subjects and careers would still have the ability to take these courses in high school.

Moreover, it's not as if all these requirements have been successful. In fact, for at least 30 years, there have been massive campaigns to boost student achievement in STEM, and by and large these have failed to move the needle.[13] Math SAT scores fell from 509 in 1972 to 508 in 2016 (the last year before the test was changed).[14] And there is very little difference in college STEM graduation rates. For whites, the share that received a STEM degree increased only slightly from 2012 to 2021, from 12 to 14 percent. For Hispanics, from 9 to 11 percent. For Blacks, from 8 to 10 percent. Native Americans had a small decline. Asians did go up more, from 20 to 26 percent. But overall, hardly signs of success.[15]

A better solution than forcing more math and science on high school students, most of whom are just not that interested, is to create options for students who really are interested in math and science to enroll in specialty math and science high schools.

Mathematics, science, and technology high schools differ from the general education found in comprehensive high schools in key ways. First, they focus much more extensively on STEM curricula. For example, in addition to the three years of lab science and four years of mathematics required by the state for high school graduation, Florida's Center for Advanced Technologies offers students an opportunity to declare a pathway in AI or robotics, allowing them to take four additional specialized courses in mathematics and science related to their path.[16]

Second, students don't just take more STEM courses; they take more advanced courses and do more advanced work. Indeed, the coursework and integrated curricula of math and science high schools (MSHSs) go over and above the normal graduation requirements for general education students. For example, students at the Arkansas School for Mathematics, Sciences, and the Arts can take courses in Biochemistry, Microbiology, Multivariable Calculus, Number Theory, Differential Equations, Computer Programming III, Game Programming, and AI-Assisted Programming.[17]

A better solution than forcing more math and science on high school students, most of whom are just not that interested, is to create options for students who really are interested in math and science to enroll in specialty math and science high schools.

The focus at these schools is not on the College Board's Advanced Placement offerings, but on courses beyond AP. Students are expected to work at a college level of instruction and learning. The majority of these specialized schools require students to complete a research project in an area of math, science, or technology as a graduation requirement, where they are taught to ask the right questions, use 21st-century, state-of-the-art tools to find the right answers, and then effectively communicate those answers. For example, some schools require students to be assigned research mentors with whom they work over the course of their time at the schools.

Students also compete in science fairs, research symposia, etc. as the capstone for these research projects. These projects are often entered into national competitions such as the Siemens-Westinghouse Science Talent Search, the International Science and Engineering Fair, Chemagination, DuPont Challenge, Exploravision, Neuroscience Creativity Prize, Thinkquest, Young Epidemiology Scholars, and Young Naturalist Awards.

A third distinguishing feature of these schools is their level of partnership with other organizations. Collegiate, corporate, and alumni organizations have formed significant partnerships with these schools. While some partnerships have been in support of specific events, others have been long-term partnerships supporting research and innovation among students and faculty. Collegiate partners, for example, often provide classroom, dormitory, research, and financial support to these schools. For example, at the Governor's School of South Carolina, every rising senior is placed for six weeks in the summer at an off-campus program. Many of the students work with a research professor at an in-state university.[18]

Finally, while it's difficult to assess and compare educational environments, MSHSs are distinguished by the high level of student and faculty engagement. Many students get turned on to mathematics and science because their instructors are engaging and their own love of learning is contagious. One finds a great deal more interaction between students and instructors at these schools. Students are eager to spend time with people who are interesting and interested in them. It's not uncommon to find instructors surrounded by students during off periods or after classes. When a student conducts research under the tutelage of an interested teacher, the mutual excitement grows.

Thus, it should not be surprising that graduates pursue STEM fields in college at a rate nearly 50 percent higher than that of other students.[19] And compared with the national average, nearly 20 percent more selective STEM school graduates earn a STEM-related postsecondary degree within four years of graduating from high school.[20] To be sure, these outcomes may come from selection bias, as these students are more inclined to pursue STEM. Nevertheless, the outcomes are impressive.

Yet, there are only around 90 specialized STEM high schools in the nation, about the same number as 20 years ago. They represent just 0.3 percent of all high schools. What is worse is that, because of pressure from those pursuing racial equality, a number of schools are no longer selective, some moving from strict entrance exams to lotteries, defeating the entire purpose of high standards to produce excellence.[21]

Congress and the administration should set a goal of approximately quadrupling enrollment at such high schools to around 250,000 students. Doing so will require both the creation of a significant number of new high schools and the expansion of others with room to grow. To do this, **Congress should allocate $600 million per year for the next five years to the National Science Foundation (NSF), with matching funds from states, local school districts, and industry, and invest in both the creation of new MSHSs and the expansion of existing ones.** Moreover, a share of these funds should go toward establishing MSHSs serving underrepresented populations. To qualify, entrance and student retention should be based on merit. States, local school districts, or both would be required to match every dollar of federal support with one dollar of state and local funding. Industry funding would count toward the state or local school district match, or both.

Expanding Technical Education in High Schools and Middle Schools

A half century ago, most U.S. high schools had robust technical education tracks. Today, few do. Many other nations, such as Austria, Germany, and Switzerland, have retained that focus.

More students need to be able to learn technical skills in high school, including basic engineering. Think of it as shop class meets maker space. In fact the goal should be for every U.S. high school to have at least some kind of maker space wherein students can experiment with the latest technologies, including computer aided design and 3D printing.[22]

Middle and high school need to revitalize what used to be called "shop" into an advanced manufacturing class. For example, a relatively new program, STEM+M works with middle schools (and eventually high schools) to help them offer a one semester manufacturing class that includes CNC (computer numerical control) manufacturing, measurement, and structural science.[23] There are other innovative programs throughout the nation, but they have not scaled.[24] **Federal funding, either through the Department of War or Department of Education is needed to establish manufacturing and engineering programs at at least a quarter of America's middle and high schools.**

In addition, we should build on interesting models that expose high school students to actual manufacturing experiences. China, for example, has established a program wherein high school students visit factories.[25] Eleva-Strum high school in Wisconsin has a program called "Cardinal Manufacturing," which is a year-long two credit class that offers more than standard classroom instruction. Students gain the real-life experiences of problem-solving, running a business, and working in professional career roles. The application process includes creating and submitting a resume, project portfolio, and letter of recommendation.[26]

The goal should be for every U.S. high school to have at least some kind of maker space wherein students can experiment with the latest technologies, including computer aided design and 3D printing.

Congress should increase funding for the Carl D. Perkins Career and Technical Education Act that provides formula grants to states. And states should be able to apply for matching grants to be used to expand technical education in high schools, including engineering courses (e.g., robotics) and maker spaces.

HIGHER EDUCATION

Despite actually trying to meet labor market needs, too many Americans go to four-year colleges. College enrollment rates for U.S. 18- to 24-year-olds rose from roughly 30 percent in the late 1980s to a peak around 2010–2011, stabilizing at roughly 39–40 percent in recent years (2022). While the overall share increased, the immediate post-high school enrollment rate dropped from a 70 percent peak in 2016 to around 63 percent by 2022–2024, driven by a decline in male participation.

Michael Lind has written that "according to the Federal Reserve in 2020, 41 percent of recent college graduates work in occupations that do not require a college diploma."[27] A 2021 study by Burning Glass finds that, of the 4 in 10 college graduates who are underemployed in their first

job, two-thirds will still be underemployed five years later.[28] Of those, three-quarters will be working in noncollege jobs after a decade.[29]

In addition, too many students study humanities and social sciences without learning key foundational capabilities such as writing and critical thinking. To be sure, humanities and social science degrees have fallen as a share of total degrees. But many students still take many of the classes, in part because of requirements designed to ensure that these faculty have students to teach. For example, there are an estimated 50 million seat counts (the number of courses taken times the average number of students in the courses) for humanities classes.[30] This compares with an estimated 24 million seat counts in engineering. [31]

Finally, the educational quality of graduates is not adequate, especially to employer needs. (See box 1.)

Box 1: College Workplace Performance Gap

A 2024 survey by the National Association of Colleges and Employers (NACE) of 2,281 graduating seniors and 237 employers finds significant differences between how students rated their own competencies and how employers rated them. Students generally believed they were 20 to 30 percent more proficient in most areas than employers reported, particularly in skills such as leadership, critical thinking, and communication.[32] It's then not surprising that half of employers surveyed by *The Chronicle* and American Public Media's Marketplace said that they had trouble finding recent graduates qualified to fill positions, with nearly a third giving colleges only "fair" to "poor" marks for producing successful employees. They particularly noted that graduates lacked adaptability, communication skills, and the ability to solve complex problems, with one employer characterizing them as "woefully unprepared."[33]

This appears to be because most students are not learning a lot from the college experience. As former president of Harvard, Derek Bok, stated, "There's no question that students are studying less. I think something happened in the 1960s in the relationship between students and faculty that shifted influence much more to the students."[34] Using a variety of datasets, Philip Babcock and Mindy Marks confirmed this, finding that, in 2003, full-time students only spent 27 hours a week in class and studying, down from 40 hours a week in 1961.[35] Almost one-third of all students did not take any course requiring more than 40 pages of reading a week, and the average student spent only about 12 hours per week studying.[36]

This is partly why the National Assessment of Adult Literacy has indicated that, between 1992 and 2003, average prose literacy (the ability to understand narrative texts such as newspaper articles) decreased for all levels of educational attainment, and document literacy (the ability to understand practical information such as instructions for taking medicine) decreased among those with a bachelor's degree or higher.[37] Sociologists Richard Arum and Josipa Roksa administered the Collegiate Learning Assessment to several thousand college students at over two dozen institutions when they began college and again at the end of both their sophomore and senior years. They found that, if the tests were scaled on a 0-to-100 range, 45 percent of the students would not have demonstrated gains of even one point over the first two years, and 36 percent would not have shown such gains over four years.[38]

The data on college graduates' basic skills is concerning. One in five employed American adults with a bachelor's degree lack important literacy skills, while one in three fall below proficient levels in numeracy, based on international assessments.[39] Even more striking, only 25 percent of

college graduates score high enough to be deemed "proficient" in literacy on national assessments.[40] Moreover, 20 percent of students completing four-year degrees have only basic quantitative literacy skills, meaning they cannot estimate whether their car has enough gas to reach the next station or calculate the total cost of ordering office supplies.[41] These are fundamental life skills that many would assume all college graduates possess.

It's not as if these problems have not been known for decades. Secretary of Education's Commission on the Future of Higher Education, better known as the Spellings Commission, noted:

There are ... disturbing signs that many students who do earn degrees have not actually mastered the reading, writing, and thinking skills we expect of college graduates. Over the past decade, literacy among college graduates has actually declined. Unacceptable numbers of college graduates enter the workforce without the skills employers say they need in an economy in which ... knowledge matters more than ever.[42]

This is one reason why there is a significant disjunction between the skills employers want and what colleges teach: Employers ranked job-specific technical abilities as their top priority, while educators placed those skills last, instead prioritizing soft skills.[43] Yet, paradoxically, graduates still struggle with the soft skills educators emphasize.

While the causes of this dismal performance are many, a few seem relevant. Grade inflation has occurred as professors have become less demanding in their grading. Many colleges and universities have begun to collect student feedback on courses, and schools often use this feedback to evaluate their professors. Students can also rate their professors publicly on websites such as ratemyprofessors.com. Lowering standards is one way to lower the risk of getting a bad student rating. The result is that students have less incentive to work hard and learn, knowing that they will likely receive a good grade, or at least a passing grade, and that overall they will receive the valued diploma.

At the same time, universities increasingly compete for students, and one way to do so is to ensure that the curriculum is not overly demanding. Second, as competition for students has heated up among college-aged Americans, colleges, especially below the top elite schools, realize that they want to retain students, and one way to do that is to not push too hard. On top of that, almost all research universities reward faculty first and foremost on their research and publication output, not on their teaching skills.

The sad reality is that employers can no longer trust degrees, even from "highly ranked" colleges and universities, to be a guarantee of knowledge and capabilities. It's largely a crapshoot.

Fostering More Higher-Ed Accountability

Employers, not just in national economic power industries but in all industries, depend on high-quality workers. Currently, U.S. higher education is failing in that task and showing little signs of either recognizing that failure or attempting to fix it.

This problem stems from the inherent conflict of interest in having the entity responsible for educating students be the same one that evaluates how well they have succeeded in doing so. Not surprisingly, at most colleges and universities, there is rarely anyone held accountable for giving degrees to students who have not learned much. Failing students means fewer tuition-

paying students. Indeed, this conflict is one reason for some of the most egregious scandals at universities, such as having student-athletes enrolled in fake classes.[44] And the sad reality is that employers can no longer trust degrees, even from "highly ranked" colleges and universities, to be a guarantee of knowledge and capabilities. It's largely a crapshoot.

But widespread and systemic reform has proven difficult. This is because these barriers are not easily overcome with generalized calls for reform, more data, or more money. What is needed is a more radical step: breaking the ironclad link between education and certification. Without this change, real reform will be difficult for the simple reason that neither students nor schools will be motivated to change. In other words, we need a system wherein a diverse set of education providers compete with each other to do the best job of teaching students (providing the best value experience where quality and cost are taken into account). Some will specialize in teaching certain types of students or certain types of programs.

But for such a system to emerge, we need to overcome a chicken-or-egg dynamic. There is no national certification system for the kinds of learning and skill acquisition colleges intend to provide, in part because there is little demand for it. But there is little demand for it because such a system does not exist. Anyone seeking to make the large investments needed to create such a system (including designing and administering the tests) would need to have some level of assurance that there would be demand for this service. And as long as employers still rely almost solely on degrees, rather than skills' assessments, the demand for and use of such a system will remain limited. Although designing the right tests would be difficult, the process would force a healthy discussion about exactly what knowledge and skills colleges should teach and what experience employers value in the job market. This would help institutions do a better job of educating and help students ensure that higher education strengthened their financial security instead of jeopardizing it. Part of this would be driven by market competition—if a particular assessment does not provide useful information to employers, then they will not use it to evaluate candidates, and students will have no reason to take it. It would also help weed out weak schools and reward good ones.

We need a system wherein a diverse set of education providers compete with each other to do the best job of teaching students.

A well-designed system of credentials would accomplish several things. First, it would give students a better idea of what they need to learn in order to get a good job. Students who took the tests would have an objective credential that they could show to employers. Other students could judge the quality of different colleges by comparing the scores of graduates from different schools. And it would lead more students to realize that what matters is what they actually learn in college, motivating them to work harder.

While this movement has grown, it's still nascent. In 2025, 85 percent of employers claimed to use skills-based hiring in TestGorilla, up from 56 percent in 2022.[45] Major companies such as Delta Air Lines, Bank of America, Walmart, and Dell have publicly removed degree requirements for many roles. Harvard Business School and the Burning Glass Institute's 2024 analysis reveals that while 85 percent of companies talk about skills-based hiring, only 0.14 percent of hires are actually impacted by degree requirement removal.[46] That's roughly 1 in 700 hires. Many

technology companies have moved in this direction, for example, Amazon hired 2,468 coding bootcamp graduates in 2024, up 129 percent from 2021–2022.[47]

Encouraging Government Agencies to Hire People With Alternative Certifications

Governments should demonstrate to the private sector the feasibility of using alternative credentials by accepting a suitable set as a substitute for a college degree when filling federal government jobs. The U.S. Office of Personnel Management (OPM) took steps in this direction in the Biden administration. And the Trump administration's OPM recently issued agency guidance on hiring that, among other steps, calls for "implementing skills-based hiring, eliminating unnecessary degree requirements."[48] The administration should ensure that it follows through with this provision and that agencies are actually complying with it.

Encouraging the Private Sector to Recognize Alternative Certifications

The Department of Education should work with corporate partners to encourage the use of alternative certifications. The goal here is to develop credentials similar to the Skills Certification System the National Association of Manufacturers' Manufacturing Institute developed with its members. The difference is that these would measure the general skills that a broader section of companies expects recent college graduates to possess when they enter the workforce.

In addition, students, their parents, and employers need better measures of university and college performance. One measure is the National Survey of Student Engagement (NSSE), which documents dimensions of quality in undergraduate education and provides information and assistance to colleges, universities, and other organizations to improve student learning. Its primary activity is annually surveying college students to assess the extent to which they engage in educational practices associated with high levels of learning and development.[49] The Center for Postsecondary Research at Indiana University's School of Education administers NSSE. The problem is that the results are only provided to universities. **Congress should require that any college receiving federal funding disclose its NSSE scores.**

Passing a Third "Morrill Act" to Restructure Land Grant Universities to Technical Skills in Alignment With Industry Needs

Too many Americans go to four-year colleges believing that they will be the ones who benefit from the fact that the average lifetime earnings for a college degree holder is higher than those of non-college-degree individuals. The share of high school students enrolling in four-year colleges increased from around 55 percent in 1984 to 62 percent in 2024.[50] But that earnings bump is not so much from the fact that they went to college, but rather that there is a fixed share of middle- and higher-wage jobs and those are given to college grads, whether or not a college degree is needed.

Moreover, there are too many students in degree programs that provide general education rather than more specific degrees, such as engineering, business administration, and pre-med. In 2024 and 2025, only 41 and 30 percent of graduates, respectively, found jobs in their chosen field.[51] Perhaps the core reason is that colleges are run by academics whose passion is for academic disciplines. And that is what they want to teach: existential philosophy, the women's movement, Latin American literature, etc.

To be sure, there is nothing wrong with a liberal arts degree, but only if the students learn rigorous thinking, writing, analytical, and communication skills. Simply learning some English literature or sociology is just not very useful if it does not come with real skill development. That requires an enormous amount of hard work—something most students have no desire to engage in and few faculty want to insist on. It's much easier to take the semester class, turn in a term paper, and do okay on a test that assess memorization. Moreover, few professors appear to want or even be able to teach the kinds of skills employers need.

One solution would be to copy what some Commonwealth nations have done and establish a national system of four-year polytechnics. These are institutions of higher education providing technical, applied, hands-on learning, and offering applied degrees, diplomas, certificates, and apprenticeship training, fueling business innovation with applied research expertise.[52]

For example, Canada has a system of 13 polytechnics.[53] Their focus is on "industry-responsive education; a focus on developing a work-ready talent pipeline; Industry-academic collaborative spaces; mid-career retraining options, bridge training and advanced placement, and applied research supports."[54] They offer programs for students who want to become industrial mechanics, agricultural equipment technicians, food researchers and innovators, or supply chain specialists.

Too many Americans go to four-year colleges believing that they will be the ones who benefit from the fact that the average lifetime earnings for a college degree holder is higher than those of non-college-degree individuals.

The United States supposedly has a system like that: the state land grant colleges. Today, there are 112 land grant universities. But they have drifted radically away from their original mission. Congress needs to pass legislation to fundamentally restructure state land grant universities.

The original idea of the Morrill Act in 1862 was to grant federal land to states to establish institutions teaching agriculture, engineering, and military tactics to the working class. The goal was to provide practical, affordable, and industrial-focused education to the "industrial classes" as an alternative to the traditional, elite universities such as Yale, Harvard, and Princeton.

At least until World War II, they generally followed that path. But after, most land grants transitioned from vocational "mechanic arts" schools to "glorified flagships." A number of factors led to that change. When the GI Bill sent millions of veterans to college, land grant schools were the only ones with the physical space (and the mandate) to accommodate them. To serve this new, diverse student body, these schools rapidly built out departments in the Liberal Arts, Business, and Humanities, moving away from a strictly agricultural or technical focus.

University presidents, such as Michigan State University's John Hannah, intentionally leveraged this growth to compete with traditional flagships for prestige and funding.[55] Because of the professors' pursuit of status through peer-reviewed publications, they and land grant university leadership sought to emulate the Harvards and Yales of the world. And that meant turning away from their more technical mission and broadening the curricula, most of it unrelated to the original mission. Practical education and industry-applied research became seen as second rate.

On top of that, after the creation of NSF, the federal government shifted its funding model. Instead of just funding "practical" agricultural research, agencies such as NSF and the National Institutes of Health began pouring billions into "pure" or "basic" science. To get this funding, land grant schools had to hire theoretical researchers who prioritized publishing papers over conducting applied research and teaching. Land grants also shifted their curricula to emphasize graduate education, effectively mimicking the structure of elite private and flagship universities.

And as part of that striving for respect, most land grant universities sought an invitation to join the Association of American Universities (AAU) as the ultimate signal that they are no longer just a "vocational school" but a global peer to Harvard or the University of Michigan. This in turn led to a ranking obsession and a focus on metrics that define "flagship" status: high selectivity, low acceptance rates, and high faculty citation counts.

This led to a change in curricula. Originally, land grant curricula were structurally different from traditional universities. Over time, they adopted similar curricula as flagship state universities to ensure accreditation, transferability, and that their students could get into law or medical schools. But while most land grants still place a slightly greater focus on engineering and other technical disciplines, they are largely very similar to state flagship universities. For example, Michigan State University, a land grant, offers over 200 undergraduate majors, while the University of Michigan offers 130.[56] Michigan State and Michigan both offer a degree in African American and African studies, both offer film studies, and both offer women and gender studies.

Since land grants now compete for the same high-achieving high schoolers as flagships do, they must offer the same "amenities": prestigious honors colleges, study abroad programs, and high-ranking business schools. A land grant that is busy trying to climb the *U.S. News & World Report* rankings might prioritize building a new student union over updating a high-tech, specialized lab for CNC machining or circuit design.

Originally, land grant curricula were structurally different from traditional universities. Over time, they adopted similar curricula as flagship state universities.

Also, to satisfy the faculty, they require broad requirements, with one result being that students spend two extra years taking "General Education" requirements (e.g., Michigan State's Integrative Studies) instead of mastering the high-level technical skills needed in modern industry. Or instead of finishing in two or three years, they now need four or five. And of course, that has contributed to the explosion of student debt.

In addition, the original mission of land grant universities included the Cooperative Extension Service, designed to bring university research directly into the hands of local workers and farmers.[57] As these schools became "glorified flagships," funding and prestige shifted toward theoretical research rather than applied and more practical research. And of course, these institutions needed to get big so they could field NCAA sports teams to satisfy alumni and gain revenues.

Opponents of shrinking and repurposing these institutions will counter that, in a rapidly changing economy, specialized skills become obsolete quickly. They contend that by giving a student a "flagship-style" education (teaching them how to learn through social sciences and humanities),

the student is better prepared. But as previously noted, it would be one thing if universities were actually teaching students, including how to learn. But they are not even doing that, as evidenced by the low levels of numeracy and literacy and the general disgruntlement of employers with college grads.

If land grants are to go back to their original mission, which included not only helping agriculture and industry but also providing the skills needed for working-class students, they will need to be fundamentally reformed.

Instead of a curriculum designed by academic committees, a specialized land grant would co-create its programs with industry leaders. Students might spend two or three years on campus for intensive technical theory and one full year in a paid, credit-bearing industrial residency. These schools would relax the requirement that all professors have Ph.D.s and instead hiring professors of practice who have actually worked in industry. They would dramatically reduce non-STEM faculty and course offerings available to students at other state universities. They would provide a hyper-focused, streamlined degree (perhaps three-year instead of four-year) that strips away the general "integrative studies" in favor of deep-dive technical mastery and project-based learning. And they would dramatically expand the breadth of technical degrees, similar to what Canada's Polytechnics do.

Also, the original land grants had "Extension" offices in every county. Today, these are often underfunded or focused on gardening for suburbanites. In the new land grant mission, these offices should be transformed into Regional Tech Hubs—satellite labs where workers could return for "micro-credentials" in new technologies (e.g., AI-driven logistics or robotic maintenance) without needing a full new degree, and where faculty work with regional industry to help solve technical problems.

If land grants are to go back to their original mission, which included not only helping agriculture and industry but also providing the skills needed for working-class students, they will need to be fundamentally reformed.

Why don't some states do this on their own? Why does Congress need to act? The answer is simple: the academic professorial guild holds the power at all universities, including land grants. Despite what a university president might think, he or she does not really run the institution; the faculty does. And if any institutions were to try to move in this direction, the resistance from the faculty would be a firestorm. Moreover, even if a state could achieve this, its land grant school would see its national reputation decline and faculty would be reluctant to teach there. What is needed is system-wide change incented by Congress.

To break this stranglehold, Congress needs to act by passing a third Morrill Act to incentivize state land grant universities to return to their original mission.[58] Congress can do that by providing grants to states that take the steps previously described. These massive "Capacity Grants" should be used to build world-class, industry-grade labs to enable applied research and technical training for students. And they should buy necessary related equipment, such as virtual reality technology, to enable real-time distance learning.

And as part of this, new federal funding should be used to cut tuition to at least half the levels of the flagship universities. In addition, companies or groups of companies should be able to "underwrite" specific departments in exchange for a direct pipeline of graduates, similar to the apprenticeship models found in Germany. The legislation should also authorize a "Technical Pell Grant" that covers 100 percent of tuition specifically for applied majors related to national economic power industries, such as advanced manufacturing, semiconductors, and biopharma processing. In addition, the legislation should explicitly include technologies such as AI systems, Cybersecurity, Biotechnology, and Advanced Robotics to the core land grant mandate. And as part of this new designation, land grants wanting aid would agree to cap their non-STEM enrollment at 30 percent initially, followed by 20 percent in five years, even if that means reducing faculty in nontechnical areas and closing entire academic programs. And as a condition of receiving federal funding, the land grants should have tuition rates at least one-third lower than the state flagship universities.

The repurposed land grants should also prioritize worker upskilling, such as providing nondegree "micro-credentials" at land grants, making it easier for mid-career workers to return for six-month intensive technical "retooling" programs.

As discussed in the ITIF report in this series on reforming U.S. research funding, **agencies such as NSF and the Department of Energy that currently prioritize basic research should be required to dedicate at least 25 percent of all federal research funding given to land grants to "translational or applied" research.** And for every federal dollar given to a land grant lab, the university must secure a 20 percent match from a domestic private sector industry partner. Doing so would force faculty to work on problems that the U.S. economy actually needs solved.

As part of their mission, the repurposed land grants should also prioritize worker upskilling, such as providing nondegree "micro-credentials" at land grants, making it easier for mid-career workers to return for six-month intensive technical "retooling" programs. (See box 2.)

The "professor lobby" will oppose this with all its might, calling it an attack on academic freedom, a sellout to industry, a degradation of the liberal arts, a decline in democracy, and a transformation of universities into short-term skill mills. But let's be clear: this proposal is not to eliminate the over 4,000 private colleges in America or the 1,600 non-land-grant public universities in the nation, although the lobby will suggest that it is an existential attack.

Rather, it would be a targeted intervention to enable more students not focused on liberal arts to get a strong technical education that can lead to much higher lifetime earnings at a lower cost. It would be an intervention to support more education and research in key areas that are critical to avoiding a loss to China in national economic power industries.

Box 2: MIT's "Technologist" program

One key federal role should be to foster institutional innovation and then help to scale these innovations. There is too little innovation in the university system. And to the extent there is innovation, little of it is related to creating a national education and workforce system for economic power. And even less of that, to the extent it exists, ever goes beyond one-off pilots.

One program that should be considered for scaling is the Massachusetts Institute of Technology's (MIT's) "Technologist" project, which takes talented incumbent manufacturing workers picked by their companies and trains them into a new career path between engineer and technician, enabling them to undertake the systems approach to the factory floor required to implement advanced manufacturing technologies and processes. While community colleges and Labor Department programs reach new entrant workers, there are few programs to upskill incumbent workers—a critical need for manufacturing companies, especially small and mid-sized ones, looking to adopt advanced manufacturing processes.

MIT recently completed a two-year project funded by the War Department's Industrial Base Analysis and Sustainment (IBAS) program to develop the technologist curriculum. The curriculum is online course material from MIT faculty and other experts; online simulations from MIT, Clemson, and Ohio State; and in-person labs at the six participating community colleges/tech centers.

The challenge is to scale this initiative nationally, with virtually every technical college in the nation participating. In addition, because not every college, or even most, can afford the kinds of advanced manufacturing equipment workers will need to train on, the curriculum will have to use virtual reality applications. So far, DOW has provided two-year funding. Going forward, more funds will be needed to enable MIT, or an organization it designates, to scale this nationally. Also, ongoing funding may be needed in order to provide discounted rates for small and medium-sized enterprises that enroll their employees in this program.

Supporting the Creation of Industry-Focused and -Led Industrial Colleges

While America definitely needs more universities focused on particular industries, we do have some already. The SUNY Maritime College, which trains merchant marine officers, naval architects, and marine engineers. Students get hands-on experience on actual training ships, and the curriculum is shaped by industry needs and Coast Guard licensing requirements. Graduates move directly into shipping, naval architecture, and related maritime industries.[59]

America needs more universities focused on particular industries.

Kettering University (formerly the General Motors Institute) is built around co-op education wherein students alternate between classroom study and paid work at automotive and manufacturing companies.[60] The curriculum is explicitly designed to feed talent into the auto industry and advanced manufacturing. The Colorado School of Mines specializes in engineering and applied science for the fields of mining, energy, and earth resources. Students conduct research aligned with industry partners' needs, preparing them with the practical and technical skills needed for these fields.[61] The California Institute of the Arts outside Los Angeles, originally set up by Walt Disney, trains students in skills for the entertainment and arts industries.

One could imagine a range of such specialized teaching colleges, such as a financial services college in New York, a biomedical college in Philly, a digital skills college in Silicon Valley, and even a think tank and public policy college in DC.

To do so, **Congress should appropriate funds to the Department of Education to establish a competition to establish up to 10 industry- or technology-focused universities.**

Shifting Colleges and Universities Away From Teaching Social Sciences and Humanities to Real Capabilities Students Need for Lifelong Career Success

U.S. colleges and universities are based at their core on academics: a subdivision of knowledge that is taught and researched at the college or university level. Graduate students who are passionate about a particular topic (e.g., French history, social movements, philosophy, etc.) obtain a Ph.D. so they can have a job that lets them do research and write about their passion (and to fulfill the teaching requirements that come with that). indeed, academic research is creative and systematic work undertaken to increase the stock of knowledge. And a professor is one who teaches a branch of knowledge, especially in a university (from Old French term *professeur*).

It is time for colleges and universities to evolve toward more practical education.

But few ask whether this is the best way for students to learn what they need to succeed in the workplace. Especially in the age of AI, it is much less important what academic subjects students learn. Clearly, some students, usually more motivated students at better schools, use academic subjects to learn related skills, such as critical thinking, writing, logic, and public speaking. But most students do not—and most don't even learn that much about the academic subject they are taking classes in.

It is time for colleges and universities to evolve toward more practical education. Practical does not mean vocational, although we need more of that. Rather, we mean the opposite of theoretical, scholarly subject-based study. A pedagogy that focuses on enhancing key capabilities that can be used in a wide range of careers. These could involve skills such as basic legal theory, entrepreneurship, introductory statistics, logic and argumentation, graphic design, business writing, using AI, product and market research, public speaking and presentations, organizational behavior, and budgeting. To enable the creation of these new kinds of curricula, we will need new accreditation bodies. Current ones are designed to reinforce the scholarly approach to higher education, not practical universities. They only allow schools to be accredited that have subject matter academic degree programs with students required to major in specific disciplines (e.g., history). And to be accredited, institutions must, as one accrediting agency requires, offer "degree programs [that] include a recognizable core of general education that represents an integration of basic knowledge and methodology of the humanities and fine arts, mathematical and natural sciences, and social sciences."[62] This is why the Trump administration's efforts to reform accreditation bodies should include establishing a new kind of accreditation for practical universities.[63]

At the same time, Congress should provide the Department of Education with funds to operate a challenge grant competition wherein schools could apply to create such programs within their

institutions or create new practical colleges. And Congress should ensure that all federal student aid, including Pell Grants, can be used to support practical college education.

Supporting Expansion of Critical Technology Degree Programs

U.S. higher education does respond to new science and technology developments in terms of their undergraduate and undergraduate programs, but the response is often slow and, in part because of lack of funding, haphazard.

As part of a national economic power industry, it's not enough to just fund R&D in critical and emerging technology areas. We need to also fund curriculum development. This is what China is doing. In 2025, top universities, such as Tsinghua University, Peking University, and Shanghai Jiao Tong University, added 150 undergraduate places in emerging engineering fields such as AI, integrated circuits, and new energy. These specializations serve national strategy and align with emerging industries in many cities.[64] Congress should ensure that NSF has adequate funding to establish an annual funding program for research universities (including land grant colleges) to establish new science and technology curricula in areas of national importance.

GIFTED INDIVIDUALS

The United States needs to place much greater focus on supporting and attracting highly gifted individuals, as they play a key role in supporting innovation and competitiveness.

While it is not politically acceptable to say this, the reality is that IQ matters and, in general, having a population with a higher average IQ better supports innovation and national economic success. Research suggests that the average IQ of a scientist falls between 125 and 135, essentially 2 to 5 percent of the population. The IQ of the average physicist and mathematician is even higher.[65]

This may be why a nation's intelligence is a determinant of its economic well-being. Countries with more cognitively skilled populations tend to be more productive and better able to adopt and improve new technologies. A large body of academic research shows that higher average IQ is strongly correlated with higher gross domestic product (GDP), and several studies go further by demonstrating that higher IQ, in fact, causally leads to higher economic output.[66]

Several studies indicate that higher average IQ is not just correlated with higher GDP but also a direct cause of it.

A series of academic studies supports this relationship between intelligence and economic performance. Numerous cross-country analyses find that nations with higher average IQ scores also enjoy higher GDP per capita and better overall economic outcomes. For example, Jones and Schneider found that a one-point increase in a country's average IQ is associated with a 0.11 percent increase in GDP per capita.[67] While this effect may appear modest at first glance, even small percentage gains compound substantially over time. Corroborating this finding, Hafer showed that a one-point increase in IQ is associated with a 4 percent increase in an average nation's welfare growth.[68]

A study published by the Association for Psychological Science finds that a one-point increase in a country's average IQ is associated with a $229 increase in GDP per capita.[69] The same study

also finds that if the top 5 percent of the population were to increase their IQ by one point, GDP per capita would rise by an even larger amount, at $468, highlighting the outsized economic importance of highly skilled individuals. Other evidence further reinforces these results. A study by Kreiter and Wongupparaj finds that, over five decades, the correlation between average IQ and economic growth is 0.74, an exceptionally strong relationship by social science standards.[70]

More importantly, several studies indicate that higher average IQ is not just correlated with higher GDP but also a direct cause of it. In one influential study, Jones found that a one-point increase in IQ causes roughly a 1 percent increase in wages and a 6 percent increase in national GDP.[71] Similarly, a study by Dickerson finds that a 10-point increase in a nation's mean IQ results in the doubling of per capita GDP.[72] In other words, intelligence does not simply accompany higher living standards. It actively produces them. Nations do not become rich first and intelligent later. Higher intelligence helps nations become rich in the first place.

This has two implications for policy. The first concerns how the education system treats high-IQ students. The second is how the immigration system supports increasing the national average IQ.

Expanding Support for Gifted and Talented Students

Not only are gifted and talented students largely ignored in America—despite lip service—but, for the most part, they are discriminated against. Indeed, the biggest cardinal sin in America, especially in the last decade, is being tarred with the elitist brush. Why are you focused on helping those who are already advantaged, especially if they are white or Asian? Indeed, education for high achievers has come under attack in recent years. Gifted and talented programs have been dismantled in New York, Boston, and Virginia based on this reasoning.

The reality is that gifted students are largely ignored, to their and the nation's detriment. Most teachers are overworked and stretched thin. When reviewing test scores, the students who get high marks aren't the ones who catch their eyes, as all programs now focus on getting low achievers up to average, which is what state testing measures. Moreover, schools get credit for moving students from "below proficient" to "proficient," but zero credit for moving already-proficient students to advanced levels. Gifted kids became invisible in the data that matters for school ratings. There's a widespread assumption that bright kids will be fine on their own, so resources should go to struggling students instead.

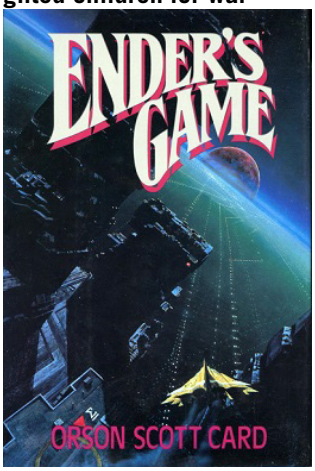
Not only are gifted and talented students largely ignored in America—despite lip service—but, for the most part, they are discriminated against.

Without proper challenge and pedagogy, many gifted students learn to underachieve in school, expending minimal effort and never learning to work.[73] For example, a study in Florida finds that disadvantaged boys accepted into a gifted student program in the fifth grade (with an IQ of 116 or higher) were significantly more likely to enroll in college on time compared with their peers with IQs just below 116 who were not admitted into the program. Specifically, boys in the gifted program had a 74 percent on-time college enrollment rate, compared with just 47 percent for those who missed out on the program. Entry into the program also closes the gender gap for boys and girls of similar IQs, with on-time college entry rates for students in the program reaching about 75 percent for both genders.[74]

The students who have the potential to contribute the most to the nation's techno-economic war with China are being underdeveloped. In his novel *Ender's Game,* science fiction writer Orson Scott Card depicted a world in which humanity is facing its third war with an alien race, and the only way to survive it is for the space military force to identify the gifted children best suited to becoming commanders at their orbiting battle school.

We need to start thinking in a similar way with regard to gifted students. No gifted student of any race or family income should be stuck in a regular school program if they and their family do not want them to be. They should be able to receive the kind of advanced education that suits their interests and capabilities.

***Ender's Game*: recruiting gifted children for war**



Other nations that see themselves in intense global competition treat their gifted young people as a valuable national resource. For example, Singapore's Gifted Education Programme (GEP) systematically identifies the top 1 percent of students in each academic year for entry into it. There are dedicated schools with enriched curricula that cover the same content areas as mainstream schools, but that content is extended in breadth and depth. Students learn skills for independent inquiry and are encouraged to do explorations of self-selected areas of interest. Students attend nine dedicated GEP primary schools nationwide; however, the program is expanding in 2027 to serve a broader, but still small, group of students.[75]

Israel, South Korea, and Taiwan have similar initiatives.[76] South Korea operates eight schools for scientifically gifted students.[77] Seoul Science High School accepts only the top 0.01 percent of middle school graduates.[78] China now runs a special program to find 100,000 top high school students from across the country every year. They train these students to compete in math Olympiads and other major international math and science competitions.[79]

Unfortunately, in the United States, there's no federal requirement to fund gifted programs, and only 32 states provide any additional funding for gifted students, with only 4 states fully funding these needs.[80] The federal government's Jacob K. Javits Gifted and Talented Education program provides just $12 million annually, which translates to only $2.50 to $4 per gifted student nationally.[81]

Federal policy should treat giftedness as it does disabilities, requiring states and school districts to test for it and provide appropriate learning environments, ideally by creating new schools for gifted students. As a start, Congress should expand funding for the Javits program to at least $100 million annually. This would help identify a broader range of gifted students. For example, when one Florida district switched to universal screening for giftedness, identification rates for Black and Latino students jumped 74 percent and 118 percent, respectively.[82] Those states that do not do that should be subject to reduced federal education funding.

Creating "Intelligence Visas" to Attract the Best and Brightest Immigrants

High intelligence is a scarce factor of production. The distribution of IQs in the population is on a bell curve, so 16 percent of people are at or above one standard deviation from the mean (that is, above 115, with 100 being average), and just 2 percent are gifted at 130 or above. That

means there are around 34 million working-age Americans above 115, and 4 million above 130. Contrast that to the rest of the world, which has 846 million above 115 and 106 million above 130.

To assume that IQ doesn't matter and that education and training can make up for societal IQ deficits is simply not borne out by logic or facts. As noted, on average, scientists are extremely intelligent. Graduating a lot more scientists with average IQs would not likely do much to advance U.S. techno-innovation cutting-edge capabilities. Attracting more truly intelligent people to America would. It is clearly in the interest of the United States to have more of this factor in production. And the easiest way to do this is to change the immigration system.

High intelligence is a scarce factor of production.

We already have immigration provisions that work in this direction. The O-1A visa is for the individual who possesses extraordinary ability in the sciences, arts, education, business, or athletics. The EB-1 visa is, in theory, reserved for people who are highly acclaimed in their field—the government cites Pulitzer, Oscar, and Olympic winners as examples—as well as respected academic researchers and multinational executives.

While there is no limit to O-1A visas, their numbers are quite small: around 9,500 in 2023. And the reason is that the qualifications for approval are quite strict, focusing more on achievement than on capabilities.[83] **Congress should reform the O-1A visa to allow applicants to qualify if they meet one of the eight possible requirements (instead of three).** These visas should automatically transition to a green card after two years (assuming the individual has obeyed the law). In addition, **applicants should qualify if they are in the top 1 percent of international SAT test takers in the math section and in the top 5 percent in the reading and writing portions.**

BARRIERS TO CHANGE

There will be significant resistance to many of these proposals, some based on inertia and preference based on the status quo; others based on self-interest. Change will be hardest at the university level because it has become an interlocking system that makes any real change extremely difficult. Accreditation bodies are run by academics. Universities are run by academics. Individuals get Ph.D.s so they can spend their life studying something that interests them (or to indoctrinate students in their policies), so they need a place that pays them to do this. In other words, higher education is in many ways a professional guild that maintains itself.

Change will be hardest at the university level because it has become an interlocking system that makes any real change extremely difficult.

Nonetheless, the criticisms of higher ed have been mounting, including massive student debt and poor performance, so it's worth trying real reform.

One criticism of these proposals is that, if Implemented, they will result in fewer humanities and social science professors and a concomitant reduction in scholarly research in these areas. That is most assuredly the case. But it's important to note that the reforms here would not eliminate these fields but only shrink them. And when you look at the bibliometric data, it's pretty clear

that this would have a minimal impact—if that—on knowledge production. For example, roughly 82 percent of humanities articles are never cited in the first five years after publication. In the social sciences, the uncited share is lower but still substantial: estimates range from 30–60 percent depending on field and time window. There is no reason why the scholarly labor market should not perform well with the decline in faculty slots for humanities and social scientists coming from the least productive and original scholars.

CONCLUSION

There is perhaps no area of policy where the narrative around the need for change so vastly outweighs actual change than education and training. To be sure, there are excellent initiatives at all levels in many parts of the country. But a national economic power industry system they do not make.

It is time for the federal government to take more seriously the creation of an education and skills system that is vastly better than the current one and that becomes an integral part of a national economic power industry strategy.

Mobilizing for Techno-Economic War, Part 5: Transforming STEM Research Policy

ROBERT D. ATKINSON

Increased federal funding for STEM research is necessary but not sufficient for America to avoid losing to China. It's also time for a new model for federal research funding that focuses on the technology needs of national power industries and directly benefits firms in the United States.

KEY TAKEAWAYS

- U.S. research policy is outmoded. It focuses too much on basic science, not enough on engineering and applied research. There is too little industry involvement, no prioritization of national power needs, and too much spillover—especially to China.
- Change must be more than incremental. Just as a new federal research model emerged after WWII, we need a new federal research model today, one that puts the mission of not losing to China in national economic power industries front and center.
- Congress should start by appropriating an additional $100 billion per year for research—and all of it should be targeted toward national economic power industries.
- The system should focus on specialized research centers, not individual awards. Funding should be sized for scale, sustained based on performance, and include more in the mid-stages so discoveries can cross the "valley of death" to be commercialized.
- The system also needs increased industry involvement, with new kinds of research universities; large-scale, non-profit research centers focused on dual-use technologies; more, better-funded Manufacturing USA centers; and a new "civilian DARPA."
- Congress should enact a 50 percent tax credit for industry-led collaborative research or funding for university or federal research; fund grants for new approaches to training scientists and engineers; and provide funding to match states' R&D funding.

INTRODUCTION

The United States has been the world's dominant techno-economic power for over 125 years. That has induced complacency. As the Information Technology and Innovation Foundation (ITIF) has written, China is hungry and determined not only to displace American techno-economic leadership, but to also make America dependent on it.[1]

On its current trajectory, it is likely that China will, in the next decade or two, amass significantly greater capabilities than the United States and even Allies will in what we term "national power": advanced traded-sector industries that are critical to national security or sovereignty. With those greater capabilities will come geostrategic hegemony over the West, unless the United States forestalls that outcome by adopting a new, transformative national power industry strategy that goes beyond a mere competitiveness or national innovation strategy. This is not a war that the United States and allies can win in the sense of significantly weakening or retarding the growth of China's own national power industries. Rather, the only way Chinese attacks will end is if China becomes a free, democratic country. But the United States and allies can avoid defeat—keeping their national power industries relatively strong—by working together and adopting national power industry strategies.

However, the inherent weaknesses of the U.S. innovation and production system (e.g., cuts in government research and development (R&D), limited STEM (science, technology, engineering, and math) skills, an overly strong dollar, institutional resistance to change, corporate short-termism, etc.) coupled with a Chinese Communist Party hyper-focused on victory suggests that, absent major structural change in U.S. policy, relative decline and loss of techno-economic competitive position and power is inevitable.

The most important research change is to make not losing to China the top national mission for federal research funding, on par with having the most advanced military in the world.

The first report in this series laid out the context for this, including what is at risk and the need for radically new approaches in a host of key policy areas.[2] Not small steps, but big ones. Not tinkering, but transformation. "Bold" is the operative term. The crisis is at such a point that incrementalism will fail. Other reports have focused on transforming from financial capitalism to national techno-economic capitalism and from free trade agreements to strategic techno-economic-trade partnerships.

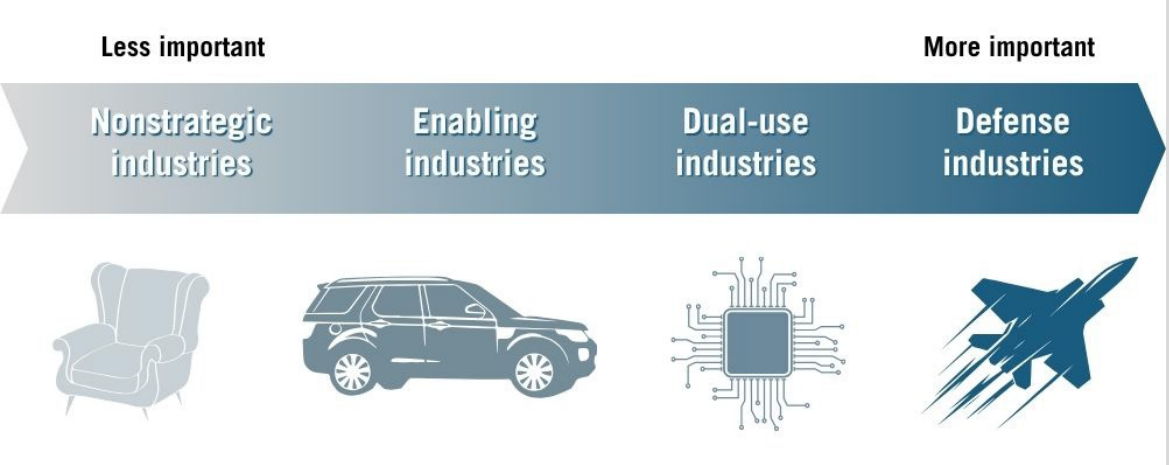
This report lays out a reform and restructuring agenda for U.S. science and engineering research policy. Federal support for scientific and research can play a key role in ensuring that the United States does not lose the techno-economic war to China, but only if Congress and the White House significantly restructure the system to make it more effective.

The most important research policy change is to make not losing to China the top national mission for federal research funding, on par with having the most advanced military in the world. That means not only significantly increased funding focused on technology needs related to national economic power industries, but also research conducted in such a way as to provide tangible mid-term benefits to existing and start-up firms in national economic power industries.

Box 1: Defining National Economic Power Industries

The conventional view is that the only industries that matter to national power are defense industries. But that is now vastly too limiting. As Corelli Barnett wrote, "For munitions production for modern war is not primarily a question of specialized armament industries, as some suppose, but of all those varied industrial and scientific resources that in peacetime make for a successful and expanding export trade."[3] As such, ITIF has developed a classification of U.S. industries for their relevance to national power. This can be viewed as a continuum between defense industries on one side, nonstrategic industries on the other, and strategic industries and strategic enabling industries in the middle. See figure 1.

Figure 1: Industrial power scale



At one end of the continuum are defense industries. Clearly industries such as ammunition, guided missiles, military aircraft and ships, tanks, drones, defense satellites, and others are strategic. Not having world-class innovation and production capabilities in these industries means a weakened military capability. Policymakers across the aisle generally (with the exception of the isolationist Right and the pacifist Left) agree that these industries are strategic and that market forces alone will not produce the needed results.

At the other end of the spectrum are industries in which the United States has no real strategic interests. These include furniture, coffee and tea manufacturing, bicycles, carpet and rug mills, window and door production, plastic bottle manufacturing, wind turbine production, lawn and garden equipment, sporting goods, jewelry, caskets, toys, toiletries, running shoes, etc. If worst came to worst and our adversaries (e.g., China) gained dominance in any of these industries and decided to cut America off, we'd survive—in part, because none of these are critical to the running of the U.S. economy, as many are final goods that might inconvenience consumers but wouldn't cripple any industries, and also because, in most cases, domestic production could be started or expanded relatively easily because none of these products are all that technological complex from either a product or process concern and the barriers to entry are relatively low.

Next to defense industries, dual-use industries are critical to American strength. Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give our adversaries incredible leverage over America. Just the threat to cut these off (assuming that they have also deindustrialized our allies in these sectors) would immediately bring U.S. policymakers to the bargaining table. National power industries tend to also need

global scale in order to compete. Moreover, many are intermediate goods such as semiconductors and chemicals, where a cutoff would cripple many other industries. Finally, these industries are hard to stand up once they're lost because of the complexity of the production process, product knowledge, and the importance of the industrial commons that support them. In other words, barriers to entry are high and, if lost, would be very difficult and expensive to reconstitute.

Finally, there are enabling industries. These are industries wherein, if the United States were cut off, the immediate effects on military readiness would be small. And the U.S. economy could survive for at least a while without production. America could survive for many years without an auto sector, as we would all just drive cars longer. But because of the nature of these industries—including technology development, process innovation, skills, and supporting institutions—their loss would harm both dual-use and defense industries. That is because enabling industries contribute to the industrial commons that support dual-use defense industries. A severely weakened motor vehicle sector would weaken the tank and military vehicle ecosystem. Similarly, a weakened commercial shipbuilding sector has weakened military shipbuilding. A weakened consumer electronics sector weakens military electronics.

U.S. SCIENCE AND RESEARCH POLICY: 1945 TO THE PRESENT

U.S. science policy has gone through a number of relatively distinct stages.

Prior to WWII, there was limited federal support for science other than establishment of land grant colleges and some funding for agricultural research and aeronautics. In fact, before the war, federal support for research was only around 0.1 percent of gross domestic product (GDP). Foundations and companies were the principal funders of university research.

That changed in and after WWII when science became seen as critical to winning the Cold War and addressing a host of national challenges. A bipartisan consensus emerged that the federal government needed to expand its funding of science. But it was not clear what the model should be. On one side was Senator Harley Kilgore (D-WV) who wanted a federal science agency to advance explicit national goals and purposes. On the other side was scientist Vannevar Bush who, in his 1945 report to the president, *Science: The Endless Frontier*, advocated a scientist-led model with individual scientists free to pursue their own interests.[4] With the establishment of the National Science Foundation (NSF) in 1950, Bush's vision prevailed. Bush articulated a linear model of innovation, wherein the federal government funded basic research and, through some unexplained process, out came commercial innovations. That oversimplified model has been thoroughly debunked in the science policy literature.[5]

Bush envisioned five key aspects of this system:

1. **There must be significant federal funding.** By the early 1960s, federal support for research had reached 2 percent of GDP.
2. **Funding should be merit based and go to the best universities and researchers,** with no focus on geographic diversity.
3. **There should be no strings.** As Bush wrote, "Scientific progress on a broad front results from the free play of free intellects, working on subjects of their own choice, in the manner dictated by their curiosity for exploration of the unknown. Freedom of inquiry must be preserved under any plan for Government support of science."[6]

4. **All disciplines are equal.** If science is supposed to be investigator led, then government should not favor some disciplines over others. The primary goal is knowledge generation. And all fields are equally capable of producing knowledge. Astronomy is as valuable as computer science.

5. **Science should be global.** Bush wrote that "the Government should take an active role in promoting the international flow of scientific information."[7] The advancement of science benefits humanity, so international collaboration is valued.

The United States could afford to focus on science because we dominated global manufacturing. It wasn't even close. And leaders then through to the 1970s at least could not conceive of it being otherwise. And so, the science system was established and remains embedded, even as the United States lags behind dramatically in manufacturing compared with world leaders, especially China.

Bush articulated a linear model of innovation, wherein the federal government funded basic research and, through some unexplained process, out came commercial innovations.

While science was to be "pure," there was also a realization that science and engineering played key roles in supporting key national missions. Indeed, the dictates of the Cold War meant that certain disciplines, especially physics, engineering, and later computer science were privileged. This included defense, space, health, agriculture, and energy. These were all seen as acceptable areas for government support for not just early-stage research but also later-stage development because they were areas the private sector would underinvest in.

Starting in the mid-1980s, this model was complemented by a modest focus on international competitiveness. As the United States faced techno-economic competition from Japan and Germany in particular, there was an increasing focus on having universities play a supportive role. The passage of the Bayh-Dole Act, the creation of Small Business Innovation Research (SBIR), and the establishment of industry-university programs at NSF was emblematic of that. But these programs were add-ons to the prevailing system and were only tolerated, not embraced.

LIMITATIONS OF THE CURRENT SYSTEM

This two-part system—basic research for knowledge discovery and mission-oriented applied R&D—is no longer adequate. Too little university research is oriented toward knowledge generation related to national power industries. And even where it is, too much of that knowledge is used globally, including in China, and too little is commercialized into U.S. innovations. And while mission-driven research in areas such as defense and energy does have benefits for national power industries, its "efficiency" rate is limited since its core purpose is not to support the broad array of national economic power industries.

These limitations are becoming more evident. The Endless Frontier Act and its incorporation into the Chips and Science Act was an attempt to recognize these limitations, largely by identifying support for 10 key technology areas and providing funding for NSF's new Directorate for Technology, Innovation, and Partnerships (TIP).

But the university lobby successfully pressed for most of the bill's funding to go to the other divisions at NSF for principal investigator-led grants. The last thing they wanted was limits on their freedom. And even with some money going to TIP, the internal and external pressure on the program ensures that it is at least somewhat focused on the Bush doctrine. Moreover, in FY 2023, TIP funding was 8.9 percent of total NSF funding and fell to just 6.8 percent in FY 2024.

The current U.S. STEM research system, while possessing strengths, is not likely to sustain U.S. techno-economic strength vis-à-vis China.

Many will argue that the Bush science system maximizes knowledge creation and even innovation and that is in national interest. But sometimes it does and sometimes it does not. The answer depends. Doctrinaire views that principal investigator-directed scientific research is best are a distraction from real analysis. But overall, the current U.S. science system, while possessing strengths, is not likely to sustain U.S. techno-economic strength vis-à-vis China.[8] The current model will not succeed in addressing the China challenge.

Why not just rely on the current Bush system coupled with agency-specific mission driven research to achieve national techno-economic power? The reason is that this can diverge from the goal of techno-economic power in at least four ways: 1) the balance between science and engineering, 2) the stage of the research, 3) the areas invested, 4) the involvement of industry, and 5) the duration of research funding. Relying on the current system, even with incremental reforms to reduce these divergences, is wishful thinking.

Too Much Science, Too Little Engineering and Technology

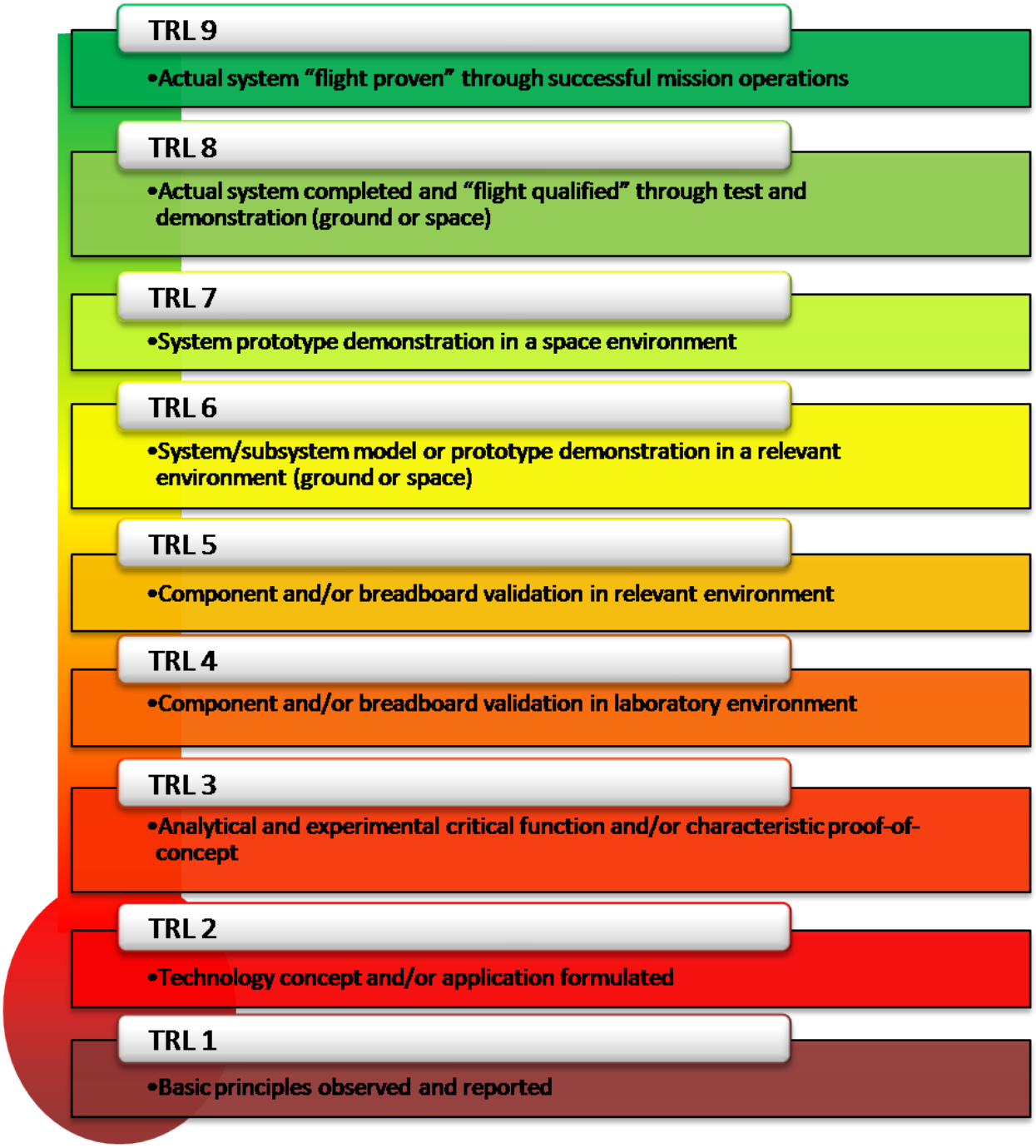
In the *Endless Frontier,* Bush mentioned science 119 times, but technology just 5. This was not an oversight. This reflected the entire purpose of his enterprise: advance science research. Today, engineering receives just 15.6 percent of federal support for research.[9] At NSF, this share is even lower at 8.2 percent.

But engineering research is a critical part of advances in industrial production that is needed in order to be able to compete with China. It's not enough for the United States to advance new ideas; it needs to be able to produce the results in the United States, and engineering plays a key role.

Too Much Focus on Basic Research

In terms of science funding, most is classified as basic research as opposed to applied. NASA has developed a measurement system to assess the maturity level of a particular technology based on Technology Readiness Levels (TRLs). (See figure 2.) Using that framework, a significant share of federal support is for early-stage research (TRLs 1 and 2), while most private sector research is much latter, around TRLs 7 to 9. In between—around TRL 4 to TRL 6—there is a huge gap that is often called the "valley of death" because it is where promising, early-stage technologies die from lack of funding.

Figure 2: NASA Technology Readiness Levels[10]



The idea of doing research related to a particular technology, such as AI or new jet engines, is different than scientific research at an earlier stage trying to understand core principles.

One way to frame this is the goal of science being to acquire knowledge and understanding of the natural world, whereas the goal of technology is to solve practical problems and fulfill human needs. The focus of science is discovery; the focus of technology is invention. The outcome of science is facts, theories, principles, and laws; whereas the outcome of technology is tools,

machines, processes, products, and services. In a world without Chinese competition, support for technology might be less important. In a world with it, it's much more important.

In addition, early-stage basic research is often not useable for industry, as it can be too basic and general. And there is often not enough support to move it up to later TRLs, or the valley of death.

Another challenge with the overfocus on basic research is that many of the results "spill over" to other nations. Scholarly research shows that when a country, even one as large as the United States, funds basic research, the majority of the benefits spill over to other nations that can use the knowledge discovered to help their own economies.[11] Basic research produces general-purpose knowledge that is nonrival and difficult to exclude others from using, crosses industry boundaries unpredictably, and tends to be published openly rather than kept proprietary. Applied research, by contrast, is more targeted, more likely to be patented or kept as trade secrets, and more valuable precisely because it creates advantages for the firm or country that conducts it.[12]

Another challenge with the overfocus on basic research is that many of the results spill over to other nations.

For too long, the United States has been doing the responsible thing and other nations the "selfish" thing. The United States has long invested significant funds into basic research at agencies such as NSF, National Institutes of Health, and Department of Energy (DOE). In contrast, nations such as China, France, Germany, Japan, South Korea, and Taiwan devote a significantly larger share of their R&D budgets to applied research to benefit their domestic industries.

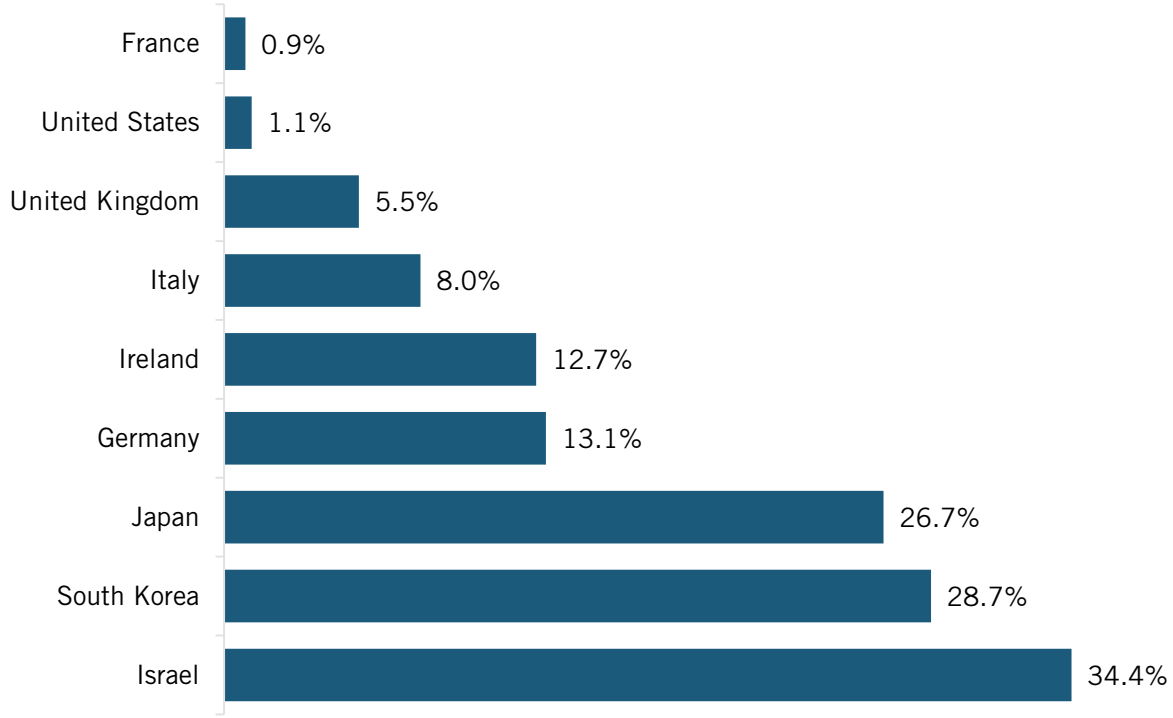
It would be one thing if other nations, especially China, stepped up to their global responsibilities and invested much more in basic research that the whole world would benefit from. But China does not. Most of China's research is later stage designed to give its firms advantage.[13] China knows that it can free ride off of U.S.-funded basic research.[14] Chinese researchers attend international conferences to hear U.S. researchers present their findings. Their China National Knowledge Infrastructure (CNKI) Express system provides them with access to over 300 million international scientific articles. They send their graduate students to U.S. universities. And they also cut off other countries from access to their own scientific publications.[15]

Research Related to National Power Industries

Mission-driven research agencies play key roles, but much of their focus is also on basic research (e.g., DOE's efforts to discover matter) or national missions, such as energy. To be sure, some of the research on energy, health, and defense supports national economic power industries, but research targeted to the needs of national economic power industries is quite limited and occurs by happenstance.

If we compare the United States with other nations, the difference is stark. Twenty-nine percent of South Korean government R&D is focused on industrial technology, compared with just 1 percent of U.S. R&D. (See figure 3.)

Figure 3: Share of national government R&D expenditures focused on industrial technology[16]



Too Little Industry Involvement

Before WWII, industry funded a significant share of university R&D. However, as federal research funding increased dramatically during and after the war, industry's share fell to just around 3 percent in the 1970s. That percentage started to rise again in the late 1970s and early 1980s, in part due to the growth of more science-based industries, including information technology and biopharmaceuticals, but also because of federal and state policy changes. For example, the Bayh Dole Act in 1980 gave universities rights to intellectual property generated from federal funding, which spurred many universities to work more with industry. Separately, NSF during the Reagan administration developed new industry partnership programs such as the Engineering Research Center (ERC) program, while many state governments developed university-industry research centers to grow technology-oriented businesses. Both of these types of initiatives spurred industry funding. As a result, the share of university research funded by industry increased from 4.9 percent in 1980 to a high of 7.4 percent in 1999. The share has fallen since then, however, even as federal funds have dropped overall. In 2024, industry funded around just 6 percent of U.S. university research.[17]

Box 2: The American vs. Chinese STEM Research Model

The conventional wisdom in the United States is that the U.S. STEM Research model is the envy of the world and, not only that, but that China seeks to copy it. This is a very comforting vision. No need to consider significant system change. Just expand federal funding and high-skill immigrants and all will be good.

The United States system was the best in the world, and may still be if we lived in a world where all other nations played by shared techno-economic and trade rules and some were not our main

international adversary. But in such a world, every developed country at least would be investing significant funds into basic research that the rest of the world would share. No country would have to worry too much about deindustrialization and the loss of national power that brings. But that is not the world we live in anymore, and the U.S. STEM research system needs to evolve in that direction.

Not only that, but, as discussed below, it's a myth to believe that the Chinese Communist Party's (CCP's) goal is to evolve its STEM research system into one that looks and operates like ours. Their system is designed to advanced national techno-economic power.

The Chinese system is different than the U.S. system in at least two main ways.

First, the U.S. system is principal-investigator driven. Some really smart researcher identifies the research they want to do, writes a proposal for it, gets money, hires a team of graduate researchers, hopefully makes discoveries, and publishes them in top-ranked peer-reviewed articles. The idea is based around individuals.

China's system is not that. It's based around teams who are motivated by one overarching mission: beating the United States. Perhaps this is a function of China's more communal culture. Or perhaps it's the CCP's realization that winning in national power industries takes big dedicated teams working together. Either way, it's a different system.

The systems differ in terms of mission-oriented labs—perhaps not so much in terms of their organization, but in terms of goals. Federal labs are there for a reason, as long as it is not commercial competitiveness. It can be agricultural productivity, health innovation, transportation materials, weapons, or energy. But there is no federal lab, even accounting for National Institute of Standards and Technology (NIST), whose mission is to beat China technologically in a slew of national economic power industries.

China has been reorganizing and expanding its laboratory system as a core component of its National Innovation Systems, particularly prioritizing this in its 14th Five-Year Plan (2021–2025), with "self-sufficiency and self-made success in science and technology" as overarching goals.

Fore example, as of 2023, there were 533 State Key Laboratories (SKLs) approved in China. Their mission is to carry out cutting-edge basic research, attract and train domestic and foreign talent, and conduct academic exchanges inside and outside China. Their areas of research include quantum computing, nanotechnology, opto-electronics, AI, Advanced semiconductors and microelectronics, photonics, and materials science. It is not that U.S. national labs don't also conduct research in these areas, it's that their goal is not U.S. commercial advancement.

We see this focus in the second area where China's system is different than the U.S. system. While the U.S. system gives lip service to commercialization, its not front and center of the activity. It is something that just hopefully happens. In contrast, the Chinese system seeks to "promote deep integration of scientific and technological innovation with industrial innovation" and to establish "concept verification and pilot verification platforms" that bridge laboratory research and commercial deployment.[18] And by 2030, a main goal is to achieve "major breakthroughs in developing new quality productive forces, building a new development pattern, and constructing a modern economic system."[19]

Too Little Long-Term Funding

Federal funding is often short term, with investigators having to constantly apply for grant renewal. And funding for research centers, while somewhat longer in duration, is still also short term. This makes it hard for researchers and centers to tackle big, bold, complex challenges and work on them until success if achieved.

China is different. For example, its National Natural Science Foundation of China, coupled with state-backed industrial policies, provides stable funding mechanisms for basic science that enable large-scale research initiatives.[20] This approach reduces fragmentation in research efforts and allows for sustained progress in the high-risk, high-reward domain of basic science.

CRAFTING A NEW FEDERAL STEM RESEARCH MODEL

A new federal STEM research model is needed—one that goes beyond simply providing more money or making incremental reforms to boost the current system's performance, including partial lotteries for principal investigator applications, agencies funding more risky proposals, expansion of the SBIR program, having more regional "accelerators" to better transfer research results to entrepreneurs, reforming the university tech transfer offices, and enhancing "the science of science" research. To be sure, these are all promising areas for change, but they still represent only incremental improvements of the current system, rather than the fundamental change that is needed.

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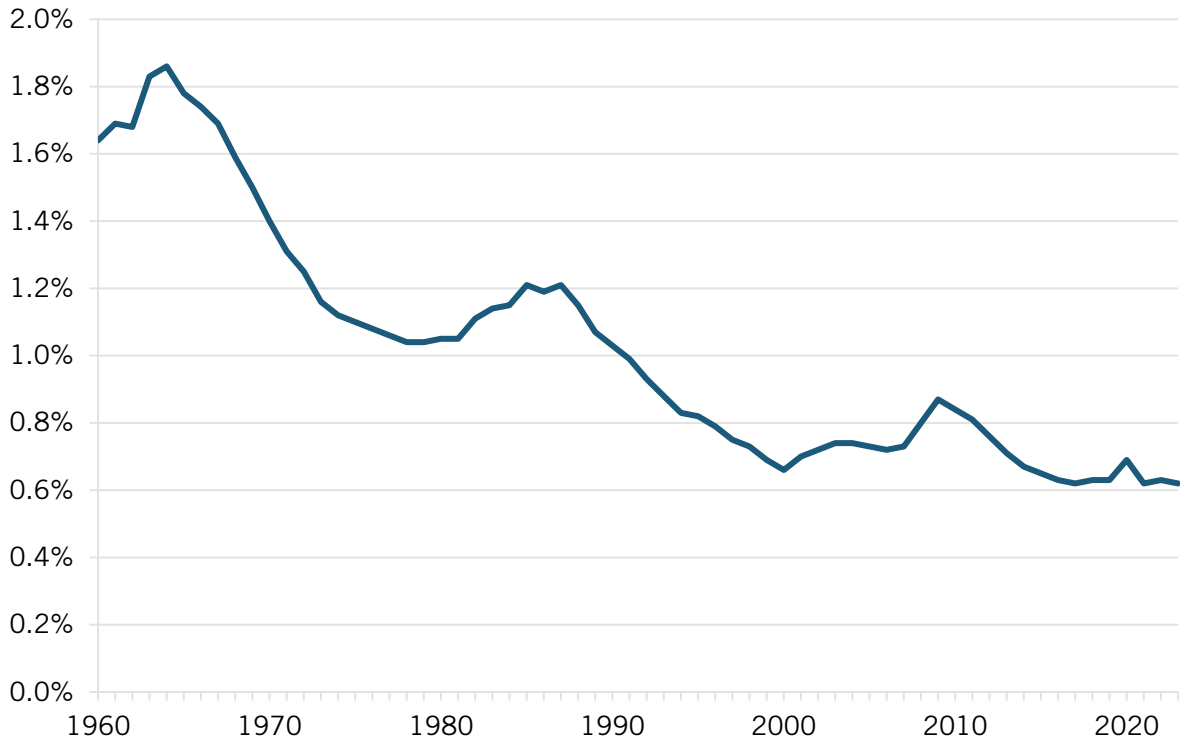
Indeed, while many of these changes would improve the system, they would not address the divergences previously discussed. That would require a move from the current system to one with an explicit alignment between STEM research and winning the techno-economic war with China. This means entering into a grand new bargain: no science funding cuts as long as the science community will commit to conducting a much larger share of their research in order to win the techno-economic cold war with China. This also means supporting certain areas of science (e.g., physics, life sciences, computer sciences, and engineering) more than others (e.g., social sciences). It means being willing to work more with industry and to actively support technology commercialization.

More Funding

First and foremost, Congress needs to increase funding. Federal R&D funding as a share of GDP peaked in 1964 at 1.86 percent during the height of the Cold War and has fallen since then to around 0.62 percent. (See figure 4.)

Congress should appropriate at least $90 billion more annually for research spending targeted to supporting innovation in national economic power industries. If over five years, congressional appropriations for federal research could increase from their current 0.67 percent of GDP to over 1 percent, that would mean an increase in federal funding from $189 billion to $282 billion, or an increase of $93 billion. After that, Congress should increase funding to maintain the same share of GDP investment.

Figure 4: U.S. federal R&D funding as a share of GDP, 1960–2023[21]



Target Increased Funding at National Economic Power Industry Needs

One place to start is to give engineering research a larger share of support. The imbalance between science and engineering support should be reduced, with **at least one-third of new funding going to engineering, up from around 15 percent**.[22]

At the same time, **new funding should be targeted to areas of science, engineering, and technology that have direct implications for national economic power industries.** The CHIPS and Science Act did that in identifying 10 key technology areas for investment. This was a good step, but winning advanced industries through research and innovation is not enough. We need to find ways to ensure more traditional, but critical, industries can also innovate—for example, research into new kinds of steel and chemicals, new ways of forging metals, or making circuit boards.

The imbalance between science and engineering support should be reduced, with at least one-third of new funding going to engineering, up from around 15 percent.

This means funding new kinds of institutional systems. It also should mean expanding the two main R&D efforts that have strong connections to commercial innovation: NIST and the Defense Advanced Research Projects Agency (DARPA). NIST funding was cut from 0.011 percent of GDP in 1995 to 0.004 percent in 2025.[23] At the same time, DARPA funding fell from around 0.027 percent of GDP in 1995 to about half of that, 0.014 percent, in 2025. **Congress should triple the NIST budget and double the DARPA budget over five years.**

Less Open Internationally, Especially to the Chinese

The current system and those who manage it see science as a global good, not a weapon in a techno-economic war. **The new system should work to limit the ability of China to access U.S. and allied STEM knowledge and capabilities.** As ITIF has documented in another report, there are a number of steps Congress and the administration should take to limit scientific and technical cooperation with China.[24] This includes requiring disclosure of U.S. faculty doing research with Chinese researchers in areas related to national power industries and restricting the U.S.-China Science and Technology Agreement, as discussed in a separate ITIF report on slowing China's advance to avoid losing the techno-economic trade war.[25]

More Focused Specialization With Scale

At the core, the U.S. research system is about projects, not sustained centers with scale.

China, in contrast, goes deep, and that makes innovation easier. For example, unlike the United States, where a research university may have just a few professors working on a particular area, China has established research institutes where a hundred researchers are working on the same topic. For example, China has close to 50 graduate programs that focus on either battery chemistry or the closely related subject of battery metallurgy. By contrast, only a handful of professors in the United States are working on batteries.[26]

This is similar to other Asian Tiger nations that have long supported large, specialized industrial research labs, such as ITRI in Taiwan focused largely on electronics and South Korea's Electrotechnology Research Institute.[27] In China, we see this with its SKL program, which, according to one report, is a "method of teaming researchers and developers as a strategy to tackle hard problems [and which] has long been hailed as a successful model, as was seen with Bell Labs in the United States."[28] The over 500 SKLs are usually located at universities, although in the last decade, the Chinese government has funded private companies to form SKLs, akin to Bell Labs.

The U.S. STEM research system is about projects, not sustained centers with scale.

We also see this focus on specialization in Chinese government efforts to form advanced technology regional clusters. A Center for Security and Emerging Technology report on SKLs notes that "to streamline the innovation process from basic to applied research, Beijing has co-located enterprises, universities, research institutions, and SKLs to form industry clusters."[29] One person told ITIF that there are universities in China that only focus on battery research. For example, China's SKL for Physical Chemistry of Solid Surfaces employs over 100 researchers at Xiamen University.[30] In contrast, NSF funds 19 ERCs and a total of 79 ERCs since the program's inception—and only about half of these are focused on technologies that could be used in globally traded industries. A typical one, such as the Center for Innovative and Strategic Transformation of Alkane Resources, has only about 30 researchers, and only few of them work full-time at the center.

As such, **federal STEM research policy needs to focus more on specialized centers than on individual awards. The funding for the centers needs to be sustained, at least for 10 years, contingent on performance. And funding needs to be sizeable enough to gain real scale.**

NSF has recently taken a step in this direction with the announcement of its new request for proposal for its Tech Labs programs. This is an "initiative designed to launch and scale a new generation of independent research organizations. These organizations will focus on technical challenges and bottlenecks that traditional university and industry labs cannot easily solve on their own."[31] Funding appears to be around $200 million a year; a reasonable amount, but no enough to adequately respond to the China challenge.[32]

More Funding of Mid-Level TRL Research

While some additional funding should go to early-stage basic research (e.g., TRLs 1 and 2), significant funds should go to TRLs 3 to 5 (proof of concept demonstrated experimentally to test the feasibility of your innovation, technology validated in a lab environment, and technology validated in a relevant environment).[33] And research proposals should demonstrate interest and commitment to having this research commercialized in the United States or with allies that have reciprocal programs with the United States. **This needs to be required by Congress, otherwise the science agencies will revert to form to satisfy their clients.**

The lion's share of mid-level TRL research is from the Department of War (DOW). As such, Congress should triple DOW's funding for university-based industrial research. Most of the funding for manufacturing-related research at universities comes from DOW. Indeed, if there is a manufacturing technology agency in the United States it is DOW. Much of what it funds has dual-use implications, such as R&D in composites, digital production systems, materials, and prototyping. Various parts of DOW have long experience and established relationships with R&D centers across the nation. These programs, however, need to be significantly expanded to pursue more R&D focusing on dual-use capabilities. For example, the University of Delaware Composites Research Center, founded in 1974, has been funded by the U.S. Army Research Laboratory (ARL), the U.S. Army Tank and Automotive Command, the Office of Naval Research, and DARPA. Similarly, Penn State University's Electronics Manufacturing Center is one of seven Navy Manufacturing Technology (ManTech) Centers of Excellence. Similarly, the Missouri University of Science and Technology's Center for Aerospace Manufacturing Technologies is funded by the U.S. Air Force Research Labs and Boeing Research.

A variety of DOW offices fund this kind of applied research and engineering development including the Under Secretary of Defense for Research & Engineering and the ManTech program. Service research programs include the Army Research Laboratory, Office of Naval Research, Air Force Research Laboratory, and AFWERX. DOW also sponsors several of the 16 Manufacturing USA institutes. However, as a share of GDP, basic, applied, and advanced-technology research funding at DOW (budget activities 6.1, 6.2, and 6.3, respectively) declined from 0.096 percent of GDP in 2006 to 0.078 percent in 2024.[34] **Congress should double 6.1, 6.2, and 6.3 funding from around $21 billion to $42 billion.**

Congress should also **create a "civilian DARPA" to co-invest with industry on research and application of key technologies needed for dual-use national security leadership** in the commercial sector. Funded by year five with at least $20 billion per year, such an entity could be administered by NIST.[35]

Increase Industry Involvement

Most of this **new additional funding should not go to university individual investigators pursuing basic research** and seeking to publish their findings. Rather, **it should go to institutional models that engage much more deeply with industry.**

One path is to create **new kinds of research universities**.[36] For example, the Chinese government has supported research universities that are focused on a few narrow technology areas, such as robotics, but do so at enormous depth. There is no reason the United States could not do that—for example, creating graduate universities focused on materials, optics, and robotics and autonomy. Congress should provide NSF with at least a one-time appropriation of $1 billion to award to around five or so entities that seek to create specialized research universities.

Another path is to **establish five national industrial research institutes focused on key, dual-use industries and technologies**—modeled after Tawain's Industrial Technology Research Institute, an industry-government advanced technology lab focused largely on IT technologies, with a long track record of working on technologies in what is referred to as the "middle Technology Readiness Levels" beyond what universities work on and earlier than most companies work on.[37]

In the CHIPS Act, Congress provided $11 billion for R&D. This included establishment of the National Semiconductor Technology Center, a public-private consortium to be operated by a new nonprofit called Natcast. It was to serve as a shared sandbox wherein start-ups, universities, and giant companies could access expensive chip design tools and prototyping capabilities without having to build their own billion-dollar facilities. The legislation also created the National Advanced Packaging Manufacturing Program to fund research into "heterogeneous integration"—basically the Lego-like stacking of different chiplets to make computers faster and more energy efficient. Unfortunately, the Trump administration is ideologically opposed to this kind of industry-led technology policy and so cut most of the funding for Natcast.[38] However, going forward, the Natcast model should be used not only for semiconductors but also other technology areas where industry is really to step forward with funding and commitment.

Congress should also **significantly expand the Manufacturing USA centers' public-private pre-competitive research institutes**.[39] There are currently 18 institutes; there should be at least 36. These centers should be selected by industry, with them coming to NIST with proposals and providing a share of the funding. Funding could also go to nonprofit service providers/manufacturers for key technologies such as ultra high-density interconnect circuit boards or other technologies for which the United States is highly dependent on China.

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Some of the increased funding should go to states that agree to increase their own funding for R&D centers focused on research related to national economic power industry technology needs, as Georgia has with its Georgia Research Alliance.

Congress should modify the collaborative R&D credit to boost the credit rate from 20 percent to 50 percent for industry funding of university or federal lab research or industry-led collaborative research. This would provide a powerful incentive for companies to support more extramural

research in areas critical to industry needs and be more oriented toward helping industry solve key challenges.

More Industry-Focused Graduate Programs

Most U.S. university Ph.D. programs are designed to turn out academic researchers/professors. That needs to change. **We need more experimentation with different kinds of programs that are more focused on industry needs**. For example, the Danish Agency for Science, Technology and Innovation oversees an industrial Ph.D. Program designed to produce STEM Ph.D.s with more industry-relevant skills. (See box 3.)

In China, the Harbin Institute of Technology (one of the Seven Sons of National Defense) is now rewarding students with a Ph.D. based on real solutions they build—such as creating vacuum laser welding tech for the military.

In the United States, Olin College of Engineering requires students to study design, business entrepreneurship, and engineering. And it has no faculty tenure.[41] Alfred Kettering University in Michigan provides immersive co-op experience for a variety of engineering disciplines.[42]

In China, the Harbin Institute of Technology is now rewarding students with a Ph.D. based on real solutions they build—like creating vacuum laser welding tech for the military.

Congress should provide funding for grants to higher education institutes that want to develop new institutional approaches for training scientists and engineers. Ideally, this would be funded not by NSF, which has shown little interest in "rocking the academic boat," but rather NIST or a new national technology agency.

Box 3: Denmark's Industrial Ph.D. Program

Beginning in 1971, Denmark's Industrial Ph.D. program became one of the first programs of its kind designed to train researchers with industrial research and workforce applications in mind.[43] With the goal of increasing knowledge sharing between universities and the private sector while also promoting research with commercial applications, the program enables a student to enter a Danish university while simultaneously working for a Danish company for a three-year period. While in the program, the student splits their time between the company and the university, completing a single research project that has direct benefits for their company while also completing the traditional requirements of the university's Ph.D. program (coursework, doctoral thesis, teaching, etc.). While enrolled, the student is paid an annual salary by the firm, which is partially subsidized by the university, while the Danish Agency for Science, Technology and Innovation pays the full tuition to the university.

The fields of inquiry for the Industrial Ph.D. Program include several areas of emerging and critical technology, including green research, technology and innovation, life sciences and welfare technology, robotics and AI, and space technology.[44] To be sure, participating Danish companies are involved in knowledge-intensive industries, particularly IT, chemicals, pharmaceuticals, medical equipment, and advanced manufacturing. The majority of companies expect patents, and at least half expect higher corporate incomes as a result of participating in the program.

In 2011 and 2013, over 1,200 projects, including 430 Industrial Ph.D. students at 270 companies, were surveyed and compared with a control group of companies and students that did not participate in the program. Among the companies that participated in the program, they generally experienced a doubling of the number of patent applications, higher gross profits, an increase in total employment, and an increase in total factor productivity compared with the control group. Additionally, the companies reported new knowledge, new market opportunities, and a bolstered network to the academic world.

Industrial Ph.D. students found that they earned about 10 percent more than conventional Ph.D. students did and were also three times as likely as conventional Ph.D.s to hold senior leadership positions in a company. The surveys also found that industrial Ph.D.s who went into the public sector earned the same as those in the private sector, but conventional Ph.D.s earned less.

An additional survey conducted in 2013 concluded that the Ph.D. program created value for students, businesses, and universities. Students were enriched by the combination of practical experience and research. Companies found concrete results with increased revenue; new products and services; and an increase in patent applications and licensing. Universities got a better sense of the research needs for business, not to mention a supply of highly qualified and motivated Ph.D. students. All parties enjoyed the benefit of networking. Finally, the Danish society was served by a program that delivered value for money, increased national competitiveness, and increased employment.

The Industrial Ph.D. is not a substitute for fundamental research in the sciences, but rather is a valuable supplement to academic, corporate, and national research agendas.

Harness AI to Transform, Not Just Optimize, Scientific Discovery

U.S. science policy should prioritize the large-scale integration of AI and advanced digital infrastructure into the core of the scientific enterprise. DOE's Genesis Mission provides a compelling model. It aims to build an integrated national discovery platform that connects supercomputers, AI systems, scientific instruments, and vast federal datasets into a single, AI-driven research engine.[45] By training scientific foundation models, automating research workflows, and enabling AI systems to generate and test hypotheses, the initiative is designed to double the productivity and impact of American science within a decade. This approach reflects a critical shift: AI for science is not merely about improving efficiency or stretching research dollars, but also about fundamentally modernizing how discovery occurs. Evidence shows that AI can enhance the novelty and impact of research—especially in complex domains—while countries such as China are already leveraging these capabilities at scale to gain advantage in frontier research. As one recent study finds, "China has taken the lead in AI-driven research, outpacing both the US and the EU, not just in sheer output, but also in terms of scientific novelty and impact."[46] To remain globally competitive, the United States should treat AI-enabled science as a strategic national capability, embedding it into research infrastructure, funding models, and institutional design across all federal research agencies.

More Tracking of China's Efforts

It is not enough for the U.S. STEM research system to focus more on supporting U.S. national economic power industries. The federal government also needs to do a better job of tracking Chinese directions and progress.

Current intelligence and policy frameworks are heavily focused on applied technologies and commercial developments, often reacting to Chinese innovations only after they have materialized. Using procurement power to accelerate the development of anticipatory models that look at early-stage research, patents, and funding trends would enable the United States to better predict and prepare for technological shifts driven by Chinese scientific advancements.

THE FEDERAL GOVERNMENT CAN'T RELY ON INTEREST GROUPS FOR CHANGE

Bold institutional change is hard. But in the case of U.S. STEM research policy, continuing with the status quo will lead to the United States losing the techno-economic war with China. And relying on interest group pressures for needed change will mean little change.

The core political economy problem with federal STEM research policy is that industry largely relegates it to a minor issue that it doesn't lobby for while the core lobby is the recipient community—in this case, to take a page from Eisenhower, the NSF-scientist-university complex.

And the last thing the science lobby wants is change. In fact, most actively oppose change. The only change they want is more money. We can see that in the science lobby responses to a recent Office of Science and Technology Policy request for comments on science policy. In response to the first question, "What policy changes to Federal funding mechanisms, procurement processes, or partnership authorities would enable stronger public-private collaboration and allow America to tap into its vast private sector to better drive use-inspired basic and early-stage applied research," the most-answered response was predictable: more money.

The American Council on Education, representing 16 higher-ed organizations, said in its response to this question that "we encourage the administration to work with Congress to deliver on sustained and consistent federal funding for the research enterprise."[47]

The last thing the science lobby wants is change. In fact, most actively oppose change.

When asked, "What reforms will enable the American scientific enterprise to pursue more high-risk, high-reward research that could transform our scientific understanding and unlock new technologies, while sustaining the incremental science essential for cumulative production of knowledge?" the council's response was don't change anything other than give DARPA more money.[48]

In response to, "How can the Federal government support novel institutional models for research that complement traditional university structures and enable projects that require vast resources, interdisciplinary coordination, or extended timelines?" they essentially said that this was not a good idea. Rather, they said that the federal government should allow more indirect costs to qualify for research grants.

"How can the federal government leverage and prepare for advances in AI systems that may transform scientific research?" Answer: more money.

Overall, the university community will also say that it is basic research that produces the largest improvements, not later-stage applied research and certainly not development. Even assuming that this is true, it misses the point. If the U.S. science system keeps producing basic knowledge

discoveries that Chinese firms also use and that do not do enough to strengthen U.S. techno-economic power industries, then the United States will be dependent on China.

Many free-market enthusiasts will object that this is inappropriate government intervention in the market. Only basic research is where there is a market failure. And many progressives will oppose giving money that might help business. Nonetheless, it is hard to see how companies in the United States will be able to compete with Chinese advanced companies without such an initiative.

Some will decry industry funding of research universities as somehow corrupting them and turning them away from their true mission of knowledge discovery for its own sake.[49] However, as North Carolina State Professor Denis Gray has documented, industry-university partnerships have no negative effects on academic freedom.[50] It is simply not the case that industry funding comes at the price of high-quality, independent research. If it did, then institutions such as Stanford and MIT should be worse than second-tier universities in their research quality, given how much money they receive from industry. In those and many other cases, high-quality, independent research attracts industry support. The key is not independence or even the phase of research, but rather the orientation. Universities focused more on what Princeton Professor Donald Stokes termed "Pasteur's quadrant" research—basic research directed at a specific challenge or problem—appear to be ones that are more likely to receive industry funding.[51]

If the U.S. science system keeps producing basic knowledge discoveries that Chinese firms also use and that do not do enough to strengthen U.S. techno-economic power industries, then the United States will be dependent on China.

However, many in industry will support this change, although most industry leaders will not be likely to place such change high on their priority list, in part because of the broad national—as opposed to firm—benefits of such a program. Many state governments will support it because of the economic development benefits. And many in the national security community will support it for obvious reasons.

This clearly will make change hard. In this case, the normal process of change in Washington wherein interest groups push changes and Congress and the White House respond will fail to produce needed change. In this case, national economic security interests require that Congress and the White House need to largely ignore status quo interests and recognize that virtually all will oppose needed change.

CONCLUSION

Federal support for STEM research is a key to enabling the United States to not lose to China. But the old Vannevar Bush linear model coupled with a narrow mission-driven model that excludes commercial technology development for national economic power industries is a path to losing.

Bold institutional changes in how the Untied Stats funds research are needed. None of the proposals here are all that complicated, at least in terms of implementation. All they require is the willingness to expand funding and devote it to new kinds of research institutions and programs.

Mobilizing for Techno-Economic War, Part 6: Transforming Free Trade Agreements Into Strategic China-Defense Partnerships

RODRIGO BALBONTIN AND STEPHEN EZELL

The era of free trade globalization is over. To replace it, the United States should lead a new class of binding deals with allies, with a dual objective of strengthening allied national economic power industries and weakening China's.

KEY TAKEAWAYS

- Absent serious policy change, the People's Republic of China will dominate most of the advanced industries that underpin national power in the 21st century, leaving the United States and its allies weaker and more vulnerable.
- It is time to recognize that the global vision for unfettered free trade with all or most nations on a most-favored-nation basis, as promising as it was, has failed. In fact, today's global trade regime constrains allied nations' responses to Chinese aggression.
- No country, including the United States, can counter Chinese national economic power aggression alone. Rather, Washington should lead a bloc of allies committed to coordinated action in trade, technology, investment, and economic security issues.
- It is thus time for Strategic Techno-Economic Agreements (STEAs). These should include the elimination of most trade barriers among partners, as well as measures to strengthen allies' national power industries and constrain those of the PRC.
- The United States should offer zero-for-zero tariffs to STEA partners, but only if they meet enforceable conditions on all the other aspects of these agreements.
- For the United States, leading this new regime would require changing its rhetoric with allies and abandoning the hubristic notion that America alone can deal with China—a rival unlike any other it has faced in its 250 years of constitutional democracy.

INTRODUCTION

The era of free trade globalization should be over, but autarky should not replace it. The free trade vision, in which nations agreed to remove tariffs and nontariff barriers—grew during the 1990s and 2000s within a very specific geopolitical context. These decades were characterized by the idea that it was a "unipolar moment" for the United States in the post-Cold War Era—that no other hegemon would challenge U.S. global influence and dominance.[1] In that context, Fukuyama's "End of History" notion in the early 1990s—that all societies would eventually converge on liberal Western democratic models—shaped the belief that the victory of trade liberalization was inevitable.[2]

But the rise of China as a global techno-economic challenger to the United States—already surpassing America in certain areas—sustained by nonmarket, mercantilist policies, has proved that this vision, while well intentioned, was fundamentally flawed. The global trading system was not prepared for the scale of China's economic aggression. The World Trade Organization's (WTO's) members opened the door for the People's Republic of China (PRC) to join the organization, but they failed to realize that the WTO, as it was structured, could not address the blatant and intentional mercantilism of the world's most populous and fastest-growing economy.[3] In fact, WTO accession gave the PRC de facto carte blanche permission to massively distort global trade. For the Chinese Communist Party (CCP), the WTO rules and procedures effectively gave it sovereign immunity from trade prosecution.

This is not a call for total decoupling, as doing so is not possible. Rather, it is a call for a much more joint approach that significantly limits China's advanced industry access to allied markets, coupled with genuine cooperation.

Since then, U.S. administrations have failed to address the ongoing weakening of America's national economic power industries caused by the PRC's economic aggression. One reason has been the utter dominance of the free trade doctrine. As one economist wrote, "At the end of the twentieth century, if you do not believe in free trade, you had better be a pretty good applied game theorist. Otherwise, you run the risk of being branded 'not a real economist' and exiled to a vaguely unfashionable academic address."[4]

Arguably, the age of unfettered global free trade began to end when both Donald Trump and Hillary Clinton rejected the idea of the United States joining the Trans-Pacific Partnership (TPP).[5] But it was the election of President Trump in 2016 and his willingness to contravene long-held bipartisan standards against unilateral action toward China that changed the consensus among U.S. policymakers. But Trump's unilateralism, his failure to distinguish between strategic and nonstrategic sectors and between allies and adversaries, and his now withdrawing from pushing back on China are a dead end.

It's time to recognize that we need to return to the way policymakers conceived of trade across most of the 20th Century: two global trading blocs (at the time, the "first world" and the "second world"); today, an allied bloc working to limit the PRC bloc. To be sure, reality is very different from in the Cold War, when there was very little allied production in the Soviet bloc and relatively little trade between the Soviets and the West. This is not a call for total decoupling, as it is not possible. Rather, it is a call for a much more joint approach that significantly limits China's

advanced industry access to allied markets, coupled with genuine cooperation to limit China's techno-economic gains.[6]

No country alone has the capabilities to counter Chinese techno-economic aggression. Instead of yearning for a revival of a bygone era of liberalization that has proven infeasible, leading democracies, including the EU, should form a new type of trade partnership with the dual objectives of strengthening allied national power and weakening China's. At its core, it should take the original vision of globalization much further than it previously went and establish radical free trade among partners. At the same time, membership in such a win-win alliance would bring responsibilities—in this case, close cooperation to limit China's aggressive gains. That means, among other things, joint limits on Chinese imports; cooperation to limit Chinese foreign direct investment (FDI); a joint, robust export-control and outbound investment-review regime; agreements to share commercial counterintelligence; and engagement in close techno-industrial collaboration.

Instead of yearning for a revival of an era of liberalization that is gone and has proven infeasible, leading democracies should form a new type of trade partnership with the dual objective of strengthening their national power and weakening China's.

This is an idealistic, but hopefully not naïve, vision. Such a new system will not be easy. The national protectionists who have taken over the Republican Party will object. On the other hand, a number of globalists and many in the expert foreign policy community focused on China will balk because this vision violates free trade for the former and is too aggressive for the latter.[7] But there are still both pragmatists and individuals who are open to changing their minds.[8] Indeed, the Office of the U.S. Trade Representative's (USTR's) March 2026 Report to Congress on China's WTO Compliance states that "more and more U.S. trading partners are coming to understand the need for new strategic approaches for dealing with China and its state-led, non-market approach to the economy and trade."[9] Most recently, U.S. Secretary of the Treasury Scott Bessent argued that "America's openness will be matched by reciprocity, which is the basis of durable cooperation."[10]

This report deepens the argument that no country alone can counter Chinese mercantilism. It then presents the core ideas of STEAs, describing two key pillars—improving joint competitiveness in advanced, strategic industries and countering Chinese mercantilism. It offers specific details on their components and how to implement them, with these serving as the basis for the proposed agreements' chapters and provisions.

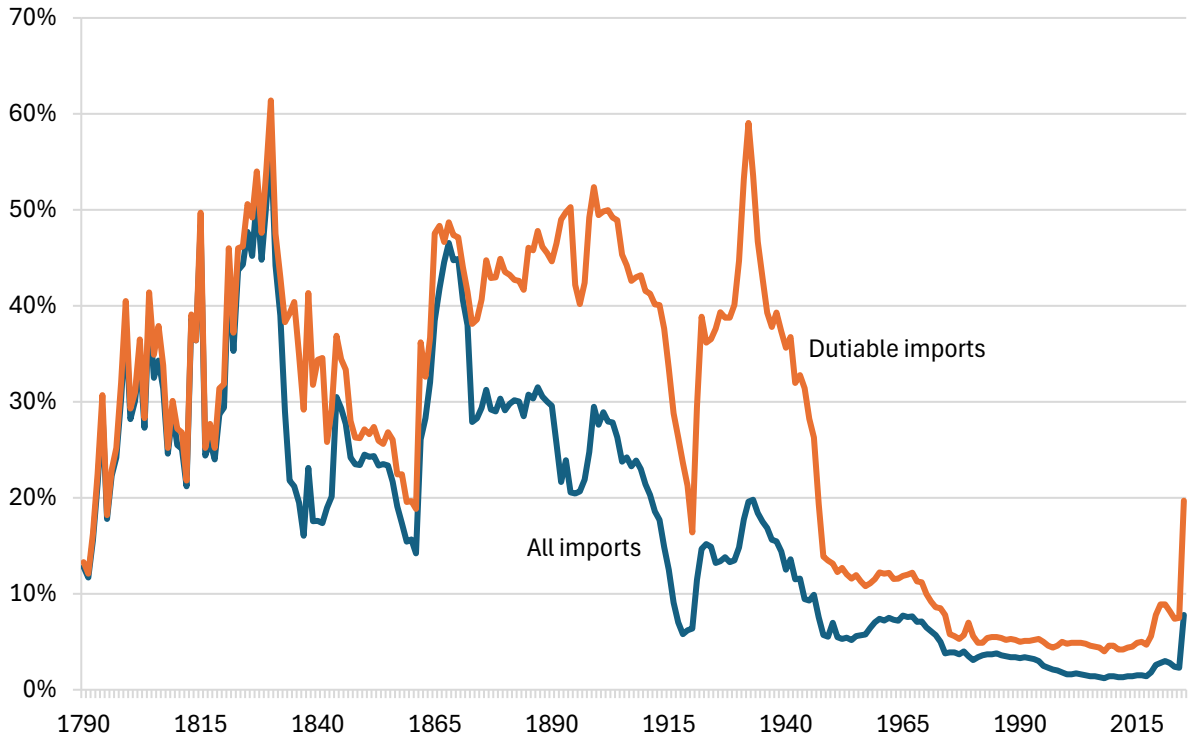
WHY THE FREE TRADE VISION FAILED

Trade policy is not neutral—it has always been based on a view of the world without strategic competition. During the Cold War, the Western trading system was designed to boost the allocation efficiency of non-Soviet nations. The Ricardian notion of competitive advantage predominated in the Western world, where efficiency was manifested in trade as countries exporting goods in which they were relatively more competitive at producing and importing goods that other countries were relatively better at producing.

This system for maximizing resource allocation among trade partners assumes that all partners routinely engage in cross-border commerce by adhering to shared rules. There is an inherent prisoner's dilemma: if a country "free rides" on the system, it can capture other countries' benefits of trade by, for example, artificially boosting its comparative advantages by subsidizing its industries, narrowing the gap in low-productivity industries by closing its markets, or gaining capabilities through unauthorized access to trade secrets and intellectual property (IP) theft. Multilateralism—first through the 1947 General Agreement on Tariffs and Trade (GATT) and later with the creation of the WTO in 1995—was intended to serve as a stabilizer, preventing countries from free riding on the global trade system.

Free trade has been an exception in the history of both capitalism and the United States itself. For virtually all of America's development up until World War II, American production was protected by tariff walls. (See figure 1.) The first year of the second Trump administration saw America experience the highest tariffs since the end of World War II. Yet, 2025 tariffs were still lower than the historical average. The average tariff rate on all imports from the first full year of the U.S. Constitution in 1790 through 2025 is 18 percent, and the average tariff rate on dutiable imports is 27 percent.[11]

Figure 1: U.S. import tariff rates since ratification of the U.S. Constitution (1790–2025)[12]



Reduced tariffs and the expansion of globalization since the end of World War II were a model tailored to expand U.S. hegemony during the Cold War. During that period, there were two almost completely separate economic and trade blocs: the Soviet bloc and the West. During the Cold War, the United States advocated for free markets, but did so from a position of strength in manufacturing and innovation. Moreover, Cold War competition meant that by the early 1960s, the federal government spent more on research and development (R&D) than did the rest of the world combined.[13]

The end of the Cold War marked the beginning of the United States' "unipolar moment," during which it was the indisputable, sole global hegemon in both hard and soft power.[14] But not when it came to industrial competitiveness. Indeed, U.S. manufacturing peaked in the late 1970s as a share of the economy.[15]

Nonetheless, the unipolar moment led to the U.S. trade policy of globalization through market liberalism, spurred by an ascendant neoliberal, orthodox economics profession that held that free trade was an ultimate objective. At the time, the idea that Western liberal-democratic capitalism had triumphed over all other models had led to the belief that free trade would permeate and liberalize all countries, including autocracies, which would eventually open as middle classes emerged.[16] President Clinton reflected this when he stated at the signing of the North American Free Trade Agreement (NAFTA)—a free trade agreement (FTA) between Canada, Mexico, and the United States—side agreements in 1993, "That's how we won the Cold War. That's how we have promoted peace and reconciliation in the Middle East. And that's how the United States of America has promoted freer trade and bigger markets for our products and those of other nations throughout the world. NAFTA is such an issue."[17]

U.S. efforts to promote extreme globalization ended the tradition of an American economic policy guided by "national developmentalism." Once the Soviet Union collapsed, the belief was that this system should be expanded across the globe. Indeed, one of the WTO's stated goals was to eliminate all barriers to free trade, gradually and through multilateral negotiations.[18]

Understanding National Developmentalism[19]

National developmentalism rejects the moral vision of libertarianism—a global market of individuals with no significant local or national attachments—as alien to human nature. It also rejects the moral vision of progressive localism, with its self-reliant yeoman farmers and artisans and shopkeepers, as anachronistic in the industrial era.

The developmentalist view does see benefits in deeper global economic integration. However—in the case of the United States—in order to maximize high-value-added exports, the federal government must play a proactive role by partnering with knowledge-intensive companies, creating incentives to boost manufacturing productivity, and promoting trade.

There are five basic principles of national developmentalism:

- **Growth is at the center, particularly productivity, innovation, and competitiveness.** Productivity is the only source of higher living standards, and it largely stems from the development and widespread adoption of new technologies in enterprises.
- **Strong, dynamic capabilities in companies of all sizes, especially large corporations, are key to achieving growth.** It is the capabilities of firms—including large and small, foreign and domestic—that determine a nation's economic well-being. Firms' capabilities are instrumental in achieving what society requires and needs: fast and broad increases in productivity, innovation, and competitiveness. Dynamic capabilities recognize that companies, processes, products, and technological paradigms must evolve over time to remain competitive.
- **Well-designed, effective government interventions are essential.** This does not mean that the development state has the expertise to decide "the next big thing," especially as narrowly defined (e.g., lithium-ion batteries), but it does mean that government should seek to

maximize enterprise capabilities and guide private enterprise toward state goals through public-private partnerships.

- **National development is focused more on goals than processes.** National developmentalism is clearly focused on three goals—innovation, productivity, and competitiveness—and is generally agnostic about the means of achieving them.
- **National developmentalism rejects the neoliberal and neo-New Deal Marxian capital-labor dialectic.** Both doctrines assume that capital and labor are fighting in a zero-sum game, and therefore what's good for one is bad for the other. That is not true. History shows that wages grow as capital expands.

That post-Cold War vision made some sense amid the euphoria of the Soviet Union's decline. It didn't make sense before that—when the Soviet Union closed itself off from the "Second World" and the United States promoted free trade—but was subject to developmentalists' priorities. But it blithely ignored the structural weaknesses in the U.S. production system and assumed that trade agreements would automatically end all protectionism, even among key allies such as Europe and Japan. They were wrong. And then came China, a trade juggernaut the world had never seen before. The PRC's techno-economic aggression was the final nail in the coffin of the free-trade vision.

Free-trade-based neoclassical economics failed for many reasons. First, U.S. trade policy was largely blind to the harm that foreign countries might inflict on U.S. national power industries.[20] Both companies and U.S. policymakers supported offshoring to relocate production to lower-cost jurisdictions under the assumption that doing so would ultimately benefit U.S. interests. In some cases, it did; in others, it did not. Thus, while the United States began to detach its priorities from its large multinational companies—and vice versa—other countries, such as Germany and Japan, continued to prioritize consumption and policy support for their national champions.[21]

The PRC's techno-economic aggression was the final nail in the coffin of the free-trade vision.

Second, there was the assumption that the United States would specialize in high-value goods and services to offset potential losses of multinationals' offshoring production outside the country. This failed both from the supply and demand sides of the job market. The former is reflected in a 2021 Information Technology and Innovation Foundation (ITIF) report, which outlines that, according to the Organization for Economic Cooperation and Development (OECD), fully one-third of working-age Americans possessed only limited digital skills, and one in six were unable to use email, web search, or other basic online tools.[22] From the demand side, this assumption failed because the recipient countries of offshore investments advanced up the value chain faster than anticipated, ultimately competing with the United States.

Third, while the post-Cold War period was marked by significant reductions in tariffs, other economies were enacting "behind-the-border" barriers. Free trade stopped at customs, as countries surreptitiously complemented their tariff reductions by erecting new types of trade-distorting nontariff measures, such as localization requirements.[23] Worse, nontariff measures are almost twice as trade restrictive as tariffs.[24] World Bank analysts argue that "[non-tariff measures] have become a defining instrument of contemporary trade policy" and "increasingly define the geography of market access in the global economy."[25] The WTO's Doha Round in

2001—the last significant round of trade negotiations among the WTO members—envisioned a global system with reduced barriers to trade, but it has failed to keep that promise. Many observers point to the Doha Round as the pivotal moment when the WTO proved that it had failed in its trade liberalization function.[26]

Finally, and arguably most importantly, China's accession to the WTO in 2001 and subsequent intentional failure to fulfill its accession commitments upended the entire global trade system. The WTO system was not structured to address a large economy directly antithetical to its fundamental principles of market-oriented policies. The WTO's former director-general from 2002 to 2005, Supachai Panitchpakdi, misguidedly stated in 2002 that China's accession to the WTO signals "China's willingness to play by international trade rules and to bring its often opaque and cumbersome governmental apparatus into harmony with a world order that demands clarity and fairness."[27] The reality is that Chinese accession to the WTO, on balance, has not moved the country significantly toward the WTO trading order because, by and large, China has willfully not lived up to its commitments.[28] Indeed, China has failed to meet numerous WTO commitments on issues such as industrial subsidies, the protection of foreign IP, the requirement to enter into joint ventures and transfer technology, and the provision of market access to service industries.[29]

Chinese authorities never intended to obey the rules needed to make free trade work, and have instead set their goal of becoming the global techno-economic powerhouse. China is a "power trader" rather than a mere beneficiary of globalization, reviving the notion that trade can be weaponized to advance a nation's own economic and national power interests.[30]

It is in this context that the United States began to reject free trade with bipartisan support, but without a long-term, positive strategy, especially to keep the PRC from taking over advanced production globally. In 2016, Congress and both presidential candidates—Donald Trump and Hillary Clinton—rejected the idea of the United States joining the TPP, an Asia-Pacific economic bloc initially designed to exclude China.[31] Since then, the United States has pivoted to more protectionist policies, first gradually through targeted tariffs during the first Trump administration and the retention and selective expansion of those policies during the Biden administration and later more radically, with the U.S. government imposing blanket tariffs on nearly all countries during the second Trump administration.

The new era, rather than a collective global optimization of the allocation of efficiency through trade, is a zero-sum game for global techno-economic dominance. There is no "win-win" in this context—it is either the West or China that will surpass the other.

WHY A NEW APPROACH IS NEEDED

No country alone will be able to counter the PRC's agenda for global techno-economic dominance. As ITIF has stated previously, "It will take a concerted and coordinated effort for the United States, Europe, Japan, Australia, Canada, South Korea, and other allies to have any chance of enacting collective defenses against predatory Chinese economic practices. A united front can impose costs on China that together would have the potential to limit its gains in advanced industry market share."[32] It is time to acknowledge that the vision of global free trade must be put on hold—at least until China transitions to a democracy, if and when that happens.[33]

Over a century ago, the U.S. economy surpassed the combined size of France, Germany, and the United Kingdom. The key difference is that when America overtook Europe, the two were not adversaries. This is not the case with China. The United States and like-minded countries need to face the reality that negotiating market-based rules with the PRC—hoping it will not deplete their manufacturing base or use economic coercion at will—is fiction. ITIF has stated previously, "The horse is already out of the barn when it comes to China overtaking Europe and America economically and technologically."[34]

China's techno-economic rise changes everything regarding existing trade rules and agreements—not necessarily because of its growth, size, and scale per se. Rather, China is a "power trader"—its policies and programs are designed not only to advance its own power, but also to degrade that of its adversaries, even at a financial cost to its own economy.[35] As China's model stands at odds with WTO principles, naturally, its inclusion in this forum in 2001 did not stop the PRC's nonmarket approach to development. As noted, China has failed to meet numerous WTO commitments on issues such as industrial subsidies, the protection of foreign IP, the requirement to enter into joint ventures and transfer technology, and the provision of market access to service industries.[36]

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China's model contains an essential goal of creating dependencies on the part of third countries. The Chinese economic model operates on a "dual circulation" strategy, involving two cycles: an internal cycle emphasizing consumption, innovation, and reducing reliance on foreign imports, and an external cycle aimed at increasing other countries' dependence on Chinese trade, technologies, manufacturing, and supply chains.[37] This is reflected in the PRC's narrative, which suggests a sense of historical inevitability about China's dominance. Xi Jinping himself said in 2023, "The Chinese people have become the masters of their future, the Chinese nation has achieved the great transformation from standing up and growing prosperous to becoming strong, and China's national rejuvenation has become a historical inevitability."[38]

It is in this context that hoping for fair, rules-based trade rules with China becomes naivety. Many Western officials and leaders have fallen into the fallacy of assuming that trade with China is like trade with a normal market-based economy. For example, in 2023, Canada and the European Union issued a joint statement: "China is an important trade and economic partner, and we will seek to ensure a level playing field and a balanced, reciprocal and mutually beneficial trade and economic relationship."[39] In January 2025, the United Kingdom's chancellor Rachel Reeves and the Chinese vice premier, He Lifeng, released a joint statement ensuring, "Both sides are committed to a fair and open investment environment that avoids arbitrary discrimination, and to ensuring that where legitimate restrictions exist, these are applied and communicated transparently."[40]

To be clear, many U.S. allies have come to realize the scope of the challenge posed by China's mercantilism. In the early 2020s, when Australia pushed to phase out Huawei from its 5G telecommunications systems and began questioning the PRC's official narrative regarding the

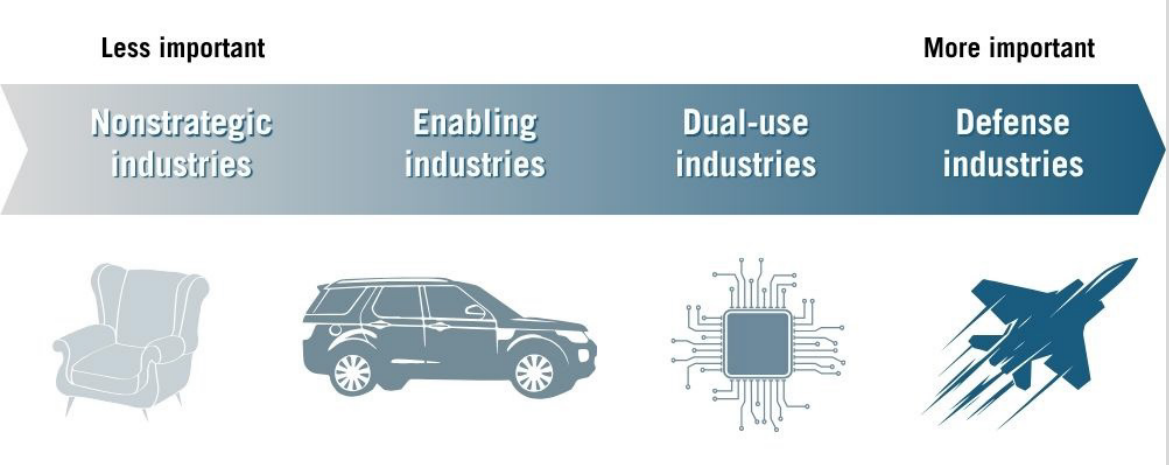
origin of the COVID-19 pandemic, China used its trade leverage to coerce Australia.[41] The Chinese strategy was to impose substantial costs across the economy and change Australia's national security policy by implementing import bans and high tariffs on many relevant Australian export sectors.[42] Likewise, Chinese tourists to Japan dropped by over 45 percent year on year in February 2026, largely in retaliation for Japan's stance on Taiwan.[43] Although the view in Europe on China is mainly driven by the PRC's support for Russia's illegal invasion of Ukraine, many EU and U.K. officials have expressed their concerns about China's subsidized industries flooding their markets and displacing their manufacturing capabilities.[44]

Even if the United States and its allies develop a broad-based consensus on the real nature of the China challenge, domestic action alone will not be enough.

Box 1: Defining National Economic Power Industries

The conventional view is that the only industries that matter to national power are defense industries. But that is now vastly too limiting. As Corelli Barnett wrote, "For munitions production for modern war is not primarily a question of specialized armament industries, as some suppose, but of all those varied industrial and scientific resources that in peacetime make for a successful and expanding export trade."[45] As such, ITIF has developed a classification of U.S. industries for their relevance to national power. This can be viewed as a continuum between defense industries on one side, nonstrategic industries on the other, and strategic industries and strategic enabling industries in the middle. (See figure 2.)

Figure 2: Industrial power scale



At one end of the continuum are defense industries. Clearly industries such as ammunition, guided missiles, military aircraft and ships, tanks, drones, defense satellites, and others are strategic. Not having world-class innovation and production capabilities in these industries means a weakened military capability. Policymakers across the aisle generally (with the exception of the isolationist Right and the pacifist Left) agree that these industries are strategic and that market forces alone will not produce the needed results.

At the other end of the spectrum are industries in which the United States has no real strategic interests. These include furniture, coffee and tea manufacturing, bicycles, carpet and rug mills, window and door production, plastic bottle manufacturing, wind turbine production, lawn and garden equipment, sporting goods, jewelry, caskets, toys, toiletries, running shoes, etc. If worst

came to worst and our adversaries (e.g., China) gained dominance in any of these industries and decided to cut America off, we'd survive—in part, because none of these are critical to the running of the U.S. economy, as many are final goods that might inconvenience consumers but wouldn't cripple any industries, and also because, in most cases, domestic production could be started or expanded relatively easily because none of these products are all that technologically complex from either a product or process concern and the barriers to entry are relatively low.

Next to defense industries, dual-use industries are critical to American strength. Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give our adversaries incredible leverage over America. Just the threat to cut these off (assuming that they have also deindustrialized our allies in these sectors) would immediately bring U.S. policymakers to the bargaining table. National power industries also tend to need a global scale in order to compete. Moreover, many are intermediate goods such as semiconductors and chemicals, where a cutoff would cripple many other industries. Finally, these industries are hard to rebuild once they're lost because of the complexity of their production processes, product knowledge, and the importance of the industrial commons that support them. In other words, barriers to entry are high and, if these industries are lost, they would be very difficult and expensive to reconstitute.

Finally, there are enabling industries. These are industries wherein, if the United States were cut off, the immediate effects on military readiness would be small. And the U.S. economy could survive for at least a while without production. America could survive for many years without an auto sector, since we would all just keep driving cars longer. But because of the nature of these industries—including technology development, process innovation, skills, and supporting institutions—their loss would harm both dual-use and defense industries. That is because enabling industries contribute to the industrial commons that support dual-use defense industries. A severely weakened motor vehicle sector would weaken the tank and military vehicle ecosystem.[46] Similarly, a weakened commercial shipbuilding sector has weakened military shipbuilding. A weakened consumer electronics sector weakens military electronics.

DEFINING STRATEGIC TECHNO-ECONOMIC AGREEMENTS

Strategic Techno-Economic Agreements (STEAs) should represent a unified, binding set of provisions that secure America's and its partners' global leadership in advanced industries. The idea of an STEA goes beyond trade facilitation—which is one of its components—and should encompass specific chapters covering the development of national power industries and the protection of proprietary technologies from access by China. STEAs would be the following:

- **Strategic**, because of their dual objective of strengthening U.S. and allies' national power while focusing on weakening those of its adversaries, particularly China.
- **Techno-Economic**, due to their focus on national power industries—advanced, traded-sector industries that form the foundation of military strength, economic resilience, and strategic independence.
- **Agreements**, since they include well-defined, binding long-term commitments. While diplomatic language is often flexible, there is a broad consensus that agreements represent binding commitments with specific obligations, whereas other mechanisms, such as partnerships, are more broadly defined and nonbinding forms of cooperation. The

> U.S. State Department Mission to the United Nations notes that "most states reserve the term 'agreement' for legally binding instruments and refrain from referring to non-binding instruments as 'agreements.' They do so specifically so that the term 'agreement' may be used to distinguish legally binding instruments from non-binding instruments."[47]

The concept of "agreement" is also pragmatic. In diplomacy, "agreements" and "treaties" have the same practical binding effect. However, the U.S. Constitution governs treaties, requiring two-thirds of the Senate to approve them.[48] On the other hand, agreements are not defined in the U.S. Constitution, and they require a simple majority in both houses to be approved.

The United States should establish minimum conditions to participate in such partnerships. If the trade partners have notable trade irritants against U.S. companies or national power industry sectors, they should commit to specific timelines and metrics to address them.[49] And they should agree to the various chapters described in the following section.

PILLARS AND COMPONENTS OF A STRATEGIC TECHNO-ECONOMIC AGREEMENT

An STEA is built on two pillars, each supporting the others. The pillars focus on national power industries' competitiveness and countering Chinese mercantilism, reflecting an STEA's dual goal: to create conditions that enable national industries to lead globally while also slowing rivals. Each pillar has different components, as detailed in table 1. These components should be understood as the minimum chapters that an STEA should contain—15 in total.

Table 1: Pillars and components of an STEA

 Pillar 1: Advancing Allies' National Economic Power Industry Development	 Pillar 2: Constraining the PRC's National Power Industry Development
▪ **Preferred Market Access:** Parties should agree to implement zero-for-zero tariffs if they comply with all the other components and provisions of an STEA. ▪ **Digital Economy:** An STEA should be the world's template for digital trade rules—with modern, binding provisions that enable digital market integration, foster a competitive environment, and improve the user experience. ▪ **National Power Industries:** Parties should seek preferential treatment for investments and production capabilities in national power industries. ▪ **Defense Production:** Parties should commit to cooperate in dual-use and defense technology research and manufacturing. ▪ **High-Skilled Talent Movement:** Parties should commit to eliminate migration constraints for highly skilled professionals, particularly in STEM fields.	**Immediate Reciprocity:** Parties should have a reciprocal approach to addressing the extensive nontariff barriers and other technical barriers to trade that China has erected to impede U.S. (and allied) companies' ability to compete in China. **Fully Integrated Investment Screening:** Parties should implement shared mechanisms among parties themselves to prevent the inflow of Chinese investment connected to the People's Liberation Army or investments that make national power industries' supply chains vulnerable. **Full Export Control Alignment:** Parties should be fully aligned on banning the export of or restricting the use of certain critical technologies outside the economic bloc. **Joint Section 301-like Investigations:** Parties should jointly conduct investigations to identify and combat Chinese unfair foreign trade practices.

Pillar 1: Advancing Allies' National Economic Power Industry Development

- **Joint Antitrust Interpretation:** Parties should agree to incorporate international competitiveness considerations within their antitrust frameworks.

Nonmarket Economies Clause: No party should sign binding commitments with non-market economies, such as China, without prior agreement of the other parties.

Pillar 2: Constraining the PRC's National Power Industry Development

Joint Sovereign Fund to Reverse Chinese Technology Adoption: Parties should seek to establish a joint sovereign fund to offset the switching costs of phasing out Chinese technologies.

Joint Import Bans: Parties should take measures to avoid companies with a sustained record of IP infringements from entering their markets.

Limiting Chinese R&D Funding: Parties should commit to establishing boundaries on Chinese research organizations' access to the local ecosystem and on companies' ability to gain market share, enabling them to reinvest in R&D.

Shared Commercial Counterintelligence: Parties should make a commitment to help companies gain more complete information about the environment in which they operate with allies.

WHAT SHOULD BE REQUIRED TO JOIN AN STEA

A trade partnership under an STEA would require strong, long-term commitments—a key aspect of which is rebuilding trust among allies. As the United States is engaged in trade negotiations with many countries, the first steps toward building a durable economic bloc among like-minded democracies are to demonstrate commitment and implement reforms that enable the implementation of more significant policies across the components. For the United States, this would entail recalibrating its trade policy to center on its techno-economic competition with China. This means reversing or changing certain policies and approaches that treat allies and trade partners the same way as they do the PRC. An illustrative example of this is the February 2026 announcement of a Section 301 investigation into structural excess capacity and production in the manufacturing sectors of 16 economies, including China, the European Union, Japan, Mexico, South Korea, and Taiwan.[50]

For other trade partners, the first steps should be to acknowledge trade irritants with the United States and to take measures to address them. Some of these policy changes and diplomatic gestures should be the following:

1. **Eliminate or significantly reduce nontariff barriers, particularly nontariff attacks**. Nontariff attacks represent a particular subset of nontariff barriers—resource-extractive, discriminatory, and often extraterritorial policies that largely target U.S. technology firms.[51] Digital service taxes are an example of a nontariff attack. To join an STEA, trade partners should, at a minimum, eliminate these so-called nontariff attacks and provide credible evidence of significant reductions in the nontariff barriers that USTR outlines annually in its National Trade Estimates report.

2. **Openly promote and share a commitment to reach an agreement with the United States based on fair, reciprocal trade**. As an STEA membership process involves trade partners obtaining approval from their respective parliaments, it should not be left to uncertainty or used as a negotiating tool to extract unrelated concessions from the United States, for example, on agricultural goods.
3. **The United States and trade partners should embark on symbolic, believable commitments to lay the groundwork for STEA membership**. For example, develop a joint expedited visa program to facilitate the exchange of STEM experts that goes beyond the current visa schemes. Governments—at the federal and subnational levels—should expand exchange and capacity-building agreements to share practices and standards that could later facilitate, for example, investment screenings or the implementation of joint export control measures.

Additionally, as an STEA would be an alliance that requires high levels of commitment among its partners, the United States can explore a modular membership approach. For example, it is likely that few, if any, Global South countries would be willing to endorse all the commitments required to counter Chinese mercantilism, or that some commodity-intensive economies are not necessarily contemplating investment in national power industries. In those cases, the United States and STEA partners should be receptive to another tier of membership to an STEA, without providing preferred market access.

Trade partners should acknowledge that they have trade irritants with the United States and take measures to address them.

In this regard, an STEA could have tiered membership based on the partners' commitments to the chapters and provisions:

- **STEA Member status** should be for those countries that fully adopt all components and provisions. These countries should enjoy reciprocal market access through zero-for-zero tariffs and the absence of behind-the-border trade barriers.
- **STEA Cooperating Partner status** should be for those countries that adopt most of the components and provisions but do not adhere to all of them. Cooperating Partners could still be subject to tariffs and other trade barriers that impede full market access with STEA members.
- **STEA Observing Partner status** should be for those countries that desire to signal a balance of U.S.-China relations or their reluctance to align with the Chinese economy but are not capable of or willing to commit to implementing measures to constrain Chinese mercantilism fully. The Observing Partner status should primarily serve as an avenue for Global South countries to share practices and regulatory standards aligned with an STEA.

COMPONENTS TO ADVANCE ALLIES' NATIONAL ECONOMIC POWER INDUSTRY DEVELOPMENT

The development of national economic power industries is understood in a broader context of advancing allied capabilities and constraining China's. A key driver for countries to join would be barrier-free access to the U.S. economy (and vice versa).

Preferred Market Access Among Partners

Specific Measures

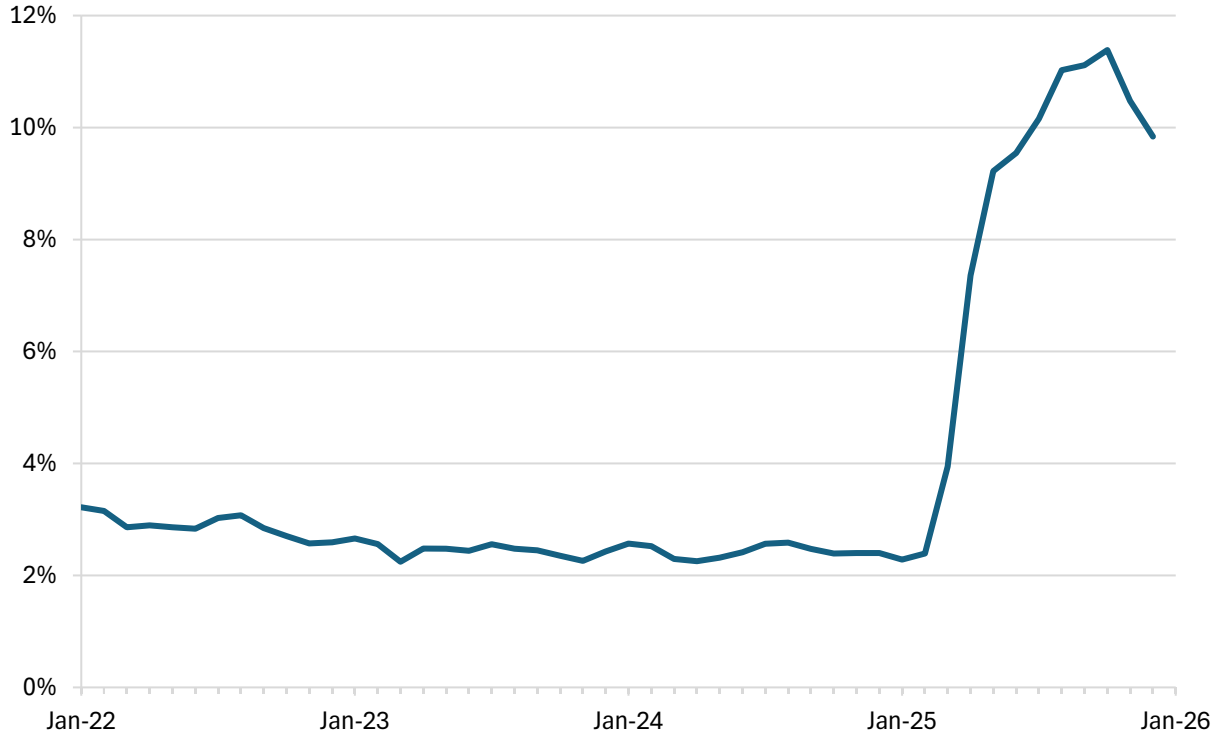
- **Zero-for-zero tariffs ideally on all products, but at a minimum on defense, dual use, and enabling products,** conditional on the parties agreeing to the remaining components of an STEA.
- **Zero tariffs should only apply under rules of origin (ROOs) thresholds**. ROOs determine where a product is made based on where its components come from and where it is produced. The United States-Mexico-Canada Agreement (USMCA), for example, defines ROOs to determine "USMCA-qualifying products" to apply a zero-tariff regime.[52] The current USMCA ROOs define thresholds based on what is produced within North America (i.e., regional value content, or RVC). Similar to the USMCA framework, parties should commit to a zero-for-zero regime only for products primarily produced within an STEA's economic bloc.
- **Parties should have a "clean sheet" regarding nontariff barriers in national power industry sectors**. The partners to an STEA should reserve the right not to provide a zero-for-zero tariff if they identify repeated trade irritants in national power industries. In the case of the United States, this means it should lower tariffs to zero if the trade partner, for example, does not have serious nontariff barriers in the USTR National Trade Estimate Report, is not listed in the USTR Special 301 Report on Intellectual Property Protection and Enforcement, and does not have physical or online markets in USTR's Notorious Market List.

Rationale

Access to the U.S. consumer market is arguably one of the most significant levers the United States can use in trade policy. Up until the Trump administration's so-called "liberation tariffs," the U.S. market was accessible to most countries either through the most-favored-nation rule—a WTO nondiscrimination principle that states that if any tariff advantage is granted to one member, it is extended to all WTO members—or through FTAs. The United States has FTAs with 20 countries, including regional agreements such as the USMCA and the U.S.-Dominican Republic-Central America FTA (CAFTA-DR).[53] Thus, the effective tariff rate before April 2, 2025—the date those tariffs went into effect, also known as "liberation day"—fluctuated between 2 percent and 3 percent.

Figure 3 illustrates the change in U.S. effective tariffs from January 2022 to December 2025, using data from Penn Wharton's Budget Model. The average effective tariff rate reflects the typical rate in customs data, calculated as the value of customs duties divided by the value of imports, and it increased fivefold after six months of Trump's tariffs. It's important to note that figure 3 does not account for the February 2026 Supreme Court decision declaring most liberation-day tariffs unlawful.[54]

Figure 3: Average effective U.S. tariff rates (January 2022–December 2025)[55]



Despite the erratic rollout of the tariffs and—as ITIF has stated—the failure to identify China as the real target for correcting trade imbalances, the current restructuring of the trade system gives the United States unique leverage.[56] If there is genuine intent and interest in providing market access to allies by lowering tariffs to zero under certain conditions, those conditions can create an environment for U.S. national power industries to thrive. This is the core of an STEA's proposal—a set of minimum conditions that allies and like-minded countries should follow to ensure that the strategic dual goal is achieved. In exchange, U.S. trade partners will both strengthen their capabilities to address Chinese mercantilism and gain access to the U.S. market in a zero-for-zero tariff scheme.

Digital Economy Integration

Specific Measures

- **Rely on the key USMCA provisions.** The USMCA should be used as a template for provisions regarding the moratorium on customs duties on electronic transmissions and digital products; nondiscriminatory treatment for digital products; a ban on data localization; free cross-border transfer of personal information; and a prohibition by parties on requiring the transfer of source code as a condition for market access.
- **Explicitly ban digital service taxes (DSTs).** Digital service taxes are surcharges on digital activities, such as online marketplaces, streaming, social media platforms, and data brokerage. DSTs typically impose taxes on the domestic revenue of multinational companies in a narrow range of business models, and include thresholds to exclude all but the largest firms.[57] These types of taxes have proven to be distortive, to discriminatory against a narrow set of companies and sectors, and to unfairly punish the same

transactions depending on the platform on which they are made (e.g., an online purchase might be subject to a DST based on whether the company meets the tax's thresholds).[58]

- **Avoid broad carve-outs.** One shortcoming of the USMCA's digital trade chapter is that it does not apply to government procurement.[59] Whereas it was intended to include additional mechanisms and carve-outs to protect sensitive government data, in practice, it has proven ineffective and has been used to advance digital protectionism. It has proven misguided because the cybersecurity safeguards required to protect sensitive government information are not subject to the provisions of the USMCA—for example, data security depends more on encryption protocols than on where the data is stored. As long as the company involved has a legal nexus with a nation, it is subject to that nation's privacy and cybersecurity laws and regulations. For example, foreign companies operating in the United States must comply with the privacy provisions of the Health Insurance Portability and Accountability Act (HIPAA), which govern U.S. citizens' privacy rights regarding health data—even when moving data outside the United States.[60] And, if a foreign company's affiliates overseas violate HIPAA, then U.S. regulators can bring legal action against the foreign company's operations in the United States.

Rationale

Digital trade rules help lower barriers to cross-border trade in digitized information and services. Digital trade represents 22 percent of global trade.[61] In 2024, the value of global digital trade reached $7.23 trillion, a nearly 60 percent increase from $4.59 trillion in 2020, representing an average annual growth rate of about 12 percent and outpacing the growth of physical trade.[62]

The U.S. digital sector is particularly competitive compared with other industries. ITIF's Hamilton Index (a measure of techno-economic strength across 10 high-tech industries) indicates that information technology (IT) services explain why the United States has not lost even more ground in advanced industries—in other words, "U.S. strength in IT services masks a real, structural weakness in advanced manufacturing."[63] America's global share of advanced industries in 2020 was 21.5 percent, a 2- percentage-point increase from 2010. However, this increase has been primarily driven by IT services. Without this sector, the United States would not have increased its global share in advanced industries and its share would be 2.5 percentage points lower.

Furthermore, as digitalization has permeated all sectors, a growing number of "traditional" industries rely on data from their operations, suppliers, and customers worldwide to make routine decisions. Digitalization of processes drives productivity growth. For example, a 2025 WTO report outlines that firms are increasingly "integrating data about sourcing, production, logistics, and sales to create unified data systems that provide real-time insights into the movements and characteristics of goods."[64] Even among small and medium-sized enterprises (SMEs)—which are traditionally at the "long-tail of low productivity"—digitalization helps increase and diversify revenues, making them more resilient to external shocks.[65] Digitalization can also help informal SMEs formalize their businesses, expanding their access to capital.[66]

National Power Industries Collaboration

China's panoply of support measures for its advanced industries are so massive that it will be hard for any particular country's industries to respond effectively. What is required is much more cooperation between allies.

Specific Measures

- **Nondiscriminatory principles applied to all national power industries**. This means that no party should give different treatment to advanced technology companies headquartered in the other party of the agreement compared with the potential benefits that local companies can receive. For example, advanced technology companies should receive the same tax incentives, credit guarantees, and other policy interventions as local firms do. This also means national treatment when it comes to regulations and taxes (e.g., no more unfair EU Digital Markets Act (DMA) rules discriminating against American firms, no more digital taxes, etc.).
- **Articulate and streamline technology partnerships among signatories**. The parties should compromise to jointly develop technologies and national power industries in which China's manufacturing scale creates systemic dependence. To do this, the signatories of an STEA should commit to promoting industrial policy tools—for example, investment incentives, preferential tax credits, etc.—to boost these selected sectors and technologies, thereby facilitating a small number of trusted production hubs.
- **Launch a joint manufacturing hub competition in third markets**. To incentivize the search for alternatives to China, the parties should establish a joint global manufacturing-hub competition in countries outside an STEA.[67] In this scheme, countries and subnational governments would compete for a special designation by reforming restrictive regulations, boosting skills development, ensuring adequate financial incentives, reducing corruption, and developing adequate infrastructure. The designated countries or regions would then benefit from increased aid from the United States and allies, and from agreements that governments would craft with their leading manufacturers to concentrate foreign manufacturing investment in the winning nations.
- **Establish a "Western Belt and Road": Align aid, development assistance, and export promotion oriented toward strengthening allied national power industries**. Signatories of an STEA need to commit to codeveloping a long-term strategy to jointly build development assistance and loan programs that expand Western national power and counter China's efforts to create dependencies in third markets, including programs such as the Belt and Road Initiative. This effort would involve, for example, measurable and accountable commitments to enhance coordination among aid agencies, such as Australia's Department of Foreign Affairs and Trade, the United Kingdom's Foreign, Commonwealth and Development Office, and development finance organizations such as the Japan Bank for International Cooperation, the Korea Development Bank, the European Investment Bank, and the European Bank for Reconstruction and Development. These organizations should expand incipient initiatives to create capabilities and co-invest in development initiatives in third markets that support supply-chain diversification efforts of mutual interest, for example, in critical minerals or semiconductor assembly, testing, and packaging (ATP).
- **Amplifying representation in standards bodies**. Technical standards are key enablers of trade and commerce, and an STEA should serve as a platform for companies to set global standards. In this context, the parties should commit to establishing mechanisms that incentivize the private sector in STEA countries to engage with standards-setting organizations and with government support, and to ensure that export control restrictions

do not apply to STEA companies interacting with entity-listed Chinese participants in international standards-setting. In addition, the parties should create a working group to identify common ground and coherence among STEA members when they engage with standards bodies.

Rationale

National power industries lie at the core of Western countries' rivalry with China—whoever is at the technological frontier in these sectors will be able to set standards, expand their global influence, and ultimately achieve dominance over the other Great Power. The idea of prioritizing strategic sectors is neither new nor necessarily Western. The concept of "commanding heights" is attributed to Lenin, who was referring to "the critical sectors that dominated economic activity—primarily electricity generation, heavy manufacturing, mining, and transportation."[68] The American historian Daniel Yergin and the economist Joseph Stanislaw in their book *The Commanding Heights: The Battle for the World Economy*, defined the 20th-century Cold War as an economic and ideological battle for market-driven or state-centralized global control for these critical sectors.[69] Despite some similarities with the rivalry with China during the 21st century—e.g., the United States contesting global hegemony against a unitary-party communist regime—the Soviet Union was a military and geopolitical rival, but unlike China, it was neither an essential market for the U.S. economy nor a business competitor for American companies.[70]

As a counterpoint, an STEA should exclude nonstrategic industries, such as professional services and retail, as well as traded industries, such as furniture, food, soda, paper, clothing, or office equipment, to name a few. These industries may have other values, such as enabling innovation or driving domestic productivity, but they are not consequential for geo-technology interests.

Despite some similarities with the rivalry with China during the 21st century, the Soviet Union was a military and geopolitical rival, but unlike China, it was neither an essential market for the U.S. economy nor a business competitor for American companies.

Furthermore, many traditional FTAs and other types of agreements are often shaped or blocked by interests in these nonstrategic industries. For example, the United States' attempt to create an economic bloc in the Asia-Pacific region without China in the mid-2010s—the TPP (now called the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, or CPTPP)—partly failed due to disagreements among U.S. constituents in agriculture and business services.[71] TPP was viewed as strategic because "the agreement's scale gives it considerable strategic heft, by creating an economically significant bloc of nations that has agreed to its broad disciplines."[72] Thus, the size of the economic bloc was prioritized over the integrated market's actual output. As a consequence, the agreement contained a wide range of—from a techno-economic power perspective—nonstrategic issues, such as agricultural standards, environmental protection provisions, labor requirements, a chapter on SMEs, and a chapter on sanitary and phytosanitary standards.[73]

The U.S. government can build on what is already being implemented through the State Department's initiatives, such as Pax Silica and the Forum on Resource Geostrategic Engagement (FORGE), but should focus on expanding its depth (i.e., binding mechanisms) and breadth (i.e., explicit, measurable goals). The administration should balance the political

objective of delivering quick results by signing nonbinding memorandums of understanding (MOUs) with the goal of building long-term relationships with allies and like-minded countries by negotiating stricter, binding agreements.

Defense Production and Security Elements

Specific Measures

- **Parties should set specific, measurable objectives to codevelop dual-use and defense applications**. For example, parties could set a minimum percentage of their military spending relative to gross domestic product (GDP), earmarked for joint military production. This could include partnering with such allies on areas such as robotics and aerospace, artificial intelligence (AI) use in the military, developing a shared network of advanced-industry centers in which firms from both countries could participate in each other's programs, and joint participation in national science programs.
- **Approve strategic transactions between the defense industrial bases of North Atlantic Treaty Organization (NATO) countries**.[74] In international markets, very few mergers or joint development agreements, even between leading firms in separate NATO countries, are likely to substantially lessen competition. Instead, transactions that consolidate the defense industrial bases among NATO countries can serve a critical purpose toward developing the scale necessary to drive innovation, solidify relationships among key NATO partners, and counter China's quest for techno-economic dominance.
- **The parties agree to collaborate on R&D and applications of defense technologies**, similar to AUKUS (a trilateral security partnership between Australia, the United Kingdom, and the United States) Pillar II.
- **Parties should be prohibited from procuring goods, services, or technology produced by listed entities and from contracting with companies that employ lobbyists who lobby for those same Chinese military companies.** Furthermore, the ban should apply to all military components, not only final goods. To do so, parties should develop systems to monitor the origin and ownership of component-level suppliers, particularly for raw materials and parts.
- **Joint cyberdefense and malware counterattacks.** Parties should commit to creating joint procedures and reinforcing capabilities to coordinate cyberdefense, strengthen early-warning mechanisms, and coordinate cybercounterattacks when needed. Cybersecurity is fundamentally collective, and the leadership in this field depends on shaping the partnerships and standards that govern cyberspace.[75]

Rationale

STEA members need a strong dual-use defense industrial base. The network of U.S. alliances provides a strong base for military-to-military cooperation. However, defense spending and production requirements have, so far, been kept out of trade negotiations. This approach is new and tailored for an era of techno-economic power struggle with China.

Parties should commit to collaborating on economic security activities. For instance, the Five Eyes alliance—which includes Australia, Canada, New Zealand, the United Kingdom, and the United States—provides members with mutual access to intelligence activities, including cybersecurity, and promotes greater military interoperability.[76] Another benefit of Five Eyes participation is that any nation can submit firms for accreditation in America's trusted foundry

program, which ensures the availability of trusted suppliers for the integrated circuits (and other foundational components) that go into national security-critical satellites, missiles, and weapons platforms.[77] ITIF has called for the United States to lead like-minded nations in developing a broader Five Eyes-like alliance specifically focused on combatting state-sponsored economic espionage in advanced-technology industries, and all members of an STEA should be part of this initiative.[78]

High-Skilled Talent Movement

Specific Measures

- **Parties should agree to facilitate STEM visas for highly qualified students and professionals to enable national power industries' workforce migration**. Partner nations should seek to develop STEM visas that can be applied for by both master's and Ph.D. students and by professionals in STEM fields. Increasing the circulation of academic and professional STEM talent would abet STEA nations' ability to develop technologies to counter Chinese threats.

Rationale

While the foundation of any long-term talent strategy should be a well-developed secondary and tertiary education system, that alone is insufficient. The United States and its partners also need policies that facilitate the movement of highly skilled researchers and STEM professionals, thereby enabling "brain circulation," deeper research collaboration, and international networks that accelerate knowledge creation and innovation.

A nation's STEM talent is key to its economic growth and competitiveness, especially in advanced industries where science and technology lay the foundation. Yet, the United States is falling behind China in producing STEM talent at both the undergraduate and graduate levels.[79] China has been surpassing the United States in STEM Ph.D. graduates since 2007.[80] In 2000, the United States produced 17,830 STEM Ph.D.s compared with China's 7,520. But by 2007, China had edged ahead with 24,430 Ph.D.s versus the United States' 23,940, and the gap has only widened since. By 2022, China awarded more than 50,970 STEM doctorates—over 50 percent more than the 33,820 awarded in the United States.

A nation's STEM talent is key to its economic growth and competitiveness. Yet, the United States is falling behind China in producing STEM talent at both the undergraduate and graduate levels.

While China's larger population partly explains these disparities, the implications for U.S. competitiveness are significant. Advanced industries such as semiconductors, biotechnology, AI, and weapons systems depend on a robust pipeline of world-class STEM talent. If the United States and allies fail to keep pace with China in cultivating the next generation of researchers, they risk ceding ground in the very sectors that will define economic and geopolitical leadership in the 21st century.

Joint Antitrust Interpretation Focused on Competitiveness

Specific Measures

- **Parties should agree to consider competitiveness in antitrust regulations**. After liability is established in cases involving strategic sectors, authorities should incorporate

international competitiveness into their prosecutorial discretion and remedies. ITIF also recommends that, during merger reviews, agencies utilize prosecutorial discretion by not allocating limited resources to challenging deals with strong competitiveness justifications and instead focus on blocking anticompetitive deals that lack such justifications.[81]

- **Competitiveness considerations should apply only in national power industries**. Antitrust agencies should focus resources on cases without competitiveness concerns. This approach would maintain the consumer welfare standard's analytical rigor while ensuring that enforcement decisions account for national strategic interests, including effects on U.S. innovation capabilities and strategic industry leadership.
- **Joint antitrust consultation**. Parties should agree that their antitrust agencies will establish a formal consultation process in which relevant agencies related to trade, national security, and foreign affairs provide input on international competitive effects before finalizing enforcement actions in strategic industries.
- **Improve coordination and cooperation among antitrust agencies**. The USMCA includes nonbinding language suggesting that antitrust agencies should cooperate in law enforcement—including through investigative assistance, notification, consultation, and exchange of information; mutually agreed technical cooperation activities; and enhanced information sharing and mutual legal assistance.[82] Parties to an STEA should have binding commitments to guarantee that this cooperation continues.

Rationale

Antitrust enforcement functions under a consumer welfare standard that has proven flexible enough to address different competitive harms but lacks formal mechanisms to consider international competitiveness implications. ITIF has previously noted that it is problematic when the Department of Justice's Antitrust Division and the Federal Trade Commission (FTC) make enforcement decisions without structured input—from entities such as the Department of Commerce's Bureau of Industry and Security (BIS), USTR, and the Department of State—regarding trade or national security impacts.[83] As noted, "antitrust agencies have no systematic process to weigh whether enforcement actions against U.S. firms might strengthen foreign competitors or harm U.S. strategic interests."[84]

Furthermore, there are reports that other governments use U.S. antitrust policies to validate their own actions against American companies. For example, the European Union cites U.S. cases to justify provisions of the DMA—a discriminatory regulation that overtly targets U.S. firms—and is imposing fines on American firms.[85]

Nonmarket Economies Clause

This provision advocates that no party should sign binding commitments with nonmarket economies, such as China's, without prior agreement of the other parties.

Specific Measures

- **Cover all types of binding agreements**. The clause should cover all types of agreements, including FTAs, digital trade agreements, and new forms of economic cooperation, such as digital economy and green economy agreements.[86]

- **Narrow the list of nonmarket countries**. The list of nonmarket countries should be narrower than the U.S. Department of Commerce's International Trade Administration's (ITA's) list of nonmarket economies. Vietnam, for example, provides a key destination for offshoring investments from China, and is a free-trade partner of U.S. allies such as Australia and Japan through the CPTPP. The list could be narrowed to the Department of Commerce's list of foreign adversaries: China, Cuba, Iran, North Korea, and Russia.[87]
- **Revise existing agreements with China retroactively**. Some U.S. allies have binding FTAs with China. Australia and South Korea, for example, signed bilateral FTAs with the PRC in 2015, while the New Zealand–China FTA has been in force since 2008.[88] In addition, many U.S. allies—Australia, Japan, New Zealand, the Philippines, South Korea, and Thailand—are part of the Regional Comprehensive Economic Partnership (RCEP), a regional trade agreement led by China. These agreements should be reviewed and, if necessary, renegotiated if the U.S. government finds that they contain binding commitments that harm an STEA's economic bloc interests.

Rationale

The goal of this clause should be to restrict how China gains influence among U.S. trade partners and indirectly affects U.S. supply chains by being a relevant trade partner with third countries. This does not exclude STEA partners from having trade and economic relations with China, but it provides a means to deter the PRC from indirectly entering the economic bloc's supply chains.

COMPONENTS TO CONSTRAIN THE PRC'S NATIONAL POWER INDUSTRY DEVELOPMENT

The parties to an STEA should jointly agree on minimum actions and frameworks to address the impact of Chinese mercantilism on the economic bloc's competitiveness, particularly in national power industries.

Immediate Reciprocity

Specific Measures

- **Parties should agree to form and join a mutually assisted alliance to counter Chinese attacks on each other's economy**. This model follows ITIF's previous recommendations for creating a new "NATO for trade" wherein economic aggressions can be countered collectively.[89]
- **Full reciprocity commitment**. The parties should commit to mirroring the restrictions that China imposes on foreign companies in its market. Such restrictions or limitations should retain legal authority only so long as the Chinese policy remains in effect. Any imposed restrictions should be imposed immediately, with a presumption of harm to the parties' interests. Any right of appeal that Chinese companies would have before the pertinent agency—such as the Federal Communications Commission (FCC) or U.S. International Trade Commission (USITC) in the United States—would be conditioned on the appeal or redress rights available to the parties' companies in China.
- **Monitoring and data sharing**. Parties should establish (and resource) a unit at their trade agencies to monitor—and publish in real time via an interactive digital dashboard—a comprehensive list of Chinese market access restrictions on U.S. companies.

Rationale

The strategic trade alliance envisioned in this report would be akin to another proposal ITIF has made: that allied nations should form a new "NATO for trade" to combat Chinese trade aggression. Allied nations could form a pact in which they agree to come to each other's aid when economically threatened by the CCP.[90] The new organization, a Democratically Aligned Trade Organization (or "DATO"), would be governed by a council of participating countries, and if any individual nation were threatened or attacked, DATO would quickly convene and potentially agree to take joint action to defend the nation attacked. For example, if China threatened to expel a given nation's students, DATO nations could agree to ban Chinese students in return. If China threatened to put a country's firms on its "Unreliable Entity List," DATO nations could agree to limit imports from Chinese firms. Any democratic nation would be welcome to join DATO, but should any nation fail to take the steps necessary to respect a DATO decision, it would lose the right to remain a member. This approach should be a core STEA feature.

In addition, the parties should agree to adopt a policy of strict reciprocity regarding products and services that Chinese companies may sell in overseas markets but that foreign companies are precluded from selling, or are heavily limited in selling, in China. An illustrative example of this is social media bans and censorship. The United States should encourage STEA partners to develop similar reciprocity provisions, and STEA partners could go further by collectively denying Chinese entities access to partner markets if China is precluding partner companies from competing in China. Further, wherever China imposes onerous restrictions or conditions on firms from partner countries competing in China, the United States and partner countries should impose similar restrictions or conditions.

The new organization, a Democratically Aligned Trade Organization (or "DATO"), would be governed by a council of participating countries, and if any individual nation were threatened or attacked, DATO would quickly convene and potentially agree to take joint action to defend the nation attacked.

There are many markers and products in which U.S. companies are precluded or impeded from competing in China. For instance, in April 2025, China severely restricted U.S. drone makers' ability to sell drones in China by placing 11 leading U.S. drone manufacturers—including Skydio, BRINC Drones, and Insitu—on its Ministry of Commerce "Unreliable Entity List."[91] (In a good example of how this policy recommendation could work, the Trump administration in December 2025 subsequently banned Chinese drone makers from selling new drone models in the United States.)[92] Similarly, in 2023, the Chinese government banned U.S. memory chipmaker Micron from selling its products in critical Chinese infrastructure.[93] The ban ultimately forced Micron to abandon its data-center chip business in China.[94] The United States should ensure that Chinese memory chipmakers—such as Yangtze Memory Technologies Corporation (YMTC)—cannot sell their products for similar uses in the United States. Another example is that "China prohibits the importation of remanufactured products, which it typically classifies as used goods."[95] Similarly, the United States and allies should prohibit Chinese companies from selling any remanufactured products in their markets.

The United States (and allies) should ensure that the exact same restrictions or conditions that are imposed on U.S. companies trying to compete in China are imposed on Chinese companies trying to compete in the United States (and allied countries). Another good example is cloud

services. China prohibits foreign companies from directly providing cloud computing services, including computer data processing and storage services and software application services provided over the Internet.[96] To access China's market, foreign cloud services providers must "establish a contractual partnership with a Chinese company, which is the holder of the necessary Internet data center license, and turn over its valuable technology, IP, know-how, and branding as part of this agreement."[97] Chinese cloud services companies should be made to operate under similarly restrictive conditions if they wish to compete in the United States.

China flatly prohibits foreign companies from providing film production and distribution services in China.[98] China further prohibits the retransmission of foreign television channels, foreign investment in TV production, and foreign investment in TV stations and channels.[99] Further, when China joined the WTO, it committed to allowing "20 films to be imported on a revenue-sharing basis in each of the three years after accession."[100] It also committed to permit U.S. firms to "form joint ventures to distribute videos, software entertainment, and sound recordings and to own and operate cinemas."[101] China failed to meet these commitments. Accordingly, an MOU initially negotiated in February 2012, and updated in 2017 between China and the United States, was to provide "for substantial increases in the number of foreign films imported and distributed in China each year, along with substantial additional revenue for U.S. film producers."[102] Still, "China has not yet fully implemented its MOU commitments, including with regard to critical commitments to open up film distribution opportunities for imported films."[103] While China needs to come into compliance with these commitments, until that happens, the United States should impose mirror limitations on Chinese entities' ability to distribute films in the United States.

The United States and partner countries need to ensure that they're treating Chinese entities the same way China treats its companies and organizations in standards-setting activities.

China further imposes severe restrictions on basic telecommunications services, including an informal ban on new entry, a 49 percent foreign equity cap, a requirement that foreign suppliers enter only into joint ventures with state-owned enterprises, and exceedingly high capital requirements.[104] So onerous are these requirements, "Since China acceded to the WTO more than two decades ago, not a single firm has succeeded in establishing a new joint venture to enter the sector."[105] Chinese authorities have also restricted the ability to offer voice-over Internet protocol (VoIP) services interconnected with the public switched telephone network (i.e., to call a traditional phone number).[106] Allied countries should ensure that reciprocal restrictions are in place for Chinese companies seeking to compete in their telecommunications service markets.

The United States and partner countries need to ensure that they're treating Chinese entities the same way China treats its companies and organizations in standards-setting activities. While China claims that it provides equal treatment to foreign companies in China's standardization activities, "in practice, the Chinese government continues to limit foreign participation in standards setting and, at times, still pursues unique national standards to protect its domestic industry."[107]

As an example, foreign companies have reported that they were excluded from the technical committee for cybersecurity standards (TC-260) "on the basis that their companies are headquartered outside of China."[108] The Chinese government further directs and often coordinates the positions of Chinese stakeholders at standards meetings.[109] STEA countries should work collaboratively to ensure their firms are treated fairly in Chinese standard-setting activities.

Fully Integrated Investment Screening

Specific Measures

- **Commitment to shared investment screening procedures**. The parties should agree on mechanisms to "white list" inward investments from other parties and to prevent the inflow of Chinese investment linked to the Chinese military or investments that make strategic industries' supply chains vulnerable. Having shared minimum procedures—such as in due diligence, sector priorities, and exposure to key industries—does not require every country to have the same FDI screening regime; instead, the different approaches should be compatible while respecting each country's institutional framework.
- **Information sharing and shared review commitments**. Parties should commit to creating information-sharing mechanisms to minimize information asymmetries about which companies are under scrutiny and the authorization decisions made. Parties should also commit to creating a common registry of all Chinese-origin companies operating in the economic bloc, including subsidiaries, joint ventures, firms with Chinese financing, and entities with partial Chinese government ownership.[110] In addition, parties should commit to fully collaborating with each other in cases where investment screening requires analyzing companies' information in the other party's jurisdiction—for example, reviewing existing Chinese interests in multiple companies across the economic bloc.
- **All parties should commit to similar rules for approval for Chinese joint ventures**. China can gain access to U.S. firm technology by requiring a joint venture for any sales or production in China.[111] The scale of the Chinese market allows the PRC to play Western trade partners against each other. If American companies cannot sell in China and other U.S. trading partners can, the only result will be lost U.S. sales. One way to address this is for all parties to adopt similar screening rules for joint ventures.
- **Better reporting of outbound investments in China.** Parties should commit to improving reporting on STEA countries' firms' activities in China, requiring them to disclose the financial information of those activities and creating facilitation mechanisms for reporting cases of coercion or forced technology transfer to diplomatic authorities

Rationale

The Committee on Foreign Investment in the United States (CFIUS) is the body authorized to review certain transactions involving foreign investment in the United States to determine whether they are aligned with U.S. national security. ITIF has advocated for CFIUS reform to better address serious issues with Chinese FDI.[112] The mercantilist nature of China's economic model means that its outbound investments are not necessarily market based—there are reports of the PRC government subsidizing companies to outbid competitors for strategic acquisitions, thereby creating technological dependencies or enabling the transfer of American IP and know-how to China.[113]

CFIUS has been implementing the Foreign Investment Risk Review Modernization Act of 2018 (FIRRMA) in its review screens since 2020.[114] Under this framework, CFIUS should consider "whether a covered transaction involves a country of special concern that has a demonstrated or declared a strategic goal of acquiring a type of critical technology or critical infrastructure that would affect United States leadership in areas related to national security."[115] FIRRMA, however, is too narrow in its definition of what would affect U.S. leadership, as it excludes industries critical to economic and strategic competitiveness.[116]

If the United States has challenges in addressing Chinese mercantilism in inbound FDI, allies and trade partners with less leverage—and often less political will—face greater difficulties.

Full Export Control Alignment

Specific Measures

- **Parties should agree either to jointly implement export controls against rivals or not to implement export controls at all**. Unilateral export controls ultimately harm the country imposing them. With this principle, an STEA should seek full alignment on export controls—avoiding loopholes or free riding.
- **Export controls should be targeted and focused on technological chokepoints**. Export controls on semiconductor manufacturing equipment serve as a good example of a "small yard, high fence" approach; an STEA should leverage that experience. It is important to note that not all participating countries will control relevant chokepoints. Still, an STEA should make clear from the outset that this tool is designed to restrict access to critical technologies—not to justify broad protectionist measures or create strategic advantages for individual members.
- **Information sharing for improving alignment**. An STEA should contain a provision committing the parties to disclose information, including information gathered by intelligence agencies, that may help improve the design and enforcement of export controls.
- **Parties should commit to expanding the remit and funding their export control agencies or bodies**. In the case of the United States, this would require Congress to expand the scope and budget of the Export Control and Related Border Security (EXBS) program within the U.S. Department of State. The EXBS program works with partner governments to identify regulatory and institutional gaps and provide technical and capacity-building assistance.[117] While the EXBS program has traditionally focused on export controls on weapons of mass destruction and national security-related technologies, its remit could be expanded to assist allied nations in further developing their capacity to evaluate export controls for advanced technologies.

Rationale

Export controls represent a vital tool for limiting rivals' access to cutting-edge technologies. The current "policy toolbox" for export controls enables the U.S. government to prohibit direct exports of U.S. technologies to competitors or to ban goods produced with U.S. technologies. This has facilitated restrictions on China's access to U.S. advanced chips and sophisticated semiconductor equipment. The enforcement mechanism for export controls in other jurisdictions is the Foreign-Direct Product (FDP) rule, which applies to a foreign-produced item under the

Export Administration Regulations (EAR) if it is a direct product of U.S. technologies, including U.S. software.[118] The FDP rule is a powerful tool, as it has allowed the U.S. government to impose unilateral export restrictions without consulting allies that hold significant supply chain chokepoints. Other tools for enforcing export controls are Entity Lists, end-use and end-user controls, controls on U.S. persons, and licensing, among others.[119]

The case of the Entity List-based export controls on Huawei since 2019 evidence that unilateral restrictions—without allied coordination—are suboptimal.[120] The restrictions on exporting U.S. technologies or direct products to Huawei created a loophole, as competitors of U.S. companies who disregarded U.S. export controls could gain market share. While these cases were exceptions, they harmed American companies. A notable example was Teradyne, a U.S. robotics and semiconductor testing company, which lost revenue to its Japanese competitor because the export restrictions on U.S. technologies to Huawei applied only to them.[121]

Joint Section 301-Like Investigations

Specific Measure

- **The parties should agree to establish the necessary legal procedures and develop adequate technical capabilities to jointly conduct investigations to identify and combat Chinese unfair foreign trade practices**. In addition, the parties should agree to jointly implement remediation and retaliatory mechanisms derived from these investigations.

Rationale

China's massive industrial subsidies and excess capacity pose a global challenge to the economics of innovation-based industries that compete on market principles. The International Monetary Fund (IMF) estimates that the equivalent fiscal cost of Chinese industrial policy through cash subsidies, tax benefits, subsidized credit, and subsidized land for favored sectors (including both private and state-owned firms) is equal to about 4 percent of Chinese GDP per year.[122] Similarly, a study from the Kiel Institute for the World Economy finds that over 99 percent of a sample of 5,260 listed Chinese firms received government subsidies totaling €35.3 billion in 2022, double the amount from 2015.[123] China has plowed over $230 billion of subsidies into its electric vehicle (EV)/battery industry.[124] China has funneled at least $150 billion into its semiconductor industry.[125] China subsidized its national aerospace champion, COMAC (the Commercial Aviation Corporation of China), with between $49 billion and $72 billion in state-related support through 2020.[126] In steel, China's share of world output grew from just 15 percent in 2000 to 55 percent today.[127] China's steel sector is currently dealing with an overcapacity of more than 50 million tonnes (Mt), a figure that is projected to rise to 250 Mt by 2035.[128]

China's predatory "massive industrial subsidization inducing overcapacity to eliminate foreign competitors" strategy reached its apotheosis with solar panels.[129] China's share of global solar panel exports grew from just 5 percent in the mid-2000s to 67 percent by 2018, with Chinese solar output turbocharged by at least $42 billion in subsidies from 2010 to 2012 alone. This instigated a global glut that saw world prices for solar panels crash by 80 percent from 2008 to 2013, bankrupting over 500 of the most innovative foreign competitors and setting up Chinese producers for a final coup de grace: using their government-enabled profits to try to buy bankrupt U.S. solar firms to strip out their remaining technology and send it back to China. As Ben

Santarris of SolarWorld, a German solar panel manufacturer, once explained, "Pervasive and all-encompassing Chinese subsidies are decimating our industry."[130]

In March 2026, USTR rightly initiated a Section 301 investigation relating to structural excess capacity and production in manufacturing sectors.[131] But China wasn't the only target of this investigation; 15 other nations, including allies such as Japan and South Korea, were also under scrutiny. To be sure, the United States should push back if and where core allies have industrial policies driving overcapacity that harms U.S. enterprises. But in cases such as these, allied countries—just as with the United States—are more likely to be harmed by Chinese overcapacity, rather than our allies being the perpetrators of that overcapacity. Rather than launching Section 301 investigations against core allies, the United States should enroll them in its Section 301 investigations against China when they address shared challenges, such as massive industrial subsidies and overcapacity (e.g., in areas such as aerospace, steel, or semiconductors).

Rather than launching Section 301 investigations against core allies, the United States should enroll them in its Section 301 investigations against China when they address shared challenges, such as massive industrial subsidies and overcapacity.

Joint Sovereign Fund to Reverse Chinese Technology Adoption

Specific Measures

- **Lump-sum commitment when joining the agreement**. Signatory parties should allocate initial capital to the joint sovereign fund, proportional to the size of their economy and fiscal capabilities. For example, assuming that the U.S. government will allocate two times its expenditure in the 2020 rip-and-replace program, a similar initial capital investment would be around 0.1 percent of each country's GDP.[132] This would mean that, for example, allies such as Japan and the United Kingdom should contribute with $4 billion and $3.7 billion, respectively.[133] For countries that might be fiscally constrained, the fund's initial capital investment could be provided by borrowing from the U.S. Treasury, for example, through the U.S. International Development Finance Corporation (DFC).
- **Ex ante definition of reimbursement conditions**. There should be minimum conditions to use the fund to replace Chinese technologies. The rip-and-replace program, for example, only reimburses the replacement of Huawei/ZTE technologies acquired before June 30, 2020. In addition to a similar threshold, the joint sovereign fund should naturally cover costs only if the new technologies originate among the parties. Likewise, the threshold should be narrowed to specific technology "chokepoints," such as telecommunications, key aspects of EV charging, or semiconductor manufacturing equipment.
- **Good sovereign fund governance**. The main guide for good sovereign fund governance is the International Forum of Sovereign Wealth Funds' (IFSWF's) Santiago Principles, which are voluntary, generally accepted principles and practices the objective of the which is to ensure that sovereign wealth funds are managed with transparency and accountability and invested prudently. Parties in an STEA should abide by the Santiago Principles in a binding manner.

Rationale

Subsidized manufactured goods allow China to "flood markets," making non-Chinese manufacturing relatively more costly due to the unfair competition. For example, a 2025 OECD report on the global steel industry finds that China's rise in this sector is "driven by market-distorting subsidies and other non-market policies and practices," leaving other countries' steel producers in a "precarious state" due to this unfair advantage.[134] In terms of EVs, Chinese low-cost production, enabled by a state-supported environment that includes reduced utility rates and suppressed labor costs, leads to artificial overcapacity, causing non-Chinese automakers to lag behind in EV technologies development and adoption.[135] These cases recur—with some nuance—across multiple national power industry sectors.[136]

China is also embedded in America's and allies' supply chains—even in national power industries. Huawei's technologies are present in the telecommunications network of nine U.S. allies—Hungary, Iceland, Italy, South Korea, Spain, the Netherlands, the Philippines, Thailand, and Turkey—and are being phased out from six others: Belgium, France, Germany, Poland, Romania, and the United Kingdom.[137] Furthermore, despite efforts to reshore production out of China to reduce U.S. dependency on its economy through frameworks such as the China Plus One—a supply chain management strategy in which a firm retains substantial production capacity in China while shifting production to at least one other country to reduce risk—many internal value chains remain anchored in China, giving the PRC significant leverage over U.S. interests.[138]

For the United States and its potential partners in an STEA, this creates two practical problems. First, as described, cheaper Chinese products are displacing other countries' products, thereby eroding their manufacturing capability and reinforcing dependency. Second, as Chinese inputs and intermediate goods are embedded in allies' supply chains due to their artificially constructed cost effectiveness, replacing them would increase production costs. In other words, if the desired outcome is to build an advanced technology supply chain free of Chinese dependency, policymakers should create mechanisms to offset switching costs.

Joint Import Bans

Specific Measures

- **Parties should agree to ban and implement strong retaliatory measures against Chinese imports that are made unfairly or pose cyber risks.** These measures should apply at the firm level, expanding the scope of traditional import bans that apply solely at the product level. In particular, firm-level bans on Chinese companies should apply where foreign companies in the same industry have limited market access in China, where Chinese firms receive subsidies above global norms, and where Chinese firms have benefited from infringing IP. For example, Huawei's and ZTE's telecom equipment notably fit both categories.[139] As such, no country should be allowed to join if it has not implemented a full ban on Huawei and ZTE telecom equipment within its borders.
- **Build an "inspection wall" against counterfeit and pirated Chinese goods: parties should commit to properly funding their IP protection agencies and IP enforcement bodies**. For example, the United States' Customs and Border Patrol (CBP) agency needs more resources. ITIF has called on Congress to increase the CBP budget and ensure that the CBP director collaborates with private sector stakeholders, including brand sellers, online

marketplaces, and shippers, to establish real-time information sharing and analytics on potential counterfeit shipments, enabling them to better detect and seize imported counterfeits.[140] Greater information sharing would enable an allied effort to work more closely together in combating fraudulent Chinese products entering allied markets.

- The United States and parties should agree to resurrect core elements of the Anti-Counterfeiting Trade Agreement (ACTA)—a U.S.-led multilateral initiative to strengthen enforcement against counterfeit goods and copyright piracy—in an STEA, particularly those pertaining to combatting piracy, counterfeiting, and IP theft.[141] ACTA was signed in 2011 by countries including Australia, Canada, Japan, the United States, and several EU member states, but it ultimately failed to gain broad acceptance and was rejected by the European Parliament, among others.[142]
- **The parties should agree to enforce mutual arrest warrants against IP infringers**. The commitment should be to prosecute IP infringers in the country where the IP was stolen, enabling other parties to arrest the individual if the individual is within their jurisdiction.

Rationale

China remains the world's most significant practitioner of IP theft, content piracy, and the export of counterfeit goods. In total, the annual cost to the U.S. economy of counterfeit goods, pirated software, and trade secret theft perpetrated by China ranges from $225 billion to $600 billion, according to the U.S. Federal Bureau of Investigation.[143] Similarly, a 2023 Library of Congress report finds that "counterfeiting and piracy costs U.S. businesses more than $200 billion a year and leads to the loss of more than 750,000 jobs."[144]

In certain industries, China has acquired significant market share—even leading globally—aided by IP theft. For example, Chinese enterprises' global share of liquid crystal display (LCD) production has reached 72 percent, while their share of organic light-emitting diode (OLED) production has surpassed 50 percent, both up from under 1 percent a decade ago.[145] Two separate USITC investigations have demonstrated that Chinese display producers have also benefited from extensive foreign IP theft.[146] An STEA should outline provisions that ban the import of all products, among all STEA partners, from companies that have benefited from IP theft.

According to CBP data, in FY 2024, the agency seized 27,927,068 counterfeit or pirated products from China and Hong Kong, with a retail value of $5.02 billion (using manufacturers' suggested retail price), accounting for approximately 90 percent of the total quantity of seized counterfeit goods entering the United States that year.[147] But China's extensive counterfeiting affects not just the United States but also allies across the world. Indeed, OECD affirms that "China remains the dominant source of counterfeit goods."[148] Another assessment finds that China accounts for 63 percent of all counterfeit goods produced worldwide.[149] The EU has likewise found that China and Hong Kong account for some three-quarters of exports of dangerous counterfeits entering its continent.[150] In 2019, the European Union Intellectual Property Office issued a report that estimates that foreign IP infringement costs the EU €60 billion ($69 billion) in annual sales through IP theft in goods and services. The report identifies China/Hong Kong as the "main offender."[151] Japan estimates that it loses $30 billion annually from counterfeit goods—again, the majority of them coming from China.[152]

Parties need to bolster their own policies to combat the import of Chinese goods that benefit from pilfered IP or are counterfeit, and work alongside strategic trade partners in doing so.

Limiting Chinese R&D Funding

Specific Measures

- **Parties should agree to ban public funding for Chinese researchers at their countries' universities and R&D facilities**. Parties should develop procedures to address the challenge of China funding students, researchers, or both at their universities, with the goal of the knowledge and technology produced will likely flow back to China. At a minimum, universities and research organizations within STEA nations should be required to disclose in real time all research partnerships with researchers or companies in China. Where those partnerships are with entities of concern in China, People's Liberation Army (PLA) military institutions, or affiliated institutions (e.g., the "seven sons of national defense"), the researchers should be required to first get permission from the country's pertinent science agency (such as the U.S. National Science Foundation [NSF]).
- **Parties should require that the faculty members from their countries disclose research with Chinese academics related to national power industries**. Academic research and exchange between Western and Chinese researchers should not be banned per se. Instead, there should be narrowed and targeted limitations. There should be a presumption that the research is problematic, and institutions should be required to obtain waivers to proceed for researchers affiliated with PLA-linked entities or for frontier research on strategic technologies. In other words, endangered species research sharing with China, yes; EV research sharing, no.
- **No public procurement to Chinese advanced-technology companies, including at the subnational and local levels**. Revenues and market share are directly correlated with companies' capabilities to invest in R&D, particularly in advanced-technology sectors.[153] As such, STEA members should commit to banning public procurement in China's advanced-technology sectors unless it is proven that no alternative is available.

Rationale

The PRC's espionage ecosystem is aided by the U.S. research environment, which privileges the free flow of ideas and researchers, allowing China to recruit (or coerce) talent trained in America to engage in IP theft and technology transfer. The challenge is to maintain a U.S. research environment within this framework while closing gaps and loopholes that enable IP and trade secret theft.

Shared Commercial Counterintelligence

Specific Measure

- **Parties should agree to share intelligence on China's IP theft actions in their countries**. Parties should also establish a formal "innovation mercantilism intelligence sharing process" whereby allied nations share information on various and sundry unfair practices that benefit a specific list of major Chinese firms.

Rationale

Counterintelligence, within an STEA economic bloc, should, among other tasks, help companies gain more complete information about the environment in which they operate so they can more

effectively reduce information loss to competitors. These companies are currently competing against rivals that benefit from their home country's counterintelligence efforts. Western advanced-technology companies are often targeted by foreign intelligence services seeking to obtain valuable knowledge and other IP surreptitiously. To accomplish all this, the signatories of an STEA should agree to establish a mechanism for interagency coordination on counterintelligence outreach programs.

PRECEDENTS: THE UNITED STATES HAS IMPLEMENTED VARIATIONS OF AN STEA'S COMPONENTS

This section outlines precedents for U.S. policies and successful cases in which the proposed components of an STEA have been implemented—or at least a similar approach has been taken. The objective of this section is to demonstrate that, although the vision of a developmentalist approach to trade agreements focused on techno-economic power is challenging, its implementation is possible and there are precedents for its components.

Precedents for the Components for Advancing Allies' National Economic Power Industry Development

Preferred Market Access Among Partners

The Reciprocal Trade Agreements Act of 1934 (RTAA) is a historical precedent in which the United States demonstrated a political willingness to reduce its tariff rates suddenly and radically. The RTAA granted the president a temporary three-year authority to increase or reduce U.S. tariffs by up to 50 percent of their current levels. The RTAA served as one of the pillars of the New Deal and provided the model for the GATT, which would later become the WTO. In that context, the RTAA should be viewed as a precedent for tariff reduction, not necessarily as a model for lowering tariffs based on techno-economic or geopolitical alignment, as an STEA proposes.

National Power Industries Collaboration

The United States has pursued several scattered, generally nonbinding bilateral and multilateral engagements with allies in national power industries. For example, the Biden administration's Indo-Pacific Economic Framework for Prosperity (IPEF) was a regional initiative aimed at strengthening economic ties among 14 countries in the Asia-Pacific region.[154] IPEF was short of being either a trade agreement—due to that administration's unwillingness to sign trade deals—or a decisive turning point for IPEF partners in terms of their relationships with China. Despite its shortcomings, IPEF achieved some progress in specific areas of national power industry cooperation. For example, the IPEF's Supply Chain pillar represents a multicountry agreement for supply chain resilience, creating governance mechanisms through coordination bodies and, among other things, focusing on semiconductors, critical minerals (including those for batteries), and chemicals.[155] Despite the fact that the Trump administration has not been engaged in IPEF, in October 2025, some IPEF partners—whose identities were not disclosed—met in South Korea to discuss an "IPEF Supply Chain Agreement's Crisis Response Network" meeting for a simulation exercise of a shutdown of critical minerals, and to coordinate potential responses.[156]

In addition, the Biden administration's Mineral Security Partnership (MSP) focused on mining investment and strategic stockpiling. MSP partners included Australia, Canada, Estonia, the European Commission, Finland, France, Germany, India, Italy, Japan, Norway, South Korea,

Sweden, and the United Kingdom.[157] In February 2026, the State Department announced FORGE, a platform that "serves as the successor to the MSP" and will allow countries to collaborate at the policy and project levels.[158] During the launch of FORGE, the U.S. government announced bilateral critical minerals frameworks with Argentina, the Cook Islands, Ecuador, Guinea, Morocco, Paraguay, Peru, the Philippines, the UAE, the United Kingdom , and Uzbekistan.[159]

The U.S.-U.K. MOU on critical minerals—signed during FORGE's launch—outlines the participants' intent to strategically prioritize and coordinate investments, permitting, asset sales, and other mechanisms across key segments of the critical minerals supply chain.[160] It also outlines commitments to "secure their respective critical minerals and rare earths industries from non-market policies and unfair trade practices."[161] Likewise, the United States and the Philippines signed an MOU on the critical minerals supply chain in February 2026.[162] Although the details of this MOU are not publicly available, some statements indicate that it concentrates on "mapping and survey, and research and innovation in mining, processing, refining, and recycling" of critical minerals.[163]

The current Trump administration is leading the Pax Silica initiative, a plurilateral engagement for AI and supply chain security, initiated—as of June 2026—by over 20 countries and the European Union.[164] Taiwan has endorsed the Pax Silica as a nonsignatory participant. Pax Silica serves as a tech-diplomacy platform to align partner countries' efforts to reduce their supply-chain dependence on China.

Digital Economy Integration

The digital trade chapter of the USMCA was considered pioneering and a template for digital trade rules when it entered into force in 2020. The chapter outlined key, binding provisions that enable companies and individuals to conduct digital activities seamlessly. Some of these binding provisions include the following:[165]

- **A moratorium on customs duties on electronic transmissions and digital products.** This provision prohibits signatories from imposing tariffs on digital transmissions, many of which are basic activities that could require cross-border exchange of digitized information, such as downloading files, streaming, or sending emails.
- **Nondiscriminatory treatment for digital products.** This provision states that no party should offer less-favorable treatment "to a digital product created, produced, published, contracted for, commissioned, or first made available on commercial terms" in the other party's jurisdiction.[166] This ensures that digital products and services receive the same access and legal treatment as their domestic counterparts do.
- **Ban on data localization measures.** Data localization targets an increasing variety of specific data types and broad categories of data considered "important," "sensitive," or related to national security.[167] Thus, data localization reduces the accessibility and security of the Internet, makes it more expensive and complex, and hampers innovation. Businesses rely on data to generate value, and many can only maximize that value when data flows freely across borders.
- **Cross-border transfer of personal data.** Facilitating regulated, secure cross-border data transfers supports global value chains and digital services while building trust by

adhering to key privacy principles. In that context, the USMCA states that "no Party shall prohibit or restrict the cross-border transfer of information, including personal information, by electronic means if this activity is for the conduct of the business of a covered person."[168]

- **Prohibition of forced transfer of source code as a condition for market access.** This provision protects companies' IP and deters adversaries from identifying and exploiting security and privacy vulnerabilities. In addition, protecting companies' IP ensures that they can capture returns from future innovations, incentivizing continuous improvement of digital products.

Defense Production and Security Elements

As noted, AUKUS represents a trilateral security partnership between Australia, the United Kingdom, and the United States.[169] AUKUS Pillar II focuses on the development and sharing of advanced technologies to enhance warfighting capabilities and increase interoperability among forces. Pillar II features collaborative efforts to develop defense technologies in areas including AI and autonomy, robotics, drones, quantum, hypersonics, and advanced cyberspace technologies. Overall, AUKUS Pillar II seeks to enable faster development and deployment of defense technologies to enhance strategic advantage in the Indo-Pacific region. STEA members should be eligible for participation in AUKUS Pillar II.

High-Skilled Talent Movement

The United States faces a growing shortage of U.S. citizens and permanent residents pursuing careers in STEM—a gap that threatens the nation's economic strength, technological leadership, and innovation capacity.[170] Indeed, NSF data shows that a substantial share of graduate STEM degrees in the United States are awarded to these temporary visa holders.[171] Between 2012 and 2021, temporary visa holders earned between 25 and 40 percent of all science (including social sciences) and engineering master's degrees, as well as between 33 and 35 percent of all science and engineering doctorates.[172]

The presence of STEM graduates is even more pronounced in strategically important fields.[173] In computer and information sciences, temporary visa holders earned 58 percent of all doctorates in 2024, compared with 37 percent awarded to U.S. citizens or permanent residents. The pattern is similar in engineering, where 51 percent of doctorates went to temporary visa holders, compared with 44 percent awarded to domestic students.

Joint Antitrust Interpretation Focused on Competitiveness

There are precedents of systematic antitrust scrutiny weakening U.S. strategic industries. The U.S. antitrust authorities weakened Western Electric (the predecessor of Lucent) and Bell Labs (a world-class R&D laboratory, now owned by Nokia) for over 60 years.[174] This persistent regulatory scrutiny led to a decline in U.S. global leadership in telecom equipment. Today, European companies such as Nokia and Ericsson dominate the U.S. 5G equipment providers' market.[175]

Traditional trade agreements consider antitrust elements; however, they are meant to align with general principles, such as maintaining competition laws that proscribe anticompetitive behavior or applying their national competition laws to all commercial activities. For example, the USMCA's competition chapter sets minimum standards to ensure that antitrust enforcement

against companies from other countries receives fair treatment, similar to the scrutiny a national company would receive.[176] However, the Trump administration has not included antitrust or competition provisions in the recent trade deals and frameworks it negotiated during 2025 and the first quarter of 2026.[177]

Nonmarket Economies Clause

The United States has signed agreements with other countries to prevent them from entering commitments with nonmarket economies. The Department of Commerce defines a list of nonmarket economy countries for purposes of the U.S. antidumping and countervailing duty laws. As of March 2026, there were 14 nonmarket economy countries: Angola, Armenia, Azerbaijan, Belarus, China, Georgia, Kyrgyzstan, Laos, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan, and Vietnam.[178]

The USMCA includes a "non-market FTA" clause in which parties should notify the other partners if they are intending to sign an FTA with a nonmarket economy and provide them with an "opportunity to review the full text of the agreement, including any annexes and side instruments."[179] If a USMCA partner enters into an FTA with a nonmarket economy, the other partners can terminate the USMCA within the first six months.

The Trump administration often added similar clauses to the trade deals it negotiated in 2025 and early 2026, but narrowed them to digital trade agreements. For example, the U.S.-Indonesia agreement signed in February 2026 states that "Indonesia shall communicate with the United States before entering into a new digital trade agreement with another country that jeopardizes essential U.S. interests."[180] As of March 2026, the administration had signed similar clauses with Cambodia, Guatemala, Malaysia, and Taiwan.[181]

Precedents for the Components for Constraining the PRC's National Power Industry Development

Immediate Reciprocity

Reciprocity—alongside national treatment and nondiscrimination—represents a basic foundational principle of the WTO, and of international trade. Technically, in the WTO context, "reciprocity" means that concessions granted between nations should be equally and fairly distributed.[182] With regard to China, it obviously means treating Chinese companies the same way U.S. (or allied) companies are treated in China. Reciprocity has also long been a foundational principle of U.S. trade policymaking. Munak has noted (citing scholar Dough Irwin's work) that "the modern era of US trade policy, which begins around 1932, was driven by the objective of reciprocity, where the US government prioritized reductions in tariff and non-tariff barriers through negotiated agreements with other countries."[183]

Or, as another scholar noted, "It was the United States that brought reciprocity into trade policy."[184]

Lastly, the recent U.S. proposal on WTO reform emphasizes the imperative of developing "reciprocal and mutually advantageous arrangements" in the context of "a new economic order premised on reciprocity and balance and oriented toward serving concrete national interests."[185]

Fully Integrated Investment Screening

Japan's foreign investment screening regime de facto considers competitiveness. In April 2023, citing concerns over national security and technology leakage, Japanese authorities added 10 advanced-technology sectors to its FDI screening regime: semiconductors, storage batteries, natural gas, metal 3D printers, machine tools and industrial robots, fertilizers (potassium chloride, etc.), permanent magnets, marine equipment, metals, and mineral products.[186] In March 2026, Japanese authorities announced the creation of a CFIUS-like screening panel and a plan to expand reviews of third parties that acquire a foreign company that already holds shares in a Japanese firm.[187]

Full Export Control Alignment

The coordination of semiconductor export controls in 2022 and 2023 among Japan, the Netherlands, and the United States serves as an example of alignment. The United States unilaterally imposed export controls on advanced chips and semiconductor manufacturing equipment to China in October 2022 with the explicit goal of preventing the PRC from catching up in chipmaking capabilities.[188] Just a few months later, in January 2023, the Netherlands and Japan agreed to ban shipments of the most-advanced extreme ultraviolet (EUV) lithography semiconductor manufacturing equipment, effectively blocking access to key chokepoints in the chipmaking supply chain.[189] The Center for Strategic and International Studies (CSIS) stated that those EUV export controls "could have backfired disastrously if other countries, particularly Japan and the Netherlands, moved to fill the gaps in the Chinese market that the partial U.S. exit left."[190] (Note: This was indeed a laudable effort, but it was incomplete. While the most advanced semiconductor manufacturing equipment technology—EUV lithography equipment—was restricted by all partners, the one-generation-older version of the technology—deep ultraviolet (DUV) lithography equipment—was restricted by the United States but not by the Netherlands or Japan. The result has been significant sales losses for U.S. DUV firms as competitors continue to sell into China, but U.S. players have been restricted. This is the subject of the MATCH (Multilateral Alignment of Technology Controls on Hardware) Act currently being considered in the U.S. Congress.[191]

The "small yard, high fence" approach of limiting China's access to advanced semiconductor technologies can only be achieved through coordination with allies, particularly Germany, Japan, the Netherlands, South Korea, and Taiwan. However, this doesn't mean export controls should necessarily be the only go-to tool. As ITIF has stated, "Many who advocate for export controls do so because they can't think of other steps to impede China technologically."[192]

The "small yard, high fence" approach of limiting China's access to a narrow set of the most advanced semiconductor technologies can only be achieved with coordination with allies.

Even when export controls are well coordinated, if they are too broad (i.e., not chokepoints), blanket restrictions will eventually backfire. They will create opportunities for retaliation and accelerate China's path to self-sufficiency—all while losing revenue and market opportunities.

Joint Section 301-Like Investigations

The United States has previously worked with like-minded nations (including through the erstwhile trilateral framework with the EU and Japan) and at the WTO to update its rules to

impose much stiffer conditions on, and penalties for, aggressive industrial subsidization.[193] The effort clarified the definition of a "public body," extending it to include state-influenced activities by entities such as state-owned enterprises and private firms.[194] In that effort, ITIF called on like-minded nations to work to achieve a significant increase in global subsidy transparency, including insisting on timely and complete notification of subsidies and establishing a presumption of prejudice against subsidies not timely notified.[195] In other words, there is already a strong precedent for STEA partners to work on industrial subsidization/overcapacity issues.

Joint Sovereign Fund to Reverse Chinese Technology Adoption

The U.S. federal government does not currently maintain sovereign wealth funds, primarily because it has not had budget surpluses for decades. The U.S. federal deficit reached $1.78 trillion in 2025 alone, contributing to a total national debt of roughly $40 trillion.[196] However, the federal government can learn best practices in sovereign fund management from local states and allies. The Sovereign Wealth Fund Institute has identified 14 sovereign funds owned by states—Alabama, Alaska, Colorado, Hawaii, Idaho, Louisiana, New Mexico, North Dakota, Oklahoma, Texas, Utah, West Virginia, Wisconsin, and Wyoming—which collectively total over $370 billion.[197] Many U.S. allies have sovereign wealth funds that they use for what they consider strategic purposes and to boost their capital markets—for example, Ireland's Strategic Investment Fund, the Israeli Citizens Fund, and South Korea's Investment Corporation.[198]

There are also precedents for providing public financial incentives to offset switching costs induced by escaping Chinese mercantilism. The FCC launched the Secure and Trusted Communications Networks Reimbursement Program—commonly known as the "rip-and-replace program"—during the first Trump administration, under the 2019 Secure Networks Act.[199] The rip-and-replace program is a nearly $5 billion program created with the explicit objective of reimbursing telecommunications providers "for reasonable expenses incurred in the removal, replacement, and disposal of communications equipment and services produced or provided by Huawei Technologies Company (Huawei) or ZTE Corporation (ZTE)."[200]

The State Department's Pax Silica initiative is reportedly creating a voluntary investment consortium for a $4 trillion fund for energy, infrastructure, critical minerals, and supply chain resilience.[201] The consortium is described as "a coalition of sovereign wealth funds and institutional investors joining forces around a single strategic imperative" by the State Department's authorities.[202] It is reported that it will include sovereign wealth funds from Qatar, Singapore, Sweden, and the UAE.

Joint Import Bans

The United States and allies such as Mexico have long collaborated to combat the entry of counterfeit Chinese goods into the U.S. market. For instance, in 2018, the United States and Mexico concluded deals to improve cooperation on trade and customs compliance and to combat illicit activities such as the export of counterfeit merchandise and substandard pharmaceuticals into the United States.[203] Mexico is working with the United States to target Chinese online retailers such as Shein and Temu that peddle counterfeit goods.[204] The USMCA strengthened North American efforts to combat the entry of counterfeit Chinese goods. For instance, previously, Canadian customs officials could detain only commercial shipments of suspected counterfeit goods destined for Canada. With the passage of the USMCA, the Canada Border

Services Agency (CBSA) is now empowered to detain in-transit commercial shipments of suspected counterfeit goods traveling through Canada en route to their final destinations.[205]

In 2006, Japan and the United States conceived the Anti-Counterfeiting Trade Agreement (ACTA), which was signed in 2011. The agreement aimed to establish an international legal framework for issues such as targeting counterfeit goods and generic medicines and addressing copyright infringement on the Internet. USTR portrayed ACTA as "a groundbreaking initiative by key trading partners to strengthen the international legal framework for effectively combating global proliferation of commercial-scale counterfeiting and piracy."[206] ACTA did not come to fruition, but could provide a template for developing high-standard commitments among STEA participants to collaboratively address issues such as combatting counterfeit goods imports and copyright infringement.

Limiting Chinese National Power R&D

China seeks to acquire knowledge and technology through all available means, both fair and unfair: while it produces hundreds of thousands of scientists and engineers legitimately, it also engages in cyberespionage and IP theft, imposes forced tech or IP transfers as a condition for market access, attracts or buys talent, acquires companies, and uses other methods. A particular concern is Chinese funding of R&D being conducted at U.S. universities and Chinese funding of postdocs studying at U.S. universities and federally funded research and development centers ITIF has called for a ban on Chinese funding of research at U.S. universities and for better screening of Chinese students studying at U.S. universities.[207]

In 2022, Chinese students accounted for 35 percent of the international pool of students seeking STEM Ph.D.s at U.S. universities.[208] Chinese doctoral students' intention to remain in the United States after graduation (i.e., the "stay rate") has declined from 90 percent in 2016 to 76 percent in 2022.[209] Partner countries should not implement blanket bans on Chinese Ph.D. students studying in their countries, but rather limit access on research in sensitive and strategic technologies. Still, at the very least, it would behoove partner countries to generate better data on the STEM fields in which Chinese Ph.D. students are pursuing degrees in partner countries. In 2025, the United States announced that it would begin revoking the visas of Chinese students studying in critical fields, such as national defense. Partner nations should also do likewise.

A recent ITIF report, part of this National Power Series, outlines several policy challenges for the United States to close gaps that allow the PRC's espionage complex to steal U.S. industrial and defense technologies.[210] For example, it urges Congress to approve the Securing American Funding and Expertise from Adversarial Research Exploitation Act of 2025 (SAFE Act) to block U.S. federal grants to scientists with a history of collaborating with hostile foreign countries, such as China. The SAFE Act would ban federally funded STEM research by researchers with a history of collaborating with PRC-associated entities, ban Department of Defense funding for universities that partner with adversaries, and, similar to the Defending Education Transparency and Ending Rogue Regimes Engaging in Nefarious Transactions (DETERRENT) Act, impose stricter disclosure requirements on collaboration with entities associated with adversaries.

In addition, the report supports the House Select Committee on the CCP's recommendation to create "an unclassified database using open-source information to keep track of PRC research entities that engage in defense and military research and civil-military fusion programs" to improve the vetting process.[211]

Shared Commercial Counterintelligence

As ITIF has reported, the U.S. intelligence community has long collected what it calls "economic intelligence."[212] A 1953 Central Intelligence Agency memo defined economic intelligence as "analysis and evaluation of a foundation of economic information, mostly quantitative, with the object of solving problems related to national security."[213]

In this context, ITIF has proposed that Congress and the administration establish a narrowly tailored pilot authority allowing the U.S. intelligence community to share classified assessments with vetted U.S. firms competing against Chinese companies for major third-country contracts.[214] The mechanism should not authorize the collection or transfer of foreign trade secrets for purely commercial gain. Instead, it should focus on bid-specific risks such as PRC subsidies, coercive financing, sanctions evasion, corruption, cybersecurity vulnerabilities, forced technology-transfer links, or military-civil fusion ties.

LIKELY SOURCES OF OPPOSITION

Changing the trade policy paradigm from free trade to a strategic techno-economic approach focused on competing against China will likely face criticism. First, China will of course decry it as protectionist. But China holds the capacity to stop this new arrangement by ending its panoply of unfair trade practices and techno-economic aggression—which will never occur.

Second, non-national power industries will characterize an STEA as hurting American consumers. But in a world wherein Western economies do not have to worry about another country becoming the global hegemon (i.e., the PRC) policy could focus on consumers. But the current reality is that that is not a possibility, similar to how U.S. taxpayers had to support Cold War efforts against the Soviets. Contrary to nonstrategic sectors, national power industries support national defense, either through direct production for the Defense Department or dual-use production.[215]

Third, many economic and foreign policy pundits and experts will likely oppose this. ITIF typified these groups in a 2025 report of the current Chinese National Power Industry War series.[216] They represent three flawed responses:

- **Some are "engagers," seeking engagement with China above all else,** yet they dismiss and downplay the CCP's actions against U.S. interests.[217] Much of the argument for engaging in collaboration with China, above all, concerns global challenges, such as climate change. Yet, this omits the underlying political economy of why China is willing to engage in "collaboration" in certain issues. As ITIF has stated, we are long past the time when Western countries could meaningfully influence China's policy.[218] The engagers would fundamentally oppose having a trade policy focused on countering China's techno-economic agenda—much in line with what the CCP would like.
- **On the other end of the spectrum, some pundits are "deniers" who are so convinced of America's superiority and China's structural flaws that there is nothing to worry about.** Under this view, there is no need to change the trajectory of U.S. trade or foreign policy. Most U.S. adherents of free-market doctrine dismiss the China threat because they believe free-market economies are inherently superior to more planned ones. As such, there is no way we can lose unless we become more like China. The deniers would fundamentally oppose the fact that the United States indeed needs its allies and trade partners to

maintain American leadership—yearning for a pre-World Wars period when the United States was more isolated and wasn't a global hegemon.

- **Finally, there is a group who largely ignore either attacking Chinese capabilities or defending against its techno-economic aggression** and instead focus only on ways the United States can improve. The deniers would object to the pillar of countering China's aggression, but they might support the pillar of strengthening U.S. and allies' national power industries.

Yet the most vociferous opposition will likely come from the trade policy community. First, it will come from traditional free traders who might still believe that, with some adjustments to the WTO governance structure and scope, the global trade system can return to the post-Cold War period. The criticism will argue that some components of an STEA constitute nonmarket practices or may be non-WTO compliant. That's part of the problem that gets the global trade system to its current state: it is not possible to keep the same extreme free-market-oriented toolkit and architecture to address China's aggression, as it is fundamentally antithetical to WTO principles. A variant of the traditional free traders is "partial globalists"—those who call for plurilateral trade deals among like-minded nations but still cling to the outdated assumption that maximizing global allocation efficiency should remain the primary objective and that trade deals should focus on trade and little else.[219]

The second group of trade policy pundits criticizing an STEA is populist, spanning the Right and the Left. Populists fundamentally reject the idea of global trade. Whether driven by entrenched nationalism on the Right or a rejection of wealth and capital accumulation on the Left, these groups advocate for very limited trade, prioritizing autarky. That would ultimately condemn the U.S. economy to being a low-tech, natural-resource producer.

It may be that only a few nations would be willing to join a U.S-led alliance. But if a few courageous leaders do, it will be more likely that others will then join when they see the safety that numbers bring and the benefits to their own economy that joining an STEA brings.

CONCLUSION

The global trading system gives China enormous freedom to launch attacks, often successful, on allied advanced industries and firms. It may not be possible to avoid losing to these attacks, given the CCP's focus, scale, and power. But one thing is for sure: Western countries will be much more likely to lose if nations do not collaborate more systematically, not only to launch a deep free trade zone for the West, but also to deepen techno-economic cooperation while limiting China's abilities to penetrate the West.

It may be, given China's power to punish nations that challenge Beijing, that only a few brave nations would be willing to join a U.S-led alliance. But if a few courageous leaders do, it will be more likely that others will then join when they see the safety that numbers bring and the benefits to their own economy that joining an STEA brings.

But this would require more nations to acknowledge that the PRC is a threat to Western countries' national power industries. For the United States, it would require changing its rhetoric to allies and abandoning the hubristic notion that America alone can deal with China—a rival unlike any other it has faced in its 250 years of constitutional democracy.

Mobilizing for Techno-Economic War, Part 7: Transforming Regulatory Policy

ROBERT D. ATKINSON

The U.S. regulatory state has become a major headwind for national economic power industries competing against China, and incremental reforms will not be enough for America to avoid techno-economic defeat. U.S. policymakers need to adopt a national developmentalist model.

KEY TAKEAWAYS

- The U.S. regulatory system has transformed multiple times since the nation's founding. Policymakers must transform it again, this time to support the national developmentalism necessary to avoid losing the techno-economic power industry war with China.
- Congress should exert federal authority on certain issues, such as regulation of technology (e.g., AI) and industry (e.g., motor vehicles), and it should devolve regulatory authority to states in other areas, especially environmental regulations.
- Congress should embrace size-neutral regulations that do not penalize larger firms and provide regulatory reductions and carveouts for critically important projects and industries, such as a program for preapproved major industrial parks.
- Agencies need to favor automation and competitiveness, and the federal government needs an antitrust regime that supports global techno-economic power.
- Above all, America needs a shared consensus that avoiding defeat to China requires shifting from a regulatory, process-based state to a developmentalist, outcome-based one.

INTRODUCTION

The United States was the world's dominant techno-economic power for over 125 years. However, China has displaced American techno-economic leadership in order to make America and the West dependent on it, just like the West was dependent on OPEC (Organization of the Petroleum Exporting Countries) oil.[1]

On its current trajectory, China will, in the next decade or two, amass even greater capabilities than the United States and even its Allies combined will in national economic power industries: advanced traded-sector industries that are critical to national security and sovereignty. With those greater capabilities comes geostrategic hegemony over the West unless the United States (and its allies) forestalls that by adopting a transformative national power industry strategy that goes beyond a simple competitiveness or national innovation strategy.

However, the inherent weaknesses of the U.S. innovation and production system (e.g., cuts in government research and development, limited STEM [science, technology, engineering, and math] skills, an overly strong dollar, institutional resistance to change, corporate short-termism, an overarching focus on redistribution, etc.) coupled with a Chinese Communist Party (CCP) hyper-focused on victory suggests that, absent major structural change in U.S. policy, relative decline and loss of techno-economic competitive position and power are inevitable with the negative consequences that accompany such change.

This report is part of a series addressing America's techno-economic-trade war with China.[2] The first report in this series laid out the context of the China challenge, including what is at risk and the need for radically new approaches in a host of key policy areas.[3] Not small steps, but big ones. Not tinkering but transformation. "Bold" is the operative term. The crisis is at such a point that incrementalism will fail. Subsequent reports in the series have addressed specific policy areas, including reforming the business financing system, the science and technology system, and the workforce and education and training system.[4]

Avoiding defeat to China requires shifting from a regulatory, process-based state to a developmentalist, outcome-based one.

This report focuses on transforming the U.S. regulatory system to one that is consistent with national developmentalism is necessary to not lose the war to China. This will mean, among other things, exerting federal regulatory authority over certain issues now addressed at the state level (e.g., artificial intelligence [AI] regulation and industry-specific regulations); significantly reducing the federal regulatory burden, especially in environmental regulations; embracing size-neutral regulations that do not penalize larger firms with stricter regulatory burdens; tilting agency regulatory decision-making toward favoring automation and competitiveness; and providing regulatory carveouts for projects and industries of critical national importance. Most important, however, is building a shared consensus that structural regulatory reform is required, regulation needs to do as little as possible to not harm America's existential mission to sustain and even grow its national techno-economic power industries, and avoiding defeat to China requires shifting from a regulatory, process-based state to a developmentalist, outcome-based one.

THE HISTORY OF U.S. REGULATORY TRANSFORMATION

Even the most die-hard, free market advocates will agree that, in capitalist economies, the state must play at least some role in regulation. The questions are how much regulation, over what, and designed in what ways? These questions matter to national economic power because their answers shapes markets, firms, and industries.

Together, the combination of economic regulation (e.g., utility price regulation) and social regulation (e.g., pollution control regulation) constitutes the nation's regulatory system. A regulatory system is not a policy platform or an administration's agenda. It is a society's shared (though contested) answer to the question of what the state is for, expressed in institutional form, constitutional doctrine, and legitimation theory. Regulatory systems are sticky. They persist across administrations that nominally oppose them, and they are supposed to change when they fail to address problems they were designed to solve, or when they create other, more serious problems.

As regulatory economist John Mayo has argued, the U.S. regulatory system has gone through several evolutionary stages.[5] These stages roughly match major techno-economic transformations.[6] That makes sense because, ideally, a nation's regulatory system should be in rough sync with the dominant techno-economic system of the time. For example, the regulatory system of an agrarian, small-producer economy will naturally be different than one of an advanced-technology, large-firm economy. A regulatory system of a nation facing little international competition will naturally be different from one of a nation facing fierce competition.

The United States is now entering into a new techno-economic stage, from one characterized by U.S. dominance in advanced technology and innovation to one characterized by fierce competition with China. As such, it is time for another regulatory transition that will prioritize national economic power competition and growth more generally. While some of this will involve deregulation, it will entail more than just that. It will require a fundamental change from the 1960s-inspired strong regulatory state that gives short shrift to the consequences of delays, added costs, and limits to innovation.

Common Law Governance Through Negative Law: 1789–1890s

The Founding Fathers could not envision the industrial revolution and the societal complexity it would bring. For them, individuals were at the center of society, as farmers, shopkeepers, and craftspeople, all using hand tools. As such, the overriding focus for the state was on protecting individuals from overreach of both the state and other individuals.

In this case, the state did not primarily regulate actions, but rather enabled individuals to defend themselves against direct harm. Common law enabled liability rules that deterred harmful conduct ex post. Contract law enabled enforcement of private agreements. Constitutional law provided limits on government itself. The affirmative provision of public goods, the management of externalities, the correction of information asymmetries—none of these were a part of that system. The paradigm's coherence came from the fact that all three of its main institutions (courts, parties, and a minimalist federal executive branch) were consistent with the same underlying theory of negative liberty—and that the world to be "regulated" was relatively simple in operation.

Governance of Abuses: 1890s–1961

Despite what some conservative opponents of the progressive era may claim, the prior regulatory system became vulnerable once industrial capitalism at scale generated externalities, concentrations of power, and coordination problems that exceeded anything common law courts could handle on a case-by-case basis.[7]

The monopoly railroad problem was the paradigmatic example. Railroad rates could not be regulated through tort litigation, or in the absence of truck freight, through competition. Likewise, the prior system could not effectively address the need to protect basic workers' rights with the rise of large employers and factories. The problem was structural. The progressives understood this, even if, in some cases, they were guilty of overreach. The Depression, and the rise of the New Deal, simply made the argument undeniable, at least to most Americans.

To be sure, before FDR's New Deal, much of the regulatory action was at the state level. States such as Wisconsin and New York were in the progressive vanguard. Indeed, the "Wisconsin Idea" under Governor "Fighting Bob" La Follette, using academic experts from the University of Wisconsin to draft legislation and administer new regulatory agencies, became a model for other states to follow.

While the federal government was for the most part not establishing major regulatory agencies during this time, it was legislating. The Elkins Act (1903) prohibited railroad rebates to favored shippers while the Hepburn Act (1906) gave the ICC real rate-setting authority and expanded its jurisdiction to pipelines and sleeping cars. The Mann-Elkins Act (1910) extended International Criminal Court (ICC) jurisdiction to telephone and telegraph companies. The Sherman Act (1890), the Clayton Act (1914), and the establishment of the Federal Trade Commission Act (1914) sought to address unfair competition and monopoly. The Pure Food and Drug Act (1906) prohibited the adulteration and mislabeling of food and drugs in interstate commerce. The Federal Reserve Act (1913) created the Federal Reserve System with 12 regional banks and a Board of Governors, establishing the first central bank since President Andrew Jackson killed the Second Bank in 1836. A variety of labor laws were passed from 1898 to 1916.

The pattern of what political scientist Stephen Skowronek calls "patchwork" is state building: each statute addresses a specific visible failure (railroad rebates, meat contamination, bank panics, child labor) without constituting a coherent administrative system.[8] By 1920, the federal government had accumulated significant regulatory authority in many domains, albeit through separate statutory regimes, separate agencies with separate mandates, no unified administrative law framework (that came later with the Administrative Procedure Act in 1946), and a constitutional jurisprudence still hostile to broad federal economic intervention.

The New Deal's task was not to invent federal regulation but to rationalize and vastly expand it—and in so doing, create the administrative, regulatory state that exists today. That system was perfected by President Franklin D. Roosevelt and maintained by Presidents Truman and Eisenhower, even though the latter was a Republican who faced a mostly Democratic Congress.

Regulatory State Peak Development: 1961–Mid-1970s

With the election of President John F. Kennedy and then the administration of President Lyndon B. Johnson, the regulatory state that exists today was built. Overall, this paradigm is best understood as the institutionalization of the market failure model. Its intellectual core is the

proposition that unregulated markets systematically fail—in the provision of public goods, in the presence of externalities, in conditions of monopoly or oligopoly, in the face of information asymmetries—and that an expert administrative state can identify these failures and correct them. The paradigm's institutional form follows logically from this theory: If market failures are varied and technical, then government needs specialized expert agencies with broad mandated authority.

Two challenges drove the emergence of the regulatory state: societal concerns, especially about race and poverty, and environmental concerns. Johnson's Great Society programs, including the Occupational Safety and Health Administration (OSHA) and the Equal Employment Opportunity Commission (EEOC), were based on a theory of intervention of rights-based equity. And the period of 1969–1977 amounted to a transformation in environmental regulations with the passage of the National Environmental Policy Act (NEPA) (1969), the Clean Air Act (1970) and its 1977 amendments, the Clean Water Act (1972), the Endangered Species Act (1973), and the Resource Conservation and Recovery Act (RCRA) (1976). These regulatory statutes were all passed at a time of U.S. dominance in international competitiveness—when policymakers simply did not consider the need to ensure that regulation would not impose harm on U.S. traded industries—and they have been built upon and expanded over the years.

The Regulatory State in Tension: Late 1970s–Present

By the mid-1970s, the regulatory state's problems had begun to emerge (or, as some would argue, had become more noticeable). The stagflation of the early and mid-1970s called the system into question, as did the emergence for the first time of serious international economic competition. By 1990, the U.S. international competitiveness position had weakened, especially in the face of the challenges from countries such as Germany and Japan. This, on top of the rise of a more antiregulatory Republican movement throughout the 1980s, muted the ability of the environmental lobby to make as rapid gains as they had before, but still they succeeded in passing significant new legislation and building on existing laws, including through the Clean Air Act amendments of 1990, the Hazardous and Solid Waste Amendments (HSWA) of 1984, the Superfund Amendments and Reauthorization Act (SARA) in 1986, and Clean Water Act amendments in the 1987 Water Quality Act, and the Energy Policy Act of 1992. But much of their progress came from using the courts to stop or limit projects.

The visible failures of regulatory capture created political traction in the 1970s and early 80s for the Chicago School's critique of microeconomic regulation—namely, its argument that regulating prices, market entry, and output usually harms consumers instead of helping them. On top of that, the rise of neoclassical economics and its greater insights into the actual workings of markets in the same period called into question many regulatory assumptions, particularly in the area of economic regulation.

The first phase began in the Carter administration, led by economist Alfred Kahn, with its deregulation of airlines, freight rail, trucking, gas pipelines, areas of financial services, and communications. Carter also put in place an executive order to implement cost-benefit analysis. In 1980, Congress passed the Paperwork Reduction Act, which, among other things, created the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB).[9]

These reform and rollback efforts were expanded on in the Reagan administration, which brought with it a deep commitment to rolling back the regulatory state. Reagan's contribution was to successfully shift the default assumption from market failure to government failure. This era was one that questioned the regulatory state, even if it did not dismantle it due to vested interests and, at least until 2000, a partially Democratically controlled federal government—and, of course, the 60-vote requirement in the Senate to break a filibuster made dismantling, much less seriously reforming, the regulatory state extremely difficult.

While the Clinton administration was generally skeptical of overregulation, the Democratic party began to more firmly resist what it termed "neo-liberalism," especially once Obama entered office. The result is that, today, most progressive Democrats want to radically expand the regulatory state, especially in areas of race, environmental regulation (particularly climate), antitrust, technology and privacy, financial services, and workers' rights. They see an even more active regulatory state as a key protection against the overreaches of neoliberalism and a necessary containment of runaway corporate power, but more fundamentally as achieving a more progressive, in fact, social democratic system. Indeed, they are largely unified on rebuilding and expanding "democratic state capacity," a codeword for an activist regulatory state to address a wide range of progressive goals: climate and environmental protections; suppression of conservative speech; income redistribution; reducing the size and market power of large companies; cheaper housing, education, and other goods; better access to low-cost financial services; and advancing civil rights and antidiscrimination protections.[10] For them, in an era of massive budget deficits, regulation has taken on the lion's share of the load of policy work.

The United States now has a deeply contested regulatory system. Both parties want to dramatically overhaul it, but one wants less regulation and the other wants more.

At the same time, many Republicans have become even more fervent advocates of radical deregulation. The Heritage Foundation's Project 2025 report called for eliminating at least some regulatory agencies, and shrinking most others.[11] The U.S. Department of Government Efficiency (DOGE) under Elon Musk was just one example of that slashing vision in action, and it was halted only due to mismanagement and resultant public opposition.

So, the United States now has a deeply contested regulatory system. Both parties want to dramatically overhaul it, but one wants less regulation and the other wants more. Moreover, with some exceptions, the courts have played a conservative role in preserving the current regulatory system, as has a vast network of well-funded liberal advocacy groups. And even with deep ideological divisions between the parties, the regulatory state had continued to incrementally grow, at least until the current Trump administration.[12]

The pattern has been deregulation through executive orders for four years when a Republican is in office, and reregulation through executive orders for the next four years when a Democrat is in office. On top of this, there are deep conflicts over regulatory federalism. On some issues, such as climate regulation, Democrats favor national laws; on others, such as Internet privacy, they favor state laws. Republicans largely favor the opposite.

Problems With the Contested Regulatory State

The whipsaw shifts back and forth are, to say the least, detrimental to national development. Moreover, by and large, the debates over the regulatory system are not informed or inspired by the need for national developmentalism or, more specifically, the techno-economic war against China. This is not informing the debate for most Republicans who see the issue as freedom and constraining an overweening regulatory state. Nor is it for Democrats who see the issue as equity and societal protection against a predatory capitalist system.

Moreover, even if it were uncontested, the current system still would be based on a number of assumptions that are no longer valid.

First is the assumption that the United States is not really in serious international competition and that, to the extent it is, regulations play a de minimis roll in that competition or are even helpful to winning that competition.[13] Neither is true.

The second is that corporations are suspect and that bad behavior, even if inadvertent, should be punished severely. Republicans might want to punish the bad actors with tort; the Democrats with the state. The societal costs of that in the form of reduced innovation and competitiveness are largely ignored.

The third dynamic is between corporations and consumers, or corporations and workers. The widespread assumption is that "what's good for GM is definitely bad for America," and workers and consumers. This leads to a bias in favor of regulation. But, in many cases, what might be good for workers is bad for both companies and consumers, such as when unions resist automation and prices go up. In other cases, what appears to be good for consumers is actually bad for consumers, companies, and society as a whole, as in the case of overly strict limitations on the use of data.[14] And of course, in this framing, rich corporate shareholders pay the price of regulation, not workers with lower wages, consumers with higher prices, or society as a whole.

The debates over the regulatory system are not informed or inspired by the need for national developmentalism or more specifically the current techno-economic war against China.

Fourth, there is an assumption among supporters of the regulatory state that the goals to be attained are absolutes, and to the extent they involve tradeoffs, regulatory results should trump costs. If 10 parts per million of a chemical in water is okay, then 5 ppm would be even better, even if removing those additional 5 ppm would be incredibly costly. But the reality is that most of what goes on in society involves trade-offs, many of which are painful. Society could significantly reduce traffic deaths, but the costs in terms of the price of automobiles would go up significantly. America could dramatically reduce its carbon emissions, but it would cost at least $100 billion a year for the next 25 years. That means $100 billion a year less on things such as education, health care, and social services.[15]

Fifth, there is an assumption that public goods are more important than private goods. If policymakers have to raise the price of products by 5 percent to get cleaner water, then it is clearly worth it because cleaner water is intrinsically more worthwhile than producing more consumer goods. In fact, there is an explicit assumption among most on the Left that consumerism is somehow morally suspect, especially in relation to collectively shared public

goods.[16] Related to this is the view that companies do not produce public goods, only private profit. When this is the view, regulation is not just without a cost, it is an outright moral and economic good. However, having a strong and competitive Boeing, Intel, Google, and Ford is a public good. So, regulations that inhibit their ability to innovate and compete in global markets do indeed come at a steep cost.

FROM THE REGULATORY STATE TO THE DEVELOPMENTAL STATE

Even with the sharp disagreements over the ideal nature of the U.S. regulatory state, there are areas of generalized consensus.

The first is that the government's role is primarily to set rules, ensure competition, and correct market failures, including from externalities. The regulatory state stays neutral on industrial outcomes. It is a state that is fundamentally a process-oriented, and it has been since the Founders established a government focused on upholding individual freedom and property rights. When it comes to regulation, the system is based on a set of legally binding processes which everyone, including government, must follow. There is little or no room for governmental discretion or picking winners that are all or in part exempt from some regulatory requirements. Republicans want less regulation, but they generally are suspect of state discretion, seeing at as the door to crony capitalism. Liberals want more regulation, and also are suspect of state discretion because they worry that a Republican administration will dismantle regulation.

This is very different than a national development state that actively steers economic development, picks strategic sectors, and uses state capacity to accelerate industrialization and competitive advantage. In national developmentalism, regulations are not procedural straightjackets. Achieving key national goals can take precedence over achieving process integrity. Developmentalist states address these issues differently. The state selects key industries and projects as strategically important and is able to impose regulatory flexibility.

Second, there is consensus in the United States that the process should be adversarial and legalistic. For the Left, government getting too close to regulated companies creates regulatory capture. For the Right, it leads to crony capitalism. It is better to have the parties engage in adversarial, arms-length relations, and be guided by formal law and processes such as the Administrative Procedure Act. Out of that supposedly comes the best outcome, or at least the outcome each side intends.

A regulatory system that does not prioritize national power cannot win in a world in which another power is intently striving for global hegemony. A process-oriented system is ultimately too utopian. It would only work if the United States were completely autarkic—cut off from the rest of the world.

Third, there is consensus on universal application. Rules apply the same way to a highway as to a semiconductor fab as to a solar farm. The state takes no view on whether the project is strategically desirable and deserves different regulatory treatment. In contrast, many other nations differentiate depending on how critical a project is to the nation. In Taiwan, for example, semiconductor fabs enjoy streamlined review and dedicated industrial zones with precleared environmental status, effectively building the regulatory accommodation into the zoning system

rather than project-by-project litigation. Taiwan does this because it sees its semiconductor industry as key to national competitiveness.

Fourth, the legalistic regulatory system allows antidevelopment advocates to manipulate the system to prevent development. For example, NEPA's biggest practical impact isn't the environmental impact statement itself—although that can and often is quite burdensome—it's that it creates a procedural handle for litigation that can delay projects for years regardless of actual environmental merit. Opposition groups, which are much more powerful and organized than they were 25 years ago, use environmental law to stop projects they oppose for unrelated reasons (NIMBYism, economic competition, ideological opposition to fossil fuels or nuclear power, socialism, antigrowth, etc.).

In contrast, developmentalist states limit standing so that those empowered to erect roadblocks are limited. They also require courts to defer to agency judgment, set hard timelines on legal challenges, or simply designate projects as beyond judicial review. As in other policy areas, the goal is not procedural integrity; it is results that benefit the nation.

A regulatory system that does not prioritize national power cannot win in a world in which another power is intently striving for global hegemony. A process-oriented system is ultimately too utopian. It would only work if the United States were completely autarkic—cut off from the rest of the world—because while the regulatory morass would raise costs, it wouldn't lead to techno-economic dependency on adversaries.

America's the deep resistance to developmentalism means that it is not likely to transform into an East-Asian-style development state. But that does not mean that there are not important changes that can be made to the U.S. regulatory system. The following section lists several key changes.

A New Federal-State Division of Labor: Preemption

Too much of what should be regulated by the federal government is currently regulated at the state and local levels, and too much of what is currently regulated at the national level should be regulated at the state and local levels. It is time for a new bargain over federalism and what states and local governments should regulate versus what the federal government should regulate. The division of labor when it comes to regulation today is a hodgepodge that depends more on where the two political parties hold power than on a logical framework for what belongs at the local level and what belongs at the national level.

It is time for a new bargain over federalism and what states and local governments should regulate versus what the federal government should regulate.

Under the simplest and most logical framework, **issues that are inherently national in scope—particularly issues with implications for innovation, productivity, and national power competitiveness—should be regulated at the national level.** And in some cases, those issues might need little or no regulation.

With the rise of a more integrated national economy that is enabled by information technology and the Internet, many issues that in the past were regulated at the local or state level now need to be regulated at the national level.[17] Before the rise of cross-border e-commerce, many

economic regulatory frameworks for industries could be handled at the state level with little national disruption. But as more and more industries that were once local are now national, state-by-state regulations raise compliance costs, reduce entry, and protect brick-and-motor incumbents. Indeed, regulatory capture at the state and local levels limits the ability of more innovative disruptive entrants.

To address this problem, Congress will need to preempt many areas now addressed either principally or secondarily by the states. Some Republicans will reflexively respond that doing so violates federalism and states rights. But the Commerce Clause of the Constitution should make it clear that the Founders intended inherently interstate issues to be addressed by the national government. Federal preemption isn't new or exotic. Congress does this all the time for things that obviously require national consistency: airline safety, food labeling, aviation rules, interstate trucking, and more. The public doesn't want planes to be regulated differently depending on which state they happen to fly over, nor would it want AI rules to swing wildly at every state border. That's not federal overreach—it's common sense.

In the old economy when the U.S. exerted dominance in national economic power industries, it didn't matter much if certain states put in place regulations that hurt the overall industry competitiveness, or created special regulations that required producers to balkanize production and make multiple versions of the same product or service.

That matters now. The United States is just too weak to afford the corrosive effects of state regulatory impositions that harm national power industry competitiveness. Case in point is the various state government regulations on automobiles. Similarly, the California Law Revision Commission ("Commission") has proposed changing its antitrust law related to single-firm conduct as well as new legislation that would effectively ban large technology companies from engaging in commonly procompetitive conduct such as self-preferencing, and the effect would be to limit needed innovation.[18] Other states have copied the EU's abuse of dominance rules.

Letting 50 states write 50 conflicting rulebooks doesn't protect Americans—it fragments markets, crushes innovation, and hands global leadership to China.

Some states, such as California, require companies to report climate emissions, even if most of the emissions are outside the state. Various state data privacy laws, such as Illinois's biometric law, as well as a proposed slew of AI laws will not only limit innovation and U.S. competitiveness, but also create a patchwork of different, and potentially conflicting, rules U.S. firms must deal with. Many states enact laws restricting e-commerce sales that favor local producers over national.

The key in all these areas is preemption, including prohibiting states from enacting stronger laws. Federal preemption forces everyone to come to the table and have a real debate. Let's be honest: the groups aggressively pushing state bills aren't doing it because they think "states know best"—they're forum-shopping for the friendliest legislature to pass the most extreme version of their agenda. Preemption puts an end to that workaround by moving the discussion to the national stage, where it belongs. Without preemption, there's zero incentive to negotiate a reasonable compromise in Congress, because advocates can always skip the hard work and run to whichever state already agrees with them.

The bottom line is that letting 50 states write 50 conflicting rulebooks doesn't protect Americans—it fragments markets, crushes innovation, and hands global leadership to China, which regulates the technology, but doesn't tie its own industry in knots with conflicting sets of rules.

Internet, E-commerce, and AI Regulatory Preemption

Congress should start by preempting the growing patchwork of state AI, privacy, and children's online safety legislation, which already pose significant threats to American competitiveness by imposing complex and conflicting rules on businesses, diverting resources away from innovation and toward compliance. While these three issues represent the largest threat to American innovation, there are a host of other Internet governance issues Congress should also act on to establish a consistent national approach, including digital taxes, right to repair, data breach notification, right of publicity, e-commerce, digital identification, content moderation, and net neutrality.[19]

First and most urgently, **Congress should pass comprehensive data privacy legislation that preempts state privacy and data breach notification laws,** including both comprehensive state privacy laws and sectoral privacy laws that target biometric data, such as Illinois's Biometric Information Privacy Act (BIPA), or data collection and use for AI. In the absence of a federal privacy law, state privacy laws could impose out-of-state costs of between $98 billion and $112 billion annually. Over a 10-year period, these costs would exceed $1 trillion.[20]

BIPA is a particularly egregious example. The law regulates the collection of biometric data by companies operating in Illinois or whose products reach consumers in Illinois, and includes a private right of action that allows both consumer class action lawsuits and employer lawsuits. Although BIPA passed into law in 2008, the number of lawsuits exploded after courts ruled in 2019 that plaintiffs are not required to show harm.[21] Between 2008 and 2018, there were 163 BIPA class action lawsuits, while in 2019 alone, there were over 300, and recent BIPA lawsuits have included several high-profile cases with individual settlements reaching up to $650 million.[22] This has led companies to pull out of Illinois or limit the technology available to Illinois consumers.[23]

Congress should impose a five-year moratorium on state AI and children's online safety laws as it works toward passing a national AI framework and children's online safety legislation that addresses online harms to children. It should establish a federal right of publicity that gives individuals the right to control the commercial use of their identity while allowing fair use.

Lawmakers should pass net neutrality legislation that does not regulate broadband Internet as a telecommunications common carrier under Title II of the Communications Act and instead codifies widely agreed-upon Internet protections and gives the Federal Communications Commission (FCC) reasonable jurisdiction to enforce open Internet rules.[24]

Congress also should pass the Improving Digital Identity Act to create a framework for deploying a digital ID system at the federal, state, and local levels.[25]

At the same time, Congress should ensure that industries that are now national—if not global—because of e-commerce have regulatory frameworks at the national level that enable them to easily do business in all 50 states. Case in point: Over 25 years, state governments have erected

protectionist laws on behalf of optometrists to limit the ability of contact lens consumers to buy their lenses online or at retail stores such as Walmart even if they have a prescription. States are able to do this because of the significant political power of the optometry lobby in their states. Congress took the right action in passing the Prescriptions Lens Contact Release Act of 2002. As the Information Technology and Innovation Foundation (ITIF) has written, states have continued to try to undermine this legislation and harm consumer rights in the intervening years.[26] The Federal Trade Commission (FTC) has generally been working on the side of consumers. Absent federal preemption to protect consumer rights, these sorts of industry rent-seeking efforts will continue and grow. As such, **the House and Senate Commerce Committees should be constantly on the alert for these kinds of rent-seeking protectionist actions at the state level,** whether they come from car dealers, real estate agents, liquor wholesalers, banks, taxi industries, etc. E-commerce companies need the ability to operate under one set of rules that enable them to compete fairly and not be harmed by incumbent protectionism.

More specifically, **Congress should update the Permanent Internet Tax Freedom Act** to ban both taxes on wireless services and discriminatory taxes on digital goods and services that do not have a physical component. It should **pass legislation instructing the Alcohol and Tobacco Products Tax and Trade Bureau, FTC, and Food and Drug Administration to establish uniform regulations for age-restricted or medical products purchased online,** which should include streamlined rules for shipping alcoholic beverages directly to consumers, a federal requirement for eye doctors to include patients' pupillary distance on prescriptions, and a federal requirement for veterinarians to provide prescriptions upon request without extra fees. It should **update the Uniform Electronic Transactions Act and Electronic Signatures in Global and National Commerce Act** to require states to recognize the legality and enforceability of records, signatures, and contracts secured over a blockchain. Finally, it should **preempt state right-to-repair laws with a consistent right-to-repair standard for electronics at the federal level.**

Industry Product Regulation Preemption

Congress needs to make sure that states repeal industry-specific regulations that balkanize national markets. A key factor in winning the competition with China is to ensure that U.S. producers do not face excess costs, particularly from having to produce multiple different kinds of products for different states to respond to different state regulatory regimes. The best example of this is the California rules on auto emissions that essentially balkanized the national industry and force automakers to produce two kinds of cards. Congress actually allowed that when it passed the Clean Air Act. In a hypercompetitive global economy, there is simply no justification for allowing states to regulate industries and products that are already regulated nationally. Congress should immediately step in and force California to repeal its separate laws regulating automobile emissions. And it should do the same for other industries that states have balkanized with patchwork regulations.

For example, California has adopted its own efficiency standards under Section 177 of the Clean Air Act Section 177 (and other states have followed suit) to regulate appliances such as refrigerators, washing machines, water heaters, pool pumps, and even ceiling fans. As a result, manufacturers often end up with both California-compliant and non-California-compliant product lines, which increases production costs.

In addition, the Environmental Protection Agency (EPA) allows states to mandate unique fuel blends for air quality, resulting in roughly 18 distinct gasoline "boutique fuel" blends across the country. This fragments refinery logistics, prevents fuel from being shipped across state lines during shortages (e.g., after hurricanes), and inflates regional price spikes.

Building codes are another example. California's Title 24 building energy code is substantially more stringent than the International Energy Conservation Code used elsewhere. Manufacturers of windows, insulation, HVAC systems, and lighting increasingly produce California-specific product lines. This has ripple effects on supply chains nationally, which is increasingly important if the goal is to dramatically increase construction productivity through automation and new technology. Companies that want to deploy 3D printing construction processes should only have to face one national building code—same with companies producing manufactured housing.

Congress needs to make sure that states repeal industry-specific regulations that balkanize national markets.

Another area is in financial services products. New York effectively regulates insurance and financial products for the national market in ways analogous to California's auto role. The state's Department of Financial Services imposes requirements on life insurance reserve standards, cybersecurity rules (the NYDFS Cybersecurity Regulation), and cryptocurrency licensing (BitLicense) that either force companies to maintain separate New York-compliant products or exit the market. Many insurers write separate New York policy forms.

New York and California have both passed their own net neutrality laws following the FCC's 2017 federal rollback. California's SB 822 is the most comprehensive. Broadband providers operating nationally have to either comply with the most stringent state standard or geofence their network management practices by state—neither is technically straightforward. Similar fragmentation exists around robocall rules and data retention requirements for telecoms.

California's Prop 65 effectively imposes national labeling and formulation decisions because manufacturers rarely want to maintain two chemical formulations. The result is that California's toxics list drives reformulation decisions for products sold nationwide—everything from furniture foam to food packaging to personal care products. This is a case wherein California exports its regulation nationally rather than creating a two-market split, because reformulation is cheaper than bifurcation.

Several states (including California and Colorado) have passed drug pricing transparency or importation laws. If these develop further, they could force pharmaceutical companies into state-specific pricing or distribution arrangements. In addition, each state has both its own generic substitution rules governing when pharmacists can substitute generics for brand-name prescriptions and crucially, different rules around substituting biosimilars for biologics. This creates state-specific pharmacy compliance burdens and can affect which biosimilars manufacturers bother seeking state formulary inclusion for.

California requires that all eggs sold in California come from hens in cage-free or enriched housing—including eggs produced out of state. The Supreme Court upheld this in *National Pork Producers Council v. Ross* (2023), validating California's ability to impose production standards

on out-of-state producers as a condition of market access. This has profound implications and opens the door to more extraterritorial regulation.

Colorado passed a right-to-repair law for agricultural equipment; California passed a broader electronics repair law. Minnesota passed one covering virtually all product categories. Manufacturers that design products with repair restrictions now face a growing set of state-specific obligations around parts availability, diagnostic tools, and documentation—though most are responding by adjusting nationally rather than maintaining state variants.

Congress needs to stop this industry product/services regulatory balkanization. **States that choose to impose their own product and service standards above federal standards should receive fewer federal funds.**

National Infrastructure

At the same time, **Congress needs to ensure that key interstate infrastructure is truly interested in nature and not allow states to restrict that.** Case in point would be penalizing states that ban or significantly limit the development of AI data centers. These centers are a national resource that provide benefits to the entire nation. And individual states should not be in a position, from NIMBY ("not in my backyard") protectionism or anticorporate animus to stop, slow, or limit their development. Another example would be the electric grid. While it is an extremely complex policy area, there clearly needs to be more national control and influence over the grid. As it stands now, states have limited incentives to ensure the country has a truly effective national grid.

Simplifying Antitrust

As a policy matter, extensive state and federal antitrust legislation is a clear redundancy within the American system that poses the risks of creating both substantial overdeterrence and legal costs for businesses. The traditional rationale for having both state and federal enforcement systems was that state antitrust laws were to deal with intrastate commerce, whereas the federal antitrust laws were to deal with interstate commerce. However, with the expansion of the scope of the interstate commerce clause and greater integration of the American economy over the 20th century, separate state antitrust regimes clearly provide little benefits in terms of policing anticompetitive conduct.[27]

To be sure, the right of states to have and enforce their own antitrust regimes is longstanding and unlikely to change. Moreover, the Supreme Court has upheld the right of states to enforce their antitrust laws in ways that go beyond federal law.[28] That being said, there is an option that should be considered to rein in state antitrust enforcers and ensure consistency within America's antitrust regime as a whole: Express preemption by Congress. **Specifically, Congress should pass a law making clear that federal antitrust laws set the outer bounds of liability for state antitrust laws.** Doing so both preserves the rights of states to enforce their antitrust laws and mitigates the problem of overdeterrence and increasingly overly aggressive actions by states—both of which can chill procompetitive behavior and innovation.

Simplification of the American antitrust regime should not ignore redundancies at the federal level. That is, in addition to an overlapping web of state enforcement regimes, the United States is also unique in having two federal antitrust agencies, the FTC and the U.S. Department of Justice's (DOJ's) Antitrust Division, which have substantial overlaps and inefficiencies when it comes to antitrust enforcement. This is especially true in the area of merger enforcement, with

deals assigned to the FTC in theory facing more hurdles given the lower burdens the FTC faces in getting a preliminary injunction in federal court, as well as its ability to challenge a transaction in its internal administrative litigation—and unilateral conduct cases—where the FTC conceptually has broad authority under Section 5 to challenge if not regulate behavior that is lawful under the Sherman Act.

For decades, the bipartisan consumer welfare approach helped create a status quo wherein these differences were without much of a difference practically speaking. For example, the FTC did not challenge mergers in its own administrative process when it was denied a preliminary injunction in federal court (known informally as the "Pitofsky Rule"). Moreover, the FTC not only ceased to issue competition rulemakings under Section 5, but also took a narrow view of the statute's "standalone authority" (i.e., condemning behavior that is not unlawful under the Sherman Act) that was largely limited to invitations to collude and other unilateral collusive conduct, with courts also often placing a high bar for the FTC to prevail on these claims.[29]

However, with the return of antitrust populism—and in particular the neo-Brandeisian movement's takeover of the Biden administration—it became clear just how easily the FTC could run off the rails. In the merger space, Chair Khan challenged two major innovation-industry mergers that faced scrutiny in other jurisdictions solely using the FTC's administrative litigation.[30] And, with respect to its unfair methods of competition authority, the Biden FTC issued a new policy statement claiming broad authority to police behavior not unlawful under the Sherman Act, as well as issued a competition rulemaking banning approximately 30 million noncompete agreements (subsequently blocked by the courts and abandoned by the new Trump administration), which often have legitimate procompetitive purposes.[31]

To prevent a repeat of these abuses by the FTC in a future administration, **Congress can and should take several important steps. One simple action, in the area of mergers, is to pass the SMARTER Act,** which would require the FTC to litigate merger cases in federal court, rather than its own administrative process, as well as satisfy the same preliminary injunction standards as DOJ.[32] Another option, especially given the potential damage the FTC can do in non-merger cases using its unfair methods of competition authority, is for Congress to **pass the One Agency Act and merge all antitrust enforcement into DOJ.**[33] Doing so effectively eliminates the FTC's unfair methods of competition authority, and thus here again both ensures that the Sherman Act sets the bounds of antitrust liability and relegates the agency to solely consumer protection matters.

Opposition to Federal Preemption

The challenge is that both the Left and the Right are biased in favor of federalism. The Left used to favor national preemption as a general matter, in part to address racial segregation in the South and then later to enable national environmental laws. But as Washington has become more gridlocked and more states are becoming deep "blue," progressives increasingly see the states as the best vehicle for achieving their goals, with the hope that if large states such as California pass a stringent rule, it will become the de facto rule companies follow nationally. Likewise, conservatives, long suspicious of an overreaching federal leviathan, have looked to the states, often "red" ones, as the last bastion of freedom and liberty. After all, people can always move to Texas or Florida to get small government.

At one level, such geographic diversity is a good thing. Some people like larger government and are happy to pay higher taxes for more services, such as smaller class size, cheaper college

tuition, more state parks, better health care services, etc. Others prefer the opposite. And for at least two decades, people have been voting with their feet.

But when it comes to state actions that affect the entire nation, and in this case the vitality of the nation's economic power industries, state regulatory impacts are not confined to state borders. It is time for Congress to step in, either by passing bans or temporary moratoriums on certain regulations, or, in cases where that is not possible, by tying federal aid to certain actions.

To be clear, congressional action on issues related to national economic power industries would not prevent states from regulating issues that don't pertain to interstate commerce. As an example, if a state wanted to ban the use of cameras on school buses, it could. What it could not do is ban the sale of school buses in the state with cameras installed on them, as doing so would create a balkanized national market. This is an important distinction for AI, as there is a difference between regulating AI models and developers and passing laws governing the use of AI in public schools or by local law enforcement. The former should be done through federal legislation to create a consistent national framework, whereas in the latter, states can determine frameworks on their own with little spillover effect on other states.

There will be considerable pushback against this framework for national versus state authority. Some will argue it will lead to weaker standards, especially compared to what more interventionist states would do. Maybe the federal standard ends up stronger, maybe not—but federal policymaking incorporates views on national security, economic competitiveness, and international leadership. States do not. A rule that seems "tough" from one state's perspective may be disastrous for national competitiveness or for U.S. leadership relative to China. Congress has to balance these tradeoffs. States don't.

Others will argue that this framework will limit needed regulatory innovations, or undermine laboratories of democracy. But while "laboratories of democracy" are great for policy experiments in schools, housing, transportation, or public health, they are counterproductive when the "experiment" is forcing every nationally distributed AI model to comply with 50 conflicting design rules. States should not experiment with policies that put the rest of the country at risk, such as dictating rules that undermine the development and use of AI in other states.

And, of course, states will complain accurately that their authorities are being stripped. The Constitution gives Congress the power to regulate interstate commerce—and delivering AI services on the Internet is a clear example of such activity, bringing it squarely within Congress's authority to regulate. Preemption isn't a federal takeover of city hall; it's Congress doing the job the Commerce Clause explicitly assigns it. Federal preemption is neither antidemocratic nor anticonsumer. It's just the common-sense way to regulate activities that span state lines.

A New Federal-State Division of Labor: Devolution

In contrast, many other regulatory matters in which the impacts are mostly local and regional should be devolved to lower levels of government, in part to enable laboratories of democracy, but also to reflect the increasingly divergent political ideologies and goals of different parts of the country. In this environment with much less unanimity and consensus, fighting over many issues at the national level becomes untenable, and it's better to just enable states through the democratic process to decide these issues themselves, even if doing so leads to a national

regulatory patchwork. As long as the patchwork effects are localized, the impact on national power industry competitiveness should be minimal.

Consider the National Environmental Protection Act (NEPA). The evidence of its negative impacts on economic development are overwhelming—from massive delays breaking ground on new projects to incredibly expensive and detailed environmental impact statement (EIS) requirements and overly long reporting requirements.[34] In fact, the White House Council of Environmental Quality found that in 2020, the average length of a final EIS was 661 pages, with the appendix coming in at another 1,042 pages.[35]

For example, a currently pending EIS for a project to widen an eight-mile highway entirely inside the borders of Pennsylvania required an EIS that was more than 7,000 pages long with 47 appendixes![36] In another example, the Air Force wants to build up to seven telescopes that would be enclosed in domes on less than an acre of land that was previously disturbed. And yet it had to file a 516-page EIS.[37] Even worse, for Micron to build a CHIPS-Act-funded semiconductor fab in the Syracuse area, it first had to file an over 27,000-page EIS on land that has been farmed for centuries.

And in most cases, the impacts of development projects do not cross state lines—and where they do, the states involved can regulate the projects themselves. Indeed, NEPA review delays are primarily a problem for state and local infrastructure (highways, transit, water systems, ports) where the federal nexus is often just a funding hook or a minor permit—or in the case of the CHIPS Act projects, a federal grant.

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States have incentive to internalize environmental costs since they receive the project benefits and bear the local impacts. Federal review adds process without adding much substantive environmental protection, particularly since NEPA doesn't actually require the environmentally superior outcome—just documentation. In addition, several states, such as California, Washington, and New York, have their own NEPA-equivalent statutes (the California Environmental Quality Act [CEQA], State Environmental Policy Act [SEPA], and State Environmental Quality Review Act [SEQRA], respectively) that are often more stringent than federal review. The duplication is pure waste. As such, the federal government should repeal NEPA, except perhaps for projects on federally owned lands.

Another area for devolution is wetlands permitting (Section 404 of the Clean Water Act). The *Sackett v. EPA* (2023) decision already moved in this direction by narrowing "waters of the US," but the broader 404 permitting program remains a federal function for what are often purely intrastate wetlands with no meaningful interstate nexus. States already run their own wetlands programs; federal duplication adds years to permit processes. The Section 404(g) Tribal and State Assumption Program allows states to take over permitting, but only two states have done so (Michigan and New Jersey), largely because EPA makes the assumption process so procedurally onerous it isn't worth it. Again, **Congress should repeal Section 404.**

Another area for devolution is non-interstate surface transportation. The Interstate Highway System has an obvious federal rationale. But local transit, bike infrastructure, and non-interstate road and bridge construction funded through federal-aid highway programs comes with an enormous compliance apparatus—Buy America, Davis-Bacon, Americans with Disabilities Act (ADA) design standards, Title VI, environmental review. In Switzerland and Germany, there are better outcomes. There, the federal government sets standards for intercity and interstate infrastructure, but local governments finance and design local networks. The United States should adopt a similar model: **Congress should allocate approximately 80 percent of Highway Trust Fund revenues to states as formula grants based on states' contributions, with no strings attached. The remaining 20 percent should be for interstate projects of national significance.**

The federal government should repeal NEPA. except perhaps for projects on federally owned lands.

Adopt Regulatory Carveouts for Key National Power Industries and Projects

As discussed, the U.S. regulatory system is processed-based, not goal-oriented. A key assumption in the current system is that regulating water quality from a dry cleaner is no different than from a semiconductor plant. This would be true if America weren't in strategic power industry competition with an adversary. But alas, it is. So, government needs to adopt a regulatory system that allows projects of national importance to have regulatory streamlining and reduction. This can be done through congressional authorization for a system in which the administration identifies key projects. (See box 1.) In addition, Congress should establish federally designated industrial readiness zones that are largely exempt from federal and state regulations. (See box 2.)

Box 1: Clean Air Act NOX Regulations as Anti-Developmentalist

As enacted and implemented, the U.S. Clean Air Act harms U.S. national economic power industry revitalization.

The 1970 Clean Air Act Amendments directed EPA to set National Ambient Air Quality Standards for several "criteria" air pollutants. EPA operates air quality monitors in many U.S. counties. If readings from a monitor violate these standards, the county is declared to be in "nonattainment," and polluting firms face stricter regulation. Most major U.S. metropolitan areas are now nonattainment areas.

Companies that seek to build factories in nonattainment areas must offset their emissions by buying offset credits from other area polluters in the same or neighboring counties that have reduced their relevant emissions below their regulatory limits. And each new ton of emissions must be offset by more than a ton.

A case in point is TSMC building six major fabs in the Phoenix metropolitan area. These fabs are critical to U.S. techno-economic security, especially given the near-term vulnerability of Taiwan to People's Republic of China (PRC) invasion. Yet, the lack of credits is holding up bringing fabs 3 through 6 online. TSMC was able to obtain permission to "build the box" of the fab before getting the offset credits, but it cannot install machines without the credits, even if those credits would be insufficient to "turn the factory on." Perversely, deindustrialization in Phoenix would create more credits for firms such as TSMC to buy.

The problem is that these emission credits can be expensive and, more importantly, very hard to obtain, with significant time delays. Indeed, NOx (nitrogen oxides) credit markets in many regions are extremely thin. There simply aren't enough legacy polluters shutting down to generate sufficient credits for a large new fab, which can require thousands of tons of NOx offsets. Intel's Ohio fab, TSMC's Arizona fab, and Samsung's Texas facility have all run into this. The United States is in a position where a new industrial birth depends on an offsetting industrial death.

Because the market for offsets is thin, prices are highly volatile and subject to speculation and hoarding, including for competitive purposes (to prevent competitors from opening new fabs). As one recent academic study using Census Bureau data finds, "Dispersion of offset prices within a market year, and the prevalence of brokers and comments from market participants, suggest the presence of search frictions. Offset prices are rapidly rising in real terms."[38]

Offsets must generally come from the same nonattainment area (or in some cases, the same airshed). This means a company can't use a credit from a plant that shut down in St. Louis to offset a fab in Phoenix. The geographic constraint further constricts the supply, even if nationally there might be ample reductions occurring.

Securing offsets can take years. A firm has to identify local sellers, negotiate, get state certification, and survive legal challenges. For projects such as CHIPS Act fabs where the whole point is speed—to reshore capacity before geopolitical risk materializes—this is particularly damaging. The permitting timeline for air quality alone can rival the construction timeline.

The offset requirement was designed for routine industrial growth in a world of many mid-sized polluters. It was never designed for a situation in which national security considerations require building large investments.

Moreover, the impacts may be quite small compared with the overall delay costs. For example, a chip fab in Arizona emitting NOx is, at the margin, a rounding error in the region's ozone nonattainment picture. Maricopa County's baseline Nox is in the range of 75,000–90,000 tons/year. For the eventual six-fab TSMC complex, there will be an estimated 400–700 tons/year. In other words, they represent a roughly 0.5–0.8 percent increase in county NOx emissions.

None of this would be a problem if the offsets were easy and quick to obtain, but they are not. On top of this, the law is biased against large point-source polluters. If ozone is a real problem in the Phoenix area, why doesn't EPA impose a population cap on the region? Or ban the sales of internal combustion engine vehicles? Because that would generate major backlash among voters, whereas imposing significant restrictions on national power industry firms raises hardly a peep.

The result is a situation wherein the U.S. government is spending $50+ billion to incentivize semiconductor reshoring while a 1970s-era air permitting regime—designed for a completely different industrial and geopolitical context—delays the very projects that that money is meant to catalyze.

There are several solutions to this problem. One is to make the program more flexible. This could include reducing the offset ratios to 1:1; allowing the creation of a national permit market, and allowing cross-pollutant trading (e.g., volatile organic compound [VOC] reductions substituting for NOx in certain circumstances).

In addition, firms should be able to create offsets from other sources. For example, all highway vehicles in the United States combined emit about 1.7 million tons of NOx per year.[39] Electric vehicles (EVs) emit essentially zero tailpipe NOx. This means that offsetting the entire TSMC GIGAFAB complex requires converting about 10 percent of passenger vehicles to EVs. Given the

growth of EVs, the natural fleet turnover toward them will almost certainly offset the entire TSMC complex's NOx footprint within several years of normal market activity.

All these changes would help, but a more important solution would be to be exempt projects that meet a national security or critical supply chain threshold from these requirements. The facilities would still have to comply with Clean Air Act rules regarding installation of Best Available Control Technologies, but they wouldn't have to find offsets that raise costs and impose delays. Moreover, we have made great progress on NOx reduction. The decline in NOx emissions nationally was 3 percent from 2023 to 2024.[40] Assuming the same reduction took place in the Phoenix area, allowing these added emissions from the fabs would mean going back to levels three months earlier.

Many other nations already do this because they recognize the importance of building key strategic industries and facilities. France's *déclaration d'utilité publique* (public utility declaration) is instructive. A project designated as serving the public interest gets a streamlined legal status that significantly limits judicial challenges. The state makes an upfront political determination that the project should happen, then environmental review becomes a process of *how* to build it, not *whether* to build it. This is the inverse of the NEPA logic, wherein the review is supposed to be genuinely open to a "no-build" outcome.

America needs a regulatory system that allows projects of national importance to have regulatory streamlining and reduction.

Germany combines strong environmental standards (often stricter than those in the United States) with faster permitting for designated projects. The *Planfeststellungsverfahren* (plan approval procedure) consolidates all permits into a single proceeding with a defined timeline and limited grounds for appeal. Environmental protection is substantive, not just procedural—projects can be stopped for actual harm, not just inadequate paperwork—but the process is unified and time bounded.

The United Kingdom has established its Nationally Significant Infrastructure Projects initiative (NSIPs). Projects above defined thresholds (energy, transport, water, waste) are automatically classified as NSIPs and removed from the normal local planning system entirely. They are decided by the Planning Inspectorate under national policy statements that Parliament preapproves, so the policy debate happens democratically upfront, and individual projects are judged against already-settled policy. A defined examination period is a of maximum 6 months, followed by a recommendation within 3 months, and a decision within 3 months, roughly 12 months total from application to decision. Legal challenges are limited to a six-week window after the decision and only on points of law, not merits.

The Netherlands, one of the world's most densely regulated countries on environmental matters, has developed explicit fast-track mechanisms after a series of infrastructure crises. For major transport infrastructure, a single national route decision integrates all permits—environmental, spatial planning, water management—into one coordinated procedure with defined timelines. The national government overrides municipal and provincial objections for projects of national significance. Its Crisis & Recovery Act (2010), later made permanent as Environment and Planning Act 2024, created a list of designated national projects that get expedited treatment;

pilot projects allowed to deviate from existing environmental rules to test new approaches; and consolidated environmental permitting under a single "Environment Permit."

South Korea has established its Industrial Complex Designation. When the South Korean government designates land as a national industrial complex, it preclears environmental, agricultural land conversion, and spatial planning approvals in a single consolidated process upfront and streamlines individual factory/facility permits within the complex to administrative registration rather than full permitting. This allows the Ministry of Trade, Industry and Energy to override local government objections for nationally designated complexes. South Korea explicitly treats permitting speed as an economic competitiveness metric. The government publishes permitting timelines and has set statutory targets for reducing them. And agency heads can be sanctioned for delays on nationally designated projects.

Countries with fast permitting invariably have one agency that can bind others, convene interagency coordination, and be held responsible for timelines. Fragmented authority with independent veto powers produces delay regardless of procedural reforms.

For these nations, pre-resolution of policy questions is the single most powerful lever. When the question of whether a type of project is nationally desirable is settled in advance, individual project review collapses to how, not whether. In contrast, the U.S. system relitigates at every stage.

In addition, countries with fast permitting invariably have one agency that can bind others, convene interagency coordination, and be held responsible for timelines. Fragmented authority with independent veto powers produces delay regardless of procedural reforms.

These nations also limit litigation to points of law, not merits. Most countries allow judicial review of planning decisions, but confine it to whether an agency followed its legal mandate—not whether an agency reached the right substantive conclusion.

In addition, in some nations, administrators face penalties for delay. In the United States, administrators face penalties for not dotting all the "i's" and crossing all the "t's."

To fix this, **Congress should pass legislation providing the Department of Commerce with the authority to identify up to 100 projects a year as national economic power importance that qualify for streamlined regulatory approval, limited legal challenges, and reduced compliance burdens.**

Box 2: Establish Federally Designated Industrial Readiness Zones Largely Exempt From Federal and State Regulations

There are many regulatory challenges with building factories and related national economic power industry facilities in the United States (e.g., data centers), including speed and uncertainty.

To do this, **Congress should charge the Commerce Department with designating a set of preapproved very large industrial sites—say 50–100 nationally that are each at least 3,000 acres in size—where comprehensive environmental and permitting review has already been completed and utilities are guaranteed.**

DOC would establish a competition whereby states and localities could bid for designation. Initial planning grants would allow a certain number of applicants to conduct a one-time comprehensive EIS for the zone as a whole, covering air, water, soil, traffic, wetlands, etc. Once approved, individual projects within the zone would get a categorical exclusion or streamlined Tier 2 review capped at something like 60–90 days.

DOC could provide funding of up to half the costs of site development and permit approval, with the state and locality providing the other half.

Congress would need to legislatively establish that the zone-level EIS satisfies project-level review obligations, eliminating duplicative site-specific NEPA for conforming uses. In addition, the site owners would renegotiate emissions budgets for the zone; individual facilities would draw from the budget rather than triggering full PSD/NSR permitting (Prevention of Significant Deterioration under the EPA's New Source Review program). Areas should be able to receive certain emissions allocations. In addition, under Section 404 of the Clean Water Act, there would be precleared wetland impacts within zone boundaries via programmatic permit, and mitigation banking would be built in. Endangered Species Act provisions would not apply to the sites. To qualify, states would need to guarantee their own and local regulatory waivers. In addition, all other federal regulatory requirements, such as Davis-Bacon, would be waived.

Finally, Congress would need to exempt the zones from NEPA challenges and prohibit injunctive relief that halts construction. This would require strong standing limitations to prevent environmental groups from relitigating at the project stage what was already decided at the zoning stage.

Tilt Agency Regulation to Consider Automation, Productivity, and Competitiveness

Regulatory agencies see their principal job as reducing type 1 errors: concluding that a problem exists when it doesn't. If they underregulate and a problem occurs, they get significant blame. But if they overregulate and innovation, productivity, competitiveness, or all three are harmed, no one notices. The result is that regulators have a bias toward minimizing the impact of their actions on productivity, innovation, and competitiveness. A good example of this is with the Federal Railway Administration, which has resisted enabling one-person train operations out of concern for the risk of potential accidents, even though automated training technology has improved dramatically and would lower transportation costs.

There needs to be a process in regulatory guidance wherein an arm of government weighs in to defend innovation, productivity, and competitiveness. The U.S. government already has something similar with regard to the Small Business Administration's (SBA's) Office of Advocacy, which intervenes in agency regulatory proceedings to defend the interests of small business—even though, as discussed in the next section, there is really no need for lighter-touch regulation of small businesses just because they're small. By contrast, there is a need for regulators to at least be required to consider in a more structured and serious way the impacts of their actions on innovation, productivity, and competitiveness. So, Congress should direct the administration to create an entity in government that weighs in on regulatory decisions to defend the interests of national power industries (and by extension national interests overall)—and, more broadly, the interests of industries in which regulation can reduce innovation.

It's not entirely clear where this body should be housed. A forthcoming report will discuss the institutional frameworks needed to formulate and implement a national economic power industry strategy.

End Small Business Preferentialism

New manufacturing production technology, coupled with improvements in transportation and communications, enabled the rise of the mass production corporation in the late 1800s, and with it transformed the American economy into the world's richest and most powerful. But small business and its political allies fought a rear-guard action to roll back its competitors through the Sherman and Clayton antitrust statutes and measures such as the Robinson Patman Act, the latter of which was a clear instance of regulatory capture.[41]

But by the end of WWII, it was clear to most in Washington that these attacks were quixotic and could not hold back the tide of bigness. But for political reasons, Washington felt that it had to favor small business. As a result, the policy shifted from attacking the big opponents to favoring small companies. The establishment of SBA in 1953 was emblematic of this. SBA helps small businesses by providing discounted financing and by working to exempt them from rules and regulations applied to large businesses. The legislation creating SBA was based on the notion that America was the dominant economy in the world and that its large corporations, such as GM, GE, and U.S. Steel were invulnerable. And to "buy off" small business owners, Congress decided that in virtually all policy, from tax to regulation to government procurement, small businesses would be favored. America can no longer afford skew the playing field like this.

As such, it is time to consign that approach to the dustbin of history. Given the importance of large companies in the national economic power industry war with China, a small business policy fit for a national power industry strategy abandons all business preferences based on size. ITIF proposes that, instead, **policymakers should embrace firm size neutrality and abolish small business preferences, including government procurement preferences, regulatory exemptions, small business financing programs, and tax benefits that favor small firms.**[42]

Democrats like small business favoritism because it makes it easier to enact higher taxes and regulations on large business, as, in many cases, small businesses are exempt. Republicans like small business favoritism because at least someone is not subject to the heavy hand of government. But in a techno-economic war with China, wherein large American companies are at the front line, small business favoritism serves to weaken these companies.

Given the importance of large companies in the national economic power industry war with China, a small business policy fit for a national power industry strategy abandons all preferences based on size.

Make Antitrust Support Techno-Economic Power

At present, U.S. antitrust policy and doctrine almost completely ignores concerns of international competitiveness and power. If anything, due to a renewal of "big is bad" within U.S. antitrust policy during the Biden administration, the focus is to reduce the power of American firms competing in global markets. Indeed, the U.S. government has a long history of using antitrust to

go after strong U.S. firms, usually with deleterious results. Cases including Western Electric, RCA, AT&T, Xerox, IBM, Kodak, and most recently most U.S. "big tech" firms.[43]

For much of its history, U.S. antitrust laws were enforced with a concern to prevent large-scale industrial consolidation, which became extensive in the FDR administration in which antitrust was weaponized against bigness. However, the United States was becoming so dominant globally that most ignored competitiveness damage. And, at least until the mid-1970s, these latter interests were sometimes represented by other parts of government, which helped mitigate the damage. For example, from the 1930s to the 1970s, DOD and the Commerce Department successfully advised the White House to overrule DOJ and not break up AT&T.

To be sure, starting in the mid-1970s, the focus of antitrust became on consumer welfare and the "big is bad" approach to antitrust was abandoned, which helped facilitate the techno-economic dominance America was able to achieve in the following decades. However, there still was little to no focus on international industry competitiveness. Indeed, given the background of the consumer welfare standard in neo-classical economics, antitrust became, in some ways, less open to competitiveness given the focus on solely economic welfare.

As a result, a troubling reality has emerged. On the Right are conservatives and libertarians wedded to a strict consumer welfare approach who dismiss any competitiveness concerns as "noneconomic" or "political." On the Left are liberals and progressives who are not wedded to a consumer welfare approach but replace it with a politics of "big is bad" and hostility to large corporations, including leading tech firms, as evidenced by the decision in the Biden administration to block the acquisition of iRobot by Amazon, with the result of the former's bankruptcy and proposed sale to a Chinese company.[44]

Without question, the iRobot case is emblematic of everything that is wrong with U.S. antitrust doctrine and policy. CCP officials, by contrast, don't think this way. Rather than want to protect small firms in order to facilitate greater product market competition, they do not want excess competition, as it lowers margins and makes it harder for Chinese firms to dominate global markets.[45] To compete with China, what is needed, therefore, is an antitrust policy fit for an NPIS—which, among other things, would treat power industries differently than non-power industries and recognize the importance of scale and at least some market power.

The iRobot case is emblematic of everything that is wrong with U.S. antitrust doctrine and policy.

There are several strategies that an NPIS antitrust policy should adopt. The first, and most important, comes in the area of remedies. As distinct from the consumer welfare standard, DOJ consent decrees are reviewed under the Tunney Act using a public interest standard, which is arguably broad enough to include competitiveness concerns or, amidst other proposals to amend the Tunney Act by progressives, could be changed to be so.[46] For example, in a case involving a company in a national power industry in which a breakup or a behavioral remedy arguably would be equally effective options to solve competition concerns, national competitiveness considerations might counsel against a breakup being in the public interest to ensure that a leading player in the industry retains sufficient scale to compete globally. **Antitrust agencies should use the flexibility in the Tunney Act to consider the effects of their actions on U.S. industrial**

competitiveness. In addition, when considering divestiture remedies, agencies should assess the likelihood that splitting up firm would result in its divisions being purchased by PRC firms.

To be sure, concerns about competitiveness should not modify substantive antitrust standards—antitrust must remain focused on protecting competition, innovation, and consumers. However, in several respects, antitrust law can be far more flexible than it currently is in ensuring that enforcement does not come at the expense of competitiveness. As scholars have noted, agencies should be wary of using the hypothetical monopolist test (also called the SSNIP test), or other qualitative assessments, to define geographic markets too narrowly by excluding foreign competitors, because in many cases should be included in the market as rapid entrants at the very least.[47] For example, a merger between three of the four largest American firms in a national power industry may be seen as anticompetitive if the geographic market is national, but it is unlikely to result in competitive concerns if the market is expanded to include two or three rapidly growing Chinese firms that could soon offer alternative solutions.

Finally, **U.S. antitrust enforcers can and should factor national competitiveness consequences as part of their prosecutorial discretion in deciding whether to bring cases.** As a general matter, the antitrust agencies have limited resources and should focus on those cases that best further the public interest, which should not ignore concerns about competitiveness and national security. For example, if DOJ is deciding whether to allocate resources to challenging a 4-to-3 merger in a non-national power industry versus challenging a 4-to-3 merger in a national power industry wherein DOD has expressed national security or competitiveness concerns with an antitrust case, DOJ should ceteris paribus focus its resources on challenging the merger in the non-national power industry and allow the 4-to-3 merger in the national power industry to go through.

Embrace Innovation- and Build-Friendly Regulation

At the end of the day, policymakers have to decide whether they value regulatory protection more than innovation and getting things built. While sometimes regulation can be consistent with, and even supportive of, these goals, the reality—despite what defenders of the precautionary principle will say—in most cases, they are in conflict. A 1992 report for the Congress Office of Technology Assessment found that to be the case, and it is likely even more true today as competitiveness has become a much more critical factor in national success.[48]

If America is to get back on track, it needs to start treating builders as heroes, not villains, while limiting the opposition forces of NIMBYs and environmentalists.

So, federal regulatory policy should tilt toward, not against, innovation, productivity, and competitiveness. This also entails recognizing the costs to all three when considering new regulations or reviewing existing regulations. As such, the White House should do the following:

Create a unit within OMB's Office of Innovation Policy Review (OIRA) to systematically consider how proposed agency regulations impact innovation and competitiveness.[49] While OIRA is tasked with reviewing major regulations from a cost-benefit perspective, it does not explicitly review regulations for impacts on longer-term dynamic effects on innovation or competitiveness. The Trump administration should establish within ORIA a branch to serve as an "innovation and competitiveness champion" in the regulatory process. The office should have authority to push

agencies to either affirmatively promote innovation, productivity, and competitiveness or achieve a particular regulatory objective in a manner least damaging to all three.

The nation also needs to craft a broadly shared narrative about the importance of building things. In 1930, it took one year and 45 days to build the Empire State Building, and it came in under budget. In 2008, California started a high-speed rail project that is nowhere close to completion and is billions of dollars over budget. Back then, people such as Robert Moses, a key public sector builder in New York City and state, was hailed as a hero. Today, he is vilified as a destroyer. If America is to get back on track, it needs to start treating builders as heroes, not villains, while limiting the opposition forces of NIMBYs and environmentalists.

BARRIERS TO CHANGE

These changes will not be easy. The chorus of pro-regulation advocacy groups and philanthropies is large, well-funded, and powerful. They will portray the changes proposed here as only benefiting corporate bottom lines at the expense of everyday Americans—and they will frame opposition to a national developmentalist agenda as the people taking on the powerful. But in that good-versus-evil narrative opponents of national developmentalism would lose sight of what they are actually opposing and what is at stake in America's techno-economic war with China. Some will simply deny the existence of the techno-economic war. Others will argue, wrongly, that to the extent there is such a war, regulation can help America win it.[50]

While free market advocates will generally support reduced regulation, their preference is to reduce it across the board for all industries. As such, they may oppose an approach which targets regulatory relief at national economic power industries.

At the same time, other vested interest groups—including citizens opposed to any and all change, and businesses worried about competition—will continue to defend the status quo. They too, will employ the "people versus the powerful" narrative to gain public support. Alongside them, the vast array of lawyers and consultants that companies must pay to navigate the miasma of the regulatory system also will resist. Finally, the regulatory state itself will resist, as regulatory agencies justify their existence by promulgating more regulations.

For too long, advocates and regulators assumed that little or no balance was required between techno-economic power goals and other social and economic goals. The United States was rich enough and powerful enough to regulate with impunity.

At the end of the day, the core question for regulatory policy, as it is for all the other areas of policy that ITIF is analyzing in this series, comes down to whether policymakers and other elites will decide that avoiding defeat in the techno-economic war against China is central to the future of America.[51] If it's not, then the status quo, perhaps with minor reforms, will be fine. But the result that will lead to is clear: national defeat to China.

CONCLUSION

It is a libertarian fantasy that the United States can or should eliminate most regulations. But that does not mean that U.S. policymakers cannot and should not craft a new regulatory system that balances national techno-economic power goals with other social and economic goals. For

too long, advocates and regulators have assumed that little or no balance is required. The United States used to be rich enough and powerful enough to regulate with impunity. It could afford to take on the added costs. Moreover, the dominance of neoclassical economics, which held that the trade deficit didn't matter and that computers chips were no different than potato chips, meant that it really didn't matter if regulation reduced domestic production in key industries—because there were no key industries. As long as the economy was growing, all was well.

If America keeps on this path, it will only accelerate its national economic power industry decline. Alternatively, if policymakers do not want that outcome, then bipartisan, pragmatic transformation of the regulatory system is needed. Not inaction. Not piecemeal change. To wit, government must begin to shift from a regulatory state to a developmentalist one that prioritizes innovation, productivity, and competitiveness.

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Mobilizing for Techno-Economic War, Part 8: Transforming Industrial Policy Organization

ROBERT D. ATKINSON

The federal government lacks adequate capabilities to conduct needed techno-economic-industrial analysis, as well as formulate and manage in an enterprise-wide way effective industrial and competitiveness strategies, policies, and programs. Policymakers must address this gap to avoid losing to China.

KEY TAKEAWAYS

- Neither markets alone nor ad hoc, incremental government actions will be enough to stop the PRC from winning most advanced industries.
- Not losing to the PRC requires a coherent set of sector strategies, complemented with an overall advanced industry competitiveness strategy and agenda.
- With a few exceptions, the U.S. government lacks the analytical and organizational capabilities to constitute and carry out such a strategy.
- Fixing that requires much better data and strengthened capabilities to analyze and draw conclusions from it.
- It also requires new organizational structures in Congress and the White House focused on national economic power industry competitiveness and strategy.
- Finally, it requires an institutional home for this effort. This could be through a new National Advanced Industry and Technology Agency or charging the Department of War to expand its industrial base efforts beyond defense sectors, or both.

INTRODUCTION

The United States has been the world's dominant techno-economic power for over 125 years. That has induced complacency. As the Information Technology and Innovation Foundation (ITIF) has written, China is hungry and determined not only to displace American techno-economic leadership, but to also make America dependent on China.[1]

On its current trajectory, it is likely that China will in the next decade or two amass significantly greater capabilities than the United States and even Allies will in what we term "national economic power": advanced traded-sector industries that are critical to national security or sovereignty. With those greater capabilities will come geostrategic hegemony over the West, unless the United States forestalls that outcome by adopting a new, transformative national power industry strategy that goes beyond a mere competitiveness or national innovation strategy. This is not a war that the United States and allies can win in the sense of significantly weakening or retarding the growth of China's own national power industries. The only way Chinese attacks will end is if China becomes a free, democratic country, which is unlikely to happen anytime soon. But the United States and allies can avoid defeat—keeping their national power industries relatively strong—by working together and adopting national power industry strategies. Both free-market doctrine and anticorporate, anti-tech progressivism are inadequate, if not outright harmful.

However, the inherent weaknesses of the U.S. innovation and production system (e.g., cuts in government research and development [R&D], limited STEM [science, technology, engineering, and math] skills, an overly strong dollar, a tax system poorly designed to spur investment, institutional resistance to change, and corporate short-termism, etc.), coupled with a Chinese Communist Party (CCP) hyper-focused on victory, suggests that, absent major structural change in U.S. policy, relative decline and loss of techno-economic competitive position and power is inevitable.

The American system of government that currently prioritizes processes needs to be modified to become a more teleological one that puts goal achievement first: in this case, not losing the techno-economic war to China.

The first report in this series addressing the China national techno-economic power industry challenge laid out the context for this, including what is at risk and the need for radically new approaches in a host of key policy areas.[2] Not small steps, but big ones. Not tinkering, but transformation. "Bold" is the operative term. The crisis is at such a point that incrementalism will fail. Other reports have focused on transforming from financial capitalism to national techno-economic capitalism, restructuring U.S. education and workforce and science and technology systems respectively, moving from free trade agreements to strategic techno-economic-trade partnerships, and reshaping the U.S. business regulatory system.

This report lays out a reform and restructuring agenda for how the U.S. government should be organized so it can effectively analyze and operationalize a national economic power industry strategy. The most important aspect of this is to recognize that the American system of government that prioritizes process needs to be modified to a more teleological one that puts goal achievement first: in this case, not losing the techno-economic war to China.

OVERVIEW

The United States lacks a "developmental state" with the analytical, organizational, or implementation capabilities to craft and carry out a coherent and effective national economic power industry strategy to address the China assaults. It has various departments and agencies, each tasked with a particular mission, none of which is about not losing to China. And there is no central coordination hub. Indeed, ask any reasonably knowledgeable person in Washington whom to go to in government to discuss the China techno-economic challenge and the answer would be no one. Because that person/office does not exist. We know whom to go to discuss monetary policy. Defense policy. Energy policy. Health policy. But not techno-economic industrial policy.

There are several reasons for this. A major one is that the awareness of the China threat is still not widely and deeply appreciated in Washington, despite efforts to raise awareness of it. Washington is simply not capable of looking over the horizon and acting on a threat that is not yet visible, and even with all the harm the People's Republic of China (PRC) economy has done to U.S. industry, much more of that harm is yet to come and not easily visible now, unless one engages in industry-by-industry analysis.

A second reason is that if you believe that there is no optimal outcome in the economy, except that which free markets naturally produce, then not only is there no need for a strategy and the analytical functions to support it, but such a strategy would be welfare reducing. To this day, most in Washington, at least most non-progressives, believe that Milton Friedman was right when he said, "So if you want efficiency and effectiveness, if you want knowledge to be properly utilized, you have to do it through the means of private property."[3] Any deviation from market-produced outcomes and structures is less efficient and effective.

happenstance.

As much as neither nationalist conservatives nor globalist liberals want to hear it, we need to move more in the direction of a teleological, national development state.

Even more broadly than this belief in the sanctity of free market is the fact that the United States, and other Anglo-inspired states, are fundamentally processed based. The American state and system derives its legitimacy from procedural integrity: rule of law, democratic consent, constitutional constraints, market mechanisms. An outcome is legitimate regardless of what it is, if the process was followed. There is no fixed destination; fidelity to method is the point. By definition, that limits the role of the state because the state can only intervene in the way that supports congressionally created, and court-backed, processes. For example, the U.S. regulatory system is based on individual rights wherein everyone and everything is treated the same. Violating that means empowering certain groups against other groups with the risk of intervening state power. The problem, of course, is when you need to follow and arrive at a destination, such as rebuilding advanced manufacturing. The U.S. process-based state can only do this by

There is only one component of American society that deviates from that process orientation and that is the national security state. National security is not about process: Did we not use market means to develop the best weapons systems? It is about goals, and doing what it takes to accomplish those goals. As the Soviet threat became clear to many Washington policymakers after Churchill's famous "Iron Curtain" speech in Fulton, Missouri, a bipartisan consensus

emerged to create a teleological national security state.[4] In 1947, Congress passed the National Security Act, creating the Central Intelligence Agency (CIA), consolidating military branches into the Department of Defense (DOD), and creating the National Security Council (NSC). The creation of National Security Council Paper NSC-68 formally identified the Soviet Union as an existential risk.[5] Over time, this system expanded, including the establishment of the Defense Advanced Research Projects Agency (DARPA) in 1958, production of national security strategies, and post-9/11 changes, including creation of the Director of National Intelligence (DNI).

Some isolationists opposed these changes, rightly understanding that they represented a fundamental change to the Founders' intention of creating a constrained, process-based state. For many of them, this was a threat to American freedom, creating a Leviathan state that would tax citizens, reduce their freedoms, and enlarge government. Others agreed, but with ambiguity and reluctance, from Eisenhower's warning about the military-industry complex to JFK's wanting to rein in the CIA to the Senate hearings on the CIA in the 1970s. But the reality of the Soviet threat to freedom in the West supported this evolution, and meant that the national security state was maintained and expanded, even as the fundamentally free market Trump administration rails against the so-called deep state.[6]

Back then, opponents wanted to turn back the clock and retreat behind the oceans to a more isolationist America. Sputnik and the risk of being destroyed by Soviet intercontinental ballistic missiles put an end to that thinking. Today, many on the Right want to go back to that thinking, believing that the China threat can be dealt with by erecting the equivalent of oceans in a pre-missile age: in this case, massive tariff walls. But, in part because of the nature of advanced industries, economic isolationism will not work and will lead to even further U.S. industrial decline.

A system that does not prioritize national power with the establishment of techno-economic power policy and programs cannot win in a world where there is a state power—the Marxist, Leninist CCP—intent on defeating us on the techno-industrial battlefield.

Rather, as much as neither nationalist conservatives nor globalist liberals want to hear it, we need to move more in the direction of a teleological, national development state. This means a state that builds on the national security state and that defines national security as more than military power (and soft power), encompassing core techno-economic capabilities. And yes, this means more of the "deep state," one focused not on partisan politics, but on securing the freedom of the West.

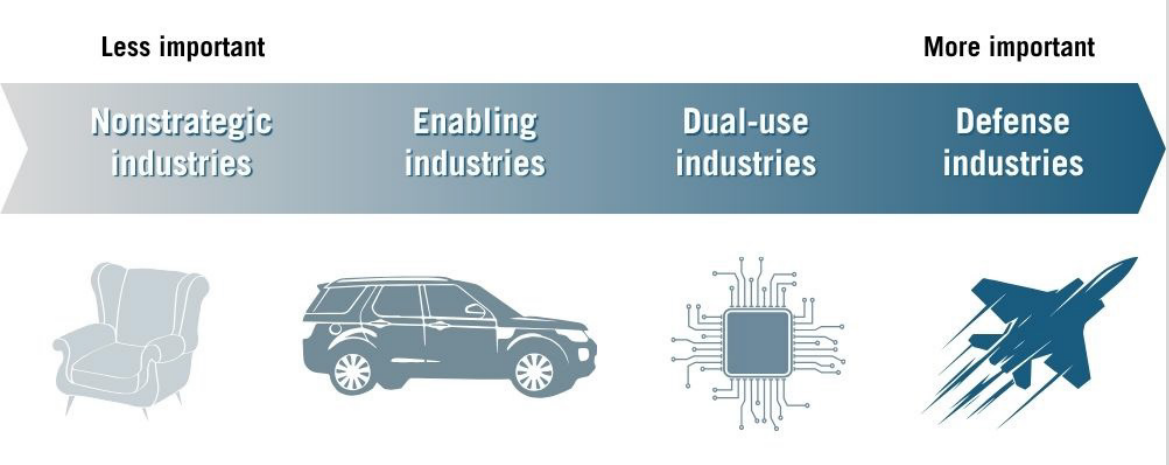
A system that does not prioritize national power with the establishment of techno-economic power policy and programs cannot win in a world where there is a state power—the Marxist, Leninist CCP—intent on defeating us on the techno-industrial battlefield. A process-based system with a shrunken state is ultimately a utopian vision that might work if the United States were cut off from the rest of the world or if every state were a modern, rights-based democratic state. But in the real world, we need a developmental state to ensure that America is not defeated. And that means, as this report details, a government that is capable of constituting and carrying out a national economic power industry strategy.

A last point. Most of the narrative on industrial policy comes from those who argue that nations need industrial policy to grow their economies and provide good wages. To be sure, having high-value industries helps in that task, but given that advanced industries account for less than 15 percent of world gross domestic product (GDP), these industries cannot be the key engine of growth. If growth is the goal, the best way to get it is through diffusion of technology and innovations in all sectors of the economy, including nontraded sectors such as retail trade, hospitality, financial services, and logistics. ITIF focuses on industrial policy because without it, America will lose to China and become dependent on the CCP.

Box 1: Defining National Economic Power Industries

The conventional view is that the only industries that matter to national power are defense industries. But that is now vastly too limiting. As Corelli Barnett wrote, "For munitions production for modern war is not primarily a question of specialized armament industries, as some suppose, but of all those varied industrial and scientific resources that in peacetime make for a successful and expanding export trade."[7] As such, ITIF has developed a classification of U.S. industries for their relevance to national power. This can be viewed as a continuum between defense industries on one side, nonstrategic industries on the other, and strategic industries and strategic enabling industries in the middle. See figure 1.

Figure 1: Industrial power scale



At one end of the continuum are defense industries. Clearly industries such as ammunition, guided missiles, military aircraft and ships, tanks, drones, defense satellites, and others are strategic. Not having world-class innovation and production capabilities in these industries means a weakened military capability. Policymakers across the aisle generally (with the exception of the isolationist Right and the pacifist Left) agree that these industries are strategic and that market forces alone will not produce the needed results.

At the other end of the spectrum are industries in which the United States has no real strategic interests. These include furniture, coffee and tea manufacturing, bicycles, carpet and rug mills, window and door production, plastic bottle manufacturing, wind turbine production, lawn and garden equipment, sporting goods, jewelry, caskets, toys, toiletries, running shoes, etc. If worst came to worst and our adversaries (e.g., China) gained dominance in any of these industries and decided to cut America off, we'd survive—in part, because none of these are critical to the running of the U.S. economy, as many are final goods that might inconvenience consumers but

wouldn't cripple any industries, and also because, in most cases, domestic production could be started or expanded relatively easily because none of these products are all that technological complex from either a product or process concern and the barriers to entry are relatively low.

Next to defense industries, dual-use industries are critical to American strength. Losing aerospace, pharmaceuticals, chemicals, semiconductors, displays, advanced software, fiber optic cable, telecom equipment, machine tools, motors, measuring devices, and other dual-use sectors would give our adversaries incredible leverage over America. Just the threat to cut these off (assuming that they have also deindustrialized our allies in these sectors) would immediately bring U.S. policymakers to the bargaining table. National power industries tend to also need global scale in order to complete. Moreover, many are intermediate goods such as semiconductors and chemicals, where a cutoff would cripple many other industries. Finally, these industries are hard to stand up once they're lost because of the complexity of the production process, product knowledge, and the importance of the industrial commons that support them. In other words, barriers to entry are high and, if lost, would be very difficult and expensive to reconstitute.

What America needs is a "third way" for trade grounded on strategic industry trade policy based on the realization that some industries matter far more than others.

Finally, there are enabling industries. These are industries wherein, if the United States were cut off, the immediate effects on military readiness would be small. And the U.S. economy could survive for at least a while without production. America could survive for many years without an auto sector, as we would all just drive cars longer. But because of the nature of these industries—including technology development, process innovation, skills, and supporting institutions—their loss would harm both dual-use and defense industries. That is because enabling industries contribute to the industrial commons that support dual-use defense industries. A severely weakened motor vehicle sector would weaken the tank and military vehicle ecosystem. Similarly, a weakened commercial shipbuilding sector has weakened military shipbuilding. A weakened consumer electronics sector weakens military electronics.

U.S. GOVERNMENTAL ORGANIZATION: 1900–PRESENT

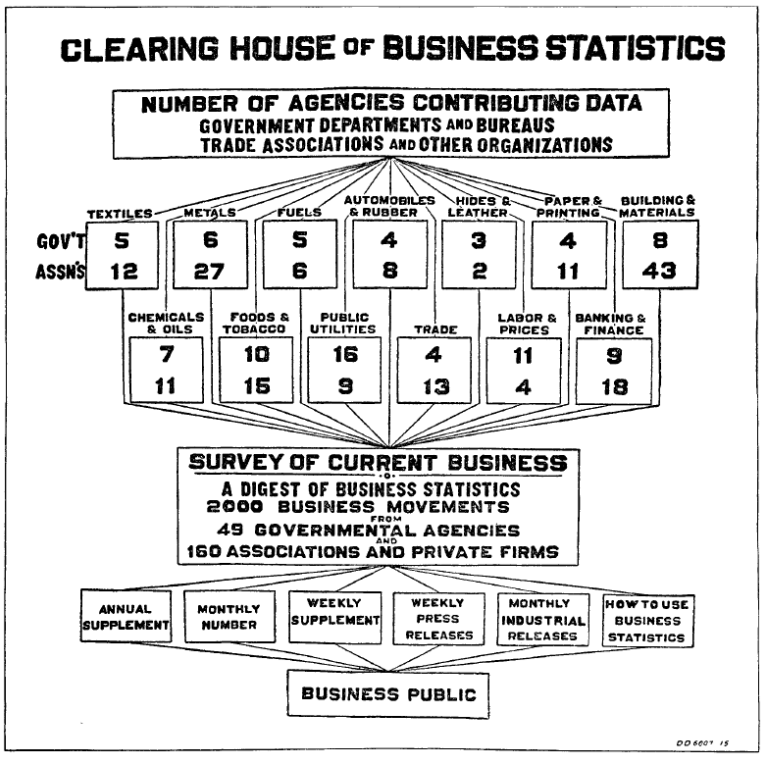
Before the third industrial revolution of the late 1880s, federal government data, analysis, and policy capabilities related to the industrial economy were limited. But as Andrew Reamer has written, government officials recognized the need for better data, especially on manufacturing industries and to set industry-specific tariffs.[8] The 1890 Census and 1900 Census included detailed statistics on manufacturing industries. After its establishment in 1903, the Commerce Department conducted detailed studies of various key industries, that in many ways were significantly more advanced than what Commerce does today. In 1921, the Bureau of Economic Analysis (BEA) began publishing the *Survey of Current Business*, the flagship monthly publication the has provided regional, industry, macro, and international economists with data, analysis, and methodological research concerning the national economic accounts.[9] As Reamer wrote, the *Survey's* July 1931 issue provided the graphic illustration of the periodical's role as the nation's "Clearing House of Business Statistics," one that offered "2,000 business movements" from data from 49 federal agencies and 160 industry associations and private firms. (See figure 2.) Much of this data was in service of ensuring that U.S. manufacturing grew and with it, U.S. international trade competitiveness.

However, it wasn't until after WWII that a new economic policy framework was institutionalized. Seeking to avoid another depression following the conversion from a wartime economy and bolstered by the insights of Keynes, Congress passed the Employment Act of 1946, which established the President's Council of Economic Advisors (CEA) and the Congressional Joint Economic Committee. The act stated that it was the "continuing policy and responsibility of the Federal Government to use all practicable means for the purpose of creating and maintaining conditions under which there will be afforded useful employment opportunities for those able, willing, and seeking to work, and to promote maximum employment, production, and purchasing power."[10] It went on to state:

> The President shall transmit to the Congress ... an economic report setting forth; 1) the levels of employment, production, and purchasing power obtaining in the United States and such levels needed to carry out the policy... 2) current and foreseeable trends in the level of employment, production, and purchasing power; 3) a review of the economic program of the federal government and a review of economic conditions affecting employment in the United States or any considerable portion thereof during the preceding year and their effect upon employment, production, and purchasing power.[11]

The goal of the legislation, and indeed the central organizing principle of U.S. economic policy to this day, was not to boost the long-term growth of the economic output, but rather to make sure that recessions don't cause economic performance to slip below some natural, immutable rate of growth. (The goal of keeping inflation low was added in the 1970s.) Nor was the goal to support trade competitiveness, as the consensus view became that the U.S. economic was globally dominant and largely immune to foreign competitive forces. When the act spoke of maximizing production, it meant avoiding recessions, running factories at full capacity, and getting to full employment. It was silent on productivity and international competitiveness. And the CEA by and large continues that tradition today. And much of the U.S. statistical system was oriented around managing the business cycle: regular data updates on price changes and sales and purchases along with other factors used to determine whether the economy was "overheating" or cooling.

Figure 2: Commerce Department illustration from 1931[12]



To be sure, parts of the Department of Commerce (DOC), especially in the International Trade Administration, were to support exports. And as discussed below, parts of DOD focused on supporting the defense industrial base. But there was no concerted effort to build capabilities focused on industrial competitiveness.

To be sure, there are many departments and agencies that touch on areas of national developmentalism and competitiveness. But none have not losing to China as their core mission. The National Science Foundation (NSF) is designed to give money to scientists to do research on whatever they choose. The Department of Energy (DOE) is designed to support energy innovation and development, but not a national energy industry competitiveness strategy and agenda. The Department of Health and Human Services and National Institutes of Health (NIH) are designed to support drug development but not a national biopharma industry competitiveness strategy and agenda. The Small Business Administration is designed to support any and all small businesses, especially those that serve local markets, such as retailers.

And of course, there is DOC, which at first glance should be seen as the home of the national development state. But it actually does very little in this space. Commerce is an amalgam of different agencies and functions that have no other place to be, so they got put in Commerce. (See figure 2.) President Nixon reportedly did not want the newly established National Oceanic and Atmospheric Administration in the Department of the Interior (DOI) due a personal feud with the then Interior secretary, so it got put in Commerce. Census and BEA collect data, but could easily be, along with other data collection agencies, in a national statistics agency. And most of Commerce is the International Trade Administration, whose mission is principally to expand exports, not to serve as a hub for consideration of industry competitiveness. The National Institute of Standards and Technology (NIST) and Bureau of Industry and Security do have more industry-specific missions, but both are limited in scope.[13]

Finally, there is the Department of War (DOW, also known as DOD). It has a wide variety of programs and offices designed to address innovation and competitiveness, mostly focused on defense industries, with dual-use industry focus. This includes DARPA, DOW Research & Engineering, Office of Strategic Capital, the Defense Innovation Unit, and Office of Undersecretary of War, Assistance Secretary for Industrial Base Policy.

LIMITATIONS OF THE CURRENT SYSTEM

At least since the Great Depression, the federal government has never felt the need to develop strategic economic intelligence in order to fully understand the competitive position of its traded sectors or to help support overall economic productivity.[14] Rather, most of the focus is on understanding the ups and downs of the business cycle and informing monetary policy.

Inadequate Data and Statistics

Notwithstanding the hundreds of millions of dollars spent every year and the thousands of economists working for the federal government, the exact nature of the challenges to U.S. capabilities with regard to the competitiveness of America's traded sectors is only weakly understood. To some extent, the intelligence community may have done some of this work; but since most is classified, it does not inform commercial policy and programs.

As George Washington University scholar Andrew Reamer has noted, the opaqueness and limitations of our national statistical system for measuring innovation, sources of productivity growth, and competitiveness make achieving the needed insight daunting.[15] Established after WWII, the system is designed to help facilitate fiscal and monetary policy in order to avoid another Great Depression, and as such, measures things such as the number of houses built and cars manufactured. It does not measure the competitiveness of the electronics industry or auto industry or any other number of important matters (the assumption being that those things take care of themselves).[16] Moreover, other nations and regions such as the EU collect much more detailed data, on firm and industry innovation activities, that can be used to understand key sectors.[17] There are two key problems with federal statistics related to national economic power industry analysis. The first is limited budgets for the federal statistical system. The Bipartisan Policy Center reports that since 2010, the real purchasing power of the 13 principal statistical agencies has declined by 12 percent while real GDP has grown 48 percent.[18] The result has been the elimination or cutbacks of some key statistical programs.

Notwithstanding the hundreds of millions of dollars spent every year and the thousands of economists working for the federal government, the exact nature of the challenges to U.S. capabilities with regard to the competitiveness of America's traded sectors is only weakly understood.

The second problem is that the system is not designed to support a national advanced industry strategy. Data on national power industries is limited. For example, one can get data on auto imports and exports, worker wages, and jobs. But data on differences between U.S. firms and foreign transplants is not available. Detailed data on productivity in factories and the overall enterprises, kinds of capital investment (including robotics, AI and smart factory technology), size of factories, share of profits retained for investment, spending on pollution control, nature of firms' supply chains, exact nature of exports and imports, types of R&D spending, and others are likewise not available, at least from public sources.

On top of that, multiple agencies, including the Bureau of Labor Statistics (BLS), National Highway Traffic Safety Administration, Commerce, Census, and the Environmental Protection Agency (EPA) collect industry data, but it is not organized into one central repository for analysis. For example, asking data.gov for data on the motor vehicles generates 147 separate databases, from local, to state, to national, but virtually none of it is relevant to understanding industry structure and competitiveness position.[19]

Inadequate Assessment of China's National Techno-Economic Power Efforts

It will be much more difficult to develop effective techno-industrial policies responding to the China threat without deep understanding of what China is doing. Unfortunately, for the most part, that understanding it lacking.

Most of the limited assessment of Chinese national economic power dynamic capabilities is done by the private sector (usually behind a pay wall) or think tanks. While much of think tanks' work is strong, it is by nature limited since these organizations, especially nonprofit ones, have limited budgets. And much of the work is focused on "popular" industries such as AI and quantum, ignoring other key industries such as steel, chemicals, consumer electronics, and others.

Inadequate Analytical and Policy Generation Capabilities

Where would a policymaker seeking to find information about how to restore U.S. competitiveness in a particular industry go? The answer is that maybe they can find an office at DOW if the industry has enough defense implications. But by and large the answer is nowhere. There are simply no capabilities in the federal enterprise to do sector-by-sector industry analysis.

On top of that, there is a dearth of individuals, not only in federal agencies but also in the United States overall, who are truly expert in industrial policy. Despite the interest in industrial policy and the misleading claims that "industrial policy is back" few of the individuals writing about industrial policy really understand it. Many approach it as technology innovation, but this is too narrow a lens. Many are area studies specialists, who may know China but do not understand the Chinese techno-economic production system and its implications for the United States. Others are economists who are lacking in deep understanding of business dynamics, strategy, and production systems.[20] Others are ideologues pushing particular social policy agendas through "industrial policy."[21] Still others want industrial policy, but for goals other than not losing to China, such as having more clean energy firms or boosting social services for the "care economy."[22] Still others are political scientists trying to make sense of why and how policy comes about.[23]

The closest to industrial policy experts are business scholars. While there was considerable excellent work done in the 1980s and 1990s on competitiveness policy, including by business scholars such as John Zysman, Laura Tyson, Robert Hayes, Lester Thurow, Michael Piorre, James Womack, Annalee Saxenian, Ira Magaziner, and others, that work did not have to focus on national power industries because our core competitors—particularly Japan and Germany—were allies. And that cadre of academic researchers has, with a few exceptions, not really been replaced today.[24]

Full expertise to really understand and craft effective industrial policy requires a combination of disciplinary knowledge of business administration, economics, technology, regional planning, and techno-economic history. Many of the individuals in this field have one of these backgrounds, but not all of them. To be sure, understanding firms and business finance is important, but that is only one component of an overarching industrial system. Similarly, expertise in one or more technologies is certainly helpful—someone should not be weighing in on semiconductor policy unless they understand at the least the basics of the technology—but again, it's not enough.

An effective strategist needs to understand key firm, industry, and technology dynamics.

What to do? Unfortunately, in part because the United States has never faced this kind of challenge, there is little intellectual work on which to build. As discussed, the closest is the field of business strategy. We need to look at this field, not for cookie-cutter answers, but rather for inspiration and ideas that can be built upon to construct a national power industry strategy framework. Any effective strategist needs to be able to understand the process of public policy formation, public administration, and policy specialties (e.g., trade, tax, workforce, regulation, and more). And an effective strategist needs to understand key firm, industry, and technology dynamics, including these issues:

- Choices of technology leapfrogging

- Overcoming latecomer disadvantages
- Role of market-share building
- Fixed costs and variable costs and impacts on marginal costs
- Economies of scope and scale
- Importance of execution vs. strategy
- Sources of competitive advantage (price, quality, customization, innovation)
- Incremental vs. disruptive innovation
- Organizational culture and resistance to disruptive innovation
- Turnaround strategies vs. sustaining
- Experience curve and learning curve
- Growth-share matrix
- Cost advantage vs. differentiation
- Barriers to entry
- Product life cycle and commodification
- Market growth rates
- Sustaining vs. disruptive innovation
- Industry positioning
- Market scope (local, national, global)
- Kinds of innovation (product, process, business model)
- Kinds of competition (dynamic vs. static)
- Industry externalities
- Network effects
- Agglomeration (localization and urbanization)
- First mover vs. latecomer advantages
- Threat of entry and barriers to entry
- Expected retaliation from incumbent
- Substitutability
- Modularity

In short, it is the almost complete absence of the study of what has been termed "meso-economics" that is the problem. Mesoeconomics sits between micro and macro, focusing on the behavior of industries, sectors, networks, and institutional structures—things too aggregated to be micro but too disaggregated to be macro. Microeconomics (and business administration) focuses on individual firms, consumers, prices, and markets, while macroeconomics focuses on aggregate output, inflation, employment, and monetary/fiscal policy.

Mesoeconomics adds a focus and understanding of 1) industry dynamics including oligopoly behavior, sector evolution, firm strategy; 2) supply chains and inter-firm networks and institutional structures including regulatory regimes, industry associations, public private partnerships; 3) sectoral composition of the economy, including manufacturing vs. services vs. finance and differences in firm size; 4) regional/cluster economics, including an understanding of what regional economists term "localization economies"; 5) the process of technology development and diffusion across industries; 6) the role of governments in shaping industry structure and evolution; 7) international industry dynamics; and 8) the historical evolution of industries.

But there are few if any graduate programs in the United States focused on education future practitioners in mesoeconomics as it applies to industrial strategy. For example, at Harvard, ranked the number 1 economics department in the country, there is no course offered in industrial policy, or anything remotely connected to it.[25] They do offer courses such as "Using Markets to Solve Social Problems," "Finance for Inclusive Growth," and "Market Power in the New Economy." In the Ph.D. program, students can specialize in fields such as contracts and organizations, econometrics, financial economics, and macroeconomics, but not mesoeconomics or industrial strategy.[26]

There are often few analysts who understand the broader theory and practice to inform program design and management.

This touches on a key challenge: the paucity of techno-economic analysts in government. In many federal agencies, there are two kinds of people: political appointees charged with setting the overall direction and dealing with the outside and program managers charged with implementing specific programs, such as grants. But there are often few analysts who understand the broader theory and practice to inform program design and management. MIT Professor Don Schoen calls these individuals "reflective practitioners" who understand both the academic and theoretical underpinnings of the agency's activities and also how iterative learning from practice can inform theory and rubrics.[27] All too often, programs just hand out money ensuring that all the federal rules are met to a "t," but they don't ensure that programs achieve their overall goals because they do not understand all the factors that contribute to success. Too many grant managers, not enough strategists.

This gets to a key point. The lack of a dedicated cadre of staff in government with these analytical capabilities. Industrial policy experts Ian Fletcher and Marc Fasteau wrote that "a dedicated corps of civil servants should exist for day-to-day administration, to maintain institutional memory, and to track ongoing changes in technologies, the strategies of other governments, and the competitive positions of US and foreign companies."[28]

Box 2: What Is an Industrial Strategy for Competitiveness?

The United States has no real industrial strategies. What is often called an industrial strategy is usually an ad hoc collection of policies related to a particular industry or technology or even all the manufacturing and software. For example, notwithstanding the funding of the CHIPS Act and related provisions, and the standing up of the CHIPS Program Office in NIST, there is no national semiconductor strategy.

An industrial strategy is based on deep understanding of a particular industry or sub-industry; how it operates (including its dynamic capabilities), how it has evolved and is evolving, what its strengths and weaknesses are, and what the opportunities and threats are. It then translates that into an assessment of the multitude of various policies at various levels of government that impact the industry and what changes are needed.

An industrial strategy is also more than a description of the industry, its history, or current performance, although these need to be core components of a strategy. Industrial strategy must include specific policies, not just generic ones. For example, the R&D tax credit is a policy that would help all national economic power industries, but it is not the core part of a sector-based industrial strategy. Specific policies are those only or predominantly for the targeted industry. In the auto sector, for instance, this would include regulations on autonomous vehicles, automobile-specific training programs (e.g., Kettering University), fuel economy standards, trade policy on autos, and the like. A biopharma strategy would include policy areas such as NIH funding, Food and Drug Administration (FDA) regulatory approvals, industry-specific factors in trade agreements, and more.

Federal agencies work to advance their own particular missions and are largely unwilling to take into account the impact of their actions on innovation and competitiveness, or to coordinate with other agencies. Medical devices are a good example. The FDA reviews their safety and effectiveness. HHS sets reimbursement schedules. The War Department (DOW) and the Veteran's Administration procure such devices. But there is little to no coordination across agencies to develop a unified strategy to orient government policies to support the competitiveness of the industry, even though it is a high-value-added sector in which the United States still retains competitive advantage—albeit one that is at risk.

Without close dialogue with industry and other experts (e.g., think tanks, consultants, financial analysts), the government will be limited in the sophistication of its analysis.

Inadequate Industry and Other Expert Involvement

Industry councils to advise government on sector-specific industrial policies largely do not exist. In part, this is because the U.S. government does not see its role as doing such analysis—and also because the general view in Washington is that industry is self-seeking and it would be inappropriate to give it a special seat at the table. It can, like other interested stakeholders, advise by responding to various notice of requests for information. But without this kind of close dialogue with industry and other experts (e.g., think tanks, consultants, financial analysts) the government will be limited in the sophistication of its analysis.

FEDERAL DATA, ANALYSIS, AND ORGANIZATION FOR A NATIONAL ECONOMIC POWER INDUSTRY POLICY

We need a whole-of-government approach to economic war-fighting. If we had that as an organizing principle, U.S. foreign aid would be explicitly linked to whether receiving nations are siding with China. Treasury would push to lower the value of the dollar, especially against the renminbi. Tax policy would focus on reducing taxes on traded sectors, especially those in advanced industries, by such steps as significantly increasing the R&D credit and instituting an investment tax credit. Antitrust regulators would abandon the neo-Brandeisian quest to break up big companies. An array of regulatory policy areas, including privacy, artificial intelligence, and biotechnology would be approached through the lens of how regulations support or advance the economic war. Policy would embrace, rather than reject, automation. The State Department would take the lead in organizing a NATO for Trade to coordinate actions against Chinese economic aggression.[29] Financial regulators would work to shrink nonproductive components of the financial sector (e.g., short-term trading and hedge funds). The intelligence and domestic law enforcement communities would be mandated to prioritize commercial intelligence and counterintelligence. Each agency would have to see its budget approved by the Office of Management and Budget in part based on how well they are contributing to U.S. success. And actions such as the Energy Department's transfer of $15 million of R&D-funded battery technology to China would stop.[30]

The question is, should an agency lead this, and if so, what agency? In an in-depth analysis of the success of Asian Tiger industrial policy, International Monetary Fund economists contended that success was dependent on "a network of institutions with a leading agency at its center."[31] This institution needs to focus on "'learning-by-doing' through experimentation, feedback, and action to build specialized knowledge and identify policies is key to the effective functioning of institutions. The Asian Miracles achieved it by devising an institutional 'system' or architecture that, we argue, can be replicated."[32] They went on to argue:

> Even in a world with strong coordination across agencies and low coordination costs, there is a need for a leading agency since it is not practical or efficient to build a stock of specialized or sector-specific knowledge across many agencies required to implement industrial policy. This stock of knowledge, another key feature of the model, has to be built or accumulated in some institution or agency. This agency will need to deal with design strategies and action plans, acquiring sector-specific and cross-sectoral information and data, conducting industry and market analyses, and monitoring and assessing progress. Eventually, it also needs to decide whether to pull the plug or conditionally support various industries, firms, and projects while tackling political economic constraints. These policy actions are costly, knowledge-intensive, and prone to failures, including government failures (e.g., special interests, capture, corruption), and require information and learning.[33]

This is correct. While institutional coordination and distributed learning is important, having a lead agency is critical. The key question is what kind of lead agencies the United States should adopt. There are three possible solutions.

The first is to put these responsibilities in the Commerce Department. At first glance, this would be logical because the issues deal with many different industries. But Commerce historically has been weak in interagency battles, and its inherent capabilities also have weakened over the years. Moreover, as a government department, it suffers from the typical bureaucratic limitations, including limits on hiring and firing and other matters. (To a lesser extent, this also applies to the agencies within Commerce, such as NIST and the Patent and Trademark Office.)

DOW is the one place in U.S. politics where "industrial policy" is seen as acceptable, if not necessary. Even free-market defenders accept many DOW industrial-base programs.

The second possible solution is to expand the purview of DOW beyond its narrow focus on the defense industrial base to encompass national economic power industries more broadly. There would be multiple advantages to this approach. First, DOW has vastly more funding than other agencies, and while it wouldn't be entirely easy to add $25 billion to $50 billion to its budget for these activities, it would be a lighter lift than increasing the Commerce budget by the same amount. Second, DOW, in part through its Office of Industrial Policy and other offices, has a long and deep involvement with industry. Finally, DOW is the one place in U.S. politics where "industrial policy" is seen as acceptable, if not necessary. Even free-market defenders accept many DOW industrial-base programs. So, defining the defense industrial base more broadly would not be a major intellectual change.

In his memo to Pentagon leaders about the establishment of the new Economic Defense Unit (EDU), Deputy Defense Secretary Steve Feinberg correctly wrote:

> Economic Competition is the coordinated and deliberate application of economic tools including capital, procurement, policy, trade, tariffs, regulatory authorities, export controls, and other potential economic activities to expand the United States' economic advantage by deterring, denying, disrupting, and helping to defeat adversaries through economic means.[34]

But the risk is that the EDU will have a relatively narrow business-financing approach that focuses on deals rather than broader industrial strategy.[35] While more patient and generous financing is necessary to avoid losing to China, it is not sufficient. The other risk with the EDU is that its scope will focus on a relatively narrow set of defense and dual-use sectors, and not on a broader set of industries in which China may establish leverage over the United States.

If Congress adopts the approach of broadening the War Department's purview to encompass national economic power industries, it should establish a new position of Undersecretary for Defense, Dual-Use, and Enabling Industries, and move related responsibilities from the Undersecretary of Acquisition and Sustainment (whose core focus should be on weapons systems). This new office would be expanded to focus on a broader range of industries besides just defense-focused ones.

But notwithstanding the significant potential benefits of DOW doing more in this space, there are also some downsides to placing all or most strategy and implementation capabilities in DOW. The first is that nondefense industries still could very well get short shrift, given the intense focus on ensuring war-fighter capacities. Related to this, the community of people involved in national

security are generally quite insular, talking largely to themselves, often in DOW jargon and acronyms, and not really having deep knowledge of the broader industrial and economic ecosystem. Taking all of this into account, **Congress should establish a new Undersecretary for Defense, Dual-Use, and Enabling Industries.** But that office should not be the lead agency for a whole-of-government approach to economic war-fighting. Instead, a new agency is needed for that purpose, and it should exist outside of either DOW or Commerce.

This brings us to the third and best possible solution to the question of how to organize a whole-of-government approach: **Congress should establish a quasi-public National Advanced Industry and Technology Agency (NAITA) organized like the Ex-Im Bank, but with greater flexibility.**[36] Well over 50 nations have already established such bodies.[37] This new agency would lead a number of core tasks, including analyzing U.S. industry strengths, weaknesses, opportunities, and threats and responding with well-resourced solutions, including support for domestic R&D and production partnerships and investment in advanced research facilities. Such an agency should take the lead in crafting and regularly revising a national advanced industry and technology strategy. It should coordinate, along with the White House, an interagency process to help align federal, state, and international (allied nation) policies and programs with the goal of U.S. advanced industry competitiveness. And it should be the one place in government that funds activities explicitly focused on commercial competitiveness. One of many advantages to this structure is that, as a quasi-public agency, it would have an easier time recruiting highly skilled individuals with industry experience.

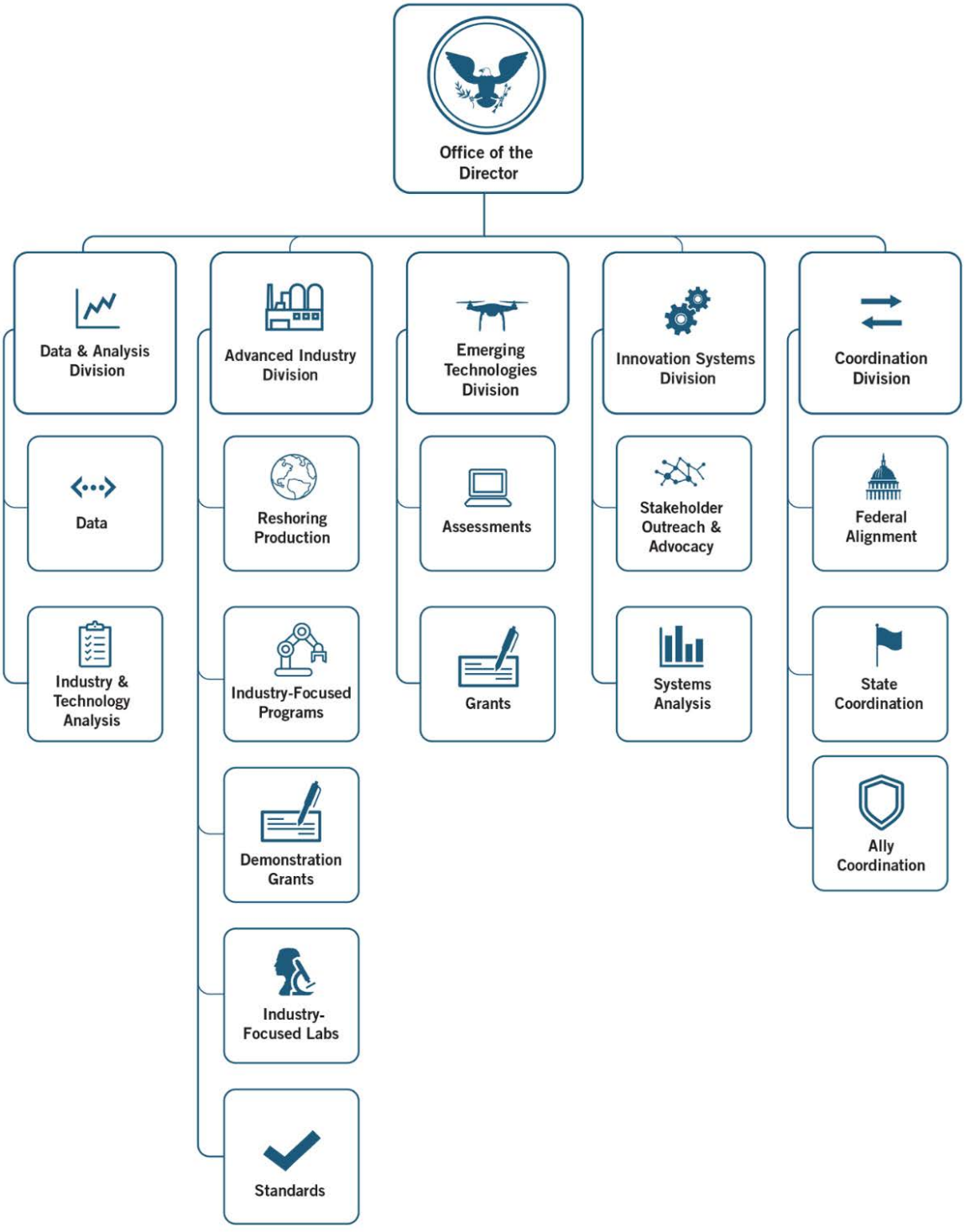
As figure 3 illustrates, the organization would have several divisions. The data and analysis division would work to close data gaps (as previously described). In addition, it would conduct competitiveness analysis of key advanced sectors and technologies, including SWOT analysis. This should involve working with key stakeholders, including other government agencies, industry, and organized labor, to develop strategic roadmaps of how the federal government can promote the competitiveness of key sectors and technologies.

Whatever the organizational form(s), if the United States is to improve policies and programs related to keeping national economic power industries globally competitive, then better data and industrial analysis are needed.

The advanced industry division would operate a variety of programs focused on boosting the overall competitive position of the United States and key industries, including programs such as the CHIPS program office, cooperative industry-led R&D programs, and established government industry-focused research and development labs. The emerging technologies division would put out calls for proposals for grants in particular technology areas. The innovation systems division would develop key competitions in various innovation systems, such as healthcare, construction, manufacturing, working with stakeholders to better understand key policy interventions in order to boost innovation in the entire system. In certain cases, this might entail support of precompetitive applied industrially relevant research. The coordination division would work to increase alignment within the federal government and with states that curate their own technology-based economic programs. It would also take the lead on ensuring that U.S. technology and competitiveness programs, wherever possible, are aligned with our allies.

The challenge with this idea is the political difficulty of creating any new agency, given committee conflicts, the view that such reorganization is difficult, and resistance by some to larger government.[38] In addition, in contrast to placing these capabilities in DOW, adequate Congressional appropriations are likely to be problematic.

Figure 3: Organizational chart for a proposed National Advanced Industry and Technology Agency



Whatever the organizational form(s), if the United States is to improve policies and programs related to keeping national economic power industries globally competitive, then better data and industrial analysis are needed.

Better Data

If the U.S. federal government is going to develop more effective policies to spur traded-sector competitiveness, including in manufacturing, it will need to get much smarter. The very existence of government policies (tax, trade, regulation, spending, etc.) means government inevitably influences innovation—sometimes for good, sometimes for ill, but almost always by happenstance. Government would be much better positioned to effectively support competitiveness, including how to ensure that regulations do only limited harm to U.S. competitiveness, if it were more strategic and knowledgeable. It should be able to understand the U.S. competitive position vis-à-vis other nations on key technologies and industries, as well as key strengths and weaknesses and where specific policies are needed.

One key change is to expand the focus to more international statistics. The federal statistical system was largely designed around collecting statistics on firms that were located in the United States. But as the economy has become increasingly global, we need much more fine-grained international statistics. These include a better input price index; better data on imports and exports in the Annual Survey of Manufacturers, restored BLS data on international labor comparisons; better BEA data collection of U.S. companies with facilities overseas to identify the types of products manufactured abroad and the number of employees at those facilities; better data on U.S. multinationals.[39] On top of that, the major statistical agencies should work to transition NAICS (the North American Industrial Classification System) to the International Standard Industrial Classification System so that U.S. industry data is comparable to most other nations.

Moreover, during the Cold War, there was virtually no risk to U.S. supply chains if the Soviets decided to take aggressive action against the United States. Our supply chain vulnerabilities were near zero. That, however, is completely different with China. Should we get into a conflict with China, or should China seek to exert leverage over the United States, it has vast capabilities in terms of cutting off needed exports. As such, it is now critical—like it has never been in the history of the Republic—that the federal government has deep, comprehensive insight into the state of U.S. supply chains, especially vulnerabilities vis-à-vis China.

Finally, federal agencies need much better data on Chinese policy and Chinese firms. A number of private sector firms provide deep analysis on this, including Datenna and WireScreen.[40] Relevant federal agencies should fully avail themselves of these and related sources.

Industry Analysis

It's not enough for the federal government to just collect better data; it needs to analyze it and add value to it. Unfortunately, the federal statistical agencies, with perhaps the exception of the Center for Economic Statistics at the Census Bureau and BLS, do little to interpret their own data. The result is that much of it goes unused. One problem is no federal agency has been tasked with performing competitiveness analysis. This explains the widespread calls for the Biden administration to step up its analytical capabilities when it came to trade and industrial competitiveness, to at least close the gap between the country's economically oriented analytical

capabilities and its national security-oriented analytical capabilities.[41] Indeed, the closest America has to that now is in DOW's Office of Industrial Policy, but its focus, as expected, is defense oriented.

The federal government needs an economy-wide equivalent of DOW's "net assessment" structure and process, which is a "framework for strategic analysis" involving quantitative and qualitative information, to assesses current and future military power of the United States and its adversaries.[42] The United States needs the same in-depth practice to assess the commercial power and capabilities of itself and its adversaries. As such, a core task for the new NAITA proposed earlier should be to conduct competitiveness analysis of key advanced sectors and technologies, including SWOT (strengths, weaknesses, and opportunities) analysis.

The federal government needs an economy-wide equivalent of DOW's "net assessment" structure and process, which is a "a framework for strategic analysis" involving quantitative and qualitative information, to assesses current and future military power of the United States and its adversaries.

In addition, this should involve working with key stakeholders, including other government agencies, industry, and organized labor, to develop strategic roadmaps of how the federal government can promote the competitiveness of key sectors and technologies. It should incorporate a number of different industry analysis rubrics, such as Pisano and Shih's "Modularity-Maturity Matrix," classifying industries by modularity and maturity, the Porter competitiveness diamond, as well as others, such as type of production (process vs. product, customized vs. mass, etc.).[43]

As noted in box 2, federal agencies work to advance their own particular missions and are largely unwilling to take into account the impact of their actions on innovation competitiveness or to coordinate with other agencies. Accordingly, NAITA should develop strategic roadmaps to guide interdepartmental efforts to ensure that the regulatory policies and activities of disparate government agencies are, wherever possible, aligned to promote the global competitiveness of strategic sectors of the U.S. economy. NAITA's Data and Analysis Division, shown in figure 3, also should assess the nature of U.S. supply chains, particularly in advanced technology industries. The unit should also be charged with identifying and tracking foreign industrial policies, both to provide learning for the United States and to understand better what our competitors, particularly China, are doing. Finally, because there is a need to coordinate advanced industry and technology strategies and programs with allies, NAITA's Coordination Division, also shown in figure 3, should work with close allies on industry and firm data alignment, coordination, and analysis.

Finally, there is a serious human capital gap. Few U.S. universities, including those with economic and public policy programs, provide a grounding in the kinds of skills needed to conduct in-depth industry analysis. (See box 3.) Moreover, while there are a few bastions of related analysis, such as the Industry Studies Association and the Industrial Policy Group, many more are needed.[44]

Box 3: The Case for Federal Support for Industrial Policy Graduate Programs

Most civil servants and political appointees in the defense, intelligence, and foreign policy establishments possess deep expertise in their respective fields, often gained through education at top universities specializing in these areas and reinforced by continued training throughout their careers. But when it comes to individuals tasked with crafting U.S. policies for strategic industries and economic competitiveness, their university-level training is, at best, incidental.

There is no established curriculum or professional pipeline to support industrial policy. The so-called "economic competitiveness" establishment—to the extent there even is such a thing—has no academic foundation to build upon.

No U.S. universities teach economic warfighting or strategic industry policy. In fact, most economics departments, steeped in neo-classical theory, teach that it's not only unnecessary to fight economic battles but actually harmful.

As such, the United States needs to catch up. NSF's Technology, Innovation, and Partnerships (TIP) Directorate should fund at least one university to establish a graduate program and related career-training tracks focused on economic warfighting and industrial strategy.

This is not the same as studying foreign affairs, macroeconomics, or military policy. It requires a unique, interdisciplinary skill set to analyze the issues and articulate sound policies—skills that American graduate programs, by and large, do not offer to teach.

Students should learn:

- how to assess the global competitive position of industries using available data and analytical tools;
- theories and models of national innovation systems;
- sore technologies and their development pathways, including key branches of engineering and science;
- the history of U.S. industrial policy and technology development;
- the operation of local economies;
- the nature of barriers to entry and reentry; and
- how policy affects industry performance, productivity, innovation, and competitiveness across the micro (firm), meso (sector and technology), and macro (economy-wide) levels

While some students may be able to piece together parts of this knowledge across departments, perhaps through electives or joint degrees, major gaps still likely remain. No existing program brings it all together in a focused, cohesive way.

Students certainly wouldn't become competent in industrial policy through an economics department that focuses on market equilibrium and not on industrial strategy. Business administration programs inch closer, as they teach real-world firm behavior. However, business schools largely ignore the role of government and national economic priorities, overlooking the nexus between policy, firms, and industries. Certain urban planning, regional planning, and public policy programs offer the best alignment, especially those integrated with engineering schools. Still, even these tend to emphasize science and technology policy over industrial competitiveness.

Beyond graduate students, there is also a pressing need to train federal employees. Few practitioners of industrial policy in government have received any formal training in the discipline. The Eisenhower School at the National Defense University offers some relevant coursework, but its focus naturally skews toward defense. Broader, civilian-focused programs are needed to equip federal employees with the skills, tools, and knowledge to design and implement advanced industry strategies effectively.

If the United States is serious about winning the ongoing techno-economic war with China, it must invest in building the intellectual and institutional infrastructure to do so. That starts with training the people who will carry out the work.

Few U.S. universities, including those with economic and public policy programs, provide a grounding in the kinds of skills needed to conduct in-depth industry analysis.

Congress and the White House

New organizational structures are needed in Congress and the White House to effectively craft and implement a national economic power industry strategy.

Congress

The House took a major step forward with the establishment of the Select Committee on Strategic Competition between the United States and the CCP. The Senate should do the same. In addition, **Congress should establish a Joint Economic Competitiveness Committee** (separate from, but akin to, the Joint Economic Committee) to bring coherence to its own disparate efforts, which are dispersed in a wide range of committees and subcommittees with little coordination or thought to how they collectively advance the economic war effort.

The White House

There is no entity in the White House whose responsibility it is to defend the United States from techno-economic attacks from China. CEA is the home for conventional economists, focused largely on macroeconomic policy. NSC, while having had some focus on these issues, sees China through the lens of national security, intelligence, and foreign policy. And the National Economic Policy team focuses largely on broad domestic economic policy issues, often related to social policy, business regulation, infrastructure, college debt, inflation, and small business.

As such, **Congress should establish a National Economic Security Council (NESC) whose job would be to manage economic competition with adversaries, especially China.**[45] This is similar to the idea for a Technology Competitiveness Council proposed by the National Security Commission on Artificial Intelligence. The NESC's role would be to establish and coordinate the implementation of an all-of-government strategy for how the United States can avoid losing to China. It would oversee analysis of U.S. advanced-industry capabilities, especially vis-à-vis China. It would assess Chinese policies designed to erode U.S. advanced-industry leadership. It would identify key sectors needed for U.S. leadership and organize a whole-of-government approach to advance that on the sectoral level (e.g., semiconductors, biopharmaceuticals, aerospace, autonomous systems, AI, etc.). The NESC should be staffed not by economists who focus principally on price-mediated markets, but rather by "productionists": analysts who have a deep understanding of firm, industry, and technology dynamics.

The NESC should lead the formation of an all-of-government China strategy wherein each major agency develops an approach to deal with China. U.S. Border and Customs should have a robust strategy for interdicting and destroying all illegal Chinese imports. The Department of Justice (DOJ) and Federal Trade Commission (FTC) should develop a joint strategy for responding to China's weaponized antitrust regime. NSF should focus on how to support knowledge generation that limits Chinese access while advancing U.S. industrial innovation. The Ex-Im Bank, the Development Finance Corporation, and other federal export agencies should be required to form joint aligned strategies, along with state governments that operate similar programs.

Agencies and departments will need to be pressured to prioritize winning the techno-economic war with China, just as containing and ultimately winning against the Soviets was a top priority for many federal agencies in the first Cold War. This will mean intervening in deep agency cultures to press them to reconsider long-held views. In antitrust, for example, it will mean agency regulators putting competitiveness first and foremost, not competition per se. For the Small Business Administration, it would mean not just supporting any and all small businesses, but also prioritizing the ones that are most likely to grow and could do the most to help compete with China. For EPA and other regulators, it would mean putting industry competitiveness impacts front and center with their traditional missions to better balance the two when they are in tension. For the State Department, it would mean putting American economic interests first and being more willing to challenge China and other foreign governments whose policies hurt U.S. advanced-industry competitiveness. For the Securities and Exchange Commission, it would be more and stronger efforts to limit Chinese access to U.S. financial markets.

Agencies and departments will need to be pressured to prioritize winning the techno-economic war with China, just as containing and ultimately winning against the Soviets was a top priority for many federal agencies in the first Cold War.

Congress should also statutorily reconstitute CEA as the Council of Economic and Enterprise Advisors. CEA was established in 1946 to provide economic advice to the president and has almost exclusively been staffed by economists focused on studying price-mediated markets and limiting business cycle fluctuations; not on productivity, innovation, and competitiveness. As these three issues have become central to U.S. economic policy, it is no longer appropriate to have U.S. economic policy guided only by economists from the market-efficiency school. We need scholars in government who understand how enterprises grow, evolve, and innovate and less on how markets respond to price signals. This means CEA members who understand enterprises and innovation.[46]

Congress should also establish a new undersecretary position at the State Department to assume responsibility for monitoring U.S.-China relations and PRC actions around the world. In the 1980s, Soviet expert Richard Pipes proposed a similar position, but to monitor the Soviet Union.[47] He wrote that: "only in such a manner will the government feel the pulse of Soviet global activities and the Secretary of State be in a position to advise the President on an intelligent response to them."[48] He argued for this because the organization of State into regional desks "ensures that the whole picture of Soviet global policy is broken down into disjointed fragments which the regional desks cannot properly interpret because they are not away of the broader context into which they fit."[49] That is even more true today. He went on to note that, "For this to happen, of

course, the Secretary of State must first persuade himself that unlike the United States, the Soviet Union has a Grand Strategy that is not only pragmatic but also ideological, and not only regional but also global in scope."[50] The same can be said today with respect to China.

CONCLUSION

Notwithstanding the increased interest in Chinese techno-economic competition, not losing this war is far from agreed upon as a national priority. We haven't even come close to agreeing that China is a serious challenger. If we had consensus on these issues, there would be vastly more action being taken by Congress and the administration. But as things stand, the federal government is not organized in a way to successfully prosecute this war.

When it became clear in the late 1940s that the threat from the Soviet Union was real and existential, a consensus emerged that the United States needed national security and intelligence capabilities to not lose to the Soviets. And Congress and the White House cooperated to institutionalize those capabilities. Without that, the outcome of the conflict could have been very different. To be sure, there was initial uncertainty about what to do, and no consensus even about the need to do it. But both were eventually resolved, and the national security state developed as a result.

It is no longer appropriate to have U.S. economic policy guided only by economists from the market-efficiency school. We need scholars in government who understand how enterprises grow, evolve, and innovate and less on how markets respond to price signals.

Today, there is a very real threat from the CCP, at least a threat for global dominance in advanced technology industries and who will be the global hegemon from an international relations perspective. As this series has argued, developing a bipartisan consensus of the nature of the threat will be much harder than it was in the late 1940s, in part because so many China scholars see China as a normal country, not a core Marxist-Leninist adversary.[51]

However, if a consensus on the nature of the threat and the need for action grows, a key step will be to put in place the institutional capacities in government to effectively assess the threat and responses, and to craft and implement a coherent U.S. national economic power industry strategy that is something more than the sum of the parts of various and sundry policies and programs. In other words, we need a national advanced-industry competitiveness state to complement the national security state. This report lays out a roadmap to establish the necessary capacities.

Mobilizing for Techno-Economic War, Part 9: Finding the Political Will to Transform America's Economic System

ROBERT D. ATKINSON

The most important techno-economic policy issue America faces is how its economic system should operate and be governed. The answer is neither market capitalism nor societal capitalism nor socialism. Only national economic power capitalism can provide the framework necessary to avoid losing the techno-economic war to China.

KEY TAKEAWAYS

- All nations hold an overarching optimal conceptual system of how their economies should function and how their governments should act. These conceptual systems evolve as technology, business, and market circumstances warrant.
- After the Great Depression, America's economic system was characterized by managerial capitalism and the welfare state. By the late 1970s, global competition and "stagflation" had led policymakers to embrace financial capitalism and neoliberalism.
- By the 2010s, recession following a financial crisis had led to the embrace of societal capitalism for most—and for the progressive Left, democratic socialism.
- Today, neither financial capitalism, nor societal capitalism, nor socialism provides the policy framework necessary to prevent America from devolving into a techno-economic vassal state of the People's Republic of China.
- The only viable path forward is for a larger share of elites (academics, journalists, think tanks, business leaders, and elected officials) to embrace a new economic system that explicitly supports businesses in national power industries.
- The odds of socialists adjusting are nil. Therefore, a core who now champion free-market or societal capitalism will have to adapt their views to support at least significant components of national economic power capitalism.

INTRODUCTION

The United States has been the world's dominant techno-economic power for more than 125 years. That dominance has induced complacency as well as divisiveness. In contrast, the People's Republic of China (PRC) is hungry and determined not only to displace American techno-economic leadership, but also to make America and the West vassal states as the Chinese Communist Party (CCP) calls the shots.[1]

On its current trajectory, it is likely that the PRC in the next decade or two will amass significantly greater techno-economic capabilities than the United States or even the West will in national economic power industries—advanced traded-sector industries critical to national security and sovereignty. With those greater capabilities will come geostrategic hegemony over the West unless the United States forestalls that outcome by adopting a new, transformative national power industry strategy that goes beyond a simple competitiveness or national innovation strategy. This is not a war that the United States and allies can win by focusing only on slowing the growth of the PRC's national power industries. The harsh reality is that the only way the PRC's zero-sum assault on the West's techno-economic leadership position will end is if the CCP goes away and China becomes a free, democratic country—something that shows no evidence of happening. But by adopting a national economic power industry framework, the United States can keep its national power industries relatively strong, thereby avoiding defeat.

However, it will be extremely difficult to find the policy consensus and political will to put in place a national economic power industry framework unless there is a significant change in the prevailing views of what the optimal U.S. economic system should be. There is no iron law that says that the organization of a nation's economic system must be permanently set in stone. Economic systems change as technology, businesses, and markets evolve. And they change as political power and views change.

By adopting a national economic power industry framework, the United States can keep its national power industries relatively strong, thereby avoiding defeat.

Sometimes the break from one economic system to the next is decisive, as when Lenin, Stalin, and Mao overthrew the capitalist systems in Russia and China, respectively, through civil war and purges—executing capitalists, kulaks, and even "rightist" communists.

But mostly these changes were evolutionary, with specific demarcation points. The rise of the New Deal reflected the rise of managerial capitalism over its prior entrepreneurial capitalism. The "stagflation" of the 1970s coupled with the election of Ronald Reagan signaled the next major transition to financial capitalism. The 2008 recession and financial crisis highlighted the flaws of financial capitalism and ushered in a new era of societal capitalism.

It's not that hard-core believers in the prior doctrine now embrace the new doctrine. Few do. The American Liberty League tried in vain to resist the emergence of the managerial capitalism and its associated New Deal governance system. Keynesians and organized labor tried in vain to resist the emergence of financial capitalism and neoliberalism. And in the last decade, free-market advocates and even pro-business Democrats have fought a losing battle against societal capitalism, while it appears that mainstream Democrats are somewhat resistant to the rise of democratic socialism.

It isn't that the opposition to a new economic system just moves on from the old one. Rather, opponents have less influence and less control as they now represent minority positions. Against that backdrop, change occurs because many individuals who formerly were weakly aligned with a flawed system became open to a new view, and because other opportunity seekers pivot with the wind of opinion to embrace a new emerging doctrine. When this happens, what was once a minority view advanced by a few out-of-the box thinkers can become dominant and widely accepted.

In each case, the prior era's limitations and failures, coupled with group-think resistance to making needed incremental changes within the current system, led to conditions that spurred a majority to reject the governing doctrine. If entrepreneurial capitalism had allowed macroeconomic management and had taken workers' and other social concerns seriously, perhaps the New Deal would have been more of an evolution than a "revolution." Likewise, had managerialism capitalism been more enterprise- and entrepreneurially friendly, the supply-side reaction of the 1980s might have been less extreme. More recently, if neoliberal financial capitalism hadn't gone to such extremes—such as cutting taxes excessively on the wealthy, deregulating finance, and limiting needed social reforms—then perhaps it wouldn't have been rejected so vociferously and transformed into societal capitalism for most in the Center and into socialism for most on the Left.

And perhaps if societal capitalism took the China competitiveness challenge seriously, instead of placing all its focus on social equity, climate change, and utopian globalization, perhaps a dramatic shift to national economic power capitalism would not be needed.

But the reality of human nature—including, or even perhaps especially, among experts—is that people become myopically committed to particular ways of seeing the world that preclude fully rational and objective analysis. That will not change, even among people whose job it is to be objective. As such, it may be that only a deeper loss of U.S. industrial capability to China, overt PRC territorial aggression, or both will provide a sufficient catalyst for societal capitalism to become questioned and for policymaking elites to embrace national economic power capitalism.

This report discusses prior systems and why elites must now do exactly that.

THE EVOLUTION OF THE AMERICAN ECONOMIC SYSTEM

Despite what many free-market advocates claim, capitalism is not the same in all places or at all times. Different countries have different varieties. And those varieties evolve over time, as they have in the United States.[2]

Indeed, U.S. capitalism did not always operate the way it does now. As eminent business historian Alfred Chandler noted, capitalism and its governing system have gone through several major stages—and to avoid losing to China, it must go through another.[3]

Market Capitalism: 1788 to the Civil War

At the risk of oversimplification, from the time of the Revolutionary War to the Civil War, market capitalism dominated. For the most part, enterprises were small and local in nature, and they were owned and managed by individuals. Banking was one of the few sectors with publicly traded companies, with shipping and railroads later joining this list. Most companies were self-financed, or "angel financed," with expansion coming from retained earnings. Most people were small

holding farmers, and "Wall Street" played only a limited role in the economy; the largest agency in the U.S. government was the Postal Service.

Entrepreneurial Capitalism: The Civil War to 1933

After the Civil War, as technology enabled the rise of large corporations that required substantial amounts of capital and national markets, companies became much bigger and relied more on equity markets. Even so, these companies were mostly still managed by their founders/owners and small management groups. Think of companies such as Carnegie Steel, Standard Oil (John D. Rockefeller), McCormick Harvester, American Tobacco Company (J. B. Duke), Singer Sewing Machine, New York Central railroad (Cornelius Vanderbilt), and later Kodak (George Eastman), Firestone Tire, Ford Motor, General Electric (Thomas Edison and Owen D. Young), and IBM (Thomas Watson, Sr.). The role of government was still quite limited; as Coolidge said, "the business of the American people is business."[4] To be sure, some reforms spurred on by the muckrakers and other progressives put some government guardrails on, but by and large, government's role remained quite limited. Case in point, during the Hoover administration White House core staff was around five people.

Capitalism and its governing system have gone through several major stages—and to avoid losing to China, it must go through another.

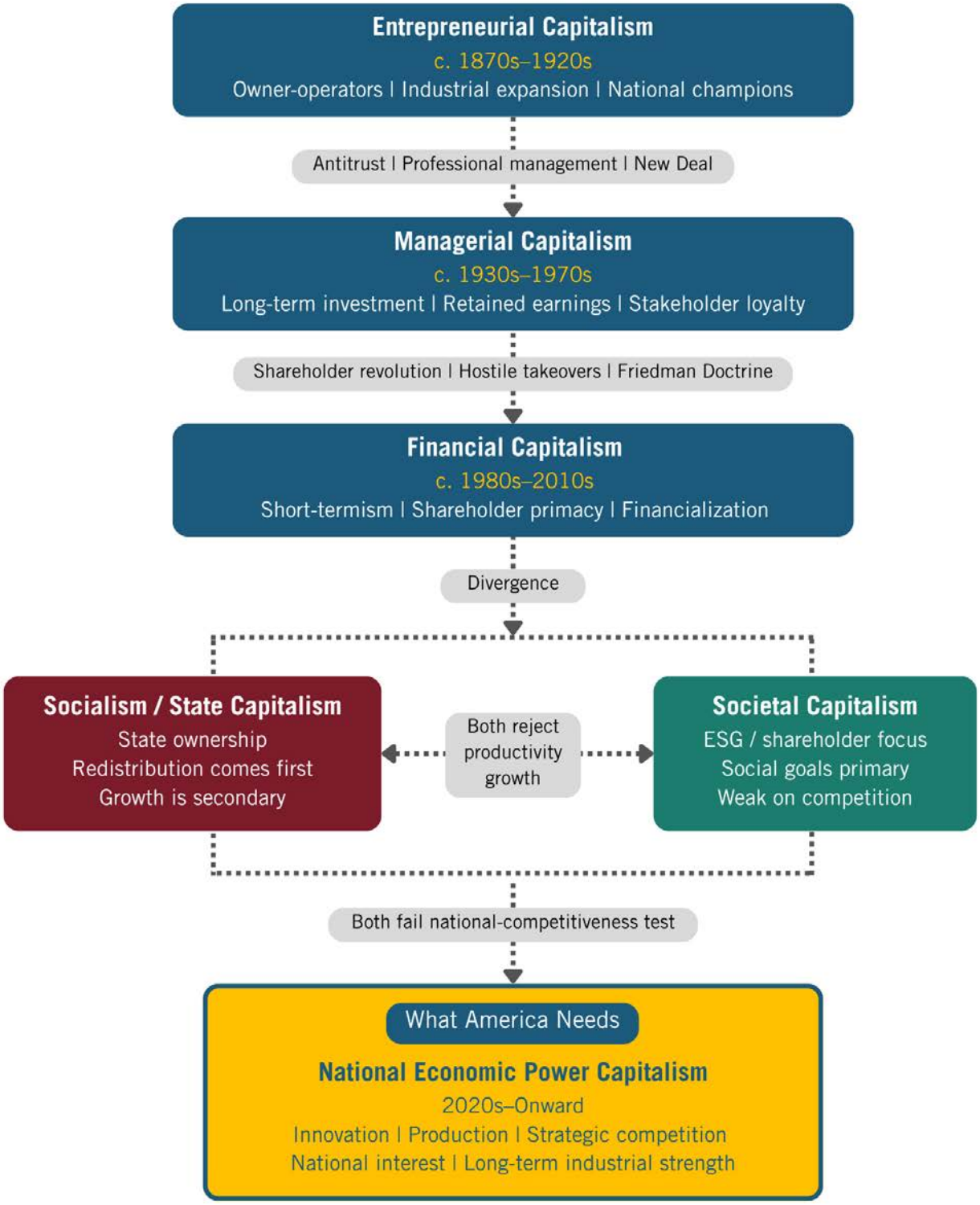
Managerial Capitalism: 1933 to the Late 1970s

As companies got even larger and bigness spread to sectors beyond just core industrials after the 1920s, managerial capitalism, wherein ownership was separate from management, gradually replaced entrepreneurial capitalism. Most founder-managed companies realized that they needed to employ professional managers to run them, especially as founders retired.

Corporations became attuned to more than just expanding and making profits for reinvestment, as managers began to consider social factors in their decision-making. Indeed, in the 1920s, before FDR's New Deal, many corporate leaders were worried about growing labor radicalism. As a result, they cooperated to establish a movement of "welfare capitalism" wherein they agreed to boost wages and provide retirement benefits, paid vacations, employee stock ownership, and other benefits—something that today's shareholders would punish. But this was too little, too late. And the emergence of the Great Depression led to the new consensus to want government to play a stronger role in the management of the economy.

As such, government's role in the economy grew sharply, instigated by FDR's New Deal. Government took on new, more expansive economic roles, not just actively managing the business cycle, but also regulating a host of industries (including transportation, energy, finance, and utilities), subsidizing agriculture, supporting organized labor, subsidizing housing, and providing state welfare (e.g., Social Security). Taxes on top earners were high while antitrust enforcement was aggressive. And in the later phase, environmental regulations were embraced. Many of these changes were needed. But some were problematic, and the entire system came under stress with the new phase of global competition emerging in the 1970s, coupled with stagflation.

Figure 1: The evolution of U.S. capitalism



Financial Capitalism: Late 1970s to the 2010s

At least until the mid-1970s, capitalism was able to better balance multiple goals, including profits and also capital investment and worker and community welfare. Until the late 1970s, a general view among corporate managers was that their mission was not just to increase stock prices, but also to serve other constituencies, including the workers, the communities in which their companies were located, and the nation as a whole. And before the 1980s, most U.S. corporations made investment decisions based on expectations of long-term returns.

But by the mid-1970s, that system had come under sharp attack. Intellectually, the attack may have started with free-market economist Milton Friedman and his highly influential essay, "A Friedman doctrine—The Social Responsibility of Business Is to Increase Its Profits," published by *The New York Times* in 1970. In it, he wrote, "There is one and only one social responsibility of business—to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud."[5]

This soon became an appealing anthem to corporate leaders besieged by radicals, powerful unions, and liberals pressing for vastly more regulation and limits on corporations. Now they could justify ignoring and pushing back against this anticorporate movement on more than self-interested grounds. Boosting profits was indeed in the public interest.

Adding fuel to the neoliberal fire, economic stagnation and increased foreign competition in the 1970s made the previous, broader view of corporate social responsibility seem impractical to many. Cost cutting, even if it did not raise productivity, was now a duty. Pleasing shareholders, an imperative.

But this was also enabled by a host of regulatory changes. Any regulations standing in the way of firms not efficiently maximizing share price were dismantled one by one.

With the rise of the new free market and global capitalism, industry after industry, including finance, was deregulated. Organized labor was weakened. Globalization was embraced. Taxes, especially on higher earners, were cut and some industry-specific incentives were reduced in favor of across-the-board business tax cuts. Antitrust enforcement was weakened. Societal supports were weakened, at least in some areas. (President Clinton promised to end welfare as we know it.) Again, while some of these changes were needed and salutary, such as deregulating transportation, others were more problematic (e.g., tax cuts on the wealthy) and still others (e.g., aversion to industrial policy) became problematic as the economy faced even stiffer international competition.

Societal Capitalism: 2009 to the Present

Inherent contradictions and challenges in financial capitalism led to increasing attacks and a broad-based loss of faith in it, including from the Center. The 2008 recession—a collapse that would have been easily preventable with managerial capitalism-era regulation—was the key event that turned the tide. On top of that, years of offshoring not backed up by a robust national industrial policy reduced society's faith that "what's good for GM is good for the nation" and allowed a growing anticorporate animus to develop. Other factors that made many question financial capitalism—and capitalism itself—included the increase in income inequality (though less than what was portrayed); the purported slower growth of wages compared with productivity

(a claim that was vastly overblown, but now widely held as the truth); and the erosion of the social contract for workers made obsolete in part by globalization.[6] Also on the list of failures ascribed to financial capitalism was the increase in carbon dioxide emissions, even though it was caused by industrialization, not by capitalism.

The widespread attack on financial capitalism came not just from the progressive Left but also from moderates. Indeed, in 2014, the World Economic Forum (the bastion of societal capitalism) published an article titled "We Need a New Kind of Capitalism." The article's frame is now the standard critique:

> Capitalism has guided the world economy to unprecedented prosperity. Yet it has also proved dysfunctional in important ways. It often encourages short-sightedness, contributes to wide disparities between the rich and poor, and tolerates the reckless treatment of environmental capital.[7]

In other words, the new societal capitalism warns not to go all the way to socialism. In fact, it holds that financial capitalism is still the best way to spur growth. It's just that it fails to address externalities, particularly social justice and climate. Underlying this is a palpable worry that unless societal capitalism replaces financial capitalism, socialism or Trumpian nationalism will replace it, and both are abhorrent. So, jump on the reformist societal capitalist bandwagon and hopefully the masses will be assuaged.

Inherent contradictions and challenges in financial capitalism led to increasing attacks and a broad-based loss of faith in it, including from the Center. The 2008 recession—a collapse that would have been easily preventable with managerial capitalism-era regulation—was the key event that turned the tide.

Five years later, Klaus Schwab, the pope of societal capitalism, published "The Davos Manifesto" for a better kind of capitalism, in which he stated that "companies should pay their fair share of taxes, show zero tolerance for corruption, uphold human rights throughout their global supply chains, and advocate for a competitive level playing field—particularly in the 'platform economy.'"[8]

Incredibly, he credited the teenage Swedish activist Greta Thunberg as his inspiration. This kind of vacuous thinking has been latched onto because it appears to be an inoculation against socialism. As one article notes, this is needed to undercut "the Bernie Sanders brigade [that] will foresee the coming of an angry, blood-in-the-streets economic revolution."[9] Rather than "let them eat cake," the new view is "let them eat a higher minimum wage and some corporate social responsibility." The reality is that the relentless attacks on financial capitalism did not inoculate societal capitalists against the Bernie brigade (and the Trump brigade); it only spurred them on by validating their populist critiques.

In this new societal capitalism system, Milton Friedman's views are (thankfully) overthrown. But now companies must embrace double or triple bottom lines, and usually racially based social justice and climate policy. As the Davos manifesto advocates, we need a new measure of "shared and sustained value creation," which should include "environmental, social and good governance" (ESG) goals as a complement to standard financial metrics.[10] And companies

should pay their executives less. In other words, companies should still make money, but now through some means, usually voluntarily, they should include other stakeholders, such as workers, communities, suppliers, customers, and the environment. Yet, because they are hard-core globalists (who believe in one unified world where we all work together), they refuse to consider the nation state as a key stakeholder. No, the manifesto says, global companies should be responsible in their overseas operations, and the nation state is seen as withering away to be replaced by global institutions and global cooperative capital elites meeting to sort things out at Davos.

A more liberal version was pushed by many foundations that went right up to the edge of embracing socialism. Under the guise of identifying alternatives to neoliberalism, foundations such as Hewlett and Ford funded a massive number of organizations to critique neoliberalism. As Hewlett announced:

> Proposals being investigated included the end of unchecked free trade; renewed interest in industrial policy and antitrust; "pre-distribution" rather than redistribution efforts; and solutions to climate change that go beyond what markets can do. But these ideas and their proponents have yet to cohere into a holistic intellectual framework and movement in the way neoliberalism did a half century ago. So, in addition to funding the generation of creative new ideas, the Hewlett Foundation will work to tie these ideas together into a coherent intellectual framework and movement to supersede neoliberalism, one better capable of addressing society's most pressing problems, from economic and racial inequality, to climate change.[11]

Rather than develop an alternative to neoliberal, financial capitalism to foster stronger growth and competitiveness, the left-leaning societal capitalists wanted to pursue a new goal: achieving economic and racial equity and curbing climate change. Their reference to industrial policy only meant supporting industries that helped advance these two goals, such as the solar panel installer and day care industries.

Rather than develop an alternative to neoliberal, financial capitalism to foster stronger growth and competitiveness, the left-leaning societal capitalists wanted to pursue a new goal: achieving economic and racial equity and curbing climate change.

Many leading societal capitalists on the Left, like Tim Wu, Lina Khan, and Senator Elizabeth Warren (at least while she was in the Biden administration), have denied being socialists but embrace the same goals as socialists, just without the heavy level of government ownership. And like socialists, their rhetoric is binary: the people vs. the powerful; the capitalists vs. the rest.

We see the victory of societal capitalism in a recent series in *The International Economy,* which asked numerous experts the question "Does American capitalism need to be reimagined?"[12] With the exception of a few hard-core, free-market financial capitalists, they all agree that reimagination is in order, and that should be societal capitalism. Ben Harris, director of economic studies at Brookings, spoke for them when he wrote, "The most valid critique of capitalism is not that it fails to raise living standards or stunts economic growth—that debate has largely been settled—but that it fosters persistent income and wealth inequality."[13] That in a

nutshell is the new received wisdom that one must accept if one wants to be taken seriously in elite Washington circles. Capitalism works, but let's make sure the masses get a bit more.

Of course, this is vastly oversimplistic. Yes, any serious-minded person who isn't a socialist understands that capitalism is better than socialism at producing prosperity. But that's a low bar. The real question is what kind of capitalism is best. Clearly, financial capitalism and societal capitalism both produced less growth than managerial capitalism did—and less than what national economic power capitalism likely would generate in the future.

As such, alternative solutions are mostly vacuous, such as to "leave capitalism alone and help the 'losers.'" Ben Harris wanted to "make more households owners of more capital," get rid of occupational licensing (a perennial favorite), and subsidize childcare, housing, and medical services.[14] (Socialists don't want subsidies, they want government ownership.)

Mohamed A. El-Erian, a professor at the Wharton School of business, echoes this view. Capitalism is the best, he has said, but it has "not translated into broad based bottom-up prosperity and stability."[15] And that is leading to all sorts of awful things, like the questioning of free trade and the emergence of industrial policy.

David Malpass, former president of the World Bank, agrees, arguing that we need to supplement financial capitalism with measures to reduce income inequality and affordability for consumers.[16] He even perversely defends a strong dollar because it increases affordability for consumers, even though it hollows out American industry and global power.

Desmond Lachman, senior fellow at the American Enterprise Institute, which used to be a defender of financial capitalism, joins in.[17] Capitalism is still best, but we need to expand the earned income tax credit, eliminate tax loopholes, institute vigorous antitrust enforcement (the new left-center-right groupthink), increase access to housing and health care, and the perennial more spending on early childhood education. If we just taught math to 3-year-olds, the billionaires would not have so much money.

And of course, under societal capitalism, workers must be protected at all costs. Union demands for wage levels that will price companies out of international competition are a progressive good. As are union demands to limit new technology adoption. Indeed, blue-collarism is the new cool. But job loss from technology? No, that's another story. If we are to avoid populist rebellion, they now argue, AI and robots should be limited so that few if any workers lose their jobs. They ignore or do not understand that this will mean productivity and wage stagnation. Instead, they argue for just helping workers through redistribution, paid for by increasing the national debt.

In sum, societal capitalism still embraces the core tenets of financial capitalism that investors decide what to invest in and how, but that big companies should now try to act more "responsibly" and government should be more aggressive on antitrust, more generous on social spending, aggressive in favoring ethnic minorities, active in limiting creative destruction, and of course, putting climate change first.

Socialism: Vying for Dominance

The problems with financial capitalism, and the attacks on it by societal capitalists, have provided a new opening for socialism. Long in the minority, progressives took advantage of the various challenges financial capitalism exacerbated, including climate change and racial

tensions, to press their attack on capitalism itself, notably with the "Occupy Wall Street" movement.

Indeed, the challenges from financial capitalism have led many Americans to reject it and turn all the way to socialism. An incredible 39 percent of Americans now have a favorable view of socialism, while only 54 percent have a favorable view of capitalism.[18] And one poll finds that 66 percent of Democrats have a favorable view of socialism, compared with just 42 percent having a favorable view of capitalism.[19]

This orientation is seen in politics, not only with the increased popularity of Bernie Sanders and the House Progressive Caucus, but also with the election of socialist mayors of cities such as New York, Washington, DC, and Seattle, socialist executives of counties such as Maryland's Montgomery County, and other elected officials who are so far left that they are for all intents and purposes socialists (such as Los Angeles Mayor Karen Bass). Meanwhile, hundreds of progressive and even socialist advocacy groups, journals (e.g., *Jacobin*, *Dissent*), and of course political parties (e.g., Democratic Socialists of America, Working Families Party, Green Party of the United States, and Socialist Party USA) all have grown.[20] Even former New Deal liberals such as John Judis now proudly proclaim their commitment to democratic socialism.[21] While most socialists don't fly the banners of Che Guevara and Lenin, at least in public, they are nonetheless supporters of widespread government ownership of the means of production. Or, where that is not possible, they support breaking up or aggressively taxing or regulating big corporations.

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Democratic socialism rejects large-business capitalism. It supports small businesses, which they see as in the same league as the oppressed proletariat. Both are oppressed by monopoly capital. It seeks more government ownership of industries such as grocery stores, housing, transportation, utilities, information services, health care and drug distribution, childcare, drug development, and now AI companies.[22] It wants free everything, including free college, a much higher minimum wage, significantly expanded organized labor, mandatory transition to renewable energy, and, of course, a wide variety of racial justice and equity initiatives.[23] And democratic socialists hate technology, which they see as destroying the environment, enriching the elite, and oppressing the masses.[24]

Like left-wing societal capitalists, socialists see the core conflict as being between the capitalists and the rest of America. One recent article in the socialist magazine *Current Affairs* was titled "You Can't Love America Without Hating Capitalism."[25] What it should have said was "You Can't Love America Without Fundamentally Transforming Away From Its Evil Ways."

And with AI, democratic socialism is getting a renewed lease on life. Embracing the nonsensical idea that AI will produce both unlimited prosperity and proletariat immiseration (not to mention environmental destruction and oppression of minorities), some otherwise thoughtful people now argue that socialism—especially free government services and universal basic income—are required.[26] This is similar to when U.S. liberals from the late 1800s to the 1930s thought that prosperity from industrialization would lead to socialism, as Edward Belemy predicted in his

1888 *Looking Backward*, and the Webbs did in the United Kingdom. Solving the production problem would pave the way for socialism, as Marx claimed 150 years ago.

While social capitalism is anemic, socialism is toxic. Embracing socialism would mean a steep decline in the rate of growth of productivity, limited innovation, the collapse of the data economy, and a catastrophic loss of U.S. advanced industries. It would make the EU look like a model of dynamism and growth. And of course, it would hollow out U.S. military capabilities, just as the PRC accelerates in the opposite direction.

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National Economic Power Capitalism: 2028–Onward?

While the societal capitalists assume that the growth and innovation engine from unfettered capitalism is automatic, and socialists don't care about growth or innovation but see a government-run economy as the rise of a cooperative and just nirvana, national economic power capitalists react to the failures of financial capitalism as a growth and competitiveness engine by prioritizing the latter more than social justice, in part because they rightly believe that a rising tide lifts almost all boats (at least those boats that are willing to row).[27]

In this series of reports, ITIF has laid out tenets of a new national economic power capitalism.[28] They are straightforward:

- Companies, especially large companies and high-growth start-ups, are the key to prosperity and national power.
- The most important industries are advanced, trade-sector industries, such as biotechnology, telecommunications equipment, aerospace, and semiconductors. Becoming dependent on Chinese production in these industries would give the PRC undue leverage over America.
- For most sectors of the economy, market forces, supplemented with the right growth and innovation policies, maximize benefits. However, for a variety of reasons, markets alone will not preserve national techno-economic power. PRC aggression is too great.
- Government needs to intervene in the most strategically important industries by providing assistance such as targeted tax incentives (e.g., the R&D tax credit); grants (e.g., through the CHIPS Act); targeted research support, especially to industry-led R&D centers; low-interest loans; and other financing, especially to help new companies get over the "valley of death" to commercialize innovations and scale up.
- These incentives should be part of an overall policy push to transition away from the short-termism of financial capitalism, which limits the kind of investment needed to avoid losing to the PRC.[29]
- Trade policy should defend advanced industries against the PRC's predation and maintain deep strategic alliances.[30]
- Education and workforce training policy should prioritize STEM (science, technology, engineering, and math) fields and practical technical skills.[31]

- Growth and competitiveness should take precedence over redistribution, although the latter should not be ignored.
- Without high levels of dynamism and creative destruction, the economy will underperform. Policymakers should resist the forces that oppose progress, including Luddites and NIMBYs.
- A wide array of regulations, including antitrust and environmental regulations, need to be restructured to promote national developmentalism.[32]
- Ultimately, the capitalist system should serve the national interest, not parochial ones (e.g., consumers, workers, different social groups, shareholders, financiers).

Making a systemic transformation to national economic power capitalism also would entail a wide range of other, complementary policy transformations, as this series of reports has detailed.[33] It is a tall order, but necessary to avoid defeat in the techno-economic war with China.

CONCLUSION

It is deeply embedded in the American psyche that democratic capitalism eventually should be the system for all countries. It's just a matter of time before all nations, even China, embrace it. After all, when Francis Fukuyama wrote *The End of History*, he was the general consensus.[34]

But it's quite possible, if not likely, that history could have a different ending, with Marxist-Leninism winning under the CCP. That victory would not necessarily have to come through a military invasion or the establishment of a U.S. communist state, but it very well could come voluntarily as most of the developing world chooses to govern itself under CCP oversight and guidance—and the CCP could end up largely calling the shots on global affairs, including issues affecting the advanced nations, particularly the United Sates. That certainly appears to be what Xi Jinping and the CCP leadership are working toward. In the meantime, the United States is focused on pretty much everything else but preserving its national techno-economic power.

Only time will tell whether American elites can respond before it is too late. But doing so will require the courage to reject group think.

As such, it will be extremely difficult, if not impossible, for the United States and the West to avoid sliding toward that fate if they remain committed to social capitalism—or worse, if they embrace socialism—because both doctrines antithetically oppose "picking winners" among industrial sectors and both resist robust dynamism, growth, and competitiveness. Only time will tell whether American elites can respond before it is too late. But doing so will require the courage to reject group think.

Index of Recommendations by Topic

PART 1: THE CASE FOR POLICY TRANSFORMATION

Overarching Recommendation

- Fundamentally transform the U.S. techno-industrial-economic system to prevent America from becoming subservient to China in strategically important industries that underpin national power and security in the 21st century.

Five Key Principles to Guide U.S. Policymaking

1. China is an adversary of the United States and of Western democracies more generally.
2. National power industry capabilities are so critical that losing them to China cannot be an option.
3. Strong domestic policy actions are necessary but not sufficient to avoid losing production capabilities in national power industries.
4. Just as domestic action alone is not sufficient to avoid losing the techno-economic war to China, efforts that individual nations undertake on their own will not be sufficient.
5. Transforming techno-economic and trade policy on both the offensive and defense sides of the equation cannot be done incrementally.

PART 2: SLOWING CHINA'S ADVANCE

Limits of Export Controls

- Establish a modern-day version of the Coordinating Committee for Multilateral Export Controls (COCOM) focused on China.

Limiting Chinese Knowledge Acquisition

- Require universities and Federally Funded Research and Development Centers (FFRDCs) to report the country of citizenship of postdocs, and track their later decisions to determine whether they stayed in the United States or went back to home countries, especially China.
- Pass the Defending Education Transparency and Ending Rogue Regimes Engaging in Nefarious Transactions (DETERRENT) Act to expand the oversight and disclosure requirements regarding Chinese funds channeled to U.S. universities and research institutions.
- Require universities to disclose in real time all research partnerships with researchers or companies in China.
- Approve the Securing American Funding and Expertise from Adversarial Research Exploitation Act of 2025 (SAFE Act) to block U.S. federal grants to scientists with a history of collaborating with hostile foreign countries, such as China.
- Improve cross-agency disclosure guidance produced under National Security Presidential Memorandum 33 (NSPM-33) by NSF.

- Create an unclassified database using open-source information to keep track of PRC research entities that engage in defense and military research and civil-military fusion programs.
- Ban cooperation with CCP/PLA-associated entities, presume research is problematic, and require those institutions to obtain waivers to proceed.
- Expand the practice of revoking visas of Chinese students with connections to the CCP or studying in critical fields.
- Require universities and FFRDCs to be more transparent about how many Chinese are enrolled in what disciplines, and provide analytical tools to universities and Federally Funded Research and Development Centers (FFRDCs) to make better decisions on individual students.
- Pressure foreign fellowship and other tuition assistance programs to not include Chinese students and instead prioritize students from other nations.
- Limit the U.S.-China Science and Technology (S&T) Agreement to areas that do not provide China with any assistance in technologies related to national economic power industries.
- Reinstate a White House-level IP enforcement reporting function to restore the institutional continuity necessary to translate isolated agency actions into a sustained strategic response.
- Strengthen and broaden screening and oversight under the Committee on Foreign Investment in the United States (CFIUS).
- Direct CFIUS to create a comprehensive registry of all Chinese-origin companies operating in the United States, including subsidiaries, joint ventures, firms with Chinese financing, and entities with partial Chinese government ownership.
- Reform the Protecting American Intellectual Property Act of 2022 (PAIPA) to include a presumption of refusal to foreign persons who have engaged in significant theft of trade secrets.
- Expand the Corporate Transparency Act to require Chinese-origin companies operating in U.S. power industries to report beneficial ownership and operational control, including minority stakes, joint ventures, offshore subsidiaries, and IP transfer rights.
- Implement pre-award due diligence to screen for Chinese ownership, operational control, or dual-use access before awarding grants or cooperative agreements.
- Clarify brand obscuration practices, which false-flagging companies use to maintain U.S. branding that obscures foreign ownership and misleads stakeholders and regulators.
- Pass legislation or engage in rulemaking to mandate that Chinese companies operating in defense, dual-use, or enabling industries disclose foreign state ownership or control in a standardized and visible manner.
- Pass legislation that requires bankruptcy courts to consider U.S. national security and competitiveness interests as a factor when approving asset transfers.

- Expand FIRRMA to widen the definition of what would affect U.S. leadership so that CFIUS's mandate encompasses threats to not only U.S. leadership "in areas related to national security" but also industries critical to economic and strategic competitiveness, including dual-use and enabling industries.
- Pass new CFIUS legislation that expands its coverage to include not just acquisitions but also investments, including venture capital investments, in U.S. firms by entities from China.
- Reform CFIUS by adding a "whitelist" for approved nations.
- Ensure that any legislation requiring CFIUS approval for Chinese joint ventures is contingent on at least Europe and Japan adopting similar rules.
- Work with CFIUS and funding agencies to require companies that receive U.S. federal funding to obtain explicit approval before relocating operations or substantial portions of their workforce or IP to China, or before accepting any investment from Chinese entities.
- Incorporate topics that help the United States forecast trends in economic espionage and trade secret theft by the PRC into the President's Intelligence Priorities (PIPs) and cascading National Intelligence Priorities Framework (NIPF) if they are not already included.
- Significantly increase the FBI's commercial counterintelligence budget.
- Increase DHS funding for limiting Chinese IP theft.
- Reintroduce and pass legislation similar to the Protecting Our Courts from Foreign Manipulation Act of 2023 to stop foreign entities from using the U.S. judicial system to obtain sensitive IP.
- Pass legislation increasing criminal penalties for IP theft by adversaries so that the punishment serves as a stronger deterrent.
- Reform the Protecting American Intellectual Property Act (PAIPA) so that the executive branch can work with the judiciary to identify individuals engaged in trade secret theft and respond promptly to such theft.
- Mandate that the Bureau of Industry and Security (BIS) put entities or individuals that have committed sustained theft of U.S. IP on the Entity List.
- Expand the remit and funding for the Export Control and Related Border Security (EXBS) program at the State Department.

Limiting Chinese Imports

- Stop permitting imports from companies that the federal government designates as part of the Entity List.
- Make explicit that unfair trade practices are eligible for Section 337 investigations.
- Eliminate the requirement for injury for unfair trade practices claims under Section 337.
- Allow any federal entity to file a complaint to initiate a Section 337 unfair trade investigation against innovation mercantilists from nonmarket, non-rule-of-law economies.

- Allow broader Section 337 exclusionary orders to classes of products, including digital products.
- Mandate that lower standards of evidence apply to Section 337 cases involving nonmarket, non-rule-of-law economies.
- Use BIS cybersecurity authorities liberally to ban certain Chinese imports.
- Limit the ability of PRC companies to license their technology to U.S. companies for sale in the United States if a Chinese company maintains control over the U.S. company.
- Ban Chinese companies from federal contracts if a specific product they manufacture is deemed inadequate by federal contractors.
- Enforce federal procurement rules in states with stronger pressure by incentivizing state governments to adopt procurement rules aligned with U.S. national power, regardless of whether the funding comes from the federal government.
- Fully align federal lists of Chinese entities so that, for example, a Chinese company deemed involved in IP theft through a Section 337 investigation is not eligible for federal contracts.
- Make it easy for consumers to identify if they are buying a product owned by a Chinese company.
- Increase the CBP budget and ensure that the director collaborates with private-sector stakeholders, including brand sellers, online marketplaces, and shippers, to establish real-time information sharing and analytics about potential counterfeit shipments that would allow them to better detect and seize more imported counterfeits.
- Procure an AI-driven software solution that systematically "crawls" e-commerce platforms and essentially replicates what ITIF conducted in a test purchase by identifying suspicious listings.
- Expand the Section 5949 procurement ban to include all technology products related to national power industries and manufactured in China.

Limiting Financing to Chinese Firms

- Pass legislation prohibiting cities, states, and the federal government from providing any funding to Chinese companies investing in the United States.
- Codify what states such as Arizona, Florida, Indiana, Iowa, Kansas, Missouri, Tennessee, and Texas are already doing: creating mechanisms to restrict public pension fund investments that require divestment from China.
- Approve a broader initiative banning all types of retirement funds from being channeled to the PRC or Chinese-based entities, and urge private equity firms and employee retirement plans governed by the Employee Retirement Income Security Act (ERISA) to disclose their ongoing investments in companies based in or controlled by foreign adversaries.
- Bar U.S.-based companies with PRC financing from receiving U.S. government funding, tax incentives, or other financial support.

- Direct NDAA authorities for FY 2027 to mandate that agencies expand Section 1260H and related authorities to ensure that Chinese-origin companies in defense, dual-use, and enabling industries cannot indirectly advance military capabilities.
- Centralize interagency due diligence by establishing a single, interagency due-diligence database that integrates CFIUS, Commerce Department, and federal grant-funding data to screen all potential recipients of federal awards, contracts, and research grants.
- Pass the national security and foreign risk proposals in the INNOVATE Act.
- Introduce a targeted SBIR–STTR research security bill that builds on Senator Ernst's INNOVATE Act.
- Direct DHS and the FBI to deliver basic counterintelligence and foreign talent recruitment awareness training as an eligible, fundable SBIR support activity.

Reducing the Negative Impact of Chinese Mercantilist Policies

- Bring a WTO case, ideally with the European Union, against China for its ongoing failure to publish thousands of trade-related final measures, including subsidies, in a single official journal as it is required to do under WTO rules.
- Mandate disclosure of third-party financers to the judge and defendants in any civil case.
- Ban sovereign wealth funds' litigation financing activity.
- Ban Chinese-firm and Chinese-government participation in third-party litigation financing (TPLF).
- Bring criminal monopolization cases against Chinese state-backed entities that engage in predatory behavior and seek heavy penalties, as well as, when appropriate, jail time for guilty executives.
- Be prepared, in connection with antitrust cases brought against Chinese SOEs, to issue "Bernstein letters" to courts stating that the act of state doctrine is inappropriate when it comes to challenging anticompetitive practices by Chinese state-owned entities.
- Consider legislation that limits the foreign sovereign compulsion defense to ensure Chinese firms can be held liable for their anticompetitive behavior when it is directed by the PRC.
- Make clear that Chinese companies receiving subsidies might be violating antitrust laws as an unfair practice under Section 5 of the FTC Act, and spearhead an intergovernmental task force analyzing in what areas Chinese subsidies are having a direct, substantial, and reasonably foreseeable anticompetitive effect on U.S. commerce.
- Actively advocate for American mergers and acquisitions to be approved abroad and, where appropriate, recommend potential Section 301 actions to USTR where there is substantial evidence that a merger control regulation is being used to discriminate against American firms.
- Issue a Hart-Scott-Rodino (HSR) Act rulemaking that provides that the exemption for acquisitions by foreign states will not apply to Chinese state-owned entities.

- Require USTR's Special 301 report on IP abuses to include Chinese abuses of standard essential patents (SEPs).

Reducing Allied Production in China

- Include concrete rules in the new USMCA agreement to shield the regional economy from Chinese predatory practices, including implementing more standardized investment screening practices, strengthening rules of origin, definitions, and enforcement, and reinforcing the USMCA's non-market clause.
- Outline mechanisms in Chapter 14 of the USMCA to share information on foreign investment screening from "countries of concern," with clear objectives, responsibilities, and a mandate to report to the three partners.
- Improve USMCA rules of origin (ROO) definitions to help prevent Chinese companies that benefit from mercantilist policies from getting their final products (or even inputs) into the U.S. market.
- Reinforce the USMCA's nonmarket clause.
- Establish a joint global manufacturing hub competition with core allies.
- Create a $10 billion fund companies can apply for to pay for a portion of their expenses in repatriating manufacturing operations.
- Pass a time-limited tax incentive for firms that move Chinese production to U.S. Labor Department–designated "labor surplus areas."
- Require disclosure of production in China, to the extent governments impose ESG disclosure requirements.
- Codify the tariffs imposed on Chinese products by legislating a predictable, incremental pathway.

Contesting Chinese Firms in Non-Allied Markets

- Significantly increase Ex-Im lending levels, and permit Ex-Im's China and Transformational Exports Program workstream to accept greater loan-loss risk across its portfolio and expand its transformational export areas.
- Increase the permissible Ex-Im Bank default rate from 2 percent to at least 4 percent in reauthorizing legislation.
- Permit Ex-Im, through reauthorization, to finance weapons exports to U.S. allies (with approval from the Pentagon).
- Use the International Development Finance Corporation (DFC) as a centerpiece of a coordinated engagement strategy with allies in Global South countries.
- Increase development finance investments.
- Expand DFC's institutional capacity and expertise.
- Require DFC to use its financial tools to explicitly reduce third countries' reliance on PRC investments, technologies, or standards, and to the extent possible, focus on national economic power industries.

- Make it clear that recipients of DFC funding are not permitted to expend resources on products or services made by Chinese companies (unless there is no feasible alternative).
- Create explicit criteria for DFC to use in assessing how a country's trade and technology policies affect U.S. interests.
- Charge the Commerce Department with establishing a national, interagency, and intergovernmentally aligned trade promotion system.
- Support an export program for all national power industries, particularly in the Global South.
- Lead a coalition of Western countries to increase allied market share in national power industries in Global South markets.
- Remove the limitation on financing weapons exports that Congress placed on the Ex-Im Bank.
- Significantly increase the lending authorities for the Foreign Military Financing (FMF) program.
- Reinstate the ability of the FMF program to make grants.
- Broaden Foreign Military Financing (FMF) to all Foreign Military Sales (FMS) countries.
- Review FMF guidelines to reduce or eliminate barriers to foreign sales.
- Establish an office whose mission is to focus on winning the techno-economic weapons industry war with China by boosting foreign weapons sales.
- Be more supportive of foreign weapons sales, even to countries that are problematic from a human rights perspective, as long as they are not military adversaries.
- Increase the reporting thresholds for sales the administration must report to Congress.
- Accelerate internal review and approval of proposed FMS by streamlining deal approval among the so-called congressional "Four Horsemen."
- Pass legislation that exempts U.S. firms' bribery in China and also allows U.S. firms to get a timely exemption to the FCPA from DOJ if they can show that the bribe is needed to win a contract in a foreign country against a Chinese competitor.
- Establish a narrowly tailored pilot authority that allows the IC to share classified assessments with vetted U.S. firms competing with Chinese firms for third-country contracts.
- Ensure that agency budgets, especially the State Department's, include expanded funding for relationship-building and education efforts with government officials in contested nations.

PART 3: TRANSFORMING FINANCIAL CAPITALISM INTO NATIONAL POWER CAPITALISM

Using the Tax Code to Foster National Power Capitalism

- Raise the federal R&D tax credit to match China's incentive generosity rate by increasing the Alternative Simplified Credit (ASC) from 14 percent to 38 percent.
- Allow expenditures on workforce training and global standards setting to also qualify for the R&D tax credit.
- Institute a national power industry tax credit, modeled on the CHIPS tax credit law, that would only apply to national economic power industries.
- Tax dividends as normal income.
- Boost the capital gains tax rate and extend the holding-period time horizon for qualifying for lower rates.
- Reduce the incentives for companies to buy back their own stock by increasing the buyback tax rate.
- Allow corporate tax deductions for executive compensation above $20 million per year.

Spurring Private Vehicles to Support National Power Capitalism

- Use the bully pulpit to encourage investors and investment managers to take into consideration national economic power goals.
- Encourage patriotic, high-net-worth individuals to target more of their investments to firms in national economic power industries and take a longer-term investment horizon.
- Provide at least some federal support for strategic capital funds, or make subsidiary investments to support firms backed by strategic capital funds.
- Establish rules to prohibit measuring pension fund managers on quarterly or even annual performance and instead measure them on longer-term performance (e.g., three or more years).
- Tie federal funding to states based on whether their state pension funds include some kind of national economic power investment mandate, and do the same with the Federal Thrift Savings Plan.
- Take steps to limit the power of hedge funds to force short-termism and capital extraction.
- Reconsider the legislative and regulatory changes—including SEC proxy rule amendments, the National Securities Markets Improvement Act (NSMIA), and fiduciary obligations for pension and mutual funds to vote their shares—that have empowered hedge fund activists.
- Pass legislation to penalize organizations that allow their investments to be used in the service of "activist investors" who own a small share of a company's stock but enlist institutional investors to join their demands for the corporation to transfer cash to shareholders.

- Make it clear that, in national economic power industries, CFIUS should be able to block domestic hostile takeovers if there is a risk that they would weaken firms' dynamic capabilities, especially vis-à-vis China competition.

Spurring Public Vehicles to Support National Power Capitalism

- Provide funding to expand early stage investment programs focused on national security, including InQTel, the Defense Innovation Unit's National Security Investment Capital program, the Air Force's AFWERX STRATFI/TACFI program, the War Department's Office of Strategic Capital, and DOD's Accelerate the Procurement and Fielding of Innovative Technologies program.
- Make a one-time appropriation to establish an Industrial Finance Corporation, which would then make more patient capital investments in national economic power industries.

PART 4: TRANSFORMING EDUCATION AND WORKFORCE POLICY

K-12 Education

- Establish and fund a New Schools America Fund to encourage state legislatures to create specialized organizations for new, innovative schools that are independent of traditional school management.
- Dramatically reduce the course mandates that states have imposed over the last several decades.
- Make federal higher education funding contingent on state colleges and universities eliminating specific course requirements beyond a minimum (such as two years of math).
- Allocate $600 million per year for the next five years to the National Science Foundation (NSF), with matching funds from states, local school districts, and industry, to invest in both the creation of new math and science high schools and the expansion of existing ones.
- Provide federal funding, through either the Department of War or the Department of Education, to establish manufacturing and engineering programs at at least a quarter of America's middle and high schools.
- Increase funding for the Carl D. Perkins Career and Technical Education Act formula grants to states, and allow states to apply for matching grants to expand technical education in high schools, including engineering courses (e.g., robotics) and maker spaces.

Higher Education

- Demonstrate to the private sector the feasibility of using alternative credentials by accepting a suitable set as a substitute for a college degree when filling federal government jobs.
- Require that any college receiving federal funding disclose its National Survey of Student Engagement (NSSE) scores.
- Pass a third Morrill Act to incentivize state land grant universities to return to their original mission of technical education aligned with industry needs.

- Require agencies such as NSF and the Department of Energy that currently prioritize basic research to dedicate at least 25 percent of all federal research funding given to land grants to "translational or applied" research.
- Appropriate funds to the Department of Education to establish a competition to establish up to 10 industry- or technology-focused universities.
- Establish a new kind of accreditation for practical universities as part of efforts to reform accreditation bodies.
- Provide the Department of Education with funds to operate a challenge grant competition wherein schools could apply to create practical education programs within their institutions or create new practical colleges.
- Ensure that all federal student aid, including Pell Grants, can be used to support practical college education.
- Ensure that NSF has adequate funding to establish an annual funding program for research universities (including land grant colleges) to establish new science and technology curricula in areas of national importance.

Gifted Individuals

- Treat giftedness as federal policy treats disabilities, requiring states and school districts to test for it and provide appropriate learning environments, ideally by creating new schools for gifted students.
- Reform the O-1A visa to allow applicants to qualify if they meet one of the eight possible requirements (instead of three).
- Allow O-1A visa applicants to qualify if they are in the top 1 percent of international SAT test takers in the math section and in the top 5 percent in the reading and writing portions.

PART 5: TRANSFORMING STEM RESEARCH POLICY

More Funding

- Appropriate at least $90 billion more annually for research spending targeted to supporting innovation in national economic power industries.

Target Increased Funding at National Economic Power Industry Needs

- Reduce the imbalance between science and engineering research support by directing at least one-third of new funding to engineering, up from around 15 percent.
- Target new research funding to areas of science, engineering, and technology that have direct implications for national economic power industries.
- Triple the NIST budget and double the DARPA budget over five years.

Less Open Internationally, Especially to the Chinese

- Focus federal STEM research policy more on specialized centers than on individual awards, with funding for the centers sustained for at least 10 years, contingent on performance, and sizeable enough to gain real scale.

More Focused Specialization With Scale

- Require that significant research funds go to mid-level Technology Readiness Levels and that research proposals demonstrate interest and commitment to having the research commercialized in the United States or with allies that have reciprocal programs with the United States.

More Funding of Mid-Level TRL Research

- Double War Department basic, applied, and advanced-technology research funding from around $21 billion to $42 billion.
- Create a "civilian DARPA" to co-invest with industry on research and application of key technologies needed for dual-use national security leadership in the commercial sector.

Increase Industry Involvement

- Direct most new additional research funding not to individual investigators pursuing basic research, but to institutional models that engage much more deeply with industry.
- Create new kinds of research universities focused on a few narrow technology areas by providing NSF with at least a one-time appropriation of $1 billion to award to around five entities that seek to create specialized research universities.
- Establish five national industrial research institutes focused on key, dual-use industries and technologies, modeled after Taiwan's Industrial Technology Research Institute.
- Significantly expand the Manufacturing USA centers' public-private precompetitive research institutes from 18 to at least 36.
- Direct some of the increased research funding to states that agree to increase their own funding for R&D centers focused on research related to national economic power industry technology needs.
- Modify the collaborative R&D tax credit to boost the credit rate from 20 percent to 50 percent for industry funding of university or federal lab research or industry-led collaborative research.

More Industry-Focused Graduate Programs

- Provide funding for grants to higher education institutions that want to develop new institutional approaches for training scientists and engineers.
- Treat AI-enabled science as a strategic national capability by prioritizing the large-scale integration of AI and advanced digital infrastructure into the core of the scientific enterprise across all federal research agencies.
- Use procurement power to accelerate the development of anticipatory models that look at early-stage research, patents, and funding trends to better predict and prepare for technological shifts driven by Chinese scientific advancements.

PART 6: TRANSFORMING FREE TRADE AGREEMENTS INTO STRATEGIC CHINA-DEFENSE PARTNERSHIPS

New Approach

- Transform free trade agreements (FTAs) into a new class of strategic techno-economic agreements (STEAs) that offer full market access with zero-for-zero tariffs in return for binding commitments from trading partners to promote a dual objective of strengthening allies' national economic power industries and weakening China's.

Requirements to Join

- Require U.S. trade partners to acknowledge trade irritants and take measures to address them as a precondition for joining a strategic techno-economic agreement (STEA), including eliminating or significantly reducing nontariff barriers, particularly nontariff attacks; openly promoting and committing to fair, reciprocal trade; and embarking on symbolic, believable commitments to lay the groundwork for STEA membership.

Key Components

- Deepen allied cooperation in national economic power industries through strategic techno-economic agreements (STEAs) with six main components: preferred market access, high-standard digital trade rules, preferential investment in national power industries, cooperation on defense and dual-use technologies, high-skill talent movement, joint antitrust interpretation, and a mutual approval requirement for commitments with nonmarket economies.
- Constrain the PRC's development in national economic power industries through strategic techno-economic agreements (STEAs) that include eight key components: immediate reciprocity in addressing nontariff barriers, fully integrated investment screening, full export control alignment, joint Section 301-like investigations, a joint sovereign fund to reverse Chinese technology adoption, joint import bans, limits on Chinese R&D funding, and shared commercial counterintelligence.

PART 7: TRANSFORMING REGULATORY POLICY

A New Federal-State Division of Labor: Preemption

- Pass comprehensive data privacy legislation that preempts state privacy and data breach notification laws, including both comprehensive state privacy laws and sectoral privacy laws that target biometric data, such as Illinois's Biometric Information Privacy Act (BIPA), or data collection and use for AI.
- Impose a five-year moratorium on state AI and children's online safety laws while working toward passing a national AI framework and children's online safety legislation that addresses online harms to children.
- Pass net neutrality legislation that does not regulate broadband Internet as a telecommunications common carrier under Title II of the Communications Act and instead codifies widely agreed-upon Internet protections and gives the Federal Communications Commission (FCC) reasonable jurisdiction to enforce open Internet rules.

- Pass the Improving Digital Identity Act to create a framework for deploying a digital ID system at the federal, state, and local levels.
- Remain constantly on the alert for rent-seeking protectionist actions at the state level, whether they come from car dealers, real estate agents, liquor wholesalers, banks, taxi industries, or others.
- Update the Permanent Internet Tax Freedom Act to ban both taxes on wireless services and discriminatory taxes on digital goods and services that do not have a physical component.
- Pass legislation instructing the Alcohol and Tobacco Products Tax and Trade Bureau, FTC, and Food and Drug Administration to establish uniform regulations for age-restricted or medical products purchased online.
- Update the Uniform Electronic Transactions Act and Electronic Signatures in Global and National Commerce Act to require states to recognize the legality and enforceability of records, signatures, and contracts secured over a blockchain.
- Preempt state right-to-repair laws with a consistent right-to-repair standard for electronics at the federal level.
- Ensure that states repeal industry-specific regulations that balkanize national markets, starting by forcing California to repeal its separate laws regulating automobile emissions.
- Reduce federal funds to states that choose to impose their own product and service standards above federal standards.
- Ensure that key interstate infrastructure is truly interstate in nature and not allow states to restrict it, such as by penalizing states that ban or significantly limit the development of AI data centers.
- Pass a law making clear that federal antitrust laws set the outer bounds of liability for state antitrust laws.
- Pass the SMARTER Act, which would require the FTC to litigate merger cases in federal court rather than in its own administrative process, and to satisfy the same preliminary injunction standards as DOJ.
- Pass the One Agency Act and merge all antitrust enforcement into DOJ.

A New Federal-State Division of Labor: Devolution

- Repeal NEPA, except perhaps for projects on federally owned lands.
- Repeal Section 404 of the Clean Water Act.
- Allocate approximately 80 percent of Highway Trust Fund revenues to states as formula grants based on states' contributions, with no strings attached, and reserve the remaining 20 percent for interstate projects of national significance.

Adopt Regulatory Carveouts for Key National Power Industries and Projects

- Pass legislation providing the Department of Commerce with the authority to identify up to 100 projects a year of national economic power importance that qualify for streamlined regulatory approval, limited legal challenges, and reduced compliance burdens.

- Charge the Commerce Department with designating a set of preapproved very large industrial sites—50 to 100 nationally, each at least 3,000 acres in size—where comprehensive environmental and permitting review has already been completed and utilities are guaranteed.

Tilt Agency Regulation to Consider Automation, Productivity, and Competitiveness

- Direct the administration to create an entity in government that weighs in on regulatory decisions to defend innovation, productivity, and competitiveness and the interests of national power industries.

End Small Business Preferentialism

- Embrace firm size neutrality and abolish small business preferences, including government procurement preferences, regulatory exemptions, small business financing programs, and tax benefits that favor small firms.

Make Antitrust Support Techno-Economic Power

- Use the flexibility in the Tunney Act to consider the effects of antitrust actions on U.S. industrial competitiveness.
- Assess the likelihood that splitting up a firm would result in its divisions being purchased by PRC firms when considering divestiture remedies.
- Factor national competitiveness consequences into prosecutorial discretion in deciding whether to bring antitrust cases.

Embrace Innovation- and Build-Friendly Regulation

- Create a unit within OMB's Office of Information and Regulatory Affairs (OIRA) to systematically consider how proposed agency regulations impact innovation and competitiveness.

PART 8: TRANSFORMING INDUSTRIAL POLICY ORGANIZATION

Federal Data, Analysis, and Organization

- Establish a new Undersecretary for Defense, Dual-Use, and Enabling Industries at the War Department.
- Establish a quasi-public National Advanced Industry and Technology Agency (NAITA) organized like the Ex-Im Bank, but with greater flexibility.
- Expand federal statistical collection to include more fine-grained international statistics, such as a better input price index, better data on imports and exports in the Annual Survey of Manufactures, restored BLS international labor comparisons, better BEA data on U.S. companies' overseas facilities, and better data on U.S. multinationals.
- Transition the North American Industry Classification System (NAICS) to the International Standard Industrial Classification System so that U.S. industry data is comparable to that of most other nations.
- Fully avail federal agencies of private-sector sources of data and analysis on Chinese policy and Chinese firms.

- Conduct competitiveness analysis of key advanced sectors and technologies, including SWOT analysis, as an economy-wide equivalent of the War Department's "net assessment" process.
- Develop strategic roadmaps to guide interdepartmental efforts to ensure that the regulatory policies and activities of disparate government agencies are aligned to promote the global competitiveness of strategic sectors of the U.S. economy.
- Fund at least one university to establish a graduate program and related career-training tracks focused on economic warfighting and industrial strategy.
- Establish a Joint Economic Competitiveness Committee, separate from but akin to the Joint Economic Committee, to bring coherence to Congress's disparate efforts on economic competitiveness.
- Establish a National Economic Security Council (NESC) whose job would be to manage economic competition with adversaries, especially China.
- Form an all-of-government China strategy wherein each major agency develops an approach to deal with China.
- Statutorily reconstitute the Council of Economic Advisers as the Council of Economic and Enterprise Advisors.
- Establish a new undersecretary position at the State Department to assume responsibility for monitoring U.S.-China relations and PRC actions around the world.

PART 9: FINDING THE POLITICAL WILL TO TRANSFORM AMERICA'S ECONOMIC SYSTEM

Evolving to National Economic Power Capitalism

- Move beyond today's strains of financial capitalism, societal capitalism, and socialism, because none provides the policy framework necessary to prevent America from devolving into a techno-economic vassal state of the People's Republic of China.
- Embrace a new economic system that explicitly supports businesses in national economic power industries.

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WHOLE OF GOVERNMENT

- Fundamentally transform the U.S. techno-industrial-economic system to prevent America from becoming subservient to China in strategically important industries that underpin national power and security in the 21st century.
- Move beyond today's strains of financial capitalism, societal capitalism, and socialism, because none provides the policy framework necessary to prevent America from devolving into a techno-economic vassal state of the People's Republic of China.
- Embrace a new economic system that explicitly supports businesses in national power industries.

ADMINISTRATION

- Establish a modern-day version of the Coordinating Committee for Multilateral Export Controls (COCOM) focused on China.
- Require universities to disclose in real time all research partnerships with researchers or companies in China.
- Expand the practice of revoking visas of Chinese students with connections to the CCP or studying in critical fields.
- Pressure foreign fellowship and other tuition assistance programs to not include Chinese students and instead prioritize students from other nations.
- Reinstate a White House-level IP enforcement reporting function to restore the institutional continuity necessary to translate isolated agency actions into a sustained strategic response.
- Implement pre-award due diligence to screen for Chinese ownership, operational control, or dual-use access before awarding grants or cooperative agreements.
- Work with CFIUS and funding agencies to require companies that receive U.S. federal funding to obtain explicit approval before relocating operations or substantial portions of their workforce or IP to China, or before accepting any investment from Chinese entities.
- Incorporate topics that help the United States forecast trends in economic espionage and trade secret theft by the PRC into the President's Intelligence Priorities (PIPs) and cascading National Intelligence Priorities Framework (NIPF) if they are not already included.
- Stop permitting imports from companies that the federal government designates as part of the Entity List.
- Use BIS cybersecurity authorities liberally to ban certain Chinese imports.

- Limit the ability of PRC companies to license their technology to U.S. companies for sale in the United States if a Chinese company maintains control over the U.S. company.
- Fully align federal lists of Chinese entities so that, for example, a Chinese company deemed involved in IP theft through a Section 337 investigation is not eligible for federal contracts.
- Procure an AI-driven software solution that systematically "crawls" e-commerce platforms and essentially replicates what ITIF conducted in a test purchase by identifying suspicious listings.
- Bar U.S.-based companies with PRC financing from receiving U.S. government funding, tax incentives, or other financial support.
- Centralize interagency due diligence by establishing a single, interagency due-diligence database that integrates CFIUS, Commerce Department, and federal grant-funding data to screen all potential recipients of federal awards, contracts, and research grants.
- Bring a WTO case, ideally with the European Union, against China for its ongoing failure to publish thousands of trade-related final measures, including subsidies, in a single official journal as it is required to do under WTO rules.
- Bring criminal monopolization cases against Chinese state-backed entities that engage in predatory behavior and seek heavy penalties, as well as, when appropriate, jail time for guilty executives.
- Be prepared, in connection with antitrust cases brought against Chinese SOEs, to issue "Bernstein letters" to courts stating that the act of state doctrine is inappropriate when it comes to challenging anticompetitive practices by Chinese state-owned entities.
- Actively advocate for American mergers and acquisitions to be approved abroad and, where appropriate, recommend potential Section 301 actions to USTR where there is substantial evidence that a merger control regulation is being used to discriminate against American firms.
- Require USTR's Special 301 report on IP abuses to include Chinese abuses of standard essential patents (SEPs).
- Include concrete rules in the new USMCA agreement to shield the regional economy from Chinese predatory practices, including implementing more standardized investment screening practices, strengthening rules of origin, definitions, and enforcement, and reinforcing the USMCA's non-market clause.
- Outline mechanisms in Chapter 14 of the USMCA to share information on foreign investment screening from "countries of concern," with clear objectives, responsibilities, and a mandate to report to the three partners.
- Improve USMCA rules of origin (ROO) definitions to help prevent Chinese companies that benefit from mercantilist policies from getting their final products (or even inputs) into the U.S. market.
- Reinforce the USMCA's nonmarket clause.
- Establish a joint global manufacturing hub competition with core allies.

- Require disclosure of production in China, to the extent governments impose ESG disclosure requirements.
- Use the International Development Finance Corporation (DFC) as a centerpiece of a coordinated engagement strategy with allies in Global South countries.
- Create explicit criteria for DFC to use in assessing how a country's trade and technology policies affect U.S. interests.
- Support an export program for all national power industries, particularly in the Global South.
- Lead a coalition of Western countries to increase allied market share in national power industries in Global South markets.
- Reinstate the ability of the FMF program to make grants.
- Broaden Foreign Military Financing (FMF) to all Foreign Military Sales (FMS) countries.
- Review FMF guidelines to reduce or eliminate barriers to foreign sales.
- Establish an office whose mission is to focus on winning the techno-economic weapons industry war with China by boosting foreign weapons sales.
- Use the bully pulpit to encourage investors and investment managers to take into consideration national economic power goals.
- Encourage patriotic, high-net-worth individuals to target more of their investments to firms in national economic power industries and take a longer-term investment horizon.
- Establish rules to prohibit measuring pension fund managers on quarterly or even annual performance and instead measure them on longer-term performance (e.g., three or more years).
- Dramatically reduce the K-12 course mandates that states have imposed over the last several decades.
- Demonstrate to the private sector the feasibility of using alternative credentials by accepting a suitable set as a substitute for a college degree when filling federal government jobs.
- Establish a new kind of accreditation for practical universities as part of efforts to reform accreditation bodies.
- Focus federal STEM research policy more on specialized centers than on individual awards, with funding for the centers sustained for at least 10 years, contingent on performance, and sizeable enough to gain real scale.
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- Transform free trade agreements (FTAs) into a new class of strategic techno-economic agreements (STEAs) that offer full market access with zero-for-zero tariffs in return for binding commitments from trading partners to promote a dual objective of strengthening allies' national economic power industries and weakening China's.
- Require U.S. trade partners to acknowledge trade irritants and take measures to address them as a precondition for joining a strategic techno-economic agreement (STEA), including eliminating or significantly reducing nontariff barriers, particularly nontariff attacks; openly promoting and committing to fair, reciprocal trade; and embarking on symbolic, believable commitments to lay the groundwork for STEA membership.
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- Use the flexibility in the Tunney Act to consider the effects of antitrust actions on U.S. industrial competitiveness.
- Assess the likelihood that splitting up a firm would result in its divisions being purchased by PRC firms when considering divestiture remedies.
- Factor national competitiveness consequences into prosecutorial discretion in deciding whether to bring antitrust cases.
- Create a unit within OMB's Office of Information and Regulatory Affairs (OIRA) to systematically consider how proposed agency regulations impact innovation and competitiveness.
- Expand federal statistical collection to include more fine-grained international statistics, such as a better input price index, better data on imports and exports in the Annual Survey of Manufactures, restored BLS international labor comparisons, better BEA data on U.S. companies' overseas facilities, and better data on U.S. multinationals.
- Transition the North American Industry Classification System (NAICS) to the International Standard Industrial Classification System so that U.S. industry data is comparable to that of most other nations.
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- Conduct competitiveness analysis of key advanced sectors and technologies, including SWOT analysis, as an economy-wide equivalent of the War Department's "net assessment" process.
- Develop strategic roadmaps to guide interdepartmental efforts to ensure that the regulatory policies and activities of disparate government agencies are aligned to promote the global competitiveness of strategic sectors of the U.S. economy.
- Fund at least one university to establish a graduate program and related career-training tracks focused on economic warfighting and industrial strategy.
- Form an all-of-government China strategy wherein each major agency develops an approach to deal with China.
- Clarify brand obscuration practices, which false-flagging companies use to maintain U.S. branding that obscures foreign ownership and misleads stakeholders and regulators.
- Make clear that Chinese companies receiving subsidies might be violating antitrust laws as an unfair practice under Section 5 of the FTC Act, and spearhead an intergovernmental task force analyzing in what areas Chinese subsidies are having a direct, substantial, and reasonably foreseeable anticompetitive effect on U.S. commerce.
- Issue a Hart-Scott-Rodino (HSR) Act rulemaking that provides that the exemption for acquisitions by foreign states will not apply to Chinese state-owned entities.

CONGRESS

- Require universities and Federally Funded Research and Development Centers (FFRDCs) to report the country of citizenship of postdocs, and track their later decisions to determine whether they stayed in the United States or went back to home countries, especially China.
- Pass the Defending Education Transparency and Ending Rogue Regimes Engaging in Nefarious Transactions (DETERRENT) Act to expand the oversight and disclosure requirements regarding Chinese funds channeled to U.S. universities and research institutions.
- Approve the Securing American Funding and Expertise from Adversarial Research Exploitation Act of 2025 (SAFE Act) to block U.S. federal grants to scientists with a history of collaborating with hostile foreign countries, such as China.
- Improve cross-agency disclosure guidance produced under National Security Presidential Memorandum 33 (NSPM-33) by NSF.
- Create an unclassified database using open-source information to keep track of PRC research entities that engage in defense and military research and civil-military fusion programs.
- Ban cooperation with CCP/PLA-associated entities, presume research is problematic, and require those institutions to obtain waivers to proceed.
- Require universities and FFRDCs to be more transparent about how many Chinese are enrolled in what disciplines, and provide analytical tools to universities and Federally

Funded Research and Development Centers (FFRDCs) to make better decisions on individual students.

- Limit the U.S.-China Science and Technology (S&T) Agreement to areas that do not provide China with any assistance in technologies related to national economic power industries.
- Strengthen and broaden screening and oversight under the Committee on Foreign Investment in the United States (CFIUS).
- Direct CFIUS to create a comprehensive registry of all Chinese-origin companies operating in the United States, including subsidiaries, joint ventures, firms with Chinese financing, and entities with partial Chinese government ownership.
- Reform the Protecting American Intellectual Property Act of 2022 (PAIPA) to include a presumption of refusal to foreign persons who have engaged in significant theft of trade secrets.
- Expand the Corporate Transparency Act to require Chinese-origin companies operating in U.S. power industries to report beneficial ownership and operational control, including minority stakes, joint ventures, offshore subsidiaries, and IP transfer rights.
- Pass legislation or engage in rulemaking to mandate that Chinese companies operating in defense, dual-use, or enabling industries disclose foreign state ownership or control in a standardized and visible manner.
- Pass legislation that requires bankruptcy courts to consider U.S. national security and competitiveness interests as a factor when approving asset transfers.
- Expand FIRRMA to widen the definition of what would affect U.S. leadership so that CFIUS's mandate encompasses threats to not only U.S. leadership "in areas related to national security" but also industries critical to economic and strategic competitiveness, including dual-use and enabling industries.
- Pass new CFIUS legislation that expands its coverage to include not just acquisitions but also investments, including venture capital investments, in U.S. firms by entities from China.
- Reform CFIUS by adding a "whitelist" for approved nations.
- Ensure that any legislation requiring CFIUS approval for Chinese joint ventures is contingent on at least Europe and Japan adopting similar rules.
- Significantly increase the FBI's commercial counterintelligence budget.
- Increase DHS funding for limiting Chinese IP theft.
- Reintroduce and pass legislation similar to the Protecting Our Courts from Foreign Manipulation Act of 2023 to stop foreign entities from using the U.S. judicial system to obtain sensitive IP.
- Pass legislation increasing criminal penalties for IP theft by adversaries so that the punishment serves as a stronger deterrent.

- Reform the Protecting American Intellectual Property Act (PAIPA) so that the executive branch can work with the judiciary to identify individuals engaged in trade secret theft and respond promptly to such theft.
- Mandate that the Bureau of Industry and Security (BIS) put entities or individuals that have committed sustained theft of U.S. IP on the Entity List.
- Expand the remit and funding for the Export Control and Related Border Security (EXBS) program at the State Department.
- Make explicit that unfair trade practices are eligible for Section 337 investigations.
- Eliminate the requirement for injury for unfair trade practices claims under Section 337.
- Allow any federal entity to file a complaint to initiate a Section 337 unfair trade investigation against innovation mercantilists from nonmarket, non-rule-of-law economies.
- Allow broader Section 337 exclusionary orders to classes of products, including digital products.
- Mandate that lower standards of evidence apply to Section 337 cases involving nonmarket, non-rule-of-law economies.
- Ban Chinese companies from federal contracts if a specific product they manufacture is deemed inadequate by federal contractors.
- Enforce federal procurement rules in states with stronger pressure by incentivizing state governments to adopt procurement rules aligned with U.S. national power, regardless of whether the funding comes from the federal government.
- Make it easy for consumers to identify if they are buying a product owned by a Chinese company.
- Increase the CBP budget and ensure that the director collaborates with private-sector stakeholders, including brand sellers, online marketplaces, and shippers, to establish real-time information sharing and analytics about potential counterfeit shipments that would allow them to better detect and seize more imported counterfeits.
- Expand the Section 5949 procurement ban to include all technology products related to national power industries and manufactured in China.
- Pass legislation prohibiting cities, states, and the federal government from providing any funding to Chinese companies investing in the United States.
- Codify what states such as Arizona, Florida, Indiana, Iowa, Kansas, Missouri, Tennessee, and Texas are already doing: creating mechanisms to restrict public pension fund investments that require divestment from China.
- Approve a broader initiative banning all types of retirement funds from being channeled to the PRC or Chinese-based entities, and urge private equity firms and employee retirement plans governed by the Employee Retirement Income Security Act (ERISA) to disclose their ongoing investments in companies based in or controlled by foreign adversaries.

- Direct NDAA authorities for FY 2027 to mandate that agencies expand Section 1260H and related authorities to ensure that Chinese-origin companies in defense, dual-use, and enabling industries cannot indirectly advance military capabilities.
- Pass the national security and foreign risk proposals in the INNOVATE Act.
- Introduce a targeted SBIR–STTR research security bill that builds on Senator Ernst's INNOVATE Act.
- Direct DHS and the FBI to deliver basic counterintelligence and foreign talent recruitment awareness training as an eligible, fundable SBIR support activity.
- Mandate disclosure of third-party financers to the judge and defendants in any civil case.
- Ban sovereign wealth funds' litigation financing activity.
- Ban Chinese-firm and Chinese-government participation in third-party litigation financing (TPLF).
- Consider legislation that limits the foreign sovereign compulsion defense to ensure Chinese firms can be held liable for their anticompetitive behavior when it is directed by the PRC.
- Create a $10 billion fund companies can apply for to pay for a portion of their expenses in repatriating manufacturing operations.
- Pass a time-limited tax incentive for firms that move Chinese production to U.S. Labor Department–designated "labor surplus areas."
- Codify the tariffs imposed on Chinese products by legislating a predictable, incremental pathway.
- Significantly increase Ex-Im lending levels, and permit Ex-Im's China and Transformational Exports Program workstream to accept greater loan-loss risk across its portfolio and expand its transformational export areas.
- Increase the permissible Ex-Im Bank default rate from 2 percent to at least 4 percent in reauthorizing legislation.
- Permit Ex-Im, through reauthorization, to finance weapons exports to U.S. allies (with approval from the Pentagon).
- Increase development finance investments.
- Expand DFC's institutional capacity and expertise.
- Require DFC to use its financial tools to explicitly reduce third countries' reliance on PRC investments, technologies, or standards, and to the extent possible, focus on national economic power industries.
- Make it clear that recipients of DFC funding are not permitted to expend resources on products or services made by Chinese companies (unless there is no feasible alternative).
- Charge the Commerce Department with establishing a national, interagency, and intergovernmentally aligned trade promotion system.

- Remove the limitation on financing weapons exports that Congress placed on the Ex-Im Bank.
- Significantly increase the lending authorities for the Foreign Military Financing (FMF) program.
- Be more supportive of foreign weapons sales, even to countries that are problematic from a human rights perspective, as long as they are not military adversaries.
- Increase the reporting thresholds for sales the administration must report to Congress.
- Accelerate internal review and approval of proposed FMS by streamlining deal approval among the so-called congressional "Four Horsemen."
- Pass legislation that exempts U.S. firms' bribery in China and also allows U.S. firms to get a timely exemption to the FCPA from DOJ if they can show that the bribe is needed to win a contract in a foreign country against a Chinese competitor.
- Establish a narrowly tailored pilot authority that allows the Intelligence Community to share classified assessments with vetted U.S. firms competing with Chinese firms for third-country contracts.
- Ensure that agency budgets, especially the State Department's, include expanded funding for relationship-building and education efforts with government officials in contested nations.
- Raise the federal R&D tax credit to match China's incentive generosity rate by increasing the Alternative Simplified Credit (ASC) from 14 percent to 38 percent.
- Allow expenditures on workforce training and global standards setting to also qualify for the R&D tax credit.
- Institute a national power industry tax credit, modeled on the CHIPS tax credit law, that would only apply to national economic power industries.
- Tax dividends as normal income.
- Boost the capital gains tax rate and extend the holding-period time horizon for qualifying for lower rates.
- Reduce the incentives for companies to buy back their own stock by increasing the buyback tax rate.
- Allow corporate tax deductions for executive compensation above $20 million per year.
- Provide at least some federal support for strategic capital funds, or make subsidiary investments to support firms backed by strategic capital funds.
- Tie federal funding to states based on whether their state pension funds include some kind of national economic power investment mandate, and do the same with the Federal Thrift Savings Plan.
- Take steps to limit the power of hedge funds to force short-termism and capital extraction.

- Reconsider the legislative and regulatory changes—including SEC proxy rule amendments, the National Securities Markets Improvement Act (NSMIA), and fiduciary obligations for pension and mutual funds to vote their shares—that have empowered hedge fund activists.
- Pass legislation to penalize organizations that allow their investments to be used in the service of "activist investors" who own a small share of a company's stock but enlist institutional investors to join their demands for the corporation to transfer cash to shareholders.
- Make it clear that, in national economic power industries, CFIUS should be able to block domestic hostile takeovers if there is a risk that they would weaken firms' dynamic capabilities, especially vis-à-vis China competition.
- Provide funding to expand early stage investment programs focused on national security, including InQTel, the Defense Innovation Unit's National Security Investment Capital program, the Air Force's AFWERX STRATFI/TACFI program, the War Department's Office of Strategic Capital, and DOD's Accelerate the Procurement and Fielding of Innovative Technologies program.
- Make a one-time appropriation to establish an Industrial Finance Corporation, which would then make more patient capital investments in national economic power industries.
- Establish and fund a New Schools America Fund to encourage state legislatures to create specialized organizations for new, innovative schools that are independent of traditional school management.
- Make federal higher education funding contingent on state colleges and universities eliminating specific course requirements beyond a minimum (such as two years of math).
- Allocate $600 million per year for the next five years to the National Science Foundation (NSF), with matching funds from states, local school districts, and industry, to invest in both the creation of new math and science high schools and the expansion of existing ones.
- Provide federal funding, through either the Department of War or the Department of Education, to establish manufacturing and engineering programs at at least a quarter of America's middle and high schools.
- Increase funding for the Carl D. Perkins Career and Technical Education Act formula grants to states, and allow states to apply for matching grants to expand technical education in high schools, including engineering courses (e.g., robotics) and maker spaces.
- Require that any college receiving federal funding disclose its National Survey of Student Engagement (NSSE) scores.
- Pass a third Morrill Act to incentivize state land grant universities to return to their original mission of technical education aligned with industry needs.
- Require agencies such as NSF and the Department of Energy that currently prioritize basic research to dedicate at least 25 percent of all federal research funding given to land grants to "translational or applied" research.

- Appropriate funds to the Department of Education to establish a competition to establish up to 10 industry- or technology-focused universities.
- Provide the Department of Education with funds to operate a challenge grant competition wherein schools could apply to create practical education programs within their institutions or create new practical colleges.
- Ensure that all federal student aid, including Pell Grants, can be used to support practical college education.
- Ensure that NSF has adequate funding to establish an annual funding program for research universities (including land grant colleges) to establish new science and technology curricula in areas of national importance.
- Treat giftedness as federal policy treats disabilities, requiring states and school districts to test for it and provide appropriate learning environments, ideally by creating new schools for gifted students.
- Reform the O-1A visa to allow applicants to qualify if they meet one of the eight possible requirements (instead of three).
- Allow O-1A visa applicants to qualify if they are in the top 1 percent of international SAT test takers in the math section and in the top 5 percent in the reading and writing portions.
- Appropriate at least $90 billion more annually for research spending targeted to supporting innovation in national economic power industries.
- Reduce the imbalance between science and engineering research support by directing at least one-third of new funding to engineering, up from around 15 percent.
- Target new research funding to areas of science, engineering, and technology that have direct implications for national economic power industries.
- Triple the NIST budget and double the DARPA budget over five years.
- Require that significant research funds go to mid-level Technology Readiness Levels and that research proposals demonstrate interest and commitment to having the research commercialized in the United States or with allies that have reciprocal programs with the United States.
- Double War Department basic, applied, and advanced-technology research funding from around $21 billion to $42 billion.
- Create a “civilian DARPA” to co-invest with industry on research and application of key technologies needed for dual-use national security leadership in the commercial sector.
- Direct most new additional research funding not to individual investigators pursuing basic research, but to institutional models that engage much more deeply with industry.
- Create new kinds of research universities focused on a few narrow technology areas by providing NSF with at least a one-time appropriation of $1 billion to award to around five entities that seek to create specialized research universities.

- Establish five national industrial research institutes focused on key, dual-use industries and technologies, modeled after Taiwan's Industrial Technology Research Institute.
- Significantly expand the Manufacturing USA centers' public-private precompetitive research institutes from 18 to at least 36.
- Direct some of the increased research funding to states that agree to increase their own funding for R&D centers focused on research related to national economic power industry technology needs.
- Modify the collaborative R&D tax credit to boost the credit rate from 20 percent to 50 percent for industry funding of university or federal lab research or industry-led collaborative research.
- Provide funding for grants to higher education institutions that want to develop new institutional approaches for training scientists and engineers.
- Pass comprehensive data privacy legislation that preempts state privacy and data breach notification laws, including both comprehensive state privacy laws and sectoral privacy laws that target biometric data, such as Illinois's Biometric Information Privacy Act (BIPA), or data collection and use for AI.
- Impose a five-year moratorium on state AI and children's online safety laws while working toward passing a national AI framework and children's online safety legislation that addresses online harms to children.
- Pass net neutrality legislation that does not regulate broadband Internet as a telecommunications common carrier under Title II of the Communications Act and instead codifies widely agreed-upon Internet protections and gives the Federal Communications Commission (FCC) reasonable jurisdiction to enforce open Internet rules.
- Pass the Improving Digital Identity Act to create a framework for deploying a digital ID system at the federal, state, and local levels.
- Remain constantly on the alert for rent-seeking protectionist actions at the state level, whether they come from car dealers, real estate agents, liquor wholesalers, banks, taxi industries, or others.
- Update the Permanent Internet Tax Freedom Act to ban both taxes on wireless services and discriminatory taxes on digital goods and services that do not have a physical component.
- Pass legislation instructing the Alcohol and Tobacco Products Tax and Trade Bureau, FTC, and Food and Drug Administration to establish uniform regulations for age-restricted or medical products purchased online.
- Update the Uniform Electronic Transactions Act and Electronic Signatures in Global and National Commerce Act to require states to recognize the legality and enforceability of records, signatures, and contracts secured over a blockchain.
- Preempt state right-to-repair laws with a consistent right-to-repair standard for electronics at the federal level.

- Ensure that states repeal industry-specific regulations that balkanize national markets, starting by forcing California to repeal its separate laws regulating automobile emissions.
- Reduce federal funds to states that choose to impose their own product and service standards above federal standards.
- Ensure that key interstate infrastructure is truly interstate in nature and not allow states to restrict it, such as by penalizing states that ban or significantly limit the development of AI data centers.
- Pass a law making clear that federal antitrust laws set the outer bounds of liability for state antitrust laws.
- Pass the SMARTER Act, which would require the FTC to litigate merger cases in federal court rather than in its own administrative process, and to satisfy the same preliminary injunction standards as DOJ.
- Pass the One Agency Act and merge all antitrust enforcement into DOJ.
- Repeal NEPA, except perhaps for projects on federally owned lands.
- Repeal Section 404 of the Clean Water Act.
- Allocate approximately 80 percent of Highway Trust Fund revenues to states as formula grants based on states' contributions, with no strings attached, and reserve the remaining 20 percent for interstate projects of national significance.
- Pass legislation providing the Department of Commerce with the authority to identify up to 100 projects a year of national economic power importance that qualify for streamlined regulatory approval, limited legal challenges, and reduced compliance burdens.
- Charge the Commerce Department with designating a set of preapproved very large industrial sites—50 to 100 nationally, each at least 3,000 acres in size—where comprehensive environmental and permitting review has already been completed and utilities are guaranteed.
- Direct the administration to create an entity in government that weighs in on regulatory decisions to defend innovation, productivity, and competitiveness and the interests of national power industries.
- Embrace firm size neutrality and abolish small business preferences, including government procurement preferences, regulatory exemptions, small business financing programs, and tax benefits that favor small firms.
- Establish a new Undersecretary for Defense, Dual-Use, and Enabling Industries at the War Department.
- Establish a quasi-public National Advanced Industry and Technology Agency (NAITA) organized like the Ex-Im Bank, but with greater flexibility.
- Establish a Joint Economic Competitiveness Committee, separate from but akin to the Joint Economic Committee, to bring coherence to Congress's disparate efforts on economic competitiveness.

- Establish a National Economic Security Council (NESC) whose job would be to manage economic competition with adversaries, especially China.
- Statutorily reconstitute the Council of Economic Advisers as the Council of Economic and Enterprise Advisors.
- Establish a new undersecretary position at the State Department to assume responsibility for monitoring U.S.-China relations and PRC actions around the world.

Endnotes

Notes for the Forward

1. Robert D. Atkinson and Ian Tufts, "The Hamilton Index, 2023: China Is Running Away With Strategic Industries" (ITIF, December 2023), https://itif.org/publications/2023/12/13/2023-hamilton-index/; Robert D. Atkinson, "China Is Rapidly Becoming a Leading Innovator in Advanced Industries" (ITIF, September 2024), https://itif.org/publications/2024/09/16/china-is-rapidly-becoming-a-leading-innovator-in-advanced-industries/.
2. ITIF Hamilton Center on Industrial Strategy, https://itif.org/centers/hamilton/.
3. "About ITIF's Hamilton Center on Industrial Strategy," https://itif.org/publications/2022/06/06/about-the-hamilton-center-on-industrial-strategy/.
4. Robert D. Atkinson, "Computer Chips vs. Potato Chips: The Case for a U.S. Strategic-Industry Policy" (ITIF, January 2022), https://itif.org/publications/2022/01/03/computer-chips-vs-potato-chips-case-us-strategic-industry-policy/.
5. Robert D. Atkinson, "Think Like an Enterprise: Why Nations Need Comprehensive Productivity Strategies" (ITIF, May 2016), https://www2.itif.org/2016-think-like-an-enterprise.pdf.

Notes for Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance

1. Congress.gov. "The U.S. Defense Industrial Base: Background and Issues for Congress," October 14, 2025, https://www.congress.gov/crs-product/R47751; Kathleen Snyder, "Despite Sanctions, U.S. Defense Still Sources from China," September 26, 2023, https://www.americansecurityproject.org/us-defense-supplies-china/; Jeffrey Newman, "New report: over 40 percent of semiconductors for U.S. weapons systems still sourced from China," blog post, January 9, 2024, https://jeffnewmanlaw.com/new-report-over-40-percent-of-semiconductors-for-u-s-weapons-systems-still-sourced-from-china/.
2. Chris Miller, *The Struggle to Save the Soviet Economy: Mikhail Gorbachev and the Collapse of the USSR* (University of North Carolina Press, 2016), https://uncpress.org/9781469630182/the-struggle-to-save-the-soviet-economy/.
3. I define the "West" as economically advanced democracies, including Australia, South Korea. Japan, and Taiwan.
4. Frank Bourgin, *The Great Challenge: The Myth of Laissez-faire in the Early Republic* (George Brziller, 1989) 92.
5. Ibid., 94.
6. John Lauritz Larson, *Internal Improvement: National Public Works and the Promise of Popular Government in the Early United States* (Chapel Hill: UNC Press, 2001), 64.
7. Ibid., 57.
8. Bourgon, *The Great Challenge*, 151.
9. "Thomas Jefferson to Benjamin Austin, 9 January 1816," https://founders.archives.gov/documents/Jefferson/03-09-02-0213.
10. Michael Lind, *Land of Promise: An Economic History of the United States* (New York: Harper, 2013), 140.

11. David Kredrosky, "The decline and fall of the British economy" (Work in Progress, July 2022), https://worksinprogress.co/issue/the-decline-and-fall-of-britain/.
12. Ibid.
13. Harry Truman, "Annual Message to Congress (1946)" (Teaching American History, January 1946), https://teachingamericanhistory.org/document/state-of-the-union-address-part-i-1946/.
14. The Executive Secretary on Basic National Security Policy, *A Report to the National Security Council* (Washington DC, October 1953), https://irp.fas.org/offdocs/nsc-hst/nsc-162-2.pdf.
15. Robert Atkinson, "Advanced Industries Are Essential for US Competitiveness" (Wilson Quarterly, Winter 2023), https://www.wilsonquarterly.com/quarterly/_/advanced-industries-are-essential-for-us-competitiveness.
16. The Executive Secretary on Basic National Security Policy, *A Report to the National Security Council* (Washington DC, October 1953), https://irp.fas.org/offdocs/nsc-hst/nsc-162-2.pdf.
17. Francis Fukuyama, *The End of History and the Last Man* (New York: Free Press, 1992).
18. "Section 6: Views on Council on Foreign Relations Members" (Pew Research Center, December 2013), https://www.pewresearch.org/politics/2013/12/03/section-6-views-of-council-on-foreign-relations-members/.
19. Mitch Kokai, "What was it that Buckley said about the Boston phone book?" (John Locke, January 2013), https://www.johnlocke.org/what-was-it-that-buckley-said-about-the-boston-phone-book/.
20. Stephen Ezell, "The Trump Administration Should Refrain From Taking Equity in Semiconductor Companies" (ITIF, August 2025), https://itif.org/publications/2025/08/21/the-trump-administration-should-refrain-from-taking-equity-in-semiconductor-companies/.
21. Washington Post Editorial Board, "The Intel deal is a mistake," *The Washington Post*, August 2025, https://www.washingtonpost.com/opinions/2025/08/22/intel-trump-deal-china-chips/.
22. Ibid.
23. Heng-Fu Zou, "Liberal Ideas and the Great Enrichment: A Theoretical Model" (Annals Of Economics And Finance 26-1, 2025), https://down.aefweb.net/AefArticles/aef260101Zou.pdf.
24. Correlli Barnett, *The Audit of War: The Illusion and Reality of Britain as a Great Nation* (London: Macmillan, 1986).
25. Quoted in Broadberry and Crafts, "Britain's Productivity Gap in the 1930s: Some Neglected Factors," Warwick University discussion paper no. 364, October 1990, https://warwick.ac.uk/fac/soc/economics/research/workingpapers/1989-1994/twerp364.pdf.
26. Ibid., 159
27. Barnett, *The Audit of War*.
28. Broadberry and Crafts, 37.
29. Barnett, *The Audit of War*.
30. Broadberry and Crafts, 237.
31. Heng-Fu Zou, "Strategic Trade, Industrial Power, and Geopolitical Rivalry: A Two-Country Differential Game of the U.S.-China Conflict" (June 2025), https://down.aefweb.net/WorkingPapers/w774.pdf.
32. Ibid.
33. Ibid., 25.
34. Ibid., 25.
35. ThoughtCo, "Vladimir Lenin Quotes," https://www.thoughtco.com/lenin-quotes-4779266.

36. "Conditions of Soviet Technology: Industrial Innovation in the Soviet Union" (January 1983), https://www.cia.gov/readingroom/docs/CIA-RDP85T00153R000100010024-4.pdf.
37. Henry Farrell and Abraham Newman, *Weaponized Interdependence: How Global Economic Networks Shape State Coercion* (MIT Press Volume 44 Issue 1, Summer 2019).
38. Robert Atkinson, "We Are in an Industrial War. China Is Starting to Win." *The New York Times,* January 2025, https://www.nytimes.com/2025/01/09/opinion/china-industrial-war-power-trader.html.
39. Friends of Socialist China (@socialist_china) "Xi Jinping: 'China's success proves that socialism is not dead. It is thriving. Just imagine this: had socialism failed in China, had our communist party collapsed like the party in the Soviet Union, then global socialism would lapse into a long dark age'" (X, December 2024), https://x.com/socialist_china/status/1871742593987432793.
40. "International Friction and Cooperation in High-Technology Development and Trade: Papers and Proceedings" (National Academies of Sciences, Engineering, and Medicine, The National Academies Press, 1997), https://doi.org/10.17226/5902.
41. Ibid.
42. "Friedrich List" (Wikipedia), https://en.wikipedia.org/wiki/Friedrich_List.
43. NIST Office of Advanced Manufacturing, "China's Manufacturing Innovation Centers" (NIST Advanced Manufacturing Series NIST AMS 600-17, May 2025), https://doi.org/10.6028/NIST.AMS.600-17.
44. Stephen Brooks and Ben Vagle, "The Real China Trump Card," *Foreign Affairs*, February 2025, https://www.foreignaffairs.com/united-states/real-china-trump-card-brooks-vagle.
45. James Manyika et al., "Building a more competitive US manufacturing sector" (McKinsey Global Institute Discussion Paper, April 2021), https://www.mckinsey.com/featured-insights/americas/building-a-more-competitive-us-manufacturing-sector.
46. Orville Schell, *Wealth and Power: China's Long March to the Twenty-first Century* (Random House, July 2013).
47. William Janeway, *Doing Capitalism in the Innovation Economy: Markets, Speculation and the State* (Cambridge University Press, October 2012).
48. Charles Parton, "China, science and technology: Advancing geopolitical aims" (Council on Geostrategy: China Observatory, February 2025), https://www.geostrategy.org.uk/app/uploads/2025/04/No.-2025-05-China-science-and-technology-advancing-geopolitical-aims.pdf.
49. Daniel Tobin, "The Persistent, Soaring Ambitions of Xi Jinping's "New Era" for China, Socialism, and the Globe" (The Asian Forum, September-October 2025), https://theasanforum.org/the-persistent-soaring-ambitions-of-xi-jinpings-new-era-for-china-socialism-and-the-globe/.
50. Ibid.
51. Parton, "China, science and technology."
52. Tobin, "The Persistent, Soaring Ambitions of Xi Jinping's "New Era" for China, Socialism, and the Globe."
53. Ibid.
54. Ibid.
55. Ibid.
56. Ibid.
57. Ibid.
58. Ibid.

59. Ibid.
60. Ibid.
61. Charles Parton, "China, science and technology: Advancing geopolitical aims" (Council on Geostrategy: China Observatory, February 2025).
62. Ibid., 7.
63. Ibid., 8
64. Ibid.
65. Ibid.
66. Jude Blanchette and Ryan Hass, "Know Your Rival, Know Yourself," *Foreign Affairs*, January 2025, https://www.foreignaffairs.com/united-states/know-your-rival-know-yourself-china, 70.
67. Kyle Chan, Thomas Des Garets Geddes, and Alisa Brown, "Chinese industrial maximalism: Lu Feng" (High Capacity, June 2025), https://www.high-capacity.com/p/chinese-industrial-maximalism.
68. Ibid.
69. Ibid.
70. Wang Yu, "[Technology strengthens our country and we are strong] The connotation and characteristics of strategic emerging industries and future industries" (People's Forum, March 2024), https://web.archive.org/web/20240503094123/http:/www.rmlt.com.cn/2024/0327/698740.shtml.
71. PRC State Council, "Notice of the State Council on the Publication of 'Made in China 2025'" (CSET, May 2025), https://cset.georgetown.edu/wp-content/uploads/t0432_made_in_china_2025_EN.pdf.
72. PRC State Council, "National 13th Five-Year Plan for the Development of Strategic Emerging Industries" (CSET, December 2019), https://share.google/2CxCvhXZ9wG6HSqbM.
73. Kyle Chan, "Chinese industrial maximalism: Lu Feng," *High Capacity* (Substack), June 19 2025, https://www.high-capacity.com/p/chinese-industrial-maximalism.
74. Stephen Chen, "Made in China 2035: will it topple US hi-tech, military manufacturing in 10 years?" *South China Morning Post*, October 2024, https://www.scmp.com/news/china/science/article/3280584/made-china-2035-will-it-topple-us-hi-tech-and-military-manufacturing-10-years.
75. James Kynge, "China's high-tech rise sharpens rivalry with the US," *The Financial Times*, January 18, 2022, https://www.ft.com/content/aef33e33-523d-4360-981a-2daee579d9b5.
76. "Great Rejuvenation of the Chinese Nation" (Council on Foreign Relations, Chinese Open Source Observatory), https://chinaopensourceobservatory.org/glossary/great-rejuvenation-of-the-chinese-nation.
77. Chinese language document, https://web.archive.org/web/20250219144417/http://www.rmlt.com.cn.
78. Wei Ziping, "[A strong nation in science and technology, I am yours] Achieving self-reliance in science and technology and accelerating the construction of a strong nation in science and technology" (People's Forum, November 2023), https://web.archive.org/web/20250219144417/http://www.rmlt.com.cn/2023/1122/688379.shtml.
79. Jim Canrong, "The Uncertainty of the International Situation and the Fourth Industrial Revolution" (Council on Foreign Relations: China Open Source Observatory, March 2019), https://chinaopensourceobservatory.org/articles/the-uncertainty-of-the-international-situation-and-the-fourth-industrial-revolution.
80. Matt Pottinger, "Is Trump Getting Played by Xi?" *The Free Press*, October 29, 2025, https://www.thefp.com/p/is-trump-getting-played-by-xi.

81. Jimmy Goodrich, "China's Evolving Fortress Economy Outlook," IGCC Working Paper No 5., https://escholarship.org/uc/item/9q53t1sz.
82. Ibid.
83. Robert Atkinson and Stephen Ezell, "Toward Globalization 2.0: A New Trade Policy Framework for Advanced-Industry Leadership and National Power" (ITIF, March 2025), https://itif.org/publications/2025/03/24/globalization2-a-new-trade-policy-framework/.
84. Michael Martina, Kevin Yao, and Yawen Chen, "Exclusive - Facing U.S. blowback, Beijing softens 'Made in China 2025' message" (Reuters, June 2018), https://www.reuters.com/article/world/uk/exclusive-facing-us-blowback-beijing-softens-made-in-china-2025-message-idUSKBN1JL12F/.
85. Rush Doshi, "The long game: China's grand strategy to displace American order" (Brookings, August 2021), https://www.brookings.edu/articles/the-long-game-chinas-grand-strategy-to-displace-american-order/.
86. Office of Senator Marco Rubio, "Made in China 2025 and the Future of American Industry," February 12, 2019, https://www.rubio.senate.gov/rubio-releases-report-outlining-china-s-plan-for-global-dominance-and-why-americamust-respond/.
87. HR McMaster and Andrew Grotto, "Economic Statecraft: The Need for an Integrated Approach" (Hoover Institute, March 2025), https://www.hoover.org/research/economic-statecraft-need-integrated-approach.
88. Ibid.
89. Aaron Friedberg, "Stopping the Next China Shock: A Collective Strategy for Countering Beijing's Mercantilism," *Foreign Affairs*, August 2024, https://tnsr.org/2022/01/the-growing-rivalry-between-america-and-china-and-the-future-of-globalization/.
90. Ibid.
91. Ibid., 8.
92. Robert D. Atkinson, "Enough is Enough: Confronting Chinese Innovation Mercantilism" (ITIF, February 2012), https://itif.org/publications/2012/02/28/enough-enough-confronting-chinese-innovation-mercantilism.
93. Kun Jiang et al., "International Joint Ventures and Internal vs External Technology Transfer Evidence from China" (working paper, National Bureau of Economic Research, Inc., 2018), https://ideas.repec.org/p/nbr/nberwo/24455.html.
94. Office of the U.S. Trade Representative Executive Office of the President, "Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation Under Section 301 of the Trade Act of 1974" (Washington DC: March 2018), 22, https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF.
95. ChinesePosters.net, "To surpass England in 15 years," Central Academy of Arts and Crafts, published by Renmin meishu chubanshe, https://chineseposters.net/posters/e37-368.
96. Jie Gao, "What the 20th Party Congress Report Tells Us About China's AI Ambitions," *The Diplomat*, November 2022, https://thediplomat.com/2022/11/what-the-20th-party-congress-report-tells-us-about-chinas-ai-ambitions/.
97. "Far From Normal: An Augmented Assessment of China's State Support" (Rhodium Group, March 2025), https://rhg.com/research/far-from-normal-an-augmented-assessment-of-chinas-state-support/.
98. Gerard DiPippo et al., "Red Ink: Estimating Chinese Industrial Policy Spending in Comparative Perspective" (Center for Strategic & International Studies, May 2022), 2, https://www.csis.org/analysis/red-ink-estimating-chinese-industrial-policy-spending-comparative-perspective.

99. Frank Bickenbach et al., "Foul Play? On the Scale and Scope of Industrial Subsidies in China" (Kiel Policy Brief, April 2024), 173, https://www.ifw-kiel.de/publications/foul-play-on-the-scale-and-scope-of-industrial-subsidies-in-china-32738/.
100. Ibid.
101. Weijian Shan, "Unraveling China's Productivity Paradox," *Gavekal Dragonomics* (6 Nov. 2025), https://research.gavekal.com/article/unraveling-chinas-productivity-paradox/.
102. Robert D. Atkinson, "Chinese Manufacturers Use 12 Times More Robots Than U.S. Manufacturers When Controlling for Wages," *Innovation Files* commentary, September 5, 2023, https://itif.org/publications/2023/09/05/chinese-manufacturers-use-12-times-more-robots-than-us-manufacturers-when-controlling-for-wages/.
103. Ibid.
104. International Federation of Robotics, "World Robotics—Industrial Robots," https://ifr.org/wr-industrial-robots/.
105. "How is the Belt and Road Initiative Advancing China's Interests?" (China Power, October 2024), https://chinapower.csis.org/china-belt-and-road-initiative/.
106. Linda Calabrese, "The Belt and Road Initiative: what impact on China and the global economy?" (Economics Observatory, May 2025), https://www.economicsobservatory.com/the-belt-and-road-initiative-what-impact-on-china-and-the-global-economy.
107. Yu Jie and Jon Wallace, "What is China's Belt and Road Initiative (BRI)?" (Chatham House, December 2022), https://www.chathamhouse.org/2021/09/what-chinas-belt-and-road-initiative-bri.
108. "International Infrastructure Projects: China's Investments Significantly Outpace the U.S., and Experts Suggest Potential Improvements to the U.S. Approach" (US GAO, September 2024), https://www.gao.gov/products/gao-24-106866.
109. I want to thank Sree Ramasawamy for helpful insights for this section.
110. James A. Dorn, "Anatomy of China's Housing Crisis: Ending Financial Repression," Cato.org, https://www.cato.org/blog/anatomy-chinas-housing-crisis-ending-financial-repression.
111. Sarah Chan, "Financial repression and financial risk: the case of China," T and F online, July 3, 2020, https://www.tandfonline.com/doi/full/10.1080/14631377.2020.1833554.
112. Johns Hopkins School of Advanced International Studies, "Curriculum MAIA," https://sais.jhu.edu/academics/degree-programs/master-degrees/master-arts-international-affairs/curriculum.
113. Harvard Division of Continuing Education, "Graduate Degree: International Relations," https://courses.dce.harvard.edu/?action=explore-program&program=grad%7Cgrad-international-relations&srcdb=999926.
114. Tufts University Fletcher Graduates, "Program Offerings: Master of Arts in Law and Diplomacy," https://fletchergraduates.tufts.edu/global-affairs/.
115. David Shambaugh, *Breaking the Engagement: How China Won & Lost America* (Oxford University Press, June 2025), 23.
116. Corelli Barnett, *The Collapse of British Power*, London: Faber, 1972, 85.
117. Meghan Ostertag, "US National Power Industries Are At Risk" (ITIF, November 2025), https://itif.org.
118. Corelli Barnett, *The Collapse of British Power*, Faber and Faber, 2011, 477.
119. Tom Hazeldine, "Pride and Fall" (The Family Firm, NLR 75, September 2022), https://newleftreview.org/sidecar/posts/pride-and-fall.

120. Robert M. Solow, "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics* 39, no. 3 (August 1957): 312–320.
121. President Barack Obama, "Strategy for American Innovation: Introduction" (The White House Archives, November 2010), https://obamawhitehouse.archives.gov/innovation/strategy/introduction.
122. Ibid.
123. Stephen Currall and Venkatesh Narayanamurti, "Fostering Innovation to Strengthen US Competitiveness Through the National Science Foundation" (Issues in Science and Technology, May 2022), https://issues.org/innovation-competitiveness-national-science-foundation-nsf-currall-narayanamurti.
124. Tanner Green, "Obscurity by Design: Competing Priorities for America's China Policy" (Foreign Policy Research Institute Asia Project, March 2025), https://www.fpri.org/article/2025/03/obscurity-by-design/.
125. Eric Schmidt and Selina Xu, "China Is Building the Future," *The Atlantic*, October 29, 2025, https://www.theatlantic.com/ideas/archive/2025/10/united-states-china-technology/684754/.
126. He Huifeng, "Roomba revolution: how China swallowed up the robot vacuum market," *South China Morning Post*, September 2025, https://www.scmp.com/economy/china-economy/article/3326150/roomba-revolution-how-china-swallowed-robot-vacuum-market.
127. Real Charts, "Industrial Commons" (Real China Charts, February 2025), https://www.realchinacharts.com/p/industrial-commons.
128. Andy Grove, "How America Can Create Jobs," *Bloomberg*, July 1, 2010, https://www.bloomberg.com/news/articles/2010-07-01/andy-grove-how-america-can-create-jobs.
129. Ibid.
130. Ludwig Von Mises, *Human Action* (New Haven CT, 1949).
131. Milton Friedman, "The Goldwater View of Economics," *New York Times,* October 1964, https://miltonfriedman.hoover.org/internal/media/dispatcher/214906/full.
132. W Michael Cox, "Schumpeter in His Own Words" (Economic Insights Vol 6. No 3., 2001), https://faculty.fgcu.edu/bhobbs/Schumpeter.pdf.
133. Fahri Karakaya, "Barriers to entry in industrial markets," *The Journal of Business and Industrial Marketing*, 2002, https://www.researchgate.net/publication/235266042_Barriers_to_entry_in_industrial_markets, 379.
134. Shambaugh, *Breaking the Engagement: How China Won & Lost America*, 17.
135. Andy Rothman, "The Benefits of Engagement," *The Wire China*, March 28, 2021, https://www.thewirechina.com/2021/03/28/the-benefits-of-engagement/.
136. U.S.–China Business Council, "Understanding the U.S.–China Trade Relationship," January 9, 2017, https://www.uschina.org/articles/understanding-the-us-china-trade-relationship/.
137. Michael D. Swaine et al., "The Overreach of the China Hawks," *Foreign Affairs*, October 23, 2020, https://www.foreignaffairs.com/articles/china/2020-10-23/overreach-china-hawks.
138. Robert D. Atkinson, "Industry by Industry: More Chinese Mercantilism, Less Global Innovation" (ITIF, May 10, 2021), https://itif.org/publications/2021/05/10/industry-industry-more-chinese-mercantilism-less-global-innovation/.
139. Michael D. Swaine, et al., "The Overreach of the China Hawks: Aggression Is the Wrong Response to Beijing," *Foreign* Affairs, October 23, 2020, https://www.foreignaffairs.com/articles/china/2020-10-23/overreach-china-hawks.
140. Swaine, "The Overreach of the China Hawks."

141. "Country Comparison Taiwan vs. China," countryeconomy.com, https://countryeconomy.com/countries/compare/taiwan/china?sc=XE34.
142. Yoichi Funabashi et al., "An Emerging China in a World of Interdependence: A Report to the Trilateral Commission," *Foreign Affairs*, September/October 1994, https://www.foreignaffairs.com/reviews/capsule-review/1994-09-01/emerging-china-world-interdependence-report-trilateral-commission.
143. "An Open Letter on U.S.-China Relations," CPD, July 16, 2019, https://uscpublicdiplomacy.org/story/open-letter-us-china-relations.
144. Blanchette and Hass, "Know Your Rival, Know Yourself."
145. Ibid.
146. Swaine, "The Overreach of the China Hawks."
147. Robert D. Atkinson, "Industry by Industry: More Chinese Mercantilism, Less Global Innovation" (ITIF, May 10, 2021), https://itif.org/publications/2021/05/10/industry-industry-more-chinese-mercantilism-less-global-innovation/.
148. Shambaugh, *Breaking the Engagement: How China Won & Lost America*, 118.
149. The White House, "Remarks and Q&A by National Security Advisor Jake Sullivan on the Future of U.S.-China Relations," speech by Jake Sullivan, January 30, 2024, https://bidenwhitehouse.archives.gov/briefing-room/speeches-remarks/2024/01/30/remarks-and-qa-by-national-security-advisor-jake-sullivan-on-the-future-of-u-s-china-relations/.
150. House Committee on Oversight and Government Reform, "Final Report: COVID Select Concludes 2-Year Investigation, Issues 500+ Page Final Report on Lessons Learned and the Path Forward," press release, December 2, 2024, https://oversight.house.gov/release/final-report-covid-select-concludes-2-year-investigation-issues-500-page-final-report-on-lessons-learned-and-the-path-forward/.
151. Ha Jiming and Adam S. Posen, "US-China Economic Relations: From Conflict to Solutions" (Peterson Institute for International Economics (PIIE), June 2018), https://www.piie.com/sites/default/files/documents/piieb18-1.pdf.
152. Ibid.
153. Ibid.
154. Ryan Hass, "A Roadmap for US-China Relations in 2023" (Brookings, January 4, 2023), https://www.brookings.edu/articles/a-roadmap-for-us-china-relations-in-2023/.
155. Stephanie Hinnershitz, "The Marshall Plan and Postwar Economic Recovery," The National WWII Museum, March 30, 2022, https://www.nationalww2museum.org/war/articles/marshall-plan-and-postwar-economic-recovery.
156. Shambaugh, *Breaking the Engagement: How China Won & Lost America*, 73.
157. "Agreement Between the United States and China on Cooperation in Science and Technology," The American Presidency Project, January 31, 1979, https://www.presidency.ucsb.edu/documents/agreement-between-the-united-states-and-china-cooperation-science-and-technology.
158. Office of Science and Technology Cooperation, "United States – China Science and Technology Cooperation: Biennial Report to the United States Congress" (Washington DC: Department of State, July 2012), https://2009-2017.state.gov/documents/organization/197119.pdf.
159. Congressional Research Service (CRS), "U.S. Assistance Programs in China" (CRS: Washington DC, January 12, 2016), https://www.congress.gov/crs_external_products/RS/PDF/RS22663/RS22663.48.pdf.

160. John Barrasso, "Barrasso Bill Ends Lending to China from World Bank and Asian Development Bank," press release, March 22, 2023, https://www.barrasso.senate.gov/newsroom-news-releases-barrasso-bill-ends-lending-to-china-from-world-bank-and-asian-development-bank/.
161. Didi Tang and Collin Binkley, "Pentagon-funded research at colleges has aided the Chinese military, a House GOP report says," *Associated Press*, September 5, 2025, https://apnews.com/article/china-pentagon-funding-research-military-bf8640d0e04c016f4af513350078d58c#.
162. Peter W. Rodman, "Between Friendship and Rivalry: China and America in the 21st Century," *Foreign Affairs*, September 1, 1998, https://www.foreignaffairs.com/reviews/capsule-review/1998-09-01/between-friendship-and-rivalry-china-and-america-21st-century.
163. Ibid.
164. Charles L. Glaser, "China's Rise Can Be Peaceful if the U.S. Doesn't Provoke It," *New York Times*, December 16, 2016, https://www.nytimes.com/roomfordebate/2016/12/14/can-trump-get-tough-with-china/chinas-rise-can-be-peaceful-if-the-us-doesnt-provoke-it.
165. Shambaugh, *Breaking the Engagement: How China Won & Lost America*, 21.
166. Jake Werner, " A Program for Progressive China Policy" (Quincy Institute for Responsible Statecraft, July 30, 2024), https://quincyinst.org/research/a-program-for-progressive-china-policy/#h-two-countries-dominated-by-anxiety-and-insecurity.
167. Wilfred Chan, "What Does it Take to Explain China to America?" (Carnegie Corporation of New York, August 18, 2025), https://www.carnegie.org/our-work/article/what-does-it-take-to-explain-china-to-america/.
168. Ibid.; National Committee on U.S.-China Relations, "Public Intellectuals Program," webpage, accessed October 14, 2025, https://www.ncuscr.org/program/public-intellectuals-program/.
169. NCUSCR (@NCUSCR), "Beijing is tightening its grip on Hong Kong. Alarm bells should be ringing across the world," X (formerly Twitter), August 14, 2023, https://x.com/NCUSCR/status/1957861498816008193.
170. NCUSCR (@NCUSCR), "China is not the only country that is not happy about significant aspects of the global governance system," X (formerly Twitter), August 12, 2025, https://x.com/NCUSCR/status/1955329294814617990.
171. "Federal and State Bills Restricting Property ownership by Foreign Entities," *Committee of 100*, August 20, 2025, https://www.committee100.org/our-work/federal-and-state-bills-prohibiting-property-ownership-by-foreign-individuals-and-entities/.
172. "Racial Profiling Among Scientists of Chinese Descent and Consequences for the U.S. Scientific Community," *Committee of 100*, https://www.committee100.org/our-work/racial-profiling-among-scientists-of-chinese-descent-and-consequences-for-the-u-s-scientific-community/.
173. Jeffrey D. Sachs, "Jeffrey Sachs on China's 'Historic' Push for Multipolar World to End U.S. Domination," interviewed by Amy Goodman, April 25, 2023, accessed October 2, 2025, https://www.jeffsachs.org/interviewsandmedia/y7jhwrb4mxmtemng4znt8yyl3lj22k.
174. Jeffrey D. Sachs, "US-China Ties could Improve Under Realistic Trump," *JDS*, February 19, 2025, https://www.jeffsachs.org/newspaper-articles/xzear88bfchftaxl38jhglznm4zyh2?rq=china.
175. Jeffrey D. Sachs, "China's Success is Part of Global Success," October 14, 2020, accessed October 2, 2025, https://www.jeffsachs.org/interviewsandmedia/b8mktmgnj5dtddllkxsxe4nl6ddz3n?rq=china.
176. Ibid.
177. "A Decade of Inspiration: Interview with Jeffrey Sachs," *Global Times*, October 20, 2022, https://www.globaltimes.cn/page/202210/1277580.shtml.
178. Ibid.

179. C. Fred Bergsten, *The United States vs. China: The Quest for Global Economic Leadership* (Cambridge, MA: Polity Press, 2022).
180. Ibid.
181. Mariano-Florentino Cuellar et al., "U.S.-China Relations for the 2030s: Toward a Realistic Scenario for Coexistence" (Carnegie Endowment for International Peace, October 17, 2024), https://carnegieendowment.org/research/2024/10/us-china-relations-for-the-2030s-toward-a-realistic-scenario-for-coexistence?lang=en.
182. Nicholas R. Lardy, "China's Unfinished Economic Revolution," *Foreign Affairs*, September 1, 1998, https://www.foreignaffairs.com/reviews/capsule-review/1998-09-01/chinas-unfinished-economic-revolution.
183. John Mueller, "The Case Against Containment," *Foreign Affairs*, September 21, 2023, https://www.foreignaffairs.com/united-states/case-against-containment.
184. Daisuke Wakabayashi, "China's Problem With Competition: There's Too Much of It," *The New York Times*, July 22, 2025, https://www.nytimes.com/2025/07/22/business/china-involution-competition-deflation.html.
185. Yi Fuxian, "The End of the Chinese Dream," *Project Syndicate*, March 11, 2025, https://www.project-syndicate.org/magazine/china-shrinking-labor-force-dark-economic-outlook-by-yi-fuxian-2025-03.
186. Bret Stephens, "How Will We Win the Second Cold War," *The New York Times*, March 29, 2021, https://www.nytimes.com/2021/03/29/opinion/biden-china.html.
187. Yi Fuxian, "The End of the Chinese Dream," *Project Syndicate*, March 11, 2025, https://www.project-syndicate.org/magazine/china-shrinking-labor-force-dark-economic-outlook-by-yi-fuxian-2025-03.
188. "The Longer Telegram: Toward a New American China Strategy," *Atlantic Council,* 2021, https://www.atlanticcouncil.org/content-series/atlantic-council-strategy-paper-series/the-longer-telegram/.
189. Ibid.
190. Ibid.
191. "An Open Letter on U.S.-China Relations," CPD, July 16, 2019, https://uscpublicdiplomacy.org/story/open-letter-us-china-relations.
192. Ibid.
193. Andreea Brinza et al., "EU-China Relations: De-Risking or De-Coupling – The Future of the EU Strategy Towards China" (Brussels, Belgium: European Parliament, March 2024), https://www.europarl.europa.eu/RegData/etudes/STUD/2024/754446/EXPO_STU(2024)754446_EN.pdf.
194. Richard J. Shuster, "Trying Not to Lose It," *Journal of Advanced Military Studies,* vol. 14, no. 1 (Spring 2023), https://www.usmcu.edu/Outreach/Marine-Corps-University-Press/MCU-Journal/JAMS-vol-14-no-1/Trying-Not-to-Lose-It/.
195. Blanchette and Hass, "Know Your Rival, Know Yourself."
196. Ibid.
197. Jerry Haar, "American Manufacturing is Alive and Well," *The National Interest*, June 10, 2025, https://nationalinterest.org/feature/american-manufacturing-is-alive-and-well.
198. Atkinson and Tufts, "The Hamilton Index, 2023: China is Running Away with Strategic Industries."
199. Scott Kennedy, "China Is the Wrong Industrial Policy Model for the United States" (CSIS, August 9, 2022), https://www.csis.org/analysis/china-wrong-industrial-policy-model-united-states.

200. "Will the Dual Circulation Strategy Enable China to Compete in a Post-Pandemic World?" *China Power*, last updated November 9, 2023, https://chinapower.csis.org/china-covid-dual-circulation-economic-strategy/.
201. John Tamny, "There's only one way China could surpass America," opinion, *The Washington Post*, October 10, 2025, https://www.washingtonpost.com/opinions/2025/10/10/china-tiktok-america-propaganda-capitalism/.
202. Ben A. Vagle, *Command and Commerce: America's Enduring Economic Power Advantage over China*, New York: Oxford University Press, 2025.
203. Ricardo Marto, "What's Driving the Surge in US Corporate Profits?" (Federal Reserve Bank of St Louis, April 2025), https://www.stlouisfed.org/on-the-economy/2025/apr/whats-driving-surge-us-corporate-profits.
204. Ben A. Vagle, *Command and Commerce: America's Enduring Economic Power Advantage over China* (New York: Oxford University Press, 2025), 79.
205. Robert Atkinson, "Brussels' Strategic Choice: Forge a Western Alliance to Prevail Over China, or Triangulate and Lose" (In the Arena, September 2025), https://www.policyarena.org/p/brussels-strategic-choice-forge-a.
206. Yihan Ma, "Merchandise trade balance in China from 2014 to 2024" (Statista, January 2025), https://www.statista.com/statistics/263632/trade-balance-of-china/.
207. Trelysa Long, "No, American Manufacturing Hasn't Been Revived" (ITIF, June 2025), https://itif.org/publications/2025/06/06/no-american-manufacturing-hasnt-been-revived/.
208. Robert Atkinson, "Don't Worry About Manufacturing Jobs. Worry About Manufacturing Productivity" (ITIF, November 2024), https://itif.org/publications/2024/11/04/dont-worry-about-manufacturing-jobs-worry-about-manufacturing-productivity/.
209. Trelysa Long, "China's Labor Productivity Growth Continues to Outpace US Growth" (ITIF, September 2025), https://itif.org/publications/2025/09/22/chinas-labor-productivity-growth-continues-to-outpace-us-growth/.
210. "World Robotics – Industrial Robots" (IFR International Federation of Robotics," https://ifr.org/wr-industrial-robots/.
211. Industries are other transport equipment, chemicals, computer, electronic and optical products, machinery and equipment, nec, and pharmaceuticals.
212. ITIF calculations of OECD TIVA data for 2022, https://data-explorer.oecd.org/?pg=0&bp=true&snb=14&tm=TIVA.
213. Baburajan Kizhakedath, "Huawei strengthens lead in global telecom equipment market" (March 2025, Telecomlead), https://telecomlead.com/telecom-equipment/huawei-strengthens-lead-in-global-telecom-equipment-market-120439; and Stefan Pongratz, "Key Takeaways – Worldwide Telecom Equipment Market 2018" (Dell'Oro Group, March 2019), https://www.delloro.com/telecom-equipment-market-2018-2/.
214. Taylor Freval et al., "China is not an enemy" Open Letter, *Washington Post*, July 2019, https://www.washingtonpost.com/opinions/making-china-a-us-enemy-is-counterproductive/2019/07/02/647d49d0-9bfa-11e9-b27f-ed2942f73d70_story.html.
215. Ibid.
216. Melanie Sisson, "Victory Is Not an Option," AEI.org, 110, https://www.aei.org/wp-content/uploads/2024/10/241007_Blanchette_Defining_Success.pdf.
217. Jessica Brandt, et al., "Succeeding in the AI Competition With China: A Strategy for Action" (Brookings, September 2022), https://www.brookings.edu/wp-content/uploads/2022/09/FP_20220930_us_china_tech.pdf.

218. Ibid.
219. Ibid.
220. Andreea Brinza et al., "EU-China Relations: De-Risking or De-Coupling – The Future of the EU Strategy Towards China" (Brussels, Belgium: European Parliament, March 2024).
221. Ibid.
222. The White House, "Remarks by National Security Advisor Jake Sullivan on Renewing American Economic Leadership at the Brookings Institution," speech by Jake Sullivan, April 27, 2023, https://bidenwhitehouse.archives.gov/briefing-room/speeches-remarks/2023/04/27/remarks-by-national-security-advisor-jake-sullivan-on-renewing-american-economic-leadership-at-the-brookings-institution/.
223. Andreea Brinza et al., "EU-China Relations: De-Risking or De-Coupling – The Future of the EU Strategy Towards China" (Brussels, Belgium: European Parliament, March 2024), 59.
224. Mario Draghi, "The Future of European Competitiveness: Part A, A Competitiveness Strategy for Europe" (Luxembourg: Publications Office of the European Union, 2025), 20, https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961_en.
225. Andreea Brinza et al., "EU-China Relations: De-Risking or De-Coupling – The Future of the EU Strategy Towards China" (Brussels, Belgium: European Parliament, March 2024), 62.
226. Ibid., 73.
227. Mario Draghi, "The Future of European Competitiveness: Part A, A Competitiveness Strategy for Europe" (Luxembourg: Publications Office of the European Union, 2025), https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961_en.
228. Jon Bateman, "U.S.-China Technological 'Decoupling': A Strategy and Policy Framework (Carnegie Endowment for International Peace, April 25, 2022), https://carnegieendowment.org/research/2022/04/us-china-technological-decoupling-a-strategy-and-policy-framework?lang=en.
229. Kurt M. Campbell and Ely Ratner, "The China Reckoning: How Beijing Defied American Expectations," *Foreign Affairs*, February 13, 2018), https://www.foreignaffairs.com/china/china-reckoning.
230. The White House, "Interim National Security Strategic Guidance," press release, march 3, 2021, https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2021/03/03/interim-national-security-strategic-guidance/.
231. Ibid.
232. Ulysses S. Grant, letter to Maj. Gen. Henry W. Halleck, May 11, 1864, in *The Papers of Ulysses S. Grant*, Vol. 10, January 1–May 31, 1864, ed. John Y. Simon (Carbondale: Southern Illinois University Press, 1982), 339, https://tile.loc.gov/storage-services/service/mss/mss/mss24130/010/010.pdf.
233. Center for a New American Security (CNAS), "New CNAS Report on the World-Altering Stakes of U.S.-China AI Competition," press release, April 22, 2025, https://www.cnas.org/press/press-release/new-cnas-report-on-the-world-altering-stakes-of-u-s-china-ai-competition.
234. Antony J. Blinken, "Technology and the Transformation of U.S. Foreign Policy" (speech, Moscone Center, San Francisco, CA, May 6, 2024), https://www.state.gov/technology-and-the-transformation-of-us-foreign-policy/.
235. Brady Helwig et al., *National Action Plan for United States Leadership in Advanced Compute & Microelectronics, Special Competitive Studies Project (SCSP)*, November 2023, https://www.scsp.ai/reports/action-plans/advanced-compute-microelectronics/.

236. SCSP, "The Technologies That Will Drive Future American Competitiveness," in *Mid-Decade Challenges to National Competitiveness,* September 2022, https://www.scsp.ai/reports/mid-decade-challenges-for-national-competitiveness/chapter-7/.

237. Federal Reserve Bank of St. Louis (Total Gross Domestic Product for San Jose-Sunnyvale-Santa Clara, CA (MSA)), accessed October 2, 2025, https://fred.stlouisfed.org/series/NGMP41940.

238. Jude Blanchette and Lily McElwee, "Defining Success: Does the United States Need an 'End State' for Its China Policy" (CSIS, October 2024), https://www.aei.org/wp-content/uploads/2024/10/241007_Blanchette_Defining_Success.pdf?x85095.

239. Ibid.

240. Jake Sullivan, "Remarks by National Security Advisor Jake Sullivan at the Special Competitive Studies Project Global Emerging Technologies Summit" (speech, The White House, September 16, 2022), https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/09/16/remarks-by-national-securityadvisor-jake-sullivan-at-the-special-competitive-studies-project-global-emerging-technologies-summit/.

241. Shambaugh, *Breaking the Engagement: How China Won & Lost America*, 314.

242. Philip Luck, "Beyond Manufacturing: Why Services Are Key to U.S.-China Economic Competition" (CSIS, February 6, 2025), https://www.csis.org/analysis/beyond-manufacturing-why-services-are-key-us-china-economic-competition.

243. "Report of the Task Force on Global Capitalism in Transition" (The Trilateral Commission, June 2022), https://iaindavis.com/pdfs/TC5STAGE.pdf.

244. Ibid.

245. Ibid.

246. Klaus Schwab, "Time for a Great Reset," *Project Syndicate*, 3 June 2020, https://www.project-syndicate.org/commentary/great-reset-capitalism-covid19-crisis-by-klaus-schwab-2020-06.

247. "Harmonious Society." Wikipedia, last modified July 16, 2025, https://en.wikipedia.org/wiki/Harmonious_Society.

248. "China Leads World in Terms of fighting Pandemic: Klaus Schwab," Facebook, December 7, 2020, video, 1:36, https://www.facebook.com/watch/?v=383128166255050.

249. DecodingDsoul [@decodingdsoul], "Klaus Schwab speaks of the global reset…," TikTok, September 21, video, 1:28 duration, https://www.tiktok.com/@decodingdsoul/video/7552592046859635990.

250. World Economic Forum, "China at Davos 2025: Continuing importance to global growth," 25 January 2025, https://www.weforum.org/stories/2025/01/china-at-davos-2025-continuing-importance-to-global-growth/.

251. "China's 2024 Coal Power Construction Hits 10-Year High, Researchers Say," *Reuters*, February 13, 2025, https://www.reuters.com/business/energy/chinas-2024-coal-power-construction-hits-10-year-high-researchers-say-2025-02-13/.

252. Ibid.

253. Weihuan Zhou, "Why China's Critical Mineral Strategy Goes Beyond Geopolitics," World Economic Forum, November 19, 2024, https://www.weforum.org/stories/2024/11/china-critical-mineral-strategy-beyond-geopolitics/.

254. Weihuan Zhou, LinkedIn profile, Education section, accessed October 2, 2025, https://www.linkedin.com/in/weihuan-zhou-52b5b433/details/education/.

255. Jake Werner, "A Program for Progressive China Policy" (Quincy Institute for Responsible Statecraft, July 30, 2024), https://quincyinst.org/research/a-program-for-progressive-china-policy/#h-jobs-and-the-economy.

256. Becca Wasser and Philip Sheers, "From Production Lines to Front Lines," Center for a New American Security, April 3, 2025, https://www.cnas.org/publications/reports/from-production-lines-to-front-lines; Mark J. Gerencser and Ethan Ingram, "Re-Imagining America's Defense Industrial Base," The National Interest, May 27, 2025, https://nationalinterest.org/feature/re-imagining-americas-defense-industrial-base.

257. John F. Kennedy, "Inaugural Address," January 20, 1961, John F. Kennedy Presidential Library and Museum, https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/inaugural-address-19610120.

258. Douglas Irwin, "Memorandum on Rethinking Industrial Policy" (Peterson Institution for International Economics, 2020), https://www.piie.com/sites/default/files/documents/irwin-2020-10-rtge-memo.pdf.

259. CFR Editors, "The Contentious U.S.-China Trade Relationship" (Council on Foreign Relations, April 2025), https://www.cfr.org/backgrounder/contentious-us-china-trade-relationship.

260. Andy Rothman, "The Benefits of Engagement," *The Wire China*, March 28, 2021, https://www.thewirechina.com/2021/03/28/the-benefits-of-engagement/.

261. Robert A. Atkinson, "Bernie Sanders' Worker Dystopia: Never Lose Your Job But Never Get a Raise," *In the Arena*, October 10, 2025, https://itif.org/publications/2025/10/09/bernie-sanders-worker-dystopia-never-lose-job-never-get-raise/.

262. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (London: W. Strahan and T. Cadell, 1776), Book IV, Chapter II, 456, https://www.gutenberg.org/files/3300/3300-h/3300-h.htm.

263. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*. Book IV, Chapter 2: "Of Restraints upon the Importation from Foreign Countries of such Goods as can be Produced at Home." 1776.

264. Adam Smith, Ibid., Paragraph 23.

265. Corelli Barnett, *The Collapse of British Power*, London: Faber and Faber, 1972, 92.

266. Adam Smith, op. cit., Paragraph 29.

267. Ibid., Paragraph 37.

268. The Collapse of British Power, p, 91.

269. Ibid.

270. Ibid., 91.

271. Ibid., 93.

272. UC Berkely Haas School of Business, "Nobel achiever: How Prof. Oliver Williamson revolutionized how economists look at organizations," news release, January 15, 2010, https://newsroom.haas.berkeley.edu/nobel-achiever-how-prof-oliver-williamson-revolutionized-how-economists-look-at-organizations.

273. Barnett, op. cit., 98.

274. Ibid.

275. Robert D. Atkinson, "How 'National Developmentalism' Built America," The American Conservative, May 9, 2023, https://www.theamericanconservative.com/how-national-developmentalism-built-america/.

276. Barnett, op. cit., 98.

277. Ibid.

278. Michael Tomasky, *The Middle Out: The Rise of Progressive Economics and a Return to Shared Prosperity* (Doubleday, September 2022).

279. Dani Rodrik, "An industrial policy for good jobs," Brookings commentary, September 28, 2022, https://www.brookings.edu/articles/an-industrial-policy-for-good-jobs/.
280. Robert Atkinson, "'Khanservative' Antitrust Is Not the Answer to the Failure of Neoliberalism," In The Arena, May 20, 2025, https://www.policyarena.org/p/khanservative-antitrust-is-not-the.
281. Oren Cass, "The Communal Power of a Real Job," *New York Times*, August 2019, https://www.nytimes.com/2019/08/03/opinion/sunday/workers-conservatives.html.
282. Knowing that this truth is the movement's Achilles' heel; they have waged a campaign to discredit this argument. For example, Lina Khan launched a counter strike with a recent speech at the Carnegie Endowment and an article in Foreign Policy. See: David Dodwell, "Don't blame China for monopolies that threaten economic security," South China Morning Post, May 15, 2023, https://www.scmp.com/comment/opinion/article/3220496/dont-blame-china-monopolies-threaten-economic-security; Carnegie Endowment for International Peace, "The Future of American Innovation: A Conversation With Lina Khan," March 13, 2024, https://carnegieendowment.org/events/2024/03/the-future-of-american-innovation-a-conversation-with-lina-khan; Lina M. Khan, "America Has a Resilience Problem," *Foreign Policy*, March 20, 2024, https://foreignpolicy.com/2024/03/20/lina-khan-ftc-trade-united-states-economy-tech-monopoly-national-security-boeing/.
283. Arthur Herman, *Freedom's Forge* (Random House Trade Paperbacks, 2013).
284. "Office of Scientific Research and Development," Wikipedia, December 16, 2023, https://en.wikipedia.org/wiki/Office_of_Scientific_Research_and_Development.
285. Michael E. Porter, "How Competitive Forces Shape Strategy," *Harvard Business Review*, March-April 1979, 137, 142.
286. Ibid., 143.
287. Jay Stowsky, "From Spin-Off to Spin-On: Redefining the Military's Role in Technology Development" (paper in Berkeley Roundtable on the International Economy, 2005), https://escholarship.org/uc/item/0tf8v3c7.
288. Adams Nager, "Trade vs. Productivity: What Caused U.S. Manufacturing's Decline and How to Revive It" (ITIF, February 2017), https://www2.itif.org/2017-trade-vs-productivity.pdf.
289. "Progress Conference," Roots of Progress Institute, event page, https://rootsofprogress.org/conference/.
290. Ibid.
291. Robert Atkinson, "Abundance of Meh" (ITIF, September 8, 2025), https://itif.org/publications/2025/09/08/abundance-of-meh/.
292. Micheal Brown and Robert Atkinson, "The Real Contest With China," *Foreign Affairs*, August 28, 2023, https://www.foreignaffairs.com/china/real-contest-beijing-industrial-strategy.
293. Michael Porter, *The Competitive Advantage of Nations* (Free Press, 1998), xiii.
294. Ibid.
295. Ibid.
296. Ibid., 20.
297. Ibid., 21.
298. Michael E. Porter, "The Competitive Advantage of Nations," *Harvard Business Review* (March 1990), http://hbr.org/1990/03/the-competitive-advantage-of-nations/ar/1.
299. Klaus Schwab and Xzavier Sala-i-Martin, "The Global Competitiveness Report 2016-2017" (World Economic Forum, 2016), https://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf.

300. "World Competitiveness Yearbook 2012" (IMD World Competitiveness Center, May 2012), http://www.imd.org/wcc/wcy-world-competitivenessyearbook.
301. Porter, *The Competitive Advantage of Nations*), xii.
302. Ibid., 16.
303. Ibid, p. 624.
304. Ibid., 625.
305. Ibid.
306. Ibid., 619.
307. Ibid., 673.
308. Ibid., 674.
309. Ibid.
310. Ibid., 624.
311. Ibid., 673,
312. Ibid., 622.
313. David Moschella and Mike Lawrie, *Seeing Digital: A Visual Guide to the Industries, Organizations, ad Careers of the 2020s* (DXC Technology, 2018), 69.
314. David Moschella, *Seeing Digital: A Visual Guide to the Industries, Organizations, and Careers of the 2020s* (Los Gatos, CA: Technomics Publishing, 2018).
315. The author is indebted to Sree Ramaswamy for these insights.
316. Laura Tyson and John Zysman, "American Industry in International Competition: Government Policies and Corporate Strategies," Impact Factor 25, no. 3 (1983), https://journals.sagepub.com/doi/abs/10.2307/41165015.
317. Roger Martin, "A Plan Is Not a Strategy," *Harvard Business Review*, May 28, 2025, https://hbr.org/2025/05/a-plan-is-not-a-strategy.
318. David Aaker, "How To Select A Business Strategy," *California Management Review* 26, no. 3 (1984): 167-175, https://doi.org/10.2307/41165087.
319. Ken Favaro, "Strategy is Not About the Competition," PWC, April 28, 2014, https://www.strategy-business.com/blog/Strategy-Is-Not-about-the-Competition.
320. Al Ries and Jack Trout, *Marketing Warfare: How to Use Military Principles to Develop Marketing Strategies* (Listen USA, 1986).
321. David Teece, "Dynamic Capabilities," website, https://www.davidjteece.com/dynamic-capabilities.
322. Claudio Giachetti and Giovanni Dagnino, "Competitive Dynamics in Strategic Management," Business and Management (2021), https://oxfordre.com/business/display/10.1093/acrefore/9780190224851.001.0001/acrefore-9780190224851-e-16.
323. Martin Reeves, George Stalk, and Filippo Scognamiglio, "BCG Classics Revisited: The Experience Curve," May 28, 2013, https://www.bcg.com/publications/2013/growth-business-unit-strategy-experience-curve-bcg-classics-revisited.
324. BCG, "What Is the Growth Share Matrix?" https://www.bcg.com/about/overview/our-history/growth-share-matrix.
325. Dong Sung Cho et. al., "Latecomer Strategies: Evidence from the Semiconductor Industry in Japan and Korea," Organization Science 9, no. 4 (1998), https://pubsonline.informs.org/doi/abs/10.1287/orsc.9.4.489?journalCode=orsc.

326. Andrew Campbell and Marcus Alexander, "What's Wrong with Strategy," *Harvard Business Review*, November-December 1997 (1997), https://hbr.org/1997/11/whats-wrong-with-strategy.
327. Gary Piscano and Willy Shih, "Does America Really Need Manufacturing?" *Harvard Business Review*, March 2012, https://www.hbs.edu/faculty/Pages/item.aspx?num=42367.
328. Oren Cass and Scott Lincicome, "Should the U.S. Adopt an Industrial Policy?" American Compass, January 22, 2021, https://americancompass.org/should-the-u-s-adopt-an-industrial-policy
329. Jeff Ferry, "Industrial Policies Gain Support in the Academy," Coalition for a Prosperous America, August 17, 2023, https://prosperousamerica.org/industrial-policies-gain-support-in-the-academy.
330. ITIF analysis of BEA data.
331. David Vogel, "Why Businessmen Distrust Their State: The Political Consciousness of American Corporate Executives," *British Journal of Political Science* 8, no. 1 (1978), 45–78, https://www.jstor.org/stable/193610.
332. Ibid., 51.
333. Ibid., 60.
334. Ibid., 62.
335. Ibid.
336. Ibid.
337. Ibid., 68.
338. Doug Henwood, "To Serve Is to Rule," *Harpers Magazine*, https://harpers.org/archive/2019/11/to-serve-is-to-rule-wasps-doug-henwood/.
339. Edmund Morris, *Theodore Rex* (New York: Random House, 2001), 58.
340. Vogel, "Why Businessmen Distrust Their State: The Political Consciousness of American Corporate Executives."
341. Milton Friedman, "A Friedman doctrine—The Social Responsibility of Business Is to Increase Its Profits," *The New York Times*, September 13, 1970, https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html.
342. Ibid.
343. Peter F. Drucker in "'Development of Theory of Democratic Administration': Replies and Comments," in *The American Political Science Review*, Vol. XLVI, No. 2, June 1952.
344. Mark Mizruchi, *The Fracturing of the Corporate Elite* (Cambridge, MA: Harvard University Press, 2012), 16.
345. Steve Odland, "Where Have All the Corporate Statesmen Gone?," Committee for Economic Development, August 27, 2013, www.ced.org/blog/entry/where-have-all-the-corporate-statesman-gone.
346. Klaus Schwab and Peter Vanham, "What is stakeholder capitalism?" World Economic Forum, January 22, 2021, https://www.weforum.org/stories/2021/01/klaus-schwab-on-what-is-stakeholder-capitalism-history-relevance/.
347. Tarique Niazi, "Book Review—Beyond Shareholder Primacy: Remaking Capitalism For A Sustainable Future," *Global Policy*, November 14, 2024, https://www.globalpolicyjournal.com/blog/14/11/2024/book-review-beyond-shareholder-primacy-remaking-capitalism-sustainable-future; Joseph E. Stiglitz, *People, Power, and Profits: Progressive Capitalism for an Age of Discontent* (New York: W. W. Norton & Company, 2019), https://www.amazon.com/People-Power-Profits-Progressive-Capitalism/dp/1324004215.

348. Business Roundtable, "Business Roundtable Redefines the Purpose of a Corporation to Promote an Economy That Serves All Americans," news release, August 19, 2019, https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans.

349. Kalea Hall and Jordyn Grzelewski, "What's the deal? UAW details gains of new four-year contract with GM," *The Detroit News*, November 4, 2023, https://www.detroitnews.com/story/business/autos/general-motors/2023/11/04/uaw-details-gains-of-new-four-year-deal-with-gm/71453815007/.

350. Sidney Pollard, *The Wasting of the British Economy* (Routledge Revivals, 2012), https://www.routledge.com/The-Wasting-of-the-British-Economy-Routledge-Revivials/Pollard/p/book/9780415609166.

351. Kenneth Quinnell and Sydney Roberts, "Service & Solidarity Spotlight: New Jersey Governor Signs Two Pro-Labor Bills into Law," AFL-CIO, September 8, 2025, https://aflcio.org/2025/9/8/service-solidarity-spotlight-new-jersey-governor-signs-two-pro-labor-bills-law.

352. AFL-CIO, "What We Care About," website, https://aflcio.org/issues.

353. "Progressive Foundations," Blue Tent, https://bluetent.us/funding/progressive-foundations/.

354. Ibid.

355. Marina Dunbar, "Brown University rejects Trump proposal to overhaul policies for preferential funding," *The Guardian*, October 15, 2025, https://www.theguardian.com/us-news/2025/oct/15/brown-university-rejects-trump-proposal.

356. Ibid.

357. Vogel, "Why Businessmen Distrust Their State: The Political Consciousness of American Corporate Executives."

358. Robert D. Atkinson, "Is Trump's DOGE Going to Be a DOGD?" ITIF *Innovation Files* commentary, November 18, 2024, https://itif.org/publications/2024/11/18/is-trumps-doge-going-to-be-a-dogd/.

359. Gary Hamel and C.K. Prahalad, *Competing for the Future*, (Cambridge, MA: Harvard Business School Press, 1994), 87.

360. Ibid., 308.

361. Vogel, "Why Businessmen Distrust Their State: The Political Consciousness of American Corporate Executives."

362. Ibid.

363. Robert Atkinson, "Trump's Gilded Age Governing Agenda," In The Arena, May 15, 2025, https://www.policyarena.org/p/trumps-gilded-age-governing-agenda.

364. "Silicon Supremacy," Financial Times (podcast), https://www.ft.com/content/7bf0f79b-dea7-49fa-8253-f678d5acd64a.

365. Robert Kagan, "Why the World Needs America," Brookings Institution, February 11, 2012, https://www.brookings.edu/articles/why-the-world-needs-america/.

Notes for US National Power Industries Are at Risk

1. Federal Reserve Bank of St. Louis, Average Hourly Earnings of All Employees, Manufacturing, accessed October 16, 2025, https://fred.stlouisfed.org/series/CES3000000003#; Federal Reserve Bank of St. Louis, Average Hourly Earnings of All Employees, Total Private, accessed October 16, 2025, https://fred.stlouisfed.org/series/CES0500000003.

2. Meghan Ostertag, "The Census Bureau Confirms US Manufacturing Has Declined" (ITIF, August 9, 2024), https://itif.org/publications/2024/08/09/census-bureau-confirms-us-manufacturing-declined/.
3. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), http://itif.org.
4. Mark Muro and Siddharth Kulkarni, "America's Advanced Industries: New Trends" (Brookings, August 4, 2016), https://www.brookings.edu/articles/americas-advanced-industries-new-trends/; Michael Wolf and Dalton Terrell, "The High-Tech Industry, What Is It and Why It Matters To Our Economic Future" (BLS, May 2016), https://www.bls.gov/advisory/bloc/high-tech-industries.pdf; Thomas Hatzichronoglou, "Revision of the High-Technology Sector and Product Classification" (OECD Science, Technology and Industry Working Papers, 1997/02), https://www.oecd.org/en/publications/1997/01/revision-of-the-high-technology-sector-and-product-classification_g17a152c.html.
5. "Critical Infrastructure Sectors," CISA, accessed October 15, 2025, https://www.cisa.gov/topics/critical-infrastructure-security-and-resilience/critical-infrastructure-sectors.
6. Gary P. Pisano and Willy C. Shih, "Restoring American Competitiveness," *Harvard Business Review*, July-August 2009, https://hbr.org/2009/07/restoring-american-competitiveness.
7. Bureau of Labor Statistics (BLS), Occupational Employment and Wage Statistics Query System, accessed October 20, 2025, https://data.bls.gov/oes/#/occInd/One%20occupation%20for%20multiple%20industries; National Center for Science and Engineering Statistics (NCSES), Research and Development: U.S. Trends and International Comparisons, accessed October 20, 2025, https://ncses.nsf.gov/pubs/nsb20246/u-s-business-r-d.
8. American Automotive Policy Council, "State of the U.S. Automotive Industry" (AAPC, October 2017), https://www.americanautomakers.org/sites/default/files/2017%20Economic%20Contribution%20Report.pdf.
9. U.S. Census Bureau, 2008 Annual Survey of Manufacturers: Tables, accessed August 22, 2025, https://www.census.gov/programs-surveys/asm/data/tables.html; U.S. Census Bureau, Economic Census by Industry 2022, accessed September 24, 2025, https://www.census.gov/programs-surveys/economic-census/data/tables/industry.html.
10. Robert D. Atkinson and Stephen Ezell, "Toward Globalization 2.0: A New Trade Policy Framework for Advanced-Industry Leadership and National Power" (ITIF, March 24, 2025), https://itif.org/publications/2025/03/24/globalization2-a-new-trade-policy-framework/.
11. U.S. Department of Treasury, General Explanations of the Administration's Revenue Proposals, U.S. Department of Treasury, Washington DC, March 2024, https://home.treasury.gov/policy-issues/tax-policy/revenue-proposals.
12. "Glossary of Fields and Variables," U.S. Census Bureau, accessed October 16, 2025, https://www.census.gov/programs-surveys/economic-census/year/2017/economic-census-2017/about/fieldsandvariables.html#par_textimage_1747915268.
13. Federal Reserve Bank of St. Louis, FRED, Consumer Price Index for All Urban Consumers: All Items in U.S. City Average, accessed October 16, 2025, https://fred.stlouisfed.org/series/CPIAUCSL.
14. U.S. Census Bureau, 2008 Annual Survey of Manufacturers: Tables, accessed August 22, 2025, https://www.census.gov/programs-surveys/asm/data/tables.html; U.S. Census Bureau, Economic Census by Industry 2022, accessed September 24, 2025, https://www.census.gov/programs-surveys/economic-census/data/tables/industry.html.
15. BLS, Producer Price Index (PPI) Data Retrieval Guide, accessed October 20, 2025, https://www.bls.gov/ppi/data-retrieval-guide/#tabs-2.

16. Robert Atkinson, "Think Like an Enterprise: Why Nations Need Comprehensive Productivity Strategies" (ITIF, May 4, 2016), https://itif.org/publications/2016/05/04/think-enterprise-why-nations-need-comprehensive-productivity-strategies/.
17. Federal Reserve Bank of St. Louis, FRED, All Employees, Total Nonfarm, accessed October 20, 2025, https://fred.stlouisfed.org/series/PAYEMS#; U.S. Census Bureau, 2008 Annual Survey of Manufacturers: Tables, accessed August 22, 2025, https://www.census.gov/programs-surveys/asm/data/tables.html.
18. Please note that figure 7 shows the trends in production employment over a 15-year period, not a 16-year period like all other variables. The Economic Census stopped releasing data for this variable in 2021.
19. Helene Nguemgaing et al., "The Strategic Game of Rare Earths: Why China May Only Be in Favor of Temporary Export Restrictions" (Resources for the Future, October 7, 2025), https://www.rff.org/publications/issue-briefs/the-strategic-game-of-rare-earths-why-china-may-only-be-in-favor-of-temporary-export-restrictions/.
20. Robert D. Atkinson and Ian Tufts, "The Hamilton Index, 2023: China Is Running Away With Strategic Industries" (ITIF, December 13, 2023), https://itif.org/publications/2023/12/13/2023-hamilton-index/; Varun Sivaram et al., "Winning the Battery Race: How the United States Can Leapfrog China to Dominate Next-Generation Battery Technologies" (Carnegie Endowment for International Peace, October 2024), https://carnegieendowment.org/research/2024/10/winning-the-battery-race-how-the-united-states-can-leapfrog-china-to-dominate-next-generation-battery-technologies?lang=en.
21. USAspending.gov, Defense Department Contract Awards for Fiscal Year 2022, https://www.usaspending.gov/search?hash=34e88a0f1795135287ccfc0ccf2faaa3.
22. Bureau of Industry and Security, "Part 774 – The Commerce Control List" (Washington DC: U.S. Department of Commerce, last updated October 21, 2025), https://www.bis.gov/regulations/ear/774#supplement-1-774.
23. ITIF categorizations.

Notes for Tracking R&D Leadership: US Advantage Narrowing as China Gains Ground

1. Alex Muresianu, "Public and Private R&D Are Complements, Not Substitutes," Tax Foundation, May 16, 2022, https://taxfoundation.org/private-rd-public-rd-investment/.
2. Robert Atkinson, "American needs to sort out its industrial policy confusion," *The Hill*, April 15, 2023, https://thehill.com/opinion/technology/3952425-america-needs-to-sort-out-its-industrial-policy-confusion/.; Robert Atkinson, "The Hamilton Index: Assessing National Performance in the Competition for Advanced Industries" (ITIF, June 8, 2022), https://itif.org/publications/2022/06/08/the-hamilton-index-assessing-national-performance-in-the-competition-for-advanced-industries/.
3. European Commission, The 2025 EU Industrial R&D Investment Scoreboard (R&D investments for 2024), accessed January 2026, https://iri.jrc.ec.europa.eu/scoreboard/2025-eu-industrial-rd-investment-scoreboard; European Commission, The 2015 EU Industrial R&D Investment Scoreboard (R&D investments for 2014), accessed January 2026, https://iri.jrc.ec.europa.eu/scoreboard/2015-eu-industrial-rd-investment-scoreboard; International Monetary Fund, Representative Exchange Rates (exchange rate for 2014 and 2024), accessed January 2026, https://www.imf.org/external/np/fin/data/param_rms_mth.aspx; World Bank, World Development Indicators (GDP for the United States, China, Canada, and the world), accessed January 2026, https://databank.worldbank.org/source/world-development-indicators#.
4. Ibid.

5. Ibid.
6. Nicole Sganga, "Chinese hackers took trillions in intellectual property from about 30 multinational companies," CBS News, May 4, 2022, https://www.cbsnews.com/news/chinese-hackers-took-trillions-in-intellectual-property-from-about-30-multinational-companies/.
7. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.
8. Ibid.
9. Ibid.
10. Ibid.; International Monetary Fund, Representative Exchange Rates (exchange rate for 2014 and 2024), accessed January 2026, https://www.imf.org/external/np/fin/data/param_rms_mth.aspx.
11. Ibid.
12. Ibid.
13. Ibid.
14. Robert Atkinson, "China Is Rapidly Becoming a Leading Innovator in Advanced Industries" (ITIF, September 2024), https://itif.org/publications/2024/09/16/china-is-rapidly-becoming-a-leading-innovator-in-advanced-industries/.
15. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
16. Ibid.
17. Ibid.
18. Ibid.
19. Ibid.
20. Ibid.
21. Ibid.
22. European Commission, The 2025 EU Industrial R&D Investment Scoreboard (R&D investments for 2024), accessed January 2026, https://iri.jrc.ec.europa.eu/scoreboard/2025-eu-industrial-rd-investment-scoreboard.; International Monetary Fund, Representative Exchange Rates (exchange rate for 2014 and 2024), accessed January 2026, https://www.imf.org/external/np/fin/data/param_rms_mth.aspx.
23. Ibid.; World Bank, World Development Indicators.
24. Ibid.
25. Ibid.; European Commission, The 2015 EU Industrial R&D Investment Scoreboard.
26. Ibid.
27. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions (ICB classification and sector descriptions), accessed June 30, 2023, https://www.ftserussell.com/data/industry-classification-benchmark-icb.
28. Ibid.
29. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
30. Ibid.
31. Ibid.; World Bank, World Development Indicators.
32. Ibid.
33. Ibid.; European Commission, The 2015 EU Industrial R&D Investment Scoreboard.

34. Ibid.
35. Ibid.
36. Ibid.
37. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions.
38. Trelysa Long, "Decoupling Risks: How Semiconductor Export Controls Could Harm US Chipmakers and Innovation" (ITIF, November 2025), https://itif.org/publications/2025/11/10/decoupling-risks-semiconductor-export-controls-harm-us-chipmakers-innovation/.
39. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
40. Ibid.
41. Ibid.; World Bank, World Development Indicators.
42. Ibid.
43. Ibid.; European Commission, The 2015 EU Industrial R&D Investment Scoreboard.
44. Ibid.
45. Ibid.
46. Ibid.
47. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions.
48. Ibid.
49. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
50. Ibid.
51. Ibid.; World Bank, World Development Indicators (gdp for the United States, China, Canada, and the world), accessed January 2026, https://databank.worldbank.org/source/world-development-indicators#.
52. Ibid.
53. European Commission, The 2015 EU Industrial R&D Investment Scoreboard.
54. Ibid.
55. Ibid.
56. Ibid.
57. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions.
58. Trelysa Long, "Mapping Industrial Strength: US Machine Tool Production and Consumption" (ITIF, December 2025), https://itif.org/publications/2025/12/15/mapping-industrial-strength-us-machine-tool-production-and-consumption/.
59. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
60. Ibid.
61. Ibid.; World Bank, World Development Indicators (gdp for the United States, China, Canada, and the world), accessed January 2026, https://databank.worldbank.org/source/world-development-indicators#.
62. Ibid.
63. Trelysa Long, "Mapping Industrial Strength: US Machine Tool Production and Consumption."

64. Ibid.
65. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.; World Bank, World Development Indicators.
66. Ibid.
67. Ibid.
68. Ibid.
69. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions.
70. Ibid.
71. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
72. Ibid.
73. Ibid. World Bank, World Development Indicators.
74. Ibid.
75. Ibid.; European Commission, The 2015 EU Industrial R&D Investment Scoreboard.
76. Ibid.
77. Ibid.
78. Ibid.
79. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions.
80. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
81. Ibid.
82. Ibid.
83. Ibid.
84. Stephen Ezell, "How Innovative Is China in the Electric Vehicle and Battery Industries?" (ITIF, July 2024), https://itif.org/publications/2024/07/29/how-innovative-is-china-in-the-electric-vehicle-and-battery-industries/.
85. Ibid.
86. Ibid.
87. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.; World Bank, World Development Indicators.
88. Ibid.
89. Ibid.
90. Ibid.
91. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions.
92. Ibid.
93. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
94. Ibid.

95. Ibid.; World Bank, World Development Indicators (GDP for the United States, China, Canada, and the world), accessed January 2026, https://databank.worldbank.org/source/world-development-indicators#.
96. Ibid.
97. Scott Kennedy, "China's COMAC: An Aerospace Minor Leaguer" (CSIS, December 2020), https://www.csis.org/blogs/trustee-china-hand/chinas-comac-aerospace-minor-leaguer.
98. Ibid.
99. Kevin Gawora, "Fact of the Week: China Has Provided Its State-Owned National Champion in Commercial Aviation as Much as $72 Billion in Development Subsidies" (ITIF, February 8, 2021), https://itif.org/publications/2021/02/08/fact-week-china-has-provided-its-state-owned-national-champion-commercial/.
100. Ibid.
101. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; European Commission, The 2015 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.; World Bank, World Development Indicators.
102. Ibid.
103. Ibid.
104. Ibid.
105. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions.
106. Ibid.
107. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
108. Ibid.
109. Ibid.; World Bank, World Development Indicators.
110. Ibid.
111. Sandra Barbosu, "How Innovative Is China in Biotechnology?" (ITIF, July 2024), https://itif.org/publications/2024/07/30/how-innovative-is-china-in-biotechnology/.
112. Ibid.
113. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; European Commission, The 2015 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.; World Bank, World Development Indicators.
114. Ibid.
115. Ibid.
116. Ibid.
117. FTSE Russell, Industry Classification Benchmark (ICB) Structure & Definitions.
118. Ibid.
119. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.
120. Ibid.
121. Ibid.; World Bank, World Development Indicators.
122. Ibid.
123. Ezell, "How Innovative Is China in the Electric Vehicle and Battery Industries?"

124. European Commission, The 2025 EU Industrial R&D Investment Scoreboard.; European Commission, The 2015 EU Industrial R&D Investment Scoreboard.; International Monetary Fund, Representative Exchange Rates.; World Bank, World Development Indicators.
125. Ibid.
126. Ibid.
127. Ibid.
128. Michael E. Porter and Jan W. Rivkin, "The Looming Challenge to U.S. Competitiveness," *Harvard Business Review*, March 2012, https://hbr.org/2012/03/the-looming-challenge-to-us-competitiveness.
129. John Lester and Jacek Warda, "Enhanced Tax Incentives for R&D Would Make Americans Richer" (ITIF, September 2020), https://www2.itif.org/2020-enhanced-tax-incentives-rd.pdf.
130. Joe Kennedy and Robert Atkinson, "Why Expanding the R&D Tax Credit Is Key to Successful Corporate Tax Reform" (ITIF, July 2017), https://www2.itif.org/2017-rd-tax-credit.pdf.

Notes for The Alarming Performance of US Advanced Technology Product Trade

1. Robert Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
2. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country (advanced technology products), accessed December 2025, https://www.census.gov/foreign-trade/statistics/product/atp/index.html.; United States Census Bureau, USA Trade (imports and exports in 2014 and 2024 for the world, China, South Korea, Japan, and the EU, accessed December 2025), https://usatrade.census.gov/index.php?do=login.
3. Ibid.
4. Ibid.
5. Ibid. Due to the different products in the 2014 and 2024 categorization of each advanced technology group, the 2024 ATP group product description was used in order to examine the changes in imports and exports over time.
6. Ibid.
7. Ibid.
8. Ibid.
9. Ibid.
10. U.S. Census Bureau, Advanced Technology Products Code Description, website, https://www.census.gov/foreign-trade/reference/codes/atp/index.html.
11. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade
12. Ibid.
13. Ibid.
14. U.S. Census Bureau, Advanced Technology Products Code Description.
15. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade.
16. Ibid.

17. Ibid.
18. U.S. Census Bureau, Advanced Technology Products Code Description.
19. Ibid.
20. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade.
21. Ibid.
22. Ibid.
23. U.S. Census Bureau, Advanced Technology Products Code Description.
24. Ibid.
25. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade.
26. Ibid.
27. Ibid.
28. U.S. Census Bureau, Advanced Technology Products Code Description.
29. Ibid.
30. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade.
31. Ibid.
32. Ibid.
33. U.S. Census Bureau, Advanced Technology Products Code Description.
34. Ibid.
35. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade.
36. Ibid.
37. Ibid.
38. U.S. Census Bureau, Advanced Technology Products Code Description.
39. Ibid.
40. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade.
41. Ibid.
42. Ibid.
43. U.S. Census Bureau, Advanced Technology Products Code Description.
44. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade.
45. Ibid.
46. Ibid.
47. U.S. Census Bureau, Advanced Technology Products Code Description.
48. United States Census Bureau, ATP Data – Imports and Exports – ATP Group by Country.; United States Census Bureau, USA Trade.
49. Ibid.

50. Ibid.

Notes for Assessing the Clout of US National Power Industries vs. China

1. Henry Farrell and Abraham Newman, "The Weaponized World Economy," *Foreign Affairs*, August 19, 2025, https://www.foreignaffairs.com/united-states/weaponized-world-economy-farrell-newman.
2. "China bans dual-use goods exports for Japan military over Taiwan remarks," *Reuters*, January 6, 2026, https://www.reuters.com/world/asia-pacific/china-bans-dual-use-goods-exports-japan-military-over-taiwan-remarks-2026-01-06/.
3. Meghan Ostertag, "US National Power Industries Are at Risk" (ITIF, November 2017), https://itif.org/publications/2025/11/17/us-national-power-industries-are-at-risk/.
4. The RCA statistic is credited to Balassa. See Béla Balassa, "Trade Liberalisation and Revealed Comparative Advantage," The Manchester School 33 (1965): 99–123.
5. The use of RCA to identify domestic manufacturing strength was first applied by Hildago and Hausmann in their work on economic complexity theory and development of the Harvard Atlas of Economic Complexity. See César A. Hidalgo and Ricardo Hausmann, "The Building Blocks of Economic Complexity," *Proceedings of the National Academy of Sciences* 106, no. 26 (2009): 10570–10575.
6. Corelli Barnett, *The Collapse of British Power* (London: Faber, 1972), 85.
7. Ostertag, "US National Power Industries Are at Risk."
8. The RCD was first described by Belton. See Keith Belton, "U.S. Supply Chains and Biden's China Challenge" (Progressive Policy Institute, July 2023), https://www.progressivepolicy.org/publication/u-s-supply-chains-and-bidens-china-challenge/.
9. We note that not all of the ITIF power industries are in manufacturing. A handful are services not associated with traded goods.
10. ITC developed a concordance to identify specific U.S. ITC codes (8- and 10-digit) associated with NAICS codes. The ITC commodity translation tool is publicly available at "Commodity Translation Tool," U.S. International Trade Commission DataWeb, accessed February 14, 2026, https://dataweb.usitc.gov/commodity-translation-tool.
11. Comtrade uses internationally harmonized codes for tradeable goods. Harmonization is done at the 6-digit level, and nations are free to assign 8- and 10-digit codes to serve their own purposes. In order to estimate RCA and RCD (and therefore CI), we must use six-digit codes for all goods associated with a particular power industry.
12. Our methodology results in fewer goods being used to estimate CI for an industry. From a practical standpoint, this makes no difference for industries with one HS code or with more than a dozen. It may make a difference for those between 1 and 12 HS codes. Consequently, there is more uncertainty about CI for power industries characterized by relatively few HS codes.
13. We treat each HS code associated with an industry the same because we are unaware of an objective approach to weighting HS codes to "best" characterize an industry's capabilities or dependence.
14. A few studies have equated the impact of China joining the WTO to the loss of U.S. manufacturing jobs in the first decade of this century. For example, see Justin R. Pierce and Peter K. Schott, "The Surprisingly Swift Decline of U.S. Manufacturing Employment," *American Economic Review* 106, no. 7 (2016): 1632–1662.
15. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, 2025),

https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.

16. Ibid.
17. Promoting Resilient Supply Chains Act of 2025, S. 257, 119th Cong. (2025–2026), https://www.congress.gov/bill/119th-congress/senate-bill/257.

Notes for The Global Trade Battleground: US-China Competition in the Global South

1. Robert D. Atkinson, "China's Industrial War With America Has a Way Out," *New York Times*, January 9, 2025, https://www.nytimes.com/2025/01/09/opinion/china-industrial-war-power-trader.html.
2. Robert D. Atkinson, *Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance* (ITIF, November 17, 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
3. Robert D. Atkinson, "Testimony Before House Oversight IT Subcommittee on Ensuring America Remains the World Leader in Technology and Innovation" (ITIF, September 26, 2018), https://itif.org/publications/2018/09/26/testimony-house-oversight-it-subcommittee-ensuring-america-remains-world/.
4. Atkinson, *Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance*.
5. World Trade Organization, "Who Are the Developing Countries in the WTO?" https://www.wto.org/english/tratop_e/devel_e/d1who_e.htm; World Trade Organization, "List of Developing Countries," https://tfadatabase.org/en/developing-countries.
6. World Bank, "World Bank Country and Lending Groups," World Bank Data Help Desk, https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.
7. Organisation for Economic Co-operation and Development (OECD), "Accession to the OECD," https://www.oecd.org/en/about/legal/oecd-accession-process.html.
8. Corelli Barnett, *The Collapse of British Power*, London: Faber, 1972, 85.
9. Meghan Ostertag, "US National Power Industries Are At Risk" (ITIF, November 17, 2025), https://itif.org/publications/2025/11/17/us-national-power-industries-are-at-risk/.
10. International Monetary Fund, "World Economic Outlook Database: Groups and Aggregates Information," last updated April 2025, https://www.imf.org/en/publications/weo/weo-database/2023/april/groups-and-aggregates.
11. Code of Federal Regulations, "Determination of foreign adversaries," 15 CFR § 791.4, 2025, https://www.ecfr.gov/current/title-15/subtitle-B/chapter-VII/subchapter-E/part-791/subpart-A/section-791.4.
12. World Bank, "World Bank Open Data," https://data.worldbank.org/.
13. Ministry of Foreign Affairs of the People's Republic of China, "President Xi Jinping Attends the 19th G20 Summit and Delivers Important Remarks," November 19, 2024, https://www.fmprc.gov.cn/eng/xw/zyxw/202411/t20241119_11528778.html.
14. Ministry of Foreign Affairs of the People's Republic of China, "Wang Yi on scientific and technological innovation: Where there is blockade, there is breakthrough," March 7, 2025, https://www.fmprc.gov.cn/eng/wjbzhd/202503/t20250307_11570164.html.

15. Eric Robinson et al., *Development as a Tool of Economic Statecraft: A Net Assessment of U.S. and Chinese Approaches* (RAND Corporation, RR-A2271-1, September 2022), https://www.rand.org/content/dam/rand/pubs/research_reports/RRA2200/RRA2271-1/RAND_RRA2271-1.pdf.
16. The State Council Information Office of the People's Republic of China, "A Global Community of Shared Future: China's Proposals and Actions," State Council Information Office of the People's Republic of China, September 26, 2023, http://english.scio.gov.cn/whitepapers/2023-09/26/content_116710660_4.htm.
17. The State Council Information Office of the People's Republic of China, "A Global Community of Shared Future: China's Proposals and Actions."
18. Council on Foreign Relations, "What Is the BRICS Group and Why Is It Expanding?" January 26, 2025, https://www.cfr.org/backgrounders/what-brics-group-and-why-it-expanding/.
19. Ibid.
20. 金华珊, 史俊杰, and 曾海英, "'金砖好物'从'浙'走向'大市场' '买在金砖'面向国内消费者打造爆款," 杭州日报 (via 杭州网), May 20, 2025, https://hznews.hangzhou.com.cn/chengshi/content/2025-05/20/content_8998486.htm.
21. Adam Mayer, "Resurgent Africa: A Socialist Past, a Multipolar Present: Introduction," *International Critical Thought* 15, no. 2 (2025): 153–166, https://doi.org/10.1080/21598282.2025.2511108.
22. Library of Congress, "BRICS: Sources of Information," Research Guides, https://guides.loc.gov/brics.
23. Alicia R. Chen, "Foreign Aid With Chinese Characteristics: Where Beijing Is—and Isn't—Seeking Influence," *Foreign Affairs*, December 3, 2025, https://www.foreignaffairs.com/china/foreign-aid-chinese-characteristics.
24. Robert D. Atkinson and Stephen Ezell, *Toward Globalization 2.0: A New Trade Policy Framework for Advanced-Industry Leadership and National Power* (ITIF, March 24, 2025), https://itif.org/publications/2025/03/24/globalization2-a-new-trade-policy-framework/.
25. Add national power; Atkinson and Ezell, *Toward Globalization 2.0: A New Trade Policy Framework for Advanced-Industry Leadership and National Power*.
26. Based on the International Institute for Applied Systems Analysis' (IIASA) Shared Socioeconomic Pathways Scenario Database (SSP), version 3.1. The 2050 projections were based on OECD estimates in this database, assuming medium frontier growth and a medium speed of income convergence (SSP2); International Institute for Applied Systems Analysis (IIASA), "SSP Database," https://data.ece.iiasa.ac.at/ssp/#/downloads.
27. World Bank, "World Bank Open Data."
28. The Growth Lab at Harvard University, "International Trade Data (SITC, Rev. 2)," Harvard Dataverse, 2026, https://doi.org/10.7910/DVN/H8SFD2.
29. Robert D. Atkinson, *The Hamilton Index: Assessing National Performance in the Competition for Advanced Industries* (ITIF, June 8, 2022), https://itif.org/publications/2022/06/08/the-hamilton-index-assessing-national-performance-in-the-competition-for-advanced-industries/.
30. Includes China and Hong Kong; U.S. Bureau of Economic Analysis, "Worldwide Activities of U.S. Multinational Enterprises: Preliminary 2023 Statistics," https://www.bea.gov/worldwide-activities-us-multinational-enterprises-preliminary-2023-statistics.
31. Alex Kwanten, Cody Trotter, and Ryan Maxin, "Cars Made in Mexico for the United States in 2026," *U.S. News & World Report*, June 25, 2025, https://cars.usnews.com/cars-trucks/advice/cars-made-in-mexico?onepage; Igor Patrick, "BYD Opens Massive Brazil Plant, Its Biggest Investment Outside Asia," *South China Morning Post*, October 10, 2025,

https://www.scmp.com/news/china/article/3328433/byd-opens-massive-brazil-plant-its-biggest-investment-outside-asia.

32. Stijn Broecke, *Offshoring, Reshoring, and the Evolving Geography of Jobs: A Scoping Paper* (Paris: OECD, April 23, 2024), https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/04/offshoring-reshoring-and-the-evolving-geography-of-jobs_bcef831d/adc9a9d5-en.pdf.
33. Atkinson, *Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance*.
34. Justin R. Pierce and Peter K. Schott, "A Concordance Between Ten-Digit U.S. Harmonized System Codes and SIC/NAICS Product Classes and Industries," *NBER Working Paper* no. 15548 (Cambridge, MA: National Bureau of Economic Research, December 2009), https://www.nber.org/system/files/working_papers/w15548/w15548.pdf; World Integrated Trade Solution (WITS), World Bank, "Product Concordance," https://wits.worldbank.org/product_concordance.html; Add the description of conversion from NAICS to SITC Rev3. Why? How?
35. The Growth Lab at Harvard University, "International Trade Data (SITC, Rev. 2)."
36. Ibid.
37. Ibid.
38. Xinhua, "Full Text: China's Policy Paper on Latin America and the Caribbean," *Global Times*, December 10, 2025, https://www.globaltimes.cn/page/202512/1350190.shtml.
39. Jon Orbach, "Explainer: China's Free-Trade Agreements in Latin America," *Americas Society/Council of the Americas*, February 15, 2024, https://www.as-coa.org/articles/explainer-chinas-free-trade-agreements-latin-america; Presidencia Uruguay, "Declaración conjunta de Uruguay y China sobre profundización de la asociación estratégica," February 3, 2026, https://www.gub.uy/presidencia/comunicacion/noticias/declaracion-conjunta-uruguay-china-sobre-profundizacion-asociacion.
40. The Growth Lab at Harvard University, "International Trade Data (SITC, Rev. 2)."
41. Ibid.
42. Ibid.
43. Ibid.
44. Categorized as medical and pharmaceutical products vehicles (code 54 under SITC Rev. 2 at the 2-digit level), chemical materials and products, n.e.s. (code 59), Telecommunications and sound recording and reproducing apparatus and equipment (code 76), electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (code 77), and road vehicles (code 78) within ITIF's national power industries definition.
45. The Growth Lab at Harvard University, "International Trade Data (SITC, Rev. 2)"; Pharmaceuticals exports were calculated using data published in January 2025 for the 2000–2023 period; the year 2024 was proxied using 2023–2024 growth, based on data published in January 2026.
46. Ibid.
47. Midea Group, "Midea officially laid the foundation stone for a new plant in Brazil," April, 2023, https://www.midea.com.cn/en/about-midea/news/news-20230414164438; Morning Studio editors, "Sustainable, 5G and AI Factory in Thailand Powers Midea's Global Expansion," *South China Morning Post*, September 30, 2025, https://www.scmp.com/native/business/topics/innovating-world/article/3326766/sustainable-5g-and-ai-factory-thailand-powers-mideas-global-expansion.
48. Pallavi Goel, "Haier India Targets Rs 14,500 Cr Revenue in FY26; Bets on Premium as Mass Segments Remain Under Stress," *ETRetail* (Economic Times), December 17, 2025,

https://retail.economictimes.indiatimes.com/news/consumer-durables-and-information-technology/consumer-electronics/haier-india-targets-rs-14500-cr-revenue-in-fy26-bets-on-premium-as-mass-segments-remain-under-stress/126037866; Haier India, "Haier Celebrates Its 20 Years of Innovating 'In India, For India', Unveils Its New Vision of 'More Creation, More Possibilities'," June 3, 2024, https://www.haier.com/in/about-haier/awards-events/20240402_236888.shtml.

49. Gabriel Daros, "China's Biggest Delivery App Brings Its Disruptive Playbook to Brazil," Rest of World, August 19, 2025, https://restofworld.org/2025/meituan-brazil-launch-food-delivery/.
50. Charles Chang, Andrew Wood, Claire Yuan, and Chris Rogers, "China Inc. Heads to Global South in the Age of Tariffs," *S&P Global Ratings and S&P Global Market Intelligence*, August 2025, https://www.spglobal.com/en/research-insights/special-reports/china-inc-heads-to-global-south-in-the-age-of-tariffs.
51. International Energy Agency, *Global EV Outlook 2025: Expanding Sales in Diverse Markets* (Paris: International Energy Agency, May 2025), https://www.iea.org/reports/global-ev-outlook-2025/executive-summary.
52. Jang Woo-jeong and Lee Young-kwan, "Chinese EVs Dominate Emerging Markets with 80% Share in Thailand, Israel," *The Chosun Daily*, November 4, 2025, https://www.chosun.com/english/industry-en/2025/11/04/AQ2KWUSWNBFTTKDOPRZADO5T4M/; Merritt Enright, "How Chinese EV makers are winning in Brazil," *CNBC*, November 5, 2024, https://www.cnbc.com/2025/11/05/chinese-evs-brazil.html.
53. SAE Detroit Section, "The U.S. Automotive Industry at Risk" (white paper, October 2024), https://www.sae-detroit.org/wp-content/uploads/2024/12/24-GLC-White-Paper.pdf.
54. Scott Kennedy, "The Chinese EV Dilemma: Subsidized Yet Striking" (CSIS, June 20, 2024), https://www.csis.org/blogs/trustee-china-hand/chinese-ev-dilemma-subsidized-yet-striking.
55. Juan Felipe Munoz, "Chinese Cars Are Dominating in Asia, Africa, and South America," *Motor1.com*, October 23, 2025, https://www.motor1.com/news/776805/chinese-cars-domination-asia-afria-south-america/.
56. Robert D. Atkinson, "How China's Mercantilist Policies Have Undermined Global Innovation in the Telecom Equipment Industry" (ITIF, June 22, 2020), https://itif.org/publications/2020/06/22/how-chinas-mercantilist-policies-have-undermined-global-innovation-telecom/.
57. StatCounter, "Browser Market Share Worldwide—January 2026," *StatCounter Global Stats*, https://gs.statcounter.com/.
58. Ibid.
59. Ibid.
60. Ibid.
61. Caleb Foote and Robert D. Atkinson, "Chinese Competitiveness in the International Digital Economy" (ITIF, November 23, 2020), https://itif.org/publications/2020/11/23/chinese-competitiveness-international-digital-economy/.
62. Ben Jiang, "Huawei's HarmonyOS Gains Traction in China With 103 Million Smartphones Shipped," *South China Morning Post*, June 13, 2025, https://www.scmp.com/tech/big-tech/article/3314283/huaweis-harmonyos-gains-traction-china-103-million-smartphones-shipped; Fabio Duarte, "Most Popular Messaging Apps (2026)," *Exploding Topics*, last updated January 12, 2026, https://explodingtopics.com/blog/messaging-apps-stats; Barry Elad, "Alipay vs. WeChat Pay Statistics 2026: Must-See Data Now," *CoinLaw*, updated February 2, 2026, https://coinlaw.io/alipay-vs-wechat-pay-statistics/; David Curry, "TikTok Revenue and Usage Statistics (2026)," *Business of Apps*, January 7, 2026, https://www.businessofapps.com/data/tik-tok-statistics/.
63. Vion, "How Will TikTok Triple Its Ecommerce GMV in SE Asia in 2023?" *The Low Down* (Momentum Works), June 16, 2023, https://thelowdown.momentum.asia/how-will-tiktok-triple-its-ecommerce-

gmv-in-se-asia-in-2023/; Wolf of Harcourt Street, "Shopee's Dominance in Southeast Asia's E-Commerce Market," *The Wolf of Harcourt Street* (Substack), July 12, 2025, https://www.thewolfofharcourtstreet.com/p/shopees-dominance-in-southeast-asias.

64. Ibid.
65. 36Kr English, "As E-Commerce Heats Up in LATAM, Who Can Catch Mercado Libre?" *KrASIA*, August 20, 2024, https://kr-asia.com/as-e-commerce-heats-up-in-latam-who-can-catch-mercado-libre.
66. Ken Parks and Stephan Kueffner, "A Chinese E-Commerce Glut Is Meeting Resistance in Latin America," *Bloomberg*, August 25, 2025, https://www.bloomberg.com/news/features/2025-08-25/china-floods-latin-america-with-cheap-goods-through-temu-shein-mercadolibre.
67. Mariana Allende, "Temu, Shein Take 40% of Mexico's E-Commerce Market," *Mexico Business News*, January 14, 2025, https://mexicobusiness.news/ecommerce/news/temu-shein-take-40-mexicos-e-commerce-market.
68. Synergy Research Group, "Cloud Market Share Trends—Big Three Together Hold 63% While Oracle and the Neoclouds Inch Higher," news release, November 19, 2025, https://www.srgresearch.com/articles/cloud-market-share-trends-big-three-together-hold-63-while-oracle-and-the-neoclouds-inch-higher.
69. Diana Goovaerts, "China's Cloud and AI Giants Build a Parallel Tech Universe," *Fierce Network*, September 11, 2025, https://www.fierce-network.com/cloud/chinese-cloud-giants-are-flying-under-radar/.
70. Lehdonvirta, Boxi Wú, and Zoe Hawkins, "Weaponised Interdependence in a Bipolar World: How Economic Forces and Security Interests Shape the Global Reach of US and Chinese Cloud Data Centres," *Review of International Political Economy* 32, no. 5 (2025): 1442–1467, https://doi.org/10.1080/09692290.2025.2489077.
71. Ibid.
72. "AS58453—China Mobile International," PeeringDB, accessed February 4, 2026, https://www.peeringdb.com/net/4338; PeeringDB, "Network: Alibaba Cloud (AS45102)," accessed February 4, 2026, https://www.peeringdb.com/net/16535; PeeringDB, "Huawei Cloud Global (AS136907)," accessed February 4, 2026, https://www.peeringdb.com/net/18382; PeeringDB, "Tencent Global (AS132203)," accessed February 4, 2026, https://www.peeringdb.com/net/5005.
73. Robert D. Atkinson, "Industry by Industry: More Chinese Mercantilism, Less Global Innovation" (ITIF, May 10, 2021), https://itif.org/publications/2021/05/10/industry-industry-more-chinese-mercantilism-less-global-innovation/.
74. Christoph Nedopil, "China Belt and Road Initiative (BRI) Investment Report 2025," Griffith Asia Insights (Griffith Asia Institute), July 17, 2025, https://blogs.griffith.edu.au/asiainsights/china-belt-and-road-initiative-bri-investment-report-2025/.
75. Ibid.
76. Ibid.
77. Christoph Nedopil, "Countries of the Belt and Road Initiative (BRI)," Green Finance & Development Center, FISF Fudan University, May 2025, https://greenfdc.org/countries-of-the-belt-and-road-initiative-bri/.
78. Rodrigo Balbontin, "Backfire: Export Controls Helped Huawei and Hurt U.S. Firms" (ITIF, October 27, 2025, https://itif.org/publications/2025/10/27/backfire-export-controls-helped-huawei-and-hurt-us-firms/.

79. Evan Williams, "China's Digital Silk Road taking its shot at the global stage," *East Asia Forum*, May 9, 2024), https://eastasiaforum.org/2024/05/09/chinas-digital-silk-road-taking-its-shot-at-the-global-stage/.

80. Alex He, "The Digital Silk Road and China's Influence on Standard Setting," CIGI Papers No. 264 (Centre for International Governance Innovation), April 2022, https://www.cigionline.org/static/documents/no.264.pdf; Sameer Patil and Prithvi Gupta, "The Digital Silk Road and Smart City Networks in the Indo-Pacific: A Primer," *Observer Research Foundation*, https://www.orfonline.org/research/the-digital-silk-road-and-smart-city-networks-in-the-indo-pacific-a-primer; Council on Foreign Relations, "Assessing China's Digital Silk Road Initiative: A Transformative Approach to Technology Financing or a Danger to Freedoms?" https://www.cfr.org/china-digital-silk-road/.

81. Ana Horigoshi et al., *Delivering the Belt and Road: Decoding the Supply of and Demand for Chinese Overseas Development Projects* (Williamsburg, VA: AidData at William & Mary, 2022), https://docs.aiddata.org/reports/delivering-the-belt-and-road.html; Oyintarelado Moses and Laura Gormley, "Beyond Policy Banks: The Overseas Development Investment Funds Financing the Belt and Road Initiative," Boston University Global Development Policy Center, November 4, 2022, https://www.bu.edu/gdp/2022/11/04/beyond-policy-banks-the-overseas-development-investment-funds-financing-the-belt-and-road-initiative/.

82. China Power Team, "How Is the Belt and Road Initiative Advancing China's Interests?" ChinaPower (Center for Strategic and International Studies), May 8, 2017, updated October 11, 2024, https://chinapower.csis.org/china-belt-and-road-initiative/.

83. Dalia Parete, "Digital Silk Road," China Media Project, November 24, 2023, https://chinamediaproject.org/the_ccp_dictionary/digital-silk-road/.

84. Vivek Chilukuri and Charlie Scanlon, "Countering the Digital Silk Road," Center for a New American Security, October 15, 2025, https://www.cnas.org/publications/reports/countering-the-digital-silk-road.

85. Balbontin, *Backfire: Export Controls Helped Huawei and Hurt U.S. Firms*.

86. Ana Horigoshi et al., *Delivering the Belt and Road: Decoding the Supply of and Demand for Chinese Overseas Development Projects*; Andres B. Schwarzenberg, *Tracking China's Global Economic Activities: Data Challenges and Issues for Congress*, Congressional Research Service, updated July 14, 2020, https://www.everycrsreport.com/files/2020-07-14_R46302_095d25f35cae3102f3d48b0809f261d9eed5e2f4.pdf.

87. Ana Horigoshi et al., *Delivering the Belt and Road: Decoding the Supply of and Demand for Chinese Overseas Development Projects*; Daniel F. Runde, Austin Hardman, and Clara Bonin, *Responding to China's Growing Influence in Ports of the Global South*, Center for Strategic and International Studies, October 30, 2024, https://www.csis.org/analysis/responding-chinas-growing-influence-ports-global-south; Moses et al., "China-Africa Economic Bulletin, 2024 Edition."

88. Daniel F. Runde, Austin Hardman, and Clara Bonin, "Responding to China's Growing Influence in Ports of the Global South," Center for Strategic and International Studies, October 30, 2024, https://www.csis.org/analysis/responding-chinas-growing-influence-ports-global-south.

89. Tom Bowker, "We're Being Treated Like Slaves": Factory Workers Stuck in Year-Long Lockdown," *VICE*, August 24, 2021, https://www.vice.com/en/article/were-being-treated-like-slaves-factory-workers-stuck-in-year-long-lockdown/; Business & Human Rights Resource Centre, "Angola: Two Chinese Factories Closed Down for Environmental Violations and Labour Abuses," March 6, 2024, https://www.business-humanrights.org/en/latest-news/angola-two-chinese-factories-closed-down-for-environmental-violations-and-labour-abuses/; Business & Human Rights Resource Centre, "Zimbabwe: Shooting of Local Workers by Chinese Mine Owner Shows 'Systematic and Widespread' Abuse, Watchdog Says," June 29, 2020,https://www.business-humanrights.org/fr/derni%C3%A8res-actualit%C3%A9s/zimbabwe-shooting-of-local-workers-by-chinese-mine-owner-shows-systematic-and-

widespread-abuse-watchdog-says/; David Smith, "Chinese Mining Firms in Zambia Under Fire for Mistreating Workers," *The Guardian*, November 3, 2011, https://www.theguardian.com/global-development/2011/nov/03/chinese-mining-zambia-mistreating-workers.

90. Yujeong Yang, "Bring Your Own Workers: Chinese OFDI, Chinese Overseas Workers, and Collective Labor Rights in Africa," *World Development* 152 (April 2022): 105808, https://doi.org/10.1016/j.worlddev.2021.105808; "Niger Expelled Chinese Oil Execs Over Local-Expatriate Pay Gap, Minister Says," *Reuters*, March 20, 2025, https://www.reuters.com/business/energy/niger-expelled-chinese-oil-execs-over-local-expatriate-pay-gap-minister-says-2025-03-20/.
91. "A New Generation of Chinese Companies Is Expanding Around the World," *The Economist*, January 13, 2026, https://www.economist.com/business/2026/01/13/a-new-generation-of-chinese-companies-is-expanding-around-the-world.
92. "The impact of the Belt and Road Initiative on foreign direct investment from China, the United States, and major investor countries," *Journal of the Japanese and International Economies*, Volume 77, September 2025, https://doi.org/10.1016/j.jjie.2025.101365.
93. Ibid.
94. Schwarzenberg, *Tracking China's Global Economic Activities: Data Challenges and Issues for Congress*.
95. Ibid.
96. U.S. Government Accountability Office, *International Infrastructure Projects: China's Investments Significantly Outpace the U.S., and Experts Suggest Potential Improvements to the U.S. Approach* (GAO-24-106866, September 12, 2024), https://www.gao.gov/products/gao-24-106866.
97. Ibid.
98. International Monetary Fund, "Direct Investment Positions by Counterpart Economy (formerly CDIS) (DIP)," IMF Data, https://data.imf.org/en/Data-Explorer?datasetUrn=IMF.STA:DIP(12.0.1).
99. Jannick Damgaard, Thomas Elkjaer, and Niels Johannesen, "What Is Real and What Is Not in the Global FDI Network?" *IMF Working Paper* WP/19/274 (International Monetary Fund, December 2019), www.imf.org/-/media/files/publications/wp/2019/wpiea2019274-print-pdf.pdf.
100. International Monetary Fund, "Direct Investment Positions by Counterpart Economy (DIP) (formerly CDIS)," IMF *Data*, https://data.imf.org/en/Data-Explorer?datasetUrn=IMF.STA:DIP(12.0.1).
101. International Monetary Fund, "Direct Investment Positions by Counterpart Economy (DIP)."
102. Eric Robinson, Alexandra T. Evans, Raymond Kuo, Howard J. Shatz, Andrew Stravers, and Stephanie Stewart, *Development as a Tool of Economic Statecraft: A Net Assessment of U.S. and Chinese Approaches*, RAND Corporation, September, 2022, https://www.rand.org/pubs/research_reports/RRA2271-1.html.
103. International Monetary Fund, "Direct Investment Positions by Counterpart Economy (DIP)."
104. Matt Ferchen, *Growing US-China Rivalry in Africa, Latin America and Southeast Asia: Implications for the EU* (MERICS, March 24, 2022), https://merics.org/en/report/growing-us-china-rivalry-africa-latin-america-and-southeast-asia-implications-eu.
105. Ibid.
106. United Nations Economic Commission for Latin America and the Caribbean (ECLAC/CEPAL), *La Inversión Extranjera Directa en América Latina y el Caribe, 2025* (CEPAL, November 3, 2025),, https://www.cepal.org/es/tipo-de-publicacion/la-inversion-extranjera-directa-america-latina-caribe.
107. International Monetary Fund, "Direct Investment Positions by Counterpart Economy (DIP)."
108. Ibid.

109. Ibid.
110. Ibid.
111. Ibid.
112. UN Trade and Development (UNCTAD), "World Investment Report 2025," https://unctad.org/topic/investment/world-investment-report.
113. Pak Yiu, "Chinese deal activity shifts toward emerging markets and into greenfields," Nikkei Asia, September 16, 2024, https://asia.nikkei.com/business/business-trends/chinese-deal-activity-shifts-toward-emerging-markets-and-into-greenfields.
114. Ibid.
115. Inter-American Dialogue, "MapLists (Policy List: amount)," https://www.thedialogue.org/MapLists/#/Policy/List/amount.
116. Diana Roy, "China's Growing Influence in Latin America," Council on Foreign Relations (Backgrounder), updated June 6, 2025, https://www.cfr.org/backgrounders/china-influence-latin-america-argentina-brazil-venezuela-security-energy-bri.
117. Ibid.
118. Eric Olander, "BYD Opens Massive Brazil Plant on Former Ford Site, Underscoring China's Expanding Foothold in Latin America," *The China-Global South Project*, October 13, 2025, https://chinaglobalsouth.com/2025/10/13/byd-brazil-camacari-ev-factory/.
119. Adam Hancock, "Brazil Sues China Carmaker BYD over 'Slave-Like' Conditions," *BBC*, May 28, 2025, https://www.bbc.com/news/articles/c3v5n7w55kpo.
120. Tariff Act of 1930, § 771(18), 19 U.S.C. § 1677(18); Tariff Act of 1930, § 701(f), 19 U.S.C. § 1671(f).
121. Office of the United States Trade Representative, "Trade Policy Review of the People's Republic of China, Statement by Deputy Permanent Representative David Bisbee on Behalf of the United States," July, 2024, https://ustr.gov/about-us/policy-offices/press-office/speeches-and-remarks/2024/july/trade-policy-review-peoples-republic-china.
122. Meghan Ostertag, "Fact of the Week: More Than 99 Percent of Listed Firms in China Receive Direct Subsidies From the Chinese Government" (ITIF, September 8, 2025), https://itif.org/publications/2025/09/08/more-than-99-percent-listed-firms-in-china-receive-direct-subsidies-chinese-government/.
123. Gerard DiPippo, Ilaria Mazzocco, Scott Kennedy, and Matthew P. Goodman, "Red Ink: Estimating Chinese Industrial Policy Spending in Comparative Perspective," *Center for Strategic and International Studies*, May 2022, https://www.csis.org/analysis/red-ink-estimating-chinese-industrial-policy-spending-comparative-perspective.
124. Atkinson, *Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance*.
125. International Labour Organization, "Wages, Productivity and Labour Share in China," ***Research Note***, ILO Regional Office for Asia and the Pacific, Regional Economic and Social Analysis Unit (RESA), April 2016, https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@asia/@ro-bangkok/documents/publication/wcms_475254.pdf.
126. World Bank, *China Economic Update* (June 2025) (Washington DC: World Bank, June 2025), https://openknowledge.worldbank.org/server/api/core/bitstreams/43f4bc2c-b457-4a6f-911f-8ad3bded0de9/content.
127. U.S. Department of the Treasury, Office of International Affairs, *Report to Congress: Macroeconomic and Foreign Exchange Policies of Major Trading Partners of the United States* (Washington DC: U.S.

Department of the Treasury, June 2024), https://home.treasury.gov/system/files/136/June-2024-FX-Report.pdf.

128. U.S.-China Economic and Security Review Commission, "China Bulletin: February 4, 2026," February 4, 2026, https://www.uscc.gov/trade-bulletins/china-bulletin-february-4-2026.
129. Alicia R. Chen, "Foreign Aid With Chinese Characteristics," *Foreign Affairs*, December 3, 2025, https://www.foreignaffairs.com/china/foreign-aid-chinese-characteristics.
130. Atkinson and Ezell, *Toward Globalization 2.0: A New Trade Policy Framework for Advanced-Industry Leadership and National Power*.
131. Stephen Ezell and Rodrigo Balbontin, "How America's Trading Partners Are Reacting to U.S. Tariffs, Global Trade and Innovation Policy Alliance, June, 2025, https://itif.org/publications/2025/06/30/how-americas-trading-partners-reacting-to-us-tariffs/.
132. Joe Cash and Xiuhao Chen, "China's Trade Ends 2025 With Record $1.2 Trillion Surplus Despite Trump Tariff Jolt," *Reuters*, January 14, 2026, https://www.reuters.com/world/china/chinas-trade-ends-2025-with-record-trillion-dollar-surplus-despite-trump-tariffs-2026-01-14/.
133. U.S. General Accounting Office, "Export Promotion: Federal Programs Lack Organizational and Funding Cohesiveness," U.S. General Accounting Office, NSIAD-92-49, January, 1992, https://www.gao.gov/assets/nsiad-92-49.pdf.
134. Atkinson and Ezell, *Toward Globalization 2.0: A New Trade Policy Framework for Advanced-Industry Leadership and National Power*.
135. Nigel Cory, "Testimony to the U.S. House Ways & Means Subcommittee on Trade Regarding Reforming the Generalized System of Preferences to Safeguard U.S. Supply Chains and Combat China" (ITIF, September 20, 2023), https://itif.org/publications/2023/09/20/testimony-reforming-gsp-to-safeguard-us-supply-chains-and-combat-china/.
136. Vivek Chilukuri, "How the United States Can Win the Global Tech Race," Foreign Policy, June 2025, https://foreignpolicy.com/2025/06/09/china-tech-deepseek-chips-tech/?tpcc=recirc_latest062921.
137. Shayerah I. Akhtar, "Export-Import Bank: Overview and Issues for Congress," *In Focus* IF10017 (Congressional Research Service, updated September 25, 2025), https://www.congress.gov/crs-product/IF10017.
138. Steil, *The Battle of Bretton Woods: John Maynard Keynes, Harry Dexter White, and the Making of a New World Order* (Princeton, NJ: Princeton University Press, 2013).
139. U.S. International Development Finance Corporation, "DFC Secures Expanded Authorities with FY26 NDAA Signed into Law," media release, December 18, 2025, https://www.dfc.gov/media/press-releases/dfc-secures-expanded-authorities-fy26-ndaa-signed-law.
140. Erin Collinson and Julia Brownell, "Looking Back and Moving Forward: What DFC's 2025 Portfolio Reveals About What Comes Next," *Center for Global Development* (blog), January 23, 2026, https://www.cgdev.org/blog/looking-back-and-moving-forward-what-dfcs-2025-portfolio-reveals-about-what-comes-next.
141. George Ingram, "Reauthorization of the Development Finance Corporation," Brookings, November 5, 2025, https://www.brookings.edu/articles/reauthorization-of-the-development-finance-corporation/.
142. Hayley Wong, "China-Thailand meeting yields agreement on strategic cooperation and military exercises," *South China Morning Post*, May 23, 2025, https://www.scmp.com/news/china/military/article/3311488/china-thailand-meeting-yields-agreement-strategic-cooperation-and-military-exercises.
143. "American AI Exports Program," Federal Register, October 28, 2025, https://www.federalregister.gov/documents/2025/10/28/2025-19674/american-ai-exports-program; U.S. Department of State, "Pax Silica," https://www.state.gov/pax-silica.

144. Reuters, "China's Xi pushes for global AI body at APEC in counter to US," November 1, 2025, https://www.reuters.com/world/china/chinas-xi-pushes-global-ai-body-apec-counter-us-2025-11-01/.
145. Daniel Castro and Nigel Cory, "'Clean Network' Initiative Risks Undermining U.S. Digital Trade" (ITIF, August 31, 2020), https://itif.org/publications/2020/08/31/clean-network-initiative-risks-undermining-us-digital-trade/; U.S. Department of State, "The Clean Network," https://2017-2021.state.gov/the-clean-network/.
146. Castro and Cory, *'Clean Network' Initiative Risks Undermining U.S. Digital Trade*.
147. U.S. Department of State, *The Clean Network*.

Notes for The Hamilton Index, 2026: China's Dominance in Advanced Industries Is Growing

1. Robert Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
2. Robert D. Atkinson, "The Hamilton Index: Assessing National Performance in the Competition for Advanced Industries" (ITIF, June 8, 2022), https://itif.org/publications/2022/06/08/the-hamilton-index-assessing-national-performance-in-the-competition-for-advanced-industries/; Robert D. Atkinson and Ian Tufts, "The Hamilton Index, 2023: China Is Running Away With Strategic Industries" (ITIF, December 13, 2023), https://itif.org/publications/2023/12/13/2023-hamilton-index/.
3. See: "The Hamilton Index, 2026: Industry Visualizations," https://itif.org/publications/2026/05/06/hamilton-index-2026-industry-visualizations/; "The Hamilton Index, 2026: Country Visualizations," https://itif.org/publications/2026/05/06/hamilton-index-2026-country-visualizations/; and, "The Hamilton Index, 2026: Momentum Visualizations," https://itif.org/publications/2026/05/06/hamilton-index-2026-momentum-visualizations/.
4. Organization for Economic Cooperation and Development (Trade in Value Added 2025 edition: principal indicators, levels), accessed February 25, 2026, https://data-explorer.oecd.org/vis?pg=0&bp=true&tm=%22%28TIVA%29%202025%20edition%22&snb=5&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_TIVA_MAINLV%40DF_MAINLV&df[ag]=OECD.STI.PIE&df[vs]=1.1&dq=VALU.AUS.C21.W..A&pd=1995%2C2022&to[TIME_PERIOD]=false.
5. Because of how companies report income for tax purposes, Ireland appears to have artificially inflated advanced industry output measures.
6. Lin Jones, "Recent Developments in Global Semiconductor Industry" (Washington DC: U.S. International Trade Commission, November 2023), https://www.usitc.gov/publications/332/executive_briefings/ebot_recent_developments_in_global_semiconductor_industry.pdf.
7. Nguyen Thu, "Vietnam's Electronics Sector Rising Fast, But Structural Hurdles Remain," Vietnam Investment Review, July 3, 2025, https://vir.com.vn/vietnams-electronics-sector-rising-fast-but-structural-hurdles-remain-131838.html.
8. Stephen Ezell, "How Innovative Is China in the Electric Vehicle and Battery Industries?" (ITIF, July 29, 2024), https://itif.org/publications/2024/07/29/how-innovative-is-china-in-the-electric-vehicle-and-battery-industries.
9. Aaron Blotnick, "The Year China Surpassed the USA in Biotech Innovation, Deal Value, and Clinical Output," *Synbiobeta*, January 22, 2026, https://www.synbiobeta.com/read/the-year-china-surpassed-the-usa-in-biotech-innovation-deal-value-and-clinical-output.

10. Sandra Barbosu, "How Innovative is China in Biotechnology?" (ITIF, July 30, 2024), https://itif.org/publications/2024/07/30/how-innovative-is-china-in-biotechnology/.
11. Claude Barfield and Matthew Glavish, "Can the Commercial Aircraft Corporation of China's Home-Field Advantage Challenge Boeing's 737?" (American Enterprise Institute, January 23, 2023), https://www.aei.org/technology-and-innovation/can-comacs-home-field-advantage-challenge-boeings-737/.
12. "The Drivers and Impacts of Subsidies to Steel Firms" (Paris, France: OECD, October 9, 2025), https://www.oecd.org/en/publications/the-drivers-and-impacts-of-subsidies-to-steel-firms_33e4b097-en.html.
13. Erica York and Alex Durante, "Tariff Tracker: Impact of Trump Tariffs & Trade War by the Numbers" (Tax Foundation, February 23, 2026), https://taxfoundation.org/research/all/federal/trump-tariffs-trade-war/.
14. Peter S. Goodman, "18,000 Reasons It's So Hard to Build a Chip Factory in America," *New York Times*, last updated December 8, 2025, https://www.nytimes.com/2025/12/04/business/tsmc-phoenix-fab.html.
15. Stephen Ezell, "How Innovative Is China in the Display Industry" (ITIF, September 16, 2024), https://itif.org/publications/2024/09/16/how-innovative-is-china-in-the-display-industry/.
16. "Digital and Technologies" (London, United Kingdom: UK Department for Business and Trade), accessed February 25, 2026, https://www.business.gov.uk/invest-in-uk/investment/sectors/technology/.
17. "United Kingdom Country Commercial Guide" (Washington DC: International Trade Administration), https://www.trade.gov/country-commercial-guides/united-kingdom-aerospace-and-defense.
18. "The UK's Digital Tax Policy" (ITIF, last updated February 5, 2026), https://itif.org/publications/2025/02/11/uk-digital-tax-policy/.
19. "Non-Tariff Attack Tracker" (ITIF, accessed February 25, 2026), https://itif.org/publications/knowledge-bases/attack-tracker/.
20. Ibid.
21. Bao Thanh Nien, "Over 50% of Samsung Phones Globally Are 'Made in Vietnam'," *Vietnam.vn*, July 30, 2023, https://www.vietnam.vn/en/hon-50-dien-thoai-samsung-toan-cau-made-in-vietnam.
22. See: "The Hamilton Index, 2026: Country Visualizations" (ITIF, May 2026), https://itif.org/publications/2026/05/06/hamilton-index-2026-country-visualizations/.

Notes for Targeted Pressure: How Chinese Manufacturing Competition Impacts US States

1. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 17, 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/; Meghan Ostertag, "National Power Industries Are at Risk" (ITIF, November 17, 2025), https://itif.org/publications/2025/11/17/us-national-power-industries-are-at-risk/.
2. Ibid.
3. Francesco Saltarelli et al., "Is Export a Probe for Domestic Production," *Frontiers in Physics 8* (2020), https://www.frontiersin.org/journals/physics/articles/10.3389/fphy.2020.00180/full.
4. "Lenzing Nonwoven Fibers at SINCE in Shanghai," Association of Nonwoven Fabrics Industry, https://www.inda.org/membership/member-news/lenzing-nonwoven-fibers-at-since-in-shanghai/?utm.

5. U.S. Census Bureau (County Business Patterns: 2013-2023, accessed January 15, 2026), https://www.census.gov/programs-surveys/cbp.html.
6. Fatemeh Ashrafi et al., "Global State of Man-Made Filaments," *The Journal of the Textile Institute* (January 2026): 1–17, https://www.tandfonline.com/doi/full/10.1080/00405000.2025.2610799?scroll=top&needAccess=true#d1e1329.
7. Federal Reserve Bank of St. Louis (Industrial production: manufacturing: nondurable goods: artificial and synthetic fibers and filaments (NIACS = 32522), accessed January 15, 2025), https://fred.stlouisfed.org/series/IPG32522NQ.
8. Harvard Atlas of Economic Complexity (Country trade by product: global market share, accessed January 15, 2026), https://atlas.hks.harvard.edu/data-downloads.
9. Fatemeh Ashrafi et al., "Global State of Man-Made Filaments."
10. United States International Trade Commission, "Commodity Translation Tool," accessed January 15, 2026, https://dataweb.usitc.gov/classification/commodity-translation; Harvard Atlas of Economic Complexity (Country trade by product: exports, accessed January 15, 2026), https://atlas.hks.harvard.edu/data-downloads.
11. Organization for Economic Cooperation and Development (OECD) (Trade in Value Added (TiVA) 2025 ed.: manufacturing of textiles, wearing apparel, leather and related products, accessed January 15, 2026), https://data-explorer.oecd.org/vis?pg=0&bp=true&tm=%22%28TIVA%29%202025%20edition%22&snb=5&vw=tb&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_TIVA_MAINLV%40DF_MAINLV&df[ag]=OECD.STI.PIE&df[vs]=1.1&dq=VALU%2BEXGR%2BFFD_DVA.AUT%2BBEL%2BCAN%2BCHL%2BCOL%2BCRI%2BCZE%2BDNK%2BEST%2BFIN%2BFRA%2BDEU%2BGRC%2BHUN%2BISL%2BIRL%2BISR%2BITA%2BJPN%2BKOR%2BLVA%2BLTU%2BLUX%2BMEX%2BNLD%2BNZL%2BNOR%2BPOL%2BPRT%2BSVK%2BSVN%2BESP%2BSWE%2BCHE%2BTUR%2BGBR%2BUSA%2BAGO%2BARG%2BBGD%2BBLR%2BBRA%2BBRN%2BBGR%2BKHM%2BCMR%2BCHN%2BCOD%2BCIV%2BHRV%2BCYP%2BEGY%2BHKG%2BIND%2BIDN%2BJOR%2BKAZ%2BLAO%2BMYS%2BMLT%2BMAR%2BMMR%2BNGA%2BPAK%2BPER%2BPHL%2BROU%2BRUS%2BSTP%2BSAU%2BSEN%2BSGP%2BZAF%2BTWN%2BTHA%2BTUN%2BUKR%2BARE%2BVNM%2BAUS.C13T15.W..A&pd=2022%2C&to[TIME_PERIOD]=false.
12. Harvard Atlas of Economic Complexity (Country trade by partner and product: exports, accessed January 15, 2026).
13. U.S. Census Bureau (County Business Patterns: 2003, accessed January 15, 2026), https://www.census.gov/data/datasets/2003/econ/cbp/2003-cbp.html; U.S. Census Bureau (County Business Patterns: 2023, accessed January 15, 2026), https://www.census.gov/data/datasets/2023/econ/cbp/2023-cbp.html.
14. U.S. Census Bureau (County Business Patterns: 2013-2023, accessed January 15, 2026).
15. Robert D. Atkinson and Ian Tufts, "The Hamilton Index, 2023: China Is Running Away With Strategic Industries" (ITIF, December 13, 2023), https://itif.org/publications/2023/12/13/2023-hamilton-index/.
16. UN Comtrade Database (Trade Data: Imports and Exports, HS codes 7309, 7311, 7611, 7613, 8609, accessed April 14, 2026), https://comtradeplus.un.org/TradeFlow.
17. OECD, "Subsidies to the Steel Industry" (Paris, France: OECD; April 26, 2023), https://www.oecd.org/en/publications/subsidies-to-the-steel-industry_06e7c89b-en.html.
18. UN Comtrade Database (Trade Data: Imports and Exports, HS codes 7309, 7311, 7611, 7613, 8609, accessed April 14, 2026).

19. Shannon Blood, "Arizona: The Emerging Star of the Semiconductor Industry Boom," *Kiterocket*, May 23, 2024, https://www.kiterocket.com/arizona-the-emerging-star-of-the-semiconductor-industry-boom/; Arizona Commerce Authority, "New: Arizona's International Trade Reaches Record Levels," news release, March 28, 2025, https://www.azcommerce.com/news-events/news/2025/3/new-arizona-s-international-trade-reaches-record-levels/#:~:text=Record%20exports%20from%20Arizona%20companies,breaking%20$100%20billion%20announcement%20recently.
20. U.S. Census Bureau (County Business Patterns 2015-2023, accessed January 15, 2026).
21. Danielle Popov, "China's Chip Investment Falls in First Half of 2025 While Equipment Funding Surges: Report," *SCMP*, August 12, 2025, https://www.scmp.com/tech/policy/article/3321579/chinas-chip-investment-falls-first-half-2025-while-equipment-funding-surges-report.
22. Ibid.
23. Daniel Blaugher et al., "Made in China 2025: Evaluating China's Performance" (Washington, D.C.: U.S.-China Economic and Security Review Commission, November 14, 2025), https://www.uscc.gov/research/made-china-2025-evaluating-chinas-performance.
24. Raj Varadarajan et al., "Emerging Resilience in the Semiconductor Supply Chain" (industry report, SIA, May 2024), https://www.semiconductors.org/emerging-resilience-in-the-semiconductor-supply-chain/.
25. UN Comtrade Database (Trade Data: Imports and Exports, HS 8451 and 8542, accessed January 5, 2026).
26. "TSMC Intends to Expand Its Investment in the United States to US$165 Billion to Power the Future of AI," press release, March 4, 2025, https://pr.tsmc.com/english/news/3210; https://www.cfr.org/blog/unpacking-tsmcs-100-billion-investment-united-states.
27. Ana Swanson and Paul Mozur, "U.S. Takes Aim at China's Production of Essential Computer Chips," *The New York Times*, December 23, 2024, https://www.nytimes.com/2024/12/23/business/economy/us-china-semiconductor-legacy-chips.html.
28. Ibid.
29. UN Comtrade Database (Trade Data: Imports and Exports, HS 8451 and 8542, accessed January 5, 2026).
30. Stephen Ezell, "How Innovative is China in Semiconductors?" (ITIF, August 19, 2024), https://itif.org/publications/2024/08/19/how-innovative-is-china-in-semiconductors/.
31. Joanne Chiao, "China and US bolster semiconductor independence as Taiwan's foundry capacity share projected to decline to 41% by 2027, says Trendforce," news release, *Trendforce*, December 14, 2023, https://www.trendforce.com/presscenter/news/20231214-11959.html?utm.
32. Ezell, "How Innovative is China in Semiconductors?" (ITIF, August 19, 2024).
33. Chiao, news release, *Trendforce*, https://www.trendforce.com/presscenter/news/20231214-11959.html?utm.
34. Ardi Janjeva et al., "China's Quest for Semiconductor Self-Sufficiency" (Centre for Emerging Technology and Security, December 4, 2024), https://cetas.turing.ac.uk/publications/chinas-quest-semiconductor-self-sufficiency.
35. Census Bureau (County Business Patterns 2023, accessed March 18, 2026).
36. Atkinson and Tufts, "The Hamilton Index, 2023: China Is Running Away With Strategic Industries."

37. Power Info Today, "Electric Motor & Generator Market – Growth on the Cards," news release, https://www.powerinfotoday.com/news-press-releases/electric-motor-generator-market-growth-on-the-cards/.
38. Census Bureau (County Business Patterns 2015-2023, accessed March 18, 2026).
39. UN Comtrade (Exports of HS codes 8501, 8502, and 8503, accessed March 26, 2026).
40. U.S.-China Economic and Security Review Commission, Made in China 2025: Evaluating China's Performance (Washington, D.C.: U.S.-China Economic and Security Review Commission, November 2025), https://www.uscc.gov/sites/default/files/2025-11/Made_in_China_2025--Evaluating_Chinas_Performance.pdf.
41. Trend Economy (Annual International Trade Statistics by Country, accessed March 23, 2025), https://trendeconomy.com/data/h2/UnitedStatesOfAmerica/85.
42. UN Comtrade (Exports of HS codes 8501, 8502, and 8503, accessed March 26, 2026).
43. U.S. Census Bureau (County Business Patterns, 2003, 2013, 2023, accessed March 24, 2026).
44. Ibid.
45. UN Comtrade (Exports of HS codes 8471, 8473, and 8523, accessed March 24, 2026).
46. Ibid.
47. U.S. Trade Representative, *Four-Year Review of Actions Taken In The Section 301 Investigation: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation* (Washington, D.C.: Office of the U.S. Trade Representative, May 14, 2024), https://ustr.gov/sites/default/files/05.14.2024%20Four%20Year%20Review%20of%20China%20Tech%20Transfer%20Section%20301%20%28Final%29_0.pdf.
48. Eli Clemens, "Internal Value Chains Remain Dependent on China Even as Multinationals Shift Production to America" (ITIF, February 23, 2026), https://itif.org/publications/2026/02/23/internal-value-chains-dependent-china-multinationals-shift-production-to-america/.
49. U.S. Census Bureau (County Business Patterns, 2017-2023, accessed March 24, 2026).
50. UN Comtrade (Exports of HS codes 8471, 8473, and 8523, accessed April 8, 2026).
51. Ibid.
52. Ibid.
53. Office of the United States Trade Representative (USTR), *Four-Year Review of Actions Taken in the Section 301 Investigation: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation* (Washington, D.C.: USTR, May 14, 2024), https://ustr.gov/sites/default/files/05.14.2024%20Four%20Year%20Review%20of%20China%20Tech%20Transfer%20Section%20301%20%28Final%29_0.pdf.
54. Eli Clemens, "Internal Value Chains Remain Dependent on China Even as Multinationals Shift Production to America" (ITIF, February 23, 2026).
55. "Aerospace and Defense Industries in Connecticut," AdvanceCT, accessed April 8, 2026, https://www.advancect.org/key-industries/aerospace-and-defense.
56. U.S. Census Bureau (County Business Patterns, 2014-2023, accessed April 8, 2026).
57. UN Comtrade (Exports of HS codes 840710, 840910, 8411, 841210, accessed April 8, 2026).
58. Blaugher et al., "Made in China 2025: Evaluating China's Performance.
59. Scott Kennedy, "China's COMAC: An Aerospace Minor Leaguer," CSIS, December 7, 2020, https://www.csis.org/blogs/trustee-china-hand/chinas-comac-aerospace-minor-leaguer.

60. OECD, *Measuring Distortions in International Markets: Below-Market Finance* (Paris, France: OECD, May 2021), https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/05/measuring-distortions-in-international-markets-below-market-finance_ef463ae3/a1a5aa8a-en.pdf.
61. Harvard Atlas of Economic Complexity (U.S. exports of turbo-jet engines, <25KN in 2024, accessed April 8, 2026), https://atlas.hks.harvard.edu/explore/treemap?year=2024&exporter=country-840&view=markets&product=product-HS92-8795.
62. UN Comtrade (Exports of (HS codes 840710, 840910. 8411, 841210, accessed April 8, 2026).
63. U.S. Census Bureau (County Business Patterns 2019, 2023, accessed March 24, 2026).
64. Siemens Healthineers, "Siemens Healthineers to Expand its Newark, DE Laboratory Diagnostics Manufacturing Facility," press release, September 27, 2021, https://www.siemens-healthineers.com/en-us/press-room/press-releases/glasgowexpansion2021.
65. U.S.-China Economic and Security Review Commission, "Made in China 2025: Evaluating China's Performance" (Washington, D.C.: U.S. China Economic and Security Review Commission, November 2025).
66. UN Comtrade (Exports of HS codes 3002 and 3822, accessed March 24, 2026).
67. US International Trade Commission, DataWeb (Exports of HS codes 3002 and 3822, accessed March 24, 2026), https://dataweb.usitc.gov/trade/search/TotExp/HTS.
68. UN Comtrade (Exports of HS codes 3002 and 3822, accessed March 24, 2026).
69. U.S.-China Economic and Security Review Commission, "Made in China 2025: Evaluating China's Performance."
70. Ibid.
71. Alexander Brown et al., "Investigating State Support For China's Medical Technology Companies," *MERICS*, November 2023, https://merics.org/sites/default/files/2023-11/MERICS_Report_MedTech%20State%20Support_November%202023_final.pdf.
72. U.S. Census Bureau (County Business Patterns 2017-2023, accessed March 27, 2026).
73. U.S. Trade Representative, *Four-Year Review of Actions Taken In The Section 301 Investigation: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation*.
74. Eli Clemens, "Internal Value Chains Remain Dependent on China Even as Multinationals Shift Production to America" (ITIF, February 23, 2026).
75. Gartner, "Gartner Says Worldwide PC Shipments Increased 0.3% in Fourth Quarter of 2023 but Declined 14.8% for the Year," January 10, 2024, press release, https://www.gartner.com/en/newsroom/press-releases/01-10-2024-gartner-says-worldwide-pc-shipments-increased-zero-point-three-percent-in-fourth-quarter-of-2023-but-declined-fourteen-point-eight-percent-for-the-year.
76. UN Comtrade (Exports of HS codes 8471 and 8473, accessed March 24, 2026).
77. Ibid.
78. Zachary Hansen, "How the Inflation Reduction Act Impacts Georgia's EV Industry," *Governing*, August 15, 2022, https://www.governing.com/next/how-the-inflation-reduction-act-impacts-georgias-ev-industry.
79. Census Bureau (County Business Patterns 2023, accessed March 18, 2026).
80. Office of Senator Jon Ossoff, "Sen. Ossoff: LG Energy Solution & Hyundai to Build $4.3 Billion EV Battery Plant in Georgia, Create 3,000 Jobs," news release, May 25, 2023, https://www.ossoff.senate.gov/press-releases/sen-ossoff-lg-energy-solutions-hyundai-to-build-4-3-billion-ev-battery-plant-in-georgia-create-3000-jobs/.

81. "Impacts of IRA Repeal," International Council on Clean Transportation, April 2025, https://theicct.org/wp-content/uploads/2025/04/Impacts-of-IRA-Repeal-GA-Factsheet.pdf.
82. International Energy Agency (IEA), "Executive Summary" (Paris, France: IEA, 2024), https://www.iea.org/reports/batteries-and-secure-energy-transitions/executive-summary.
83. Shannon Osaka and Naema Ahmed, "How the U.S. Lost Its Lead in Electric Vehicles and Other Clean Energy Inventions," *The Washington Post*, July 31, 2025, https://www.washingtonpost.com/climate-environment/2025/07/31/china-clean-energy-united-states-inventions/.
84. Stephen Ezell, "How Innovative is China in the Electric Vehicle and Battery Industries?" (ITIF, July 29, 2024), https://itif.org/publications/2024/07/29/how-innovative-is-china-in-the-electric-vehicle-and-battery-industries/#_edn88.
85. Ibid.
86. Ibid.
87. Ibid.
88. Ibid.
89. Shannon Osaka and Naema Ahmed, "How the U.S. Lost Its Lead in Electric Vehicles and Other Clean Energy Inventions."
90. IEA, "Lithium-Ion Battery Manufacturing Capacity, 2022-2030" (Paris, France: IEA, May 22, 2023), https://www.iea.org/data-and-statistics/charts/lithium-ion-battery-manufacturing-capacity-2022-2030.
91. "University of Hawaii: Institute for Astronomy," accessed April 14, 2026, https://www.ifa.hawaii.edu/.
92. "Oceanit," accessed April 14, 2026, https://www.oceanit.com/.
93. Census Bureau (County Business Patterns 2018-2023, accessed April 14, 2026).
94. UN Comtrade (Exports of HS code 9001, 9002, 9005, 9011, 9013, accessed April 14, 2026).
95. U.S.-China Economic and Security Review Commission, "Made in China 2025: Evaluating China's Performance."
96. OECD, *Measuring Distortions in International Markets: Below-Market Finance*.
97. "Sunny Group," accessed April 14, 2026, https://www.sunnyoptical.com/en/default.html; OFilm, accessed April 14, 2026, http://www.ofilm.com/en/.
98. "Teledyne Technologies," accessed April 14, 2026, https://www.teledyne.com/en-us.
99. "Semiconductors in Idaho" (factbook, Semiconductor Industry Association (SIA), Washington, D.C.), https://www.semiconductors.org/wp-content/uploads/2022/05/Idaho-2022.pdf; "Idaho's Semiconductor Industry," Idaho Commerce, https://commerce.idaho.gov/semiconductor/.
100. U.S. Census Bureau (County Business Patterns, 2018-2023, accessed April 1, 2026).
101. Semiconductor Industry," Idaho Commerce; "Top 10 Manufacturing Companies in Idaho" (IndustrySelect, December 8, 2025), https://www.industryselect.com/blog/top-10-manufacturing-companies-in-idaho.
102. Yang Jie, "The Chinese Company Taking On the World's Memory-Chip Giants," *The Wall Street Journal*, January 11, 2026, https://www.wsj.com/tech/the-chinese-company-taking-on-the-worlds-memory-chip-giants-78dfea55?st=UhqVRo&reflink=article_email_share.
103. Ibid.
104. "Global DRAM Market Share by Revenue (Q3 2024 – Q3 2025), Counterpoint, December 18, 2025, https://counterpointresearch.com/en/insights/global-dram-and-hbm-market-share.

105. Ibid.
106. Popov, "China's Chip Investment Falls in First Half of 2025 While Equipment Funding Surges: Report."
107. Lee Deokjoo, "China Spent 70 Trillion Won on Semiconductor Subsidies and Plans to Double That—Meanwhile, K-Semiconductors Stand Alone," *Maeil Business Newspaper*, December 29, 2025, https://www.mk.co.kr/en/business/11917168#:~:text=This%20is%20not%20the%20end,semiconductor%20subsidies%20are%20proving%20effective.
108. Ibid.
109. Micron, "Micron and Trump Administration Announce Expanded U.S. Investments in Leading-Edge DRAM Manufacturing and R&D," news release, June 12, 2025, https://investors.micron.com/news-releases/news-release-details/micron-and-trump-administration-announce-expanded-us-investments.
110. Ana Swanson and Paul Mozur, "U.S. Takes Aim at China's Production of Essential Computer Chips," *The New York Times*, December 23, 2024, https://www.nytimes.com/2024/12/23/business/economy/us-china-semiconductor-legacy-chips.html.
111. Ezell, "How Innovative is China in Semiconductors?" (ITIF, August 19, 2024).
112. Andrew David et al., "Foundational Fabs: China's Use of Non-Market Policies to Expand Its Role in the Semiconductor Supply Chain" (Silverado Policy Accelerators, October 2023), 15, https://silverado.org/news/report-foundational-fabs-chinas-use-of-non-market-policies/.
113. Ibid.
114. Ezell, "How Innovative is China in Semiconductors?" (ITIF, August 19, 2024).
115. Ardi Janjeva et al., "China's Quest for Semiconductor Self-Sufficiency" (Centre for Emerging Technology and Security, December 4, 2024), https://cetas.turing.ac.uk/publications/chinas-quest-semiconductor-self-sufficiency.
116. "Illinois," Office of the United States Trade Representative, accessed January 20, 2026, https://ustr.gov/map/state-benefits/il.
117. United States Census Bureau, USA Trade (State export data, HS 8427, 8429, 8430, 8431, accessed January 20, 2026), https://usatrade.census.gov/data/Perspective60/View/dispview.aspx.
118. U.S. Census Bureau (County Business Patterns 2017-2023, accessed April 1, 2026).
119. "Heavy Equipment Manufacturers: Trends Shaping the Industry's Future," Illinois Manufacturers' Association, accessed January 20, 2026, https://ima-net.org/heavy-equipment-manufacturers/.
120. "Global Construction Guide 2026," Construction Briefing, December 11, 2025, https://www.constructionbriefing.com/magazines/international-construction/latest-issue.
121. Global Trade Alert, "China: Government subsidies for listed company Xcmg Construction Machinery Co., Ltd. in year 2023," https://globaltradealert.org/intervention/136968-china-government-subsidies-for-listed-company-xcmg-construction-machinery-co-ltd-in-year-2023; Global Trade Alert, "China: Government subsidies for listed company Xcmg Construction Machinery Co., Ltd. in year 2022," https://globaltradealert.org/state-act/85153.
122. European Commission, "Commission acts against unfairly subsidized imports of mobile access equipment from China," news release, April 28, 2025, https://policy.trade.ec.europa.eu/news/commission-acts-against-unfairly-subsidised-imports-mobile-access-equipment-china-2025-04-28_en.
123. International Trade Administration, "China industrial Equipment Upgrading," July 10, 2024, https://www.trade.gov/market-intelligence/china-industrial-equipment-upgrading.

124. Neil Gerrard, "Yellow Table 2025 in 4 Charts: Market Share, Growth, and Regional Power Shifts," *Construction Briefing*, June 11, 2025, https://www.constructionbriefing.com/news/yellow-table-2025-in-4-charts-market-share-cagr-and-regional-power-shift/8062551.article?zephr_sso_ott=DjBjBu.
125. UN Comtrade Database (Trade Data: Exports, HS 8427, 8429, 8430, 8431, accessed January 20, 2026).
126. Ibid.
127. "China Construction Machinery Industry Eyes Global Markets Amid Domestic Slowdown," imachine, June 11, 2025, https://www.imachinemall.com/news/china-construction-machinery-industry-eyes-global-markets-amid-domestic-slowdown/.
128. Caterpillar, "Caterpillar Reports Third-Quarter 2025 Results," news release, October 29, 2025, https://investors.caterpillar.com/news/news-details/2025/Caterpillar-Reports-Third-Quarter-2025-Results/default.aspx.
129. U.S. Geological Survey, Mineral Commodity Summaries, "Iron and Steel" (U.S. Geological Survey: Washington, D.C., January 2025), https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-iron-steel.pdf; U.S. Census Bureau (County Business Patterns 2017-2023, accessed March 27, 2026).
130. "Indiana Harbor," Cleveland Cliffs, accessed March 31, 2026, https://www.clevelandcliffs.com/operations/steelmaking/indiana-harbor; "United States Steel," accessed March 31, 2026, https://www.ussteel.com/.
131. U.S. Census Bureau (County Business Patterns 2017-2023, accessed March 27, 2026).
132. OECD, "Subsidies to the Steel Industry" (Paris, France: OECD; April 26, 2023), https://www.oecd.org/en/publications/subsidies-to-the-steel-industry_06e7c89b-en.html.
133. Ibid.
134. "World Steel in Figures 2025," World Steel Association, accessed March 31, 2026, https://worldsteel.org/data/world-steel-in-figures/world-steel-in-figures-2025/.
135. OECD, "Surging Excess Capacity Threatens Steel Market Stability, Employment, and Decarbonization Plans," May 27, 2025, press release, https://www.oecd.org/en/about/news/press-releases/2025/05/surging-excess-capacity-threatens-steel-market-stability-employment-and-decarbonisation-plans.html.
136. "World Steel in Figures 2025," World Steel Association, accessed March 31, 2026.
137. UN Comtrade Database (Trade Data: Imports and Exports, HS 72, accessed March 30, 2026).
138. International Trade Administration (ITA), "Global Steel Trade Monitor: Steel Exports Report: United States" (Washington, D.C.: ITA, August 2019), https://legacy.trade.gov/steel/countries/pdfs/2019/q1/exports-us.pdf.
139. UN Comtrade Database (Trade Data: Imports and Exports, HS 72, accessed March 30, 2026).
140. OECD, "Surging Excess Capacity Threatens Steel Market Stability, Employment, and Decarbonization Plans," May 27, 2025.
141. U.S. Census Bureau (County Business Patterns 2023; June 26, 2025).
142. "Our American Factories & Facilities," John Deere, https://about.deere.com/en-us/locations/us-locations.
143. "Global Construction Guide 2026," Construction Briefing, December 11, 2025, https://www.constructionbriefing.com/magazines/international-construction/latest-issue.
144. Ibid.
145. UN Comtrade Database (Trade Data: Exports, HS 8427, 8429, 8430, 8431, accessed January 20, 2026), https://comtradeplus.un.org/TradeFlow.

146. Global Trade Alert, "China: Government subsidies for listed company Xcmg Construction Machinery Co., Ltd. in year 2023," https://globaltradealert.org/intervention/136968-china-government-subsidies-for-listed-company-xcmg-construction-machinery-co-ltd-in-year-2023; Global Trade Alert, "China: Government subsidies for listed company Xcmg Construction Machinery Co., Ltd. in year 2022," https://globaltradealert.org/state-act/85153.
147. International Trade Administration, "China industrial Equipment Upgrading," July 10, 2024, https://www.trade.gov/market-intelligence/china-industrial-equipment-upgrading.
148. Ibid.
149. Gerrard, "Yellow Table 2025 in 4 Charts: Market Share, Growth, and Regional Power Shifts."
150. Ibid.
151. European Commission, "Commission acts against unfairly subsidized imports of mobile access equipment from China," news release, April 28, 2025, https://policy.trade.ec.europa.eu/news/commission-acts-against-unfairly-subsidised-imports-mobile-access-equipment-china-2025-04-28_en.
152. UN Comtrade Database (Trade Data: Exports, HS 8427, 8429, 8430, 8431, accessed January 20, 2026).
153. Ibid.
154. U.S. Census Bureau (County Business Patterns, accessed April 1, 2026).
155. BLS (Employment and Wages Data Viewer, NAICS 3331, accessed March 18, 2026), https://data.bls.gov/cew/apps/table_maker/v4/table_maker.htm#type=18&from=2020&to=2024&qtr=1&own=5&ind=3331&area=20000&supp=1.
156. Census Bureau (County Business Patterns 2014, 2023, accessed March 18, 2026).
157. UN Comtrade (Exports of HS Codes 8432, 8433, 8434, 8435, 8436, 8437, 8701 to world, accessed March 17, 2026).
158. Ibid.
159. "Global Export of Agricultural, Horticultural or Forestry Machinery Share by Country (US Dollars)," ReportLinker, https://www.reportlinker.com/dataset/004a42bfe45ee49e9855d982f6116ed0637e1d77.
160. Wang Xiaotong, "Empowering the Global South: Chinese Agricultural Machinery in Motion," *China Economic Net*, http://en.ce.cn/Insight/202603/t20260307_2811505.shtml.
161. "Global Export of Agricultural, Horticultural or Forestry Machinery Share by Country (US Dollars)," ReportLinker.
162. Yajuan Zhou et al., "Impact of Agricultural Machinery Purchase Subsidies on the Sustainable and Intensive Utilization of Cultivated Land: A Perspective on Agricultural Machinery Socialization Services," *Journal of Rural Studies*, vol 119 (October 2025), https://www.sciencedirect.com/science/article/pii/S0743016725002396.
163. International Trade Administration (ITA), "China Agricultural Machinery Market" (Washington, D.C.: ITA, 2021), https://www.trade.gov/market-intelligence/china-agricultural-machinery-market.
164. UN Comtrade (Exports of HS Codes 8432, 8433, 8434, 8435, 8436, 8437, 8701 to Indonesia, the Philippines, and Vietnam, accessed March 17, 2026).
165. "U.S. and Global Operations," GE Appliances, accessed April 1, 2026, https://geappliancesco.com/operations/.
166. U.S. Census Bureau (County Business Patterns 2018-2023, accessed April 1, 2026).

167. Team Kentucky, "Gov. Beshear: GE Appliances To Invest $490 Million, Create 800 Full-Time Jobs at Global Corporate Headquarters in Louisville," news release, June 26, 2025, https://newkentuckyhome.ky.gov/Newsroom/NewsPage/20250626_GEAppliances.
168. Ibid.
169. Ibid.
170. UN Comtrade (U.S. and China Exports of HS codes 8418, 8422, 8450, 8508, 8516, accessed March 19, 2026).
171. Ibid.
172. Ibid.
173. Ibid.
174. Midea, "Financial Reports" https://www.midea.com.cn/en/Investors/Financial_Reports; Haier, "Financial Reports," https://smart-home.haier.com/en/investor-relations/#financial-reports.
175. Junhui Shi et al., "The Effect of Household Technology on Child Health: Evidence from China's "Home Appliances Going to the Countryside" Policy," *International Journal of Environmental Research and Public Health*, no. 19 (2022), http://pmc.ncbi.nlm.nih.gov/articles/PMC9565273/; Ryan Featherston, "Is Your Refrigerator Running? China's Trade-In Programs and Plans to Boost Consumption" (CSIS, March 27, 2025), https://www.csis.org/blogs/trustee-china-hand/your-refrigerator-running-chinas-trade-programs-and-plans-boost.
176. Ibid.
177. Midea, "2024 Annual Report," https://www.midea.com.cn/en/Investors/Financial_Reports.
178. U.S. Census Bureau (County Business Patterns 2017-2023, accessed March 27, 2026).
179. "Atalco," Atalco, accessed March 30, 2026, https://www.atalco.com/.
180. U.S. Census Bureau (County Business Patterns 2017-2023, accessed March 27, 2026).
181. U.S. Geological Survey, Mineral Commodity Summaries, "Aluminum" (U.S. Geological Survey: Washington, D.C., January 2024), https://pubs.usgs.gov/periodicals/mcs2024/mcs2024-aluminum.pdf.
182. OECD, "Measuring Distortions in International Markets: The Aluminum Value Chain" (OECD: Paris, France, January 7, 2019), https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/01/measuring-distortions-in-international-markets-the-aluminium-value-chain_058cb425/c82911ab-en.pdf.
183. Ibid.
184. Robert E. Scott, "Testimony Before the U.S. Department of Commerce on Aluminum Imports" (Economic Policy Institute, June 22, 2017), https://www.epi.org/publication/testimony-before-the-u-s-department-of-commerce-on-aluminum-imports/.
185. UN Comtrade Database (Trade Data: Imports and Exports, HS 2818, 7601, 7603-7607, accessed January 5, 2026).
186. "Minerals and Metals," U.S. International Trade Commission, February 15, 2022, https://www.usitc.gov/research_and_analysis/tradeshifts/2021/minerals.
187. UN Comtrade Database (Trade Data: Imports and Exports, HS 2818, 7601, 7603-7607, accessed January 5, 2026).
188. OECD (Trade in Value Added, accessed March 27, 2026), https://data-explorer.oecd.org/vis?pg=0&bp=true&tm=%22%28TIVA%29%202025%20edition%22&snb=5&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_TIVA_MAINLV%40DF_MAINLV&df[ag]=OECD.STI.PIE&df[vs]=1.1&dq=VALU.AUS.C21.W..A&pd=1995%2C2022&to[TIME_PERIOD]=false.

189. U.S. Census Bureau (County Business Patterns 2013, 2018, 2023, accessed March 24, 2026).
190. IDEXX, "About Us," https://www.idexx.com/en/about-idexx/.
191. Ocean Optics, "About Ocean Optics," https://www.oceanoptics.com/about/.
192. U.S.-China Economic and Security Review Commission, "Made in China 2025: Evaluating China's Performance."
193. Ibid.
194. Alexander Brown et al., "Investigating State Support For China's Medical Technology Companies," *MERICS*, November 2023, https://merics.org/sites/default/files/2023-11/MERICS_Report_MedTech%20State%20Support_November%202023_final.pdf.
195. UN Comtrade (Exports of HS codes 9012, 9025, 9027, 9030, 9031, accessed March 24, 2026).
196. Ibid.
197. NAICS Association, "325414 – Biological Product (except Diagnostic) Manufacturing," website, https://www.naics.com/naics-code-description/?code=325414.
198. NAICS List, "Maryland companies engaged in Biological Product (except Diagnostic) Manufacturing with NAICS 325414," website, https://naicslist.com/company-directory/state-md?industry=325414.
199. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026), https://dataweb.usitc.gov/classification/commodity-translation
200. U.S. Census Bureau, County Business Patterns (NAICS 325414 from 2014 to 2023, accessed April 2026).
201. Ibid.
202. UN Comtrade Database, Trade Data (exports for all nations for NAICS 325110, accessed February 2026).
203. Ibid.
204. Ibid.
205. NAICS Association, "334517 – Irradiation Apparatus Manufacturing."
206. NAICS List, "Massachusetts companies engaged in Irradiation Apparatus Manufacturing with NAICS 334517."
207. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
208. U.S. Census Bureau, County Business Patterns (NAICS 3334517 from 2014 to 2023, accessed March 2026).
209. Ibid.
210. Ibid.
211. "2023 Industry Snapshot," MassBio, 2023, https://www.massbio.org/wp-content/uploads/2023/09/FINAL-2023_IndustrySnapshot.pdf.
212. UN Comtrade Database, Trade Data (exports for all nations for NAICS 325110, accessed February 2026).
213. Ibid.
214. Ibid.
215. Fredrik Erixon et al., "China's Public Procurement Protectionism and Europe's Response: The Case of Medical Technology," European Centre for International Political Economy, September 2021, https://ecipe.org/publications/chinas-public-procurement-protectionism/.

216. Ibid.
217. Alexander Brown et al., "Investigating state support for China's medical technology companies," Mercator Institute for China Studies, November 20, 2023, https://merics.org/en/report/investigating-state-support-chinas-medical-technology-companies.
218. Ibid.
219. NAICS Association, "336112 – Light Truck and Utility Vehicle Manufacturing."
220. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
221. U.S. Census Bureau, County Business Patterns (NAICS 336112 from 2014 to 2023, accessed March 2026).
222. Ibid.
223. Ibid.
224. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
225. Ibid.
226. Ibid.
227. Usha C.V. Haley, "Putting the pedal to the metal" (Economic Policy Institute January 2012), https://www.epi.org/publication/bp316-china-auto-parts-industry/.
228. NAICS Association, "333997 – Scale and Balance Manufacturing."
229. NAICS Association, "NAICS Profile Page," website, https://www.naics.com/company-profile-page/?co=6411; "Service information: Avery Weigh-Tronix LLC," document, https://rsp.pca.state.mn.us/TEMPO_RSP/pages/getCOR.jsp?serviceId=69543.
230. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
231. U.S. Census of Bureau, County Business Patterns (NAICS 333997 from 2018 to 2023, accessed March 2026).
232. Ibid.
233. Ibid.
234. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
235. Ibid.
236. Ibid.
237. NAICS Association, "335311 - Power, Distribution, and Specialty Transformer Manufacturing."
238. NAICS List, "Mississippi companies engaged in Power, Distribution, and Specialty Transformer Manufacturing with NAICS 335311."
239. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
240. U.S. Census Bureau, County Business Patterns (NAICS 335311 from 2018 to 2023, accessed March 2026).
241. Ibid.
242. Ibid.

243. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
244. Ibid.
245. Ibid.
246. NAICS Association, "335932 - Noncurrent-Carrying Wiring Device Manufacturing."
247. NAICS List, "Missouri companies engaged in Noncurrent-Carrying Wiring Device Manufacturing with NAICS 335932."
248. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
249. U.S. Census Bureau, County Business Patterns (NAICS 335932 from 2015 to 2023, accessed March 2026).
250. Ibid.
251. Ibid.
252. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
253. Ibid.
254. Ibid.
255. NAICS Association, "331410 – Nonferrous Metal (except Aluminum) Smelting and Refining."
256. NAICS List, "Montana companies engaged in Nonferrous Metal (except Aluminum) Smelting and Refining with NAICS 331410."
257. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
258. U.S. Census Bureau, County Business Patterns (NAICS 331410 from 2016 to 2023, accessed March 2026).
259. Ibid.
260. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
261. Ibid.
262. "China's Rare Earth Industry: Subsidies and State Control Over the Last Decade," Rare Earth Exchanges, August 14, 2025, https://rareearthexchanges.com/news/chinas-rare-earth-industry-subsidies-and-state-control-over-the-last-decade/.
263. Ibid.
264. Ibid.
265. Ibid.
266. "China unveils plan to support growth of non-ferrous metals industry," The State Council of The People's Republic of China, September 28, 2025, https://english.www.gov.cn/news/202509/28/content_WS68d92363c6d00ca5f9a06832.html.
267. NAICS Association, "333111 - Farm Machinery and Equipment Manufacturing."
268. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
269. U.S. Census Bureau, County Business Patterns (NAICS 333111 from 2013 to 2023, accessed February 2026).

270. Ibid.
271. Ibid.
272. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
273. Ibid.
274. NAICS Association, "334511 - Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing."
275. Ibid.
276. NAICS List, "Nevada companies engaged in Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing with NAICS 334511."
277. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
278. U.S. Census Bureau, County Business Patterns (NAICS 334511 from 2018 to 2023, accessed February 2026).
279. Ibid.
280. UN Comtrade Database, Trade Data (exports for all nations for NAICS 334511, accessed February 2026).
281. Ibid.
282. NAICS Association, "334118 - Computer Terminal and Other Computer Peripheral Equipment Manufacturing."
283. Ibid.
284. NAICS List, "New Hampshire companies engaged in Electronic Computer Manufacturing with NAICS 334118."
285. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
286. U.S. Census Bureau, County Business Patterns (NAICS 334118 from 2013 to 2023, accessed February 2026).
287. UN Comtrade Database, Trade Data (exports for all nations for NAICS 334118, accessed February 2026).
288. Ibid.
289. UN Comtrade Database, Trade Data (exports for all nations for NAICS 334118, accessed February 2026).
290. NAICS Association, "325412 - Pharmaceutical Preparation Manufacturing."
291. NAICS List, "New Jersey companies engaged in Pharmaceutical Preparation Manufacturing with NAICS 325412."
292. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
293. UN Comtrade Database, Trade Data (exports for all nations for NAICS 325412, accessed February 2026).
294. Ibid.
295. Intel, "Intel in New Mexico," https://www.intel.com/content/www/us/en/corporate-responsibility/intel-in-new-mexico.html.

296. Kim Vallez Quintana, "Sandia to Help Propel US Semiconductor Manufacturing," *Sandia Lab News*, https://www.sandia.gov/microelectronics/; Los Alamos National Laboratory, "New Centers Set To Transform Microelectronics Technologies" news release, February 4, 2025, https://www.lanl.gov/media/news/0130-microelectronics-technologies.
297. U.S. Census Bureau (County Business Patterns 2018-2023, accessed April 1, 2026).
298. Popov, "China's Chip Investment Falls in First Half of 2025 While Equipment Funding Surges: Report."
299. U.S. Census Bureau (County Business Patterns 2023, accessed March 24, 2026); SIA, "Semiconductors in New Mexico," 2022, https://www.semiconductors.org/wp-content/uploads/2022/05/New-Mexico-2022.pdf.
300. Popov, "China's Chip Investment Falls in First Half of 2025 While Equipment Funding Surges: Report."
301. Blaugher et al., "Made in China 2025: Evaluating China's Performance."
302. Varadarajan et al., "Emerging Resilience in the Semiconductor Supply Chain."
303. UN Comtrade Database (Trade Data: Imports and Exports, HS 8451 and 8542, accessed January 5, 2026).
304. Ana Swanson and Paul Mozur, "U.S. Takes Aim at China's Production of Essential Computer Chips," *The New York Times*, December 23, 2024, https://www.nytimes.com/2024/12/23/business/economy/us-china-semiconductor-legacy-chips.html.
305. Ibid.
306. UN Comtrade Database (Trade Data: Imports and Exports, HS 8451 and 8542, accessed January 5, 2026).
307. Ezell, "How Innovative is China in Semiconductors?" (ITIF, August 19, 2024).
308. Chiao, "China and US bolster semiconductor independence as Taiwan's foundry capacity share projected to decline to 41% by 2027, says Trendforce."
309. Ezell, "How Innovative is China in Semiconductors?" (ITIF, August 19, 2024).
310. Chiao, news release, *Trendforce*, https://www.trendforce.com/presscenter/news/20231214-11959.html?utm.
311. Ardi Janjeva et al., "China's Quest for Semiconductor Self-Sufficiency" (Centre for Emerging Technology and Security, December 4, 2024), https://cetas.turing.ac.uk/publications/chinas-quest-semiconductor-self-sufficiency.
312. NAICS Association, "334111 - Electronic Computer Manufacturing."
313. NAICS List, "New York companies engaged in Electronic Computer Manufacturing with NAICS 334111."
314. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
315. UN Comtrade Database, Trade Data (exports for all nations for NAICS 334111, accessed February 2026).
316. NAICS Association, "335921 - Fiber Optic Cable Manufacturing."
317. NAICS List, "North Carolina companies engaged in Fiber Optic Cable Manufacturing with NAICS 335921."
318. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).

319. UN Comtrade Database, Trade Data (exports for all nations for NAICS 335921, accessed February 2026).
320. NAICS Association, "333111 – Farm Machinery and Equipment Manufacturing."
321. NAICS List, "North Dakota companies engaged in Farm Machinery and Equipment Manufacturing with NAICS 333111."
322. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
323. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
324. Ibid.
325. Ministry of Agriculture and Rurak affairs of the People's Republic of China, "China expands subsidy program for replacing old agricultural machinery," February 26, 2025, https://english.moa.gov.cn/news_522/202502/t20250227_301464.html
326. Ibid.
327. NAICS Association, "333992 - Welding and Soldering Equipment Manufacturing."
328. NAICS List, "Ohio companies engaged in Fabricated Structural Metal Manufacturing with NAICS 333992."
329. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
330. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333992, accessed February 2026).
331. Internation Trade Administration, "China Industrial Equipment Upgrading," July 10, 2024, https://www.trade.gov/market-intelligence/china-industrial-equipment-upgrading.
332. U.S.- China Economic and Security Review Commission, "Made in China 2025: Evaluating China's Performance," November 14, 2025, https://www.uscc.gov/research/made-china-2025-evaluating-chinas-performance#:~:text=MIC2025%20aimed%20to%20move%20China,and%20high%2Dperformance%20medical%20devices..
333. Ibid.
334. NAICS Association, "332410 - Power Boiler and Heat Exchanger Manufacturing."
335. NAICS List, "Oklahoma companies engaged in Fabricated Structural Metal Manufacturing with NAICS 332410."
336. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
337. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
338. Oreate AI, "In-Depth Research Report on Boiler Policies and Subsidy Systems in China's Border Regions for 2024," January 7, 2026, https://www.oreateai.com/blog/indepth-research-report-on-boiler-policies-and-subsidy-systems-in-chinas-border-regions-for-2024/ae971ed46b3e8f726dbf064a5378ce89.
339. Quantherm, "China boiler renewal and heat pump replacement," July 25, 2024, https://www.quantherm.com/news/1078/.
340. Ibid.
341. U.S. Census Bureau (County Business Patterns 2018-2023, accessed April 1, 2026).

342. "Semiconductor Companies in Oregon," *Chips ETC*, https://www.chipsetc.com/semiconductor-companies-in-oregon.html.
343. "The Future's CHIPS Are Made in Oregon," Business Oregon, https://www.oregon.gov/biz/programs/semiconductor_chips/pages/default.aspx.
344. Ibid.
345. Popov, "China's Chip Investment Falls in First Half of 2025 While Equipment Funding Surges: Report."
346. Ibid.
347. Blaugher et al., "Made in China 2025: Evaluating China's Performance."
348. Varadarajan et al., "Emerging Resilience in the Semiconductor Supply Chain."
349. UN Comtrade Database (Trade Data: Imports and Exports, HS 8451 and 8542, accessed January 5, 2026).
350. Ana Swanson and Paul Mozur, "U.S. Takes Aim at China's Production of Essential Computer Chips," *The New York Times*, December 23, 2024, https://www.nytimes.com/2024/12/23/business/economy/us-china-semiconductor-legacy-chips.html.
351. Ibid.
352. UN Comtrade Database (Trade Data: Imports and Exports, HS 8451 and 8542, accessed January 5, 2026).
353. Ibid.
354. Ezell, "How Innovative is China in Semiconductors?" (ITIF, August 19, 2024).
355. Chiao, "China and US bolster semiconductor independence as Taiwan's foundry capacity share projected to decline to 41% by 2027, says Trendforce."
356. Ezell, "How Innovative is China in Semiconductors?" (ITIF, August 19, 2024).
357. Chiao, news release, *Trendforce*, https://www.trendforce.com/presscenter/news/20231214-11959.html?utm.
358. NAICS Association, "335129 – Other Lighting Equipment Manufacturing."
359. Spring City, website, https://streetlighting.springcity.com/luminaires.html; Penn Globe Lighting Design and Manufacturing, website, https://www.pennglobe.com/products; Govcon in a Box, "Deval Corporation," website, https://www.govconinabox.com/explore/contractors/profile/deval-corporation-ls4pm7.
360. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
361. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
362. NAICS Association, "332439 - Other Metal Container Manufacturing."
363. NAICS List, "Rhode Island companies engaged in Other Metal Container Manufacturing with NAICS 332439."
364. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
365. U.S. Census Bureau, County Business Patterns (NAICS 332439 from 2014 to 2023, accessed March 25, 2026).
366. Ibid.
367. Ibid.

368. UN Comtrade Database, Trade Data (exports for all nations for NAICS 332439, accessed March 2026).
369. Ibid.
370. Ibid.
371. NAICS Association, "332991 - Ball and Roller Bearing Manufacturing."
372. NAICS List, "South Carolina companies engaged in Ball and Roller Bearing Manufacturing with NAICS 332991."
373. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed March 2026).
374. U.S. International Trade Commission, "Tapered Roller Bearings from China – Investigation No. 731-TA-344 (Fifth Review)," March 2024, https://www.usitc.gov/publications/701_731/pub5497.pdf.
375. Ibid.
376. Ibid.
377. NAICS Association, "334416 - Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing."
378. NAICS List, "South Dakota companies engaged in Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing with NAICS 334416."
379. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
380. "Two manufacturers select Sioux Falls to expand," Sioux Falls Development Foundation, March 29, 2023, https://siouxfallsdevelopment.com/two-manufacturers-select-sioux-falls-to-expand/.
381. NAICS Association, "335220 - Major Household Appliance Manufacturing."
382. NAICS List, "Tennessee companies engaged in Small Electrical Appliance Manufacturing with NAICS 335220."
383. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
384. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
385. Fei Guo et al., "Cost-effective subsidy incentives for room air conditioners in China: An analysis based on a McFadden-type discrete choice model," Energy Policy 110 (2017), 375-385, https://www.sciencedirect.com/science/article/abs/pii/S0301421517305426.
386. Ibid.
387. Ibid.
388. Fan Feifei, "Trade-in push to boost sales of green energy devices," *China Daily*, January 14, 2026, https://www.chinadaily.com.cn/a/202601/14/WS69670345a310d6866eb33a6d.html.
389. NAICS Association, "335110 – Electric Lamp Bulb and Part Manufacturing."
390. "NAICS 335110 - Electric Lamp Bulb and Parts Manufacturing," Encylcopedia.com, website, https://www.encyclopedia.com/manufacturing/news-wires-white-papers-and-books/naics-335110-electric-lamp-bulb-and-parts-manufacturing.
391. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
392. U.S. Census Bureau, County Business Patterns (NAICS 335110 from 2018 to 2023, accessed April 2026).

393. Ibid.
394. Ibid.
395. UN Comtrade Database, Trade Data (exports for all nations for NAICS 325110, accessed February 2026).
396. Ibid.
397. Ibid.
398. NAICS Association, "333316 - Photographic and Photocopying Equipment Manufacturing."
399. Cordin Scientific Imaging, website, https://cordin.com/; "Photographic Processing Equipment," Manta, website, https://www.manta.com/mb_45_A402B02S_45/photographic_processing_equipment/utah.
400. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
401. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333316, accessed March 2026).
402. Ibid.
403. NAICS Association, "333997 – Scale and Balance Manufacturing."
404. Logical Machines, website, https://logicalmachines.com/what-are-logical-machines/; "Companies for NAICS Code 333997 - Scale and balance manufacturing," SIC Code, website, https://siccode.com/search-business/naics%3A333997.
405. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
406. NAICS Association, "333991 - Power-Driven Handtool Manufacturing."
407. NAICS List, "Virginia companies engaged in Power-Driven Handtool Manufacturing with NAICS 333991."
408. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
409. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333991, accessed March 2026).
410. NAICS Association, "336411 – Aircraft Manufacturing."
411. NAICS List, "Washington companies engaged in Aircraft Manufacturing with NAICS 336411."
412. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
413. U.S. Census Bureau, County Business Patterns (NAICS 332439 from 2014 to 2023, accessed March 25, 2026).
414. UN Comtrade Database, Trade Data (exports for all nations for NAICS 336411, accessed March 2026).
415. Ibid.
416. Ibid.
417. Dou Shicong, "China's C919 Jet Maker Get USD6.2 Billion Capital Injection From State-Owned Backers," *YiCai Global*, November 27, 2025, https://www.yicaiglobal.com/news/comac-receives-usd62-billion-capital-injection-from-eight-state-owned-shareholders.
418. Ibid.

419. Kevin Gawora, "Fact of the Week: China Has Provided Its State-Owned National Champion in Commercial Aviation as Much as $72 Billion in Development Subsidies" (ITIF, February 8, 2021), https://itif.org/publications/2021/02/08/fact-week-china-has-provided-its-state-owned-national-champion-commercial/; Scott Kennedy, "China's COMAC: An Aerospace Minor League," Center for Strategic and International Studies, December 7, 2020, https://csis-website-prod.s3.amazonaws.com/s3fs-public/201204_Kennedy_COMAC.pdf.
420. Ibid.
421. NAICS Association, "333131 – Mining Machinery and Equipment Manufacturing."
422. NAICS List, "West Virginia companies engaged in Surface Coal Mining with NAICS 333131."
423. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
424. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
425. Ibid.
426. Richard Bridle et al., "Subsidies to Coal Production in China" (International Institute for Sustainable Development, December 2015), https://www.iisd.org/publications/report/subsidies-coal-production-china.
427. Daniel, "China's Rare Earth Industry: Subsidies and State Control Over the Last Decade," Rare Earth Exchange, August 14, 2025, https://rareearthexchanges.com/news/chinas-rare-earth-industry-subsidies-and-state-control-over-the-last-decade/.
428. "China: Government subsidy changes for listed company Zhengzhou Coal Mining Machinery Group Co., Ltd in year 2019," Global Trade Alert, https://globaltradealert.org/state-act/54927-china-government-subsidy-changes-for-listed-company-zhengzhou-coal-mining-machinery-group-co-ltd-in-year-2019.
429. Shubham Padhi, "China Mining Machinery Market (2025-2031) Outlook | Growth, Companies, Size, Revenue, Value, Analysis, Trends, Industry, Share & Forecast," 6wresearch, https://www.6wresearch.com/industry-report/china-mining-machinery-market.
430. "Shandong Mining Machinery Group Co., Ltd (002526.SZ): PESTLE Analysis [Dec-2025 Updated]," https://www.dcfmodeling.com/products/002526sz-pestel-analysis.
431. NAICS Association, "333997 – Scale and Balance Manufacturing."
432. "Rice Lake Weighing Systems, Inc.," Buzzfile, https://www.buzzfile.com/business/Rice-Lake-Weighing-Systems%2C-Inc.-775-575-1023; "All PPP Loans in Fond du Lac County, WI," PPP Directory, https://ppp.directory/wisconsin/fond-du-lac-county; "NAICS Profile Page for Digi-Star Holdings Inc," NAICS Association, https://www.naics.com/company-profile-page/?co=624; Rice Lake Weighing Systems, website, https://www.ricelake.com/.
433. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
434. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
435. Ibid.
436. Ibid.
437. NAICS Association, "325180 – Other basic Inorganic Chemical Manufacturing."
438. "Imerys Perlite USA, Inc.," Buzzfile, website, https://www.buzzfile.com/business/Imerys-Perlite-Usa%2C-Inc.-307-875-8505; "Sisecam Wyoming LLC," Buzzfile, website,

https://www.buzzfile.com/business/Sisecam-Wyoming-LLC-307-875-2600; "Solvay Chemicals, Inc.," Buzzfile, website, https://www.buzzfile.com/business/Solvay-Soda-Ash-307-872-6500.

439. U.S. International Trade Commission, Commodity Translation Tool (NAICS to SITC code for 2022, accessed February 2026).
440. UN Comtrade Database, Trade Data (exports for all nations for NAICS 333111, accessed February 2026).
441. Ibid.
442. Robert Atkinson, "How Innovative Is China in the Chemicals Industry?" (ITIF, April 2024), https://itif.org/publications/2024/04/15/how-innovative-is-china-in-the-chemicals-industry/.
443. Ibid.
444. "China's Chemical Industry: Flying Blind?" (ATKearney), https://www.kearney.com/documents/291362523/291364877/Chinas-Chemical-Industry---Flying-Blind.pdf/a3bb9398-fb58-1096-46c1-d518e0b19665.
445. Atkinson, "How Innovative Is China in the Chemicals Industry?"
446. Ibid.
447. See https://itif.org/publication-brands/power-industries for a series of policy reports on how to respond to the China challenge.

Notes for Declining Manufacturing Births Contribute to US Manufacturing Woes

1. Robert Atkinson, "Understanding and Maximizing America's Evolutionary Economy" (ITIF, October 2014), https://www2.itif.org/2014-maximizing-evolutionary-economy.pdf.
2. Trelysa Long, "No, American Manufacturing Hasn't Been Revived" (ITIF, June 6, 2025), https://itif.org/publications/2025/06/06/no-american-manufacturing-hasnt-been-revived/.
3. Secretary Jennifer Granholm, "Make no mistake…," Twitter post, January 7, 2025, https://x.com/SecGranholm/status/1876785076190457952.
4. Corelli Barnett, *The Collapse of British Power* (London: Faber, 1972), 85.
5. U.S. Census Bureau, Business Dynamic Statistics (firms age 0 from 1978 to 2023), accessed April 2026, https://data.census.gov/table/BDSTIMESERIES.BDSFAGE?q=BDSTIMESERIES.BDSFAGE&codeset=naics~00&nkd=FAGE~010.
6. John Mueller, "Remember when Japan was going to take over the world," Responsible Statecraft, December 30, 2023, https://responsiblestatecraft.org/us-china-relations-2666818984/.
7. U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms age 0 from 1978 to 2023), accessed April 2026.
8. M. Angeles Villarreal, "The North American Free Trade Agreement," Congress.gov, May 24, 2017, https://www.congress.gov/crs-product/R42965.
9. Ibid.
10. Ibid.
11. Ibid.
12. Ibid.; U.S. Census Bureau, Business Dynamic Statistics (firms age 0 from 1978 to 2023), accessed April 2026.
13. Ibid.

14. Ibid.
15. Ibid.
16. Ibid.
17. Ibid.
18. Ibid.
19. Ibid.; U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms from 1978 to 2023), accessed April 2026, https://data.census.gov/table/BDSTIMESERIES.BDSFAGE?q=BDSTIMESERIES.BDSFAGE&codeset=naics~31-33&nkd=FAGE~001.
20. U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms age 0-4 from 1978 to 2023), accessed April 2026, https://data.census.gov/table/BDSTIMESERIES.BDSFAGE?q=BDSTIMESERIES.BDSFAGE&codeset=naics~31-33&nkd=FAGE~010:020:030:040:050.
21. U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms from 1978 to 2023), accessed April 2026.
22. U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms age 0-4 from 1978 to 2023), accessed April 2026; Ibid.
23. Ibid.
24. Ibid.
25. Ibid.
26. U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms age 0-4 from 1978 to 2023, accessed April 2026).
27. Ibid.
28. U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms and employees for firms age 0 from 1978 to 2023, accessed April 2026).
29. Ibid.
30. Robert Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
31. U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms age 0 from 1978 to 2023, accessed April 2026).
32. Ibid.
33. Ibid.
34. Ibid.
35. Ibid.
36. Ibid.
37. Ibid.
38. Bureau of Economic Analysis, Table 1.1 U.S. international Transactions (goods imports and exports from 1960 to 2023), accessed April 2026, https://apps.bea.gov/international/bp_web/tb_download_type_modern.cfm?list=1&RowID=1.; U.S. Bureau of Economic Analysis, Table 1.1.5 Gross Domestic Product (gdp from 1960 to 2023), accessed April 2026, https://apps.bea.gov/iTable/?reqid=19&step=2&isuri=1&categories=survey&_gl=1*cawodz*_ga*NzQ1

ODk3Njk1LjE3NjMwNDU5NzE.*_ga_J4698JNNFT*czE3NzczMTEwMjckbzE2JGcxJHQxNzc3MzExNTI3JGo1NiRsMCRoMA..#eyJhcHBpZCI6MTksInN0ZXBzIjpbMSwyLDMsM10sImRhdGEiOltbImNhdGVnb3JpZXMiLCJTdXJ2ZXkiXSxbIk5JUEFfVGFibGVfTGlzdCIsIjUiXSxbIkZpcnN0X1llYXIiLCIxOTYwIl0sWyJMYXN0X1llYXIiLCIyMDIzIl0sWyJTY2FsZSIsIi02II0sWyJTZXJpZXMiLCJBII1dfQ==.

39. Ibid.
40. U.S. Census Bureau, Economic Census (concentration ratio for 2022), accessed June 2025, https://data.census.gov/table/ECNSIZE2022.EC2200SIZECONCEN?q=EC2200SIZECONCEN&n=N0600.00.; U.S. Census Bureau, Economic Census (concentration ratio for 2017), accessed June 2025, https://data.census.gov/table/ECNSIZE2017.EC1700SIZECONCEN?q=Concentration+Ratio&codeset=naics~N0600.00.
41. Ibid.
42. Ibid.
43. Ibid.
44. U.S. Census Bureau, Business Dynamic Statistics (manufacturing firms from 1978 to 2023), accessed April 2026.
45. Ibid.
46. How We Work, Manufacturing USA website, https://www.manufacturingusa.com/pages/how-we-work
47. "To Do: Establish an Advanced Manufacturing Scale-Up Capital Program" (ITIF, February 7, 2025), https://itif.org/publications/2024/06/10/to-do-establish-an-advanced-manufacturing-scale-up-capital-program/.
48. Ibid.
49. Robert Atkinson, "Mobilizing for Techno-Economic War, Part 1: The Case for Policy Transformation" (ITIF, February 2026), https://itif.org/publications/2026/02/02/mobilizing-for-techno-economic-war-part-1-the-case-for-policy-transformation/.

Notes for How America Can Reduce Its Dependence on Chinese Active Pharmaceutical Ingredients (APIs)

1. National Cancer Institute, "Active pharmaceutical ingredient," https://www.cancer.gov/publications/dictionaries/cancer-terms/def/active-pharmaceutical-ingredient.
2. U.S. Food and Drug Administration (FDA), "Drug Master Files," https://www.fda.gov/drugs/forms-submission-requirements/drug-master-files-dmfs.
3. U.S. Pharmacopeia, "Global manufacturing capacity for active pharmaceutical ingredients remains concentrated," https://qualitymatters.usp.org/global-manufacturing-capacity-active-pharmaceutical-ingredients-remains-concentrated.
4. Ibid.
5. Christine Ardal et al., "Supply chain transparency and the availability of essential medicines," *Bulletin of the World Health Organization* Vol. 99 No. 4 (2021): 319–320; Andrew Rudman, "A Bilateral Approach to Address Vulnerability in the Pharmaceutical Supply Chain" (Center for Strategic and International Studies, November 2024), https://www.csis.org/analysis/bilateral-approach-address-vulnerability-pharmaceutical-supply-chain.
6. Stephen Ezell, "Testimony to the Special Committee on Aging Regarding Foreign Ownership and Control in America's Drug Supply Chain" (ITIF, July 15, 2026), https://itif.org/publications/2026/07/15/testimony-regarding-foreign-ownership-and-control-in-americas-drug-supply-chain/.

7. USP, "Different medicines, same chokepoints: Key starting materials concentrate supply chain risk for widely used therapeutic classes," December 11, 2025, https://qualitymatters.usp.org/different-medicines-same-chokepoints-key-starting-materials-concentrate-supply-chain-risk-widely.
8. Thomas J. Bollyky, "The Pharma Choke Point: How to Reduce U.S. Dependence on Chinese Pharmaceutical and Biotechnology Supply Chains" (Council on Foreign Relations, June 2026), 24, https://www.cfr.org/reports/the-pharma-choke-point.
9. Ibid., 2.
10. USP, "Different medicines, same chokepoints."
11. Yobo Kubota, "How China's Chokehold on Drugs, Chips and More Threatens the U.S.," *The Wall Street Journal*, November 4, 2025, https://www.wsj.com/world/china/how-chinas-chokehold-on-drugs-chips-and-more-threatens-the-u-s-8b3f6b2e.
12. Ibid.
13. National Academies of Sciences, Engineering, and Medicine (2022), *Building Resilience into the Nation's Medical Product Supply Chains*, The National Academies Press, https://www.ncbi.nlm.nih.gov/books/NBK583744/.
14. ChemExpert Database, "API Sourcing in India, Europe and China: Strengths and Challenges," September 2025, https://chemxpert.com/blog/api-sourcing-in-india-europe-and-china-strengths-and-challenges.
15. IQVIA Chemical Intelligence, "Overview of the Active Pharmaceutical Ingredient Market," February 2024, https://www.iqvia.com/-/media/iqvia/pdfs/library/white-papers/iqvia-innsight-api-market-article-02-24-forweb.pdf.
16. Ambika Sharma, "China's price war hits Indian Active Pharmaceutical Ingredients industry," *The Tribune*, September 12, 2025, https://www.tribuneindia.com/news/himachal/chinas-price-war-hits-indian-active-pharmaceutical-ingredients-industry/.
17. Qing Li, Jie Di, and Qingqing Liu, "Impact of government subsidies on innovation of Chinese biopharmaceutical firms: Based on kink threshold model," *Frontiers in Public Health* (2023), https://doi.org/10.3389/fpubh.2023.1087830.
18. Ibid.
19. Keith Belton, "Assessing the Clout of US National Power Industries vs. China" (ITIF, March 2026), https://itif.org/publications/2026/03/09/assessing-the-clout-of-us-national-power-industries-vs-china/.
20. U.S. – China Economic and Security Review Commission (USCC), "Growing U.S. reliance on China's biotech and pharmaceutical products," November 2019, https://www.uscc.gov/sites/default/files/2019-11/Chapter%203%20Section%203%20-%20Growing%20U.S.%20Reliance%20on%20China's%20Biotech%20and%20Pharmaceutical%20Products.pdf.
21. U.S. FDA, "Drug Shortages: Root Causes and Potential Solutions," 2019, https://www.fda.gov/media/131130/download.
22. ITIF, "National Power Industry Series," https://itif.org/publication-brands/power-industries/.
23. Barnini Chakraborty, "China hints at denying Americans life-saving coronavirus drugs," *FoxNews*, March 2020, https://www.foxnews.com/world/chinese-deny-americans-coronavirus-drugs.
24. Niels Graham, "Pharmaceuticals are China's next trade weapon," Atlantic Council, November 7, 2025, https://www.atlanticcouncil.org/blogs/econographics/pharmaceuticals-are-chinas-next-trade-weapon/.

25. Camm Epstein, "How U.S. Pharmaceutical Manufacturing Became Dependent on China," *Currant*, October 1, 2025, https://currantinsights.com/how-u-s-pharmaceutical-manufacturing-became-dependent-on-china/.
26. Graham, "Pharmaceuticals are China's next trade weapon."
27. Phlow SAPIR, "A strategic inventory of critical and essential ingredients that can be converted rapidly to finished drug products in case of emergency," https://www.phlow-usa.com/sapir/.
28. Ibid.
29. "New pharma company lands $354 million government contract to produce coronavirus drugs in the U.S.," *PR Newswire*, May 2020, https://www.phlow-usa.com/new-pharma-company-lands-354-million-government-contract-to-produce-coronavirus-drugs-in-the-u-s-2/.
30. "Phlow included in BARDA contract development and manufacturing organization network to provide domestic API capability for essential medicines and medical countermeasures," press release, October 20, 2021, https://www.phlow-usa.com/phlow-included-in-barda-contract-development-and-manufacturing-organization-network-to-provide-domestic-api-capability-for-essential-medicines-and-medical-countermeasures/.
31. "Phlow Corporation awarded $354 million HHS/ASPR/BARDA contract to manufacture essential medicines in shortage," *PR Newswire*, May 19, 2020, https://www.prnewswire.com/news-releases/phlow-corporation-awarded-354-million-hhsasprbarda-contract-to-manufacture-essential-medicines-in-shortage-301061648.html.
32. Stephen Ezell, "Faulty Prescription: Why a 'Buy American' Approach for Drugs and Medical Products Is the Wrong Solution" (ITIF, June 2020), https://itif.org/publications/2020/06/15/faulty-prescription-why-buy-american-approach-drugs-and-medical-products/.
33. "Identifying Innovative Technologies to Advance Pharmaceutical Manufacturing," National Academies Press, 2020, https://www.nationalacademies.org/projects/DELS-BCST-19-04/publication/25814.
34. API Innovation Center, "Building a Resilient Domestic Drug Supply Chain: The Path to National Health Security," March 25, 2025, https://apicenter.org/wp-content/uploads/2025/03/APIIC-White-Paper-2025-Building-a-Resilient-Domestic-Drug-Supply-Chain.pdf.
35. The Biden White House, "Executive Order 14081," September 12, 2022, https://www.presidency.ucsb.edu/documents/executive-order-14081-advancing-biotechnology-and-biomanufacturing-innovation-for.
36. API Innovation Center, "API Innovation Center and U.S. Government Advance Domestic Production of Critical Medicines Through Expanded PPP," https://apicenter.org/.
37. The Trump White House, "Executive Order 14293: Regulatory Relief to Promote Domestic Production of Critical Medicines," The American Presidency Project, May 5, 2025, https://www.presidency.ucsb.edu/documents/executive-order-14293-regulatory-relief-promote-domestic-production-critical-medicines.
38. Ezell, "Faulty Prescription."
39. U.S. FDA, "Safeguarding Pharmaceutical Supply Chains in a Global Economy," October 30, 2019, https://www.fda.gov/news-events/congressional-testimony/safeguarding-pharmaceutical-supply-chains-global-economy-10302019.
40. Administration for Strategic Preparedness and Response, U.S. Department of Health and Human Services, "HHS continuing commitment to expanding domestic pharmaceutical manufacturing capacity and reducing dependency on foreign resources," press release, July 9, 2025, https://aspr.hhs.gov/newsroom/Pages/Phlow-July2025.aspx.

41. U.S. Senator Elizabeth Warren (D-MA) and U.S. Senator Tina Smith (D-MN), "U.S. Pharmaceutical Supply Chain Defense and Enhancement Act," https://www.warren.senate.gov/wp-content/uploads/media/doc/Pharmaceutical%20Supply%20Chain%20Defense%20and%20Enhancement%20Act%20-%20One%20pager1.pdf.
42. Invest Puerto Rico, "Tax Benefits & Policy," https://www.investpr.org/why-puerto-rico/tax-benefits-policy/.
43. Puerto Rico Department of Economic Development and Commerce, "Puerto Rico's Pharmaceutical and Medicine Manufacturing Profile," 2025, https://docs.pr.gov/files/DDEC/DEDC%20PUERTO%20RICO%20DATA%20CENTER/Puerto%20Rico%20Industry%20Profiles/Puerto%20Rico%27s%20Pharmaceutical%20Profile%202025.pdf.
44. Ezell, "Faulty Prescription."
45. Puerto Rico Department of Economic Development and Commerce, "Puerto Rico's Pharmaceutical and Medicine Manufacturing Profile."
46. U.S. Department of Health and Human Services, "Essential Medicines Supply Chain and Manufacturing Resilience Assessment," https://www.armiusa.org/biofabusa/roadmap-reports/.
47. Andrew I. Rudman and Jerry Haar, "Strengthening US-Mexico Quality Pharmaceutical Supply Chains" (Wilson Center, June 11, 2024), https://www.wilsoncenter.org/article/strengthening-us-mexico-quality-pharmaceutical-supply-chains.
48. Indian Pharmaceutical Alliance, "Indo-US pharma alliance: Time to step up," January 27, 2025, https://www.ipa-india.org/article/indo-us-pharma-alliance-time-step.
49. The White House, "United States-India Joint Leaders' Statement," February 13, 2025, https://www.whitehouse.gov/briefings-statements/2025/02/united-states-india-joint-leaders-statement/.
50. BDO, "New Legal Authorities for BARDA Industry Day Initiatives," https://www.bdo.com/insights/industries/life-sciences/new-legal-authorities-for-barda-industry-day-initiatives; "Pharmaceutical Countermeasures Infrastructure (PCI)," BARDA and DHS, https://medicalcountermeasures.gov/barda/pci.
51. API Innovation Center, "Building a resilient domestic drug supply chain: The path to national health security."
52. U.S. International Development Finance Corporation, "DFC announces $70 million in new investments in India to advance shared priorities in health systems, affordable housing, and small business support," press release, September 12, 2024, https://www.dfc.gov/media/press-releases/dfc-announces-70-million-new-investments-india-advance-shared-priorities; U.S. International Development Finance Corporation, "U.S. International Development Finance Corporation Annual Management Report," 2024, https://www.dfc.gov/sites/default/files/media/documents/USIDFC%20FY2024%20AMR.pdf.
53. USP, "Concentrated origins, widespread risk: New USP insights on key starting materials," October 14, 2025, https://qualitymatters.usp.org/concentrated-origins-widespread-risk-new-usp-insights-key-starting-materials; Observer Research Foundation, China's shadow over India's medical supply chains," https://www.orfonline.org/expert-speak/china-s-shadow-over-india-s-medical-supply-chains.
54. U.S. Department of Health and Human Services, "Public Health Emergency Medical Countermeasures Enterprise," March 15, 2024, https://aspr.hhs.gov/PHEMCE/Documents/2023-2027-PHEMCE-MYB-508.pdf.
55. Senators Warner and Smith, "U.S. Pharmaceutical Supply Chain Defense and Enhancement Act."

56. U.S. Government Accountability Office (GAO), "FDA has Improved its Foreign Drug Inspection Program, but Needs to Assess the Effectiveness and Staffing of Its Foreign Offices," December 2016, https://www.gao.gov/assets/gao-17-143.pdf.
57. Ibid.; GAO, "FDA Has Faced Persistent Challenges Overseeing Foreign Drug Manufacturing," February 6, 2024, https://www.gao.gov/assets/d24107359.pdf.
58. House Energy & Commerce Committee, "Oversight and Investigations Subcommittee Hearing: Protecting American Health Security," February 6, 2024, https://energycommerce.house.gov/events/oversight-and-investigations-subcommittee-hearing-protecting-american-health-security-oversight-of-shortcomings-in-the-fda-s-foreign-drug-inspection-program; Parenteral Drug Association, "FDA Expands Use of Unannounced Foreign Inspections – A new Compliance era for Global Manufacturers," *PDA Letter*, September 2025, https://www.pda.org/pda-letter-portal/home/full-article/fda-expands-use-of-unannounced-foreign-inspections; Irena Hwang, "After Pandemic Delays, FDA still Struggling to Inspect Foreign Drug Manufacturers," April 19, 2023, *ProPublica*, https://www.propublica.org/article/fda-drugs-medication-inspections-china-india-manufacturers.
59. Rosemary Gibson, "Testimony before the U.S.-China Economic and Security Review Commission," July 15, 2019.
60. U.S. FDA, "FDA Announces Expanded Use of Unannounced Inspections at Foreign Manufacturing Facilities," May 2025, https://www.fda.gov/news-events/press-announcements/fda-announces-expanded-use-unannounced-inspections-foreign-manufacturing-facilities.
61. Mark Abdoo, Testimony before Senate Committee on Finance, "COVID-19 and Beyond: Oversight of the FDA's Foreign Drug Manufacturing Inspection Process," June 2, 2020, https://www.fda.gov/news-events/congressional-testimony/covid-19-and-beyond-oversight-fdas-foreign-drug-manufacturing-inspection-process-06022020.
62. U.S. FDA, "European Union Mutual Recognition Agreement," May 2025, https://www.fda.gov/international-programs/international-arrangements/european-union-eu-mutual-recognition-agreement.
63. U.S. FDA, "Resiliency Roadmap for FDA Inspectional Oversight," May 2021, https://www.fda.gov/files/about%20fda/published/Resiliency%20Roadmap_FINAL_5_4_21_508ed.pdf.
64. National Academies Press, "Building Resilience into the Nation's Medical Product Supply Chains," March 2022, https://pubmed.ncbi.nlm.nih.gov/36070409/.
65. Senators Warner and Smith, "U.S. Pharmaceutical Supply Chain Defense and Enhancement Act."
66. Ibid.

Notes for Mobilizing for Techno-Economic War, Part 1: The Case for Policy Transformation

1. *See* Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/; *also see* Meghan Ostertag, "US National Power Industries Are at Risk" (ITIF November 2025), https://itif.org/publications/2025/11/17/us-national-power-industries-are-at-risk/.
2. Ibid.
3. Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962).

Notes for Mobilizing for Techno-Economic War, Part 2: Slowing China's Advance

1. Robert Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
2. "China, AI, E.V.s and Trump," *The New York Times*, February 10, 2026, https://www.nytimes.com/2026/02/10/opinion/china-ai-ev-trump.html.
3. Hui Jiang (2021), The Great Contribution of the CPC to the World Socialist Movement over the Past Hundred Years, International Critical Thought, 11:4, 497–507, DOI: 10.1080/21598282.2022.1996836.
4. Indeed, as an upcoming ITIF report demonstrates, they have already done that in the Global South.
5. "COMMITTEE REPORT: American VC Firms Investing Billions into PRC Companies Fueling the CCP's Military, Surveillance State, and Uyghur Genocide" (The Select Committee on the CCP, February 2024), https://chinaselectcommittee.house.gov/media/reports/committee-report-american-vc-firms-investing-billions-prc-companies-fueling-ccps.
6. Image generated with Gemini 3.
7. For those who argue that clean energy saves money, why then do we need regulations and tax incentives to adopt it? And why has progress been so slow. And why do energy users, both businesses and consumers, largely oppose green mandates and regulations. For more information on this, see Robin Gaster, "Mend It, Don't End It: It's Time to Reset Clean Energy Policy by Focusing on Price/Performance Parity (P3)" (ITIF, January 2025), https://itif.org/publications/2025/01/27/time-reset-clean-energy-policy-focusing-price-performance-parity-p3/.
8. Robert Atkinson, "How China Divides Europe and the United States" (ITIF, May 2023), https://itif.org/publications/2023/05/12/how-china-divides-europe-and-the-united-states/.
9. Robert Atkinson, "2026: The End of the Western Alliance and the Emergence of China" (ITIF, January 2026), https://itif.org/publications/2026/01/22/2026-the-end-of-the-western-alliance-and-the-emergence-of-china/.
10. A Commercial and Government Entity (CAGE) code is a unique identifier assigned to suppliers to various government or defense agencies, as well as to government agencies themselves and also various organizations. CAGE codes provide a standardized method of identifying a given facility at a specific location. "CAGE Code - Commercial and Government Entity Code" (Defense Logistics Agency), https://www.dla.mil/Working-With-DLA/Applications/Details/Article/2920893/cage-code-commercial-and-government-entity-code/.
11. Shalia Thilakan, "Cable&Wireless: Customer centricity initiatives will become a priority in emerging markets in 2011" (Telecomlead, May 2011), https://telecomlead.com/telecom-equipment/huawei-strengthens-lead-in-global-telecom-equipment-market-120439; "Key Takeaways – Worldwide Telecom Equipment Market 2018," Dell'Oro Group, https://www.delloro.com/telecom-equipment-market-2018-2/.
12. Ryan Daws, "HarmonyOS Next: Huawei's Challenge to Apple and Android," *Telecoms Tech News*, April 25, 2024, https://www.telecomstechnews.com/news/harmonyos-next-huawei-challenge-apple-android/.
13. Joe Devanesan, "What Three Years of US Sanctions Did to Huawei," *TechWire Asia*, March 28, 2023, https://techwireasia.com/2023/03/what-three-years-of-us-sanctions-did-to-huawei/.

14. Coco Feng, "Tech war: Huawei executive claims victory over US sanctions with computing, AI ecosystem," *South China Morning Post,* August 2025, https://www.scmp.com/tech/tech-war/article/3323647/tech-war-huawei-executive-claims-victory-over-us-sanctions-computing-ai-ecosystem.
15. Since 2012, following a U.S. Congressional report that denounced the company's unfair practices and cybersecurity risks, Huawei has accelerated its efforts to decouple from U.S. technologies.
16. Eamonn Bellin, "Competing in the Episteme: The Cold War, the American University, and Strategic Competition with China Today" (Alecander Hamilton Society, September 2024). https://alexanderhamiltonsociety.org/security-strategy/issue-four/competing-in-the-episteme-the-cold-war-the-american-university-and-strategic-competition-with-china-today/.
17. Ibid.
18. "Ongoing Changes in the Demographic Composition of Postdoctoral Researchers at Federally Funded Research and Development Centers: 2023" (National Center for Science and Engineering Statistics, October 2024). https://ncses.nsf.gov/pubs/nsf24339.
19. "Research for Sale: How Chinese Money Flows to American Universities" (NAICU, April, 2024). https://www.naicu.edu/news-events/headline-news/2024/04/research-for-sale-how-chinese-money-flows-to-american-universities/; LJ Eads, "China's Expanding Financial Footpring in U.S. Universities and the Transparency Gap" (Data Abyss: Academic Capture, October 2025), https://www.dataabyss.ai/reports/academic-capture; "China and EU signed Administrative Arrangement on a new round of joint research funding" (Ministry of Science and Technology of the People's Republic of China, June 2022), https://en.most.gov.cn/pressroom/202206/t20220622_181224.html; Rob Davies, "Oxford places ban on donations and research grants from Huawei" *The Guardian*, January 2019, https://www.theguardian.com/technology/2019/jan/17/oxford-places-ban-on-donations-and-research-grants-from-huawei-chinese-national-security; Virginia Allen, "Spies on Campus: Chinese Espionage Exposed at Stanford," *The Daily Signal,* May 2025, https://www.dailysignal.com/2025/05/09/spies-campus-chinese-espionage-uncovered-stanford/.
20. Robert D. Atkinson, et al., "A Techno-Economic Agenda for the Next Administration" (ITIF, June 2024), https://itif.org/publications/2024/06/10/a-techno-economic-agenda-for-the-next-administration/.
21. "Optica Cuts Ties With Huawei After secret Funding Exposed" (Bloomberg, June 2024), https://www.bloomberg.com/news/articles/2024-06-06/optica-foundation-cuts-ties-with-huawei-after-bloomberg-report.
22. "H.R.1048 – Deterrent Act" (119th Congress, February 2025), https://www.congress.gov/bill/119th-congress/house-bill/1048.
23. Ibid.
24. Darren Tromblay, "From Outside Assaults to Insider Threats: Chinese Economic Espionage" (ITIF, November 2025), https://itif.org/publications/2025/11/03/from-outside-assaults-to-insider-threats-chinese-economic-espionage/.
25. The Select Committee on the CCP, "CCP on the Quad: How American Taxpayers and Universities Fund the CCP's Advanced Military and Technological Resources" (Majority Staff Report, September 2024), https://chinaselectcommittee.house.gov/sites/evosubsites/selectcommitteeontheccp.house.gov/files/evo-media-document/2024-09-23%20Research%20Security%20Report.pdf.
26. "ED Ties Foreign Gift Reporting to Title IV Participation" (NASFAA), https://www.nasfaa.org/newsitem/23900/ED_Ties_Foreign_Gift_Reporting_Compliance_to_Title_IV_Participation.

27. The Select Committee on the Strategic Competition between the United States and the Chinese Communist Party & the Committee on Education and the Workforce, "Joint Institutes, Divided by Loyalties: How the Chinese Communist party Exploits US University Partnerships to Empower China's Military and Repression" (Majority Staff Report, September 2025), https://chinaselectcommittee.house.gov/sites/evosubsites/selectcommitteeontheccp.house.gov/files/evo-media-document/jointinstitutesreportfinal.pdf.
28. The Select Committee on the CCP, "Joint Institutes, Divided Loyalties" (The Select Committee on the CCP, September 2025), https://chinaselectcommittee.house.gov/media/reports/joint-institutes-divided-loyalties.
29. The Select Committee on the CCP, "Reset, Prevent, Build: A Strategy to Win America's Economic Competition with the Chinese Communist Party" (The Select Committee on the CCP, December 2023), https://chinaselectcommittee.house.gov/sites/evo-subsites/selectcommitteeontheccp.house.gov/files/evo-media-document/reset-prevent-build-scc-report.pdf.
30. Ibid.
31. The Select Committee on the CCP, "CCP on the Quad: How American Taxpayers and Universities Fund the CCP's Advanced Military and Technological Research" (The Select Committee on the CCP, September 2024), https://chinaselectcommittee.house.gov/media/reports/ccp-on-the-quad-how-american-taxpayers-and-universities-fund-the-ccp-s-advanced-military-and-technological-research.
32. Matt Sheehan and Sophie Zhuang, "Have Top Chinese AI Researchers Stayed in the United States?" (Carnegie Endowment for International Peace), https://carnegieendowment.org/emissary/2025/12/china-ai-researchers-us-talent-pool.
33. Frank Laczko and Neli Esipova, "Amid Declining U.S. Enrollment, Many Chinese Students Cite Negative Experiences" (Migration Policy Institute, September 2025), https://www.migrationpolicy.org/article/discrimination-chinese-students-us.
34. Marc Thiessen, "Trump wants to admit more Chinese students. Here's why he shouldn't," *The Washington Post,* October 2025, https://www.washingtonpost.com/opinions/2025/10/30/trump-chinese-students-university-economic-espionage/.
35. "USCC Report: Trends in U.S.-China Science and Technology Cooperation: Collaborative Knowledge Production for the Twenty-First Century?" (US-China Economic and Security Review Commission," September 2014), https://www.uscc.gov/sites/default/files/Press%20Release_Trends%20in%20U.S.-China%20Science%20and%20Technology%20Cooperation.pdf.
36. Deborah Seligsohn and Scott Kennedy, "The U.S.-China Science and Technology Cooperation Agreement Is Not Yet Obsolete" (CSIS, June 2025), https://www.csis.org/analysis/us-china-science-and-technology-cooperation-agreement-not-yet-obsolete.
37. Tromblay, "From Outside Assaults to Insider Threats: Chinese Economic Espionage."
38. Ibid.
39. "Annual Intellectual Property Report to Congress" (United States Intellectual Property Enforcement Coordinator, March 2020), https://web.archive.org/web/20210816093904/https://trumpwhitehouse.archives.gov/wp-content/uploads/2020/04/IPEC-2019-Annual-Intellectual-Property-Report.pdf; "Annual Intellectual Property Report to Congress" (United States Intellectual Property Enforcement Coordinator, March 2019), https://trumpwhitehouse.archives.gov/wp-content/uploads/2019/02/IPEC-2018-Annual-Intellectual-Property-Report-to-Congress.pdf.
40. Eli Clemens, "How Chinese Online Marketplaces Fuel Counterfeits" (ITIF, August 2025) https://itif.org/publications/2025/08/20/how-chinese-online-marketplaces-fuel-counterfeits/.

41. Eli Clemens, "How Some Chinese Companies Obscure Ties to China and What Policymakers Should Do About It" (ITIF, November 2025) https://itif.org/publications/2025/11/03/some-chinese-companies-obscure-ties-to-china-what-policymakers-should-do-about-it/.
42. Office of Investment Security, USDT, 31 C.F.R. Parts 800-802 (published January 17, 2020).
43. Foreign Investment Risk Review Modernization Act of 2018, H.R. 4311, 115th Cong. (2018).
44. Clemens, "How Some Chinese Companies Obscure Ties to China and What Policymakers Should Do About It."
45. Corporate Transparency Act of 2020, Pub. L. No. 116-283, 134 Stat. 3388 (2021); Meghan Ostertag, "US National Power Industries Are at Risk" (ITIF, forthcoming report, November 2025); Atkinson, "Is It Too Much to Ask for a Third Way Beyond Free Trade and Constrained Trade?"
46. Clemens, "How Some Chinese Companies Obscure Ties to China and What Policymakers Should Do About It."
47. Atkinson, "Is It Too Much to Ask for a Third Way Beyond Free Trade and Constrained Trade?"
48. Robert D. Atkinson, "How to Implement CFIUS to Support U.S. Competitiveness" (ITIF, January 2, 2020), https://itif.org/publications/2020/01/02/how-implement-cfius-support-us-competitiveness/.
49. Tromblay, "From Outside Assaults to Insider Threats: Chinese Economic Espionage."
50. National Security Memorandum/NSM-12, "National Security Memorandum on the President's Intelligence Priorities," July 12, 2022, https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2022/07/12/national-security-memorandum-on-the-presidents-intelligence-priorities/; Intelligence Community Directive 204, "National Intelligence Priorities Framework," https://www.dni.gov/files/documents/ICD/ICD_204_National_Intelligence_Priorities_Framework_U_FINAL-SIGNED.pdf.
51. Intelligence Community Directive 204.
52. Ibid.
53. "FBI agents reassigned to immigration enforcement amid pressure from White House," The Washington Post, October 8, 2025, https://www.washingtonpost.com/national-security/2025/10/08/fbi-agents-reassigned-immigration/.
54. David Bier, "ICE Has Diverted Over 25,000 Officers from Their Jobs" (CATO Institute, September 2025), https://www.cato.org/blog/ice-has-diverted-over-25000-officers-their-jobs.
55. Emily Siegel, "China Firm Funds US Suits Amid Push to Disclose Foreign Ties (2)" (Bloomberg, November 2023), https://news.bloomberglaw.com/business-and-practice/china-firm-funds-us-lawsuits-amid-push-to-disclose-foreign-ties.
56. Ibid.
57. "S.2805 - Protecting Our Courts from Foreign Manipulation Act of 2023," https://www.congress.gov/bill/118th-congress/senate-bill/2805/text.
58. U.S. Department of Justice, "Chinese Professors Among Six Defendants Charged with Economic Espionage and Theft of Trade Secrets for Benefit of People's Republic of China," May 19, 2015, https://www.justice.gov/archives/opa/pr/chinese-professors-among-six-defendants-charged-economic-espionage-and-theft-trade-secrets.
59. Hal Berghel, "The Thousand Talents Program Prosecutions in Context" (*Computer*, vol. 56, no. 11, pp. 95-102, Nov, 2023), https://www.computer.org/csdl/magazine/co/2023/11/10286240/1RimYBXmWQw.
60. Kif Leswing, "Former Apple engineer accused of stealing automotive trade secrets pleads guilty," *CNBC,* August 2022, https://www.cnbc.com/2022/08/22/former-apple-employee-xiaolang-zhang-pleads-guilty-.html.

61. Chance Miller, "Former Apple engineer who stole Project Titan trade secrets sentenced to prison" (AAPL Company, February 2024), https://9to5mac.com/2024/02/08/apple-engineer-project-titan-secrets-prison/
62. "S.1294 - Protecting American Intellectual Property Act of 2022" (Senate - Banking, Housing, and Urban Affairs), https://www.congress.gov/bill/117th-congress/senate-bill/1294.
63. Ibid.
64. Burt Braverman and Edlira Kuka, "Congress and the President Act to Protect America's Intellectual Property" (David Wright Tremaine LLP, May 2023), https://www.dwt.com/blogs/broadband-advisor/2023/05/intellectual-property-national-security-paip.
65. Ibid.
66. "Part 744 - Control Policy: End-user and End-use Based" (Bureau of Industry and Security US Department of Commerce), https://www.bis.gov/regulations/ear/744#section-744.16.
67. Rodrigo Balbontin, "Backfire: Export Controls Helped Huawei and Hurt U.S. Firms" (ITIF, October 2025), https://itif.org/publications/2025/10/27/backfire-export-controls-helped-huawei-and-hurt-us-firms/.
68. "Part 744 - Control Policy: End-user and End-use Based" (Bureau of Industry and Security US Department of Commerce), https://www.bis.gov/regulations/ear/744#section-744.16.
69. Robert Atkinson, "How to Mitigate the Damage From China's Unfair Trade Practices by Giving USITC Power to Make Them Less Profitable" (ITIF, November 2022), https://itif.org/publications/2022/11/21/how-to-mitigate-the-damage-from-chinas-unfair-trade-practices/.
70. "Commerce Issues Final Rule to Formalize ICTS Program" (Bureau of Industry & Security: Office of Congressional and Public Affairs, December 2024), https://www.bis.gov/press-release/commerce-issues-final-rule-formalize-icts-program.
71. Ibid.
72. A Presidential Document by the Executive Office of the President, "Securing the Information and Communications Technology and Services Supply Chain" (Federal Register: The Daily journal of the United States Government, May 2019), https://www.federalregister.gov/documents/2019/05/17/2019-10538/securing-the-information-and-communications-technology-and-services-supply-chain; "ICT Supply Chain" (US Department of Commerce), https://www.commerce.gov/issues/ict-supply-chain.
73. "Commerce Finalizes Rule to Secure Connected Vehicle Supply Chains from Foreign Adversary Threats" (Bureau of Industry & Security: Office of Congressional and Public Affairs, January 2025), https://www.bis.gov/press-release/commerce-finalizes-rule-secure-connected-vehicle-supply-chains-foreign-adversary-threats.
74. "Federal Acquisition Regulation: Amendments to the FAR Buy American Act Requirements" (A Rule by the Defense Department, the General Services Administration, and the National Aeronautics and Space Administration, March 2022), https://www.federalregister.gov/documents/2022/03/07/2022-04173/federal-acquisition-regulation-amendments-to-the-far-buy-american-act-requirements.
75. "Trade Agreements Act (TAA)" (Federal Schedules), https://gsa.federalschedules.com/resources/taa-designated-countries/.
76. "Look up Trade Agreements Act-designated countries" (US General Services Administration), www.gsa.gov/sell-to-government/step-1-learn-about-government-contracting/how-to-access-contract-opportunities/help-with-mas-contracts-to-sell-to-government/roadmap-to-get-a-mas-contract/readiness-assessment-for-mas-offerors/look-up-trade-agreements-actdesignated-countries.

77. Entities Identified as Chinese Military Companies Operating in the United States in Accordance with Section 1260H of the William M. ("Mac") Thornberry National Defense Authorization Act for Fiscal Year 2021 (Public Law 116-283)1, https://media.defense.gov/2025/Jan/07/2003625471/-1/-1/1/ENTITIES-IDENTIFIED-AS-CHINESE-MILITARY-COMPANIES-OPERATING-IN-THE-UNITED-STATES.PDF.
78. "Department of Defense (DoD) 1260H List" (USC Office of Ethics and Compliance), https://oec.usc.edu/compliance-programs/international-activity/restricted-parties/dod-1260-list/.
79. "List of Equipment and Services Covered By Section 2 of The Secure Networks Act" (Federal Communications Commission), https://www.fcc.gov/supplychain/coveredlist.
80. Ibid.
81. "Office of Information and Communications Technology and Services (OICTS)," https://www.bis.gov/OICTS.
82. "OFAC Sanctions List Service," https://sanctionslist.ofac.treas.gov/Home/.
83. "Entities Owned by Blocked Persons (50% Rule)" (Office of Foreign Assets Control) https://ofac.treasury.gov/faqs/topic/1521.
84. FTI Consulting, "Shifting Expectations Survey: Wave 2," Question 35, May 15, 2020, https://fticommunications.com/covid-19/wp-content/uploads/2020/05/FTI-Shifting-Expectations-II-Topline-Results.pdf.
85. U.S. Customs and Border Protection, "Marking of Country of Origin on U.S. Imports," last modified July 2005, https://www.cbp.gov/trade/rulings/informed-compliance-publications/marking-country-origin-us-imports; Alliance for American Manufacturing, "Chinese Companies Saturate U.S. Holiday Gift Market; Consumers Hunting for American-Made Goods," news release, November 20, 2024, https://www.americanmanufacturing.org/press-release/chinese-companies-saturate-u-s-holiday-gift-market-consumers-hunting-for-american-made-goods/.
86. Brendan Ruberry, "China's Luckin Coffee Acquires Blue Bottle," *Semafor*, March 4, 2026, https://finance.yahoo.com/news/chinas-luckin-coffee-acquires-blue-223139564.html; Wendy Leigh, "The Beloved American Kitchen Appliance Brand That's Been Owned By a Chinese Company Since 2016," *Tasting Table*, August 11, 2025, https://www.tastingtable.com/1930425/american-appliance-brand-china-owned-ge/; Holly Riddle, "These Iconic Food Brands Are Owned By Chinese Companies," *The Takeout*, July 26, 2025, https://www.yahoo.com/news/articles/iconic-food-brands-owned-chinese-114000768.html; Andrew Cohen, "IPO Could Reportedly Value Wilson Parent at $10 Billion," *Front Office Sports*, September 7, 2023, https://frontofficesports.com/ipo-could-reportedly-value-wilson-parent-at-10-billion/.
87. Pztrick Phillips, "5 Tool Brands You Might Not Realize Are Owned by Chinese Companies," *SlashGear*, June 28, 2025, https://www.slashgear.com/1896136/tools-brands-owned-chinese-companies/.
88. "The Milwaukee Story," Milwaukee Tool, accessed March 2026, https://www.milwaukeetool.com/company/milwaukee-story.
89. "About Us," Techtronic Industries, accessed March 2026, https://www.ttigroup.com/company/about-us.
90. Hong Kong Special Administrative Region, "The Law of the People's Republic of China on Safeguarding National Security in the Hong Kong Special Administrative Region," accessed March 2026, https://www.elegislation.gov.hk/fwddoc/hk/a302/eng_translation_(a302)_en.pdf; *The President's Executive Order on Hong Kong Normalization*, Exec. Order No. 13936, 85 Fed. Reg. 43413 (Jul. 17, 2020), https://www.federalregister.gov/documents/2020/07/17/2020-15646/the-presidents-executive-order-on-hong-kong-normalization.

91. "ONE-KEY," Milwaukee Tool, accessed March 2026, https://onekey.milwaukeetool.com/; Peter Harrell, "Managing the Risks of China's Access to U.S. Data and Control of Software and Connected Technology" (Carnegie Endowment for International Peace, January 2025), https://carnegieendowment.org/research/2025/01/managing-the-risks-of-chinas-access-to-us-data-and-control-of-software-and-connected-technology.
92. Atkinson, *China Is Rapidly Becoming a Leading Innovator in Advanced Industries*; Atkinson, *Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance*; Ostertag, "US National Power Industries Are at Risk."
93. "Supercam-S150 UAV Reley TRR1C05D00 C21K," War & Sanctions, accessed March 2026, https://war-sanctions.gur.gov.ua/en/components/5571.
94. "Head Protection," Milwaukee Tool, accessed March 2026, https://www.milwaukeetool.com/products/safety-solutions/personal-protective-equipment/head-protection.
95. "BYTEDANCE LTD.," Bloomberg LEI, accessed March 2026, https://lei.bloomberg.com/leis/view/54930057HU24VGK3CO92.
96. Angelica Ang, "The 'Singapore-washing' strategy starts to unwind as both China and the U.S. closely scrutinize corporate roots," *Fortune*, March 9, 2026, https://fortune.com/2026/03/09/singapore-washing-us-china-shein-manus/.
97. Financial Crimes Enforcement Network, "Beneficial Ownership Information Reporting Rule Fact Sheet," September 29, 2022, https://www.fincen.gov/beneficial-ownership-information-reporting-rule-fact-sheet.
98. Jeff Newman Law, "For Products Imported to the U.S. the Importer Has the Responsibility to Make Sure the Marked Country of Origin Is Accurate," April 17, 2025, https://jeffnewmanlaw.com/for-products-imported-to-the-u-s-the-importer-has-the-responsibility-to-make-sure-the-marked-country-of-origin-is-accurate/.
99. Ibid.
100. Customs and Border Protection, "Uyghur Forced Labor Prevention Act (UFLPA)," last modified February 4, 2025, https://www.cbp.gov/trade/forced-labor/UFLPA.
101. Congressional Research Service, "U.S.-China Trade Relations," IF11284, updated September 9, 2025, https://www.congress.gov/crs_external_products/IF/PDF/IF11284/IF11284.33.pdf; "Recalls & Product Safety Warnings," U.S. Consumer Product Safety Commission, accessed March 2026, https://www.cpsc.gov/Recalls; Organisation for Economic Co-operation and Development, "Global Trade in Fake Goods Reached USD 467 Billion, Posing Risks to Consumer Safety and Compromising Intellectual Property," news release, May 7, 2025, https://www.oecd.org/en/about/news/press-releases/2025/05/global-trade-in-fake-goods-reached-USD-467-billion-posing-risks-to-consumer-safety-and-compromising-intellectual-property.html.
102. "United States Customs and Border Protection – AI Use Cases," CBP, https://www.dhs.gov/ai/use-case-inventory/cbp; Altana, "United States Customs and Border Protection Chooses Altana to Help Drive Implementation of the Uyghur Forced Labor Prevention Act," news release, July 20, 2023, https://altana.ai/resources/united-states-customs-and-border-protection-chooses-altana; Eli Clemens, "CBP Should Leverage AI, Not More Staff, to Manage the Surge in Inspections After Partial End to De Minimis Exception" (ITIF, February 6, 2025), https://itif.org/publications/2025/02/06/cbp-ai-to-manage-surge-inspections-after-partial-end-de-minimis/.
103. "United States Customs and Border Protection – AI Use Cases," CBP.
104. "H.R.7776 - James M. Inhofe National Defense Authorization Act for Fiscal Year 2023" (House - Transportation and Infrastructure), https://www.congress.gov/bill/117th-congress/house-bill/7776/text.

105. "Federal Acquisition Regulation: Prohibition on Certain Semiconductor Products and Services" (Federal Register: The Daily Journal of the United States Government), https://www.federalregister.gov/documents/2024/05/03/2024-08735/federal-acquisition-regulation-prohibition-on-certain-semiconductor-products-and-services.

106. Megan Peterson, "Section 5949's Semiconductor Ban is a Major Roadblock for U.S. Government Contracts" (ITI, August 2024), https://www.itic.org/news-events/techwonk-blog/section-5949s-semiconductor-ban-is-a-major-roadblock-for-us-government-contracts.

107. Robert D. Atkinson, "State and Local Government Need to Stop Subsidizing Chinese Companies," *The Hill*, April 21, 2022, https://thehill.com/opinion/finance/3275383-state-and-local-governments-need-to-stop-subsidizing-chinese-companies/.

108. "Public Pensions Record of Investing in Adversarial Countries" (Future Union), https://futureunion.co/pensions/.

109. Danielle Myles, "Pensions a new front for US clampdown on Chinese investment" (FDI Intelligence, August 2025), https://www.fdiintelligence.com/content/23a70b98-a11a-43b1-a83a-83e622eb21cd.

110. "H.R.4008 - Protecting Americans' Retirement Savings Act" (House - Education and the Workforce), https://www.congress.gov/bill/118th-congress/house-bill/4008/text.

111. Eli Clemens, "Make Foreign Adversary Bills Smarter" (ITIF, April 7, 2025), https://itif.org/publications/2025/04/07/make-foreign-adversary-bills-smarter/.

112. Atkinson, "Is It Too Much to Ask for a Third Way Beyond Free Trade and Constrained Trade?"

113. Select Committee on the CCP, "New Investigative Report Uncovers Billions in Taxpayer Money Used to Fund Chinese Military Apparatus"; Caroline Nowak and Ryan Fedasiuk, "Why Is the US Defense Department Funding China's Military Research?" *The Diplomat*, October 15, 2025, https://thediplomat.com/2025/10/why-is-the-us-defense-department-funding-chinas-military-research/.

114. Robert Rozansky and Robert Atkinson, "To Grow Innovative Small Businesses, Reform America's Seed Fund" (ITIF, January 2020), https://itif.org/publications/2020/01/09/grow-innovative-small-businesses-reform-americas-seed-fund/; "About SBIR and STTR," America's Seed Fund, https://www.sbir.gov/about.

115. "Survey of PRC State-Sponsored Technology Transfers Affecting SBIR Programs: A DoD Case Study" (Report by Protecting the National Security Innovation Base Study Group and OSE/Factor 8 Program, April 2021), https://cdn01.dailycaller.com/wp-content/uploads/2023/10/%E2%80%8Esbtc.orgwp-contentuploads202205PNSIBStudy-DODSBIR-China-Study-FINAL.pdf.

116. Ibid.

117. "S.4900 - SBIR and STTR Extension Act of 2022" (09/30/2022 Became Public Law No: 117-183.), https://www.congress.gov/bill/117th-congress/senate-bill/4900/all-actions; US Senate Committee on Small Business and Entrepreneurship, "Investigation Alert: Urgent Reforms Needed In SBIR Program To Protect National Security" (Critical American Technology Vulnerable To China, May 2025), https://www.ernst.senate.gov/imo/media/doc/sbir_report.pdf; "Sbir And Sttr Extension Act Of 2022, (Public Law 117–183—Sept. 30, 2022), https://www.congress.gov/117/plaws/publ183/PLAW-117publ183.pdf.

118. "Agencies Are Implementing Programs to Manage Foreign Risks and Plan Further Refinement" (Report to Congressional Committees: Small Business Research Programs, November 2023), https://www.gao.gov/assets/870/863924.pdf.

119. "Chair Ernst" (US Senate Committee on Small Business and Entrepreneurship), https://www.sbc.senate.gov/public/index.cfm/chairman; "Investigation Alert: Urgent Reforms Needed In SBIR Program To Protect National Security," https://www.ernst.senate.gov/imo/media/doc/sbir_report.pdf; "S.4900 - SBIR and STTR Extension Act

of 2022" (09/30/2022 Became Public Law No: 117-183), https://www.congress.gov/bill/117th-congress/senate-bill/4900/cosponsors.

120. "Investigation Alert: Urgent Reforms Needed In SBIR Program To Protect National Security."
121. Ibid.
122. "Ernst Unveils INNOVATE Act to Usher in Golden Age of American Innovation" (Joni Ernst, March 2025), https://www.ernst.senate.gov/news/press-releases/ernst-unveils-innovate-act-to-usher-in-golden-age-of-american-innovation.
123. "Cyrus Miryekta" (LinkedIn), https://www.linkedin.com/in/cyrus-miryekta-76a221283; "Cyrus Miryekta" (Space Settlement Summit), https://spacesettlementsummit.nss.org/featured_presenters/cyrus-miryekta/.
124. "Fostering American Innovation: Insights Into SBIR And STTR Programs" (House Small Business, February 2025), https://www.congress.gov/event/119th-congress/house-event/LC75047/text.
125. Ibid.
126. Ken Arora, "Zero Trust: Three Key Strategic Components of Assume Breach" (F5, April 2023), https://www.f5.com/company/blog/zerotrust-three-key-strategic-components-of-assume-breach; Arfan Sharif, "What is Continuous Monitoring?" (CrowdStrike, December 2022), https://www.crowdstrike.com/en-us/cybersecurity-101/next-gen-siem/continuous-monitoring/; Mikella Marley, "Data Breach Containment Guide: How to Beat Cyber Threats in Real Time" (Zero Networks, April 2025), https://zeronetworks.com/blog/data-breach-containment-guide.
127. Frank Bickenbach, et al., "Foul Play? On the Scale of Scope of Industrial Subsidies in China," (policy brief, Kiel Institute for the World Economy, no. 173, April 2024), https://www.ifw-kiel.de/publications/foul-play-on-the-scale-and-scope-of-industrial-subsidies-in-china-32738/.
128. U.S. House Select Committee on the Strategic Competition Between the United States and the Chinese Communist Party, "Predatory Pricing: How the Chinese Communist Party Manipulates Global Mineral Prices To Maintain Its Dominance" (Washington, DC: U.S. House of Representatives, November 12, 2025), https://www.congress.gov/119/meeting/house/118668/documents/HHRG-119-ZS00-20251119-SD001.pdf.
129. Ibid.
130. Ibid.
131. Bernstein v. N.V. Nederlandsche-Amerikaansche, 210 F.2d 375, 376 (2d Cir. 1954), https://law.justia.com/cases/federal/appellate-courts/F2/210/375/393409/.
132. Eli Clemens, "How Some Chinese Companies Obscure Ties to China and What Policymakers Should Do About It" (ITIF, November 2025), https://itif.org/publications/2025/11/03/some-chinese-companies-obscure-ties-to-china-what-policymakers-should-do-about-it/.
133. 16 C.F.R. § 802.52, "Acquisitions by or from foreign governmental entities," *Electronic Code of Federal Regulations*, accessed March 13, 2026, https://www.ecfr.gov/current/title-16/chapter-I/subchapter-H/part-802/section-802.52.
134. Advanced Codec Technologies, LLC v. Guangdong OPPO Mobile Telecommunications Co., Ltd. (2022) ZGFZMZ Nos. 907, 910, 911, 916, 917, and 918, Supreme People's Court of China, December 12, 2023, WIPO Lex, https://www.wipo.int/wipolex/en/judgments/details/2249; Rohin Pujari, "China's SEP Case Update – ACT V OPPO, Vivo," Conventus Law, March 4, 2024, https://conventuslaw.com/report/chinas-sep-case-update-act-v-oppo-vivo/.
135. "IWNCOMM v. Apple Inc.," Beijing Intellectual Property Court, Civil Judgment (2020), summarized in Zhang Xiaodan, "Chinese Court Rules in Favor of IWNCOMM in SEP Dispute with Apple," *China Patents & Trademarks*, no. 3 (2021), http://www.cpt.cn/en/2021-03/1710320938.html.

136. Apple Computer Trading (Shanghai) Co., Ltd. v. China IWNCOMM Co., Ltd. (2022) ZGFZMZ No. 817, Supreme People's Court of China, December 30, 2022, WIPO Lex, https://www.wipo.int/wipolex/en/judgments/details/2252.

137. Aaron Wininger, "Chongqing No. 1 Intermediate People's Court Sets Global FRAND Rate for 5G SEPs at $0.707/Unit in Nokia/OPPO Case," *China IP Law Update*, December 16, 2023, https://www.chinaiplawupdate.com/2023/12/chongqing-no-1-intermediate-peoples-court-sets-global-frand-rate-for-5g-seps-at-0-707-unit-in-nokia-oppo-case/.

138. Ningling Wang and Mike P. Lu, "Recent development on SEP disputes in China — anti-suit injunction," *Kluwer Patent Blog*, November 20, 2020, https://legalblogs.wolterskluwer.com/patent-blog/recent-development-on-sep-disputes-in-china-anti-suit-injunction/; Aaron Wininger, "China's Supreme People's Court Issues First Anti-Anti-Suit Injunction in Huawei v. Netgear," *China IP Law Update*, December 27, 2024, https://www.chinaiplawupdate.com/2024/12/chinas-supreme-peoples-court-issues-first-anti-anti-suit-injunction-in-huawei-v-netgear/.

139. Rodrigo Balbontin and Stephen Ezell, "Comments to USTR Regarding the Trade Agreement Between the United States, Mexico, and Canada" (ITIF, November 2025), https://itif.org/publications/2025/11/03/comments-to-ustr-regarding-the-usmca-trade-agreement/.

140. Christopher E. Wilson, "Working Together: Economic Ties Between the United States and Mexico" (Mexico Institute, Woodrow Wilson International Center for Scholars, November 2011), https://www.wilsoncenter.org/publication/working-together-economic-ties-between-the-united-states-and-mexico.

141. Stephen J. Ezell and Caleb Foote, "Global Trade Interdependence: U.S. Trade Linkages With Korea, Mexico, and Taiwan" (ITIF, June 2019), https://www2.itif.org/2019-global-trade-interdependence.pdf.

142. Rodrigo Balbontin and Stephen Ezell, "Comments to USTR Regarding the Trade Agreement Between the United States, Mexico, and Canada" (ITIF, November 3, 2025), https://itif.org/publications/2025/11/03/comments-to-ustr-regarding-the-usmca-trade-agreement/.

143. Stephen Ezell, "Don't Let Chinese EV Makers Manufacture in the United States" (ITIF, September 17, 2025), https://itif.org/publications/2025/09/17/dont-let-chinese-ev-makers-manufacture-in-the-united-states/.

144. Eliot Chen, "Canada Set to Side With China on EVs," The Wire China, October 26, 2025, https://www.thewirechina.com/2025/10/26/canada-set-to-side-with-china-on-evs/.

145. Robert Atkinson, "China Is Rapidly Becoming a Leading Innovator in Advanced Industries" (ITIF, September 2024), https://itif.org/publications/2024/09/16/china-is-rapidly-becoming-a-leading-innovator-in-advanced-industries/.

146. Richard Baldwin, "China is the world's sole manufacturing superpower: A line sketch of the rise," VoxEU, Centre for Economic Policy Research, May 7, 2024, https://cepr.org/voxeu/columns/china-worlds-sole-manufacturing-superpower-line-sketch-rise.

147. Stephen J. Ezell, "Policy Recommendations to Stimulate U.S. Manufacturing Innovation" (ITIF, May 2020), https://itif.org/publications/2020/05/18/policy-recommendations-stimulate-us-manufacturing-innovation/

148. Robert D. Atkinson, "Killing Two Birds With One Stone: Why Congress Should Establish a Tax Incentive For Companies Reshoring Production from China to U.S. Labor Surplus Areas" (ITIF, March 7, 2021), https://itif.org/publications/2021/03/07/killing-two-birds-one-stone-why-congress-should-establish-tax-incentive/.

149. "Is ESG failing defence? Rethinking ethics, investment and national security" (Policy Liaison Group: Environmental, Social, and Governance, July 2025), https://plgesg.org/blogs/is-esg-failing-defence-rethinking-ethics-investment-and-national-security/.

150. "Implementing the FCA's Sustainability Disclosure Requirements" (KPMG, May 2023), https://kpmg.com/xx/en/our-insights/regulatory-insights/implementing-the-fca-sustainability-disclosure-requirements.html.

151. Michael Lowell et al., "Trump 2.0 tariff tracker" (Reed Smith: Trade Compliance Resource Hub, February 2026), https://www.tradecomplianceresourcehub.com/2026/01/27/trump-2-0-tariff-tracker/; "Effective Tariff Rates and Revenues" (Penn Wharton Budget Model, January 2026), https://budgetmodel.wharton.upenn.edu/issues/2026/1/15/effective-tariff-rates-and-revenues-updated-january-15-2026.

152. Judy Chu, Jessica Lee, and Ian Shin, "Confronting Anti-Asian Racism: Anti-China Foreign Policy and Legislative Change" (NCUSCR, April 2021), https://www.ncuscr.org/event/confronting-anti-asian-racism/.

153. Ibid.

154. Kerry McInerney, "Yellow Techno-Peril: The 'Clash of Civilizations' and anti-Chinese racial rhetoric in the US–China AI arms race" (Big Data & Society, Vol 11, Issue 2, June 2024), https://journals.sagepub.com/doi/10.1177/20539517241227873.

155. Gisela Perez Kusakawa, "From Japanese American Incarceration to the China Initiative, Discrimination Against AAPI Communities Must End" (ACLU, May 2022), https://www.aclu.org/news/racial-justice/from-japanese-american-incarceration-to-the-china-initiative-discrimination-against-aapi-communities-must-end.

156. "The Racialization of Rivalry Between the United States and China," American China Forum, Johns Hopkins SAIS, accessed March 13, 2026, https://web.archive.org/web/20220320192802/https://acf.sais.jhu.edu/racialization-rivalry-between-united-states-china.html; Committee of 100, U.S.–China Public Perceptions Survey (New York: Committee of 100, 2022), https://www.committee100.org/research/u-s-china-public-perceptions-survey/.

157. Ibid.

158. Robert Kuttner, "Is It Racist to Criticize China?" (The American Prospect, April 2022), https://prospect.org/2022/04/19/is-tim-ryan-a-racist/.

159. Grace Meng, @Grace4NY, "This may not have been @TimRyan's intentions, but this is essentially shifting blame away from American corporations' anti-worker policies and putting a target on the backs of #AAPIs. Take down the ad. #StopAsianHate in both actions and words" (X, March 2022), https://x.com/Grace4NY/status/1509604269133078532.

160. Ibid.

161. Liu Yinmeng, "United front put forward to fight racism" (China Daily, April 2021), https://www.chinadailyhk.com/hk/article/163623.

162. Vivek Chilukuri, "How the United States Can Win the Global Tech Race," *Foreign Policy*, June 2025, https://foreignpolicy.com/2025/06/09/china-tech-deepseek-chips-tech/?tpcc=recirc_latest062921.

163. Stephen Ezell, Adams Nager, and Robert D. Atkinson, "The Export-Import Bank's Vital Role in Supporting U.S. Traded Sector Competitiveness" (ITIF, July 2014), https://itif.org/publications/2014/07/28/export-import-banks-vital-role-supporting-us-traded-sector-competitiveness/.

164. Shayerah I. Akhtar, "Export-Import Bank: Overview and Issues for Congress" (Congressional Research Service, September 25, 2025), file:///C:/Users/StephenEzell/Downloads/IF10017.39.pdf.

165. Ibid.

166. National Association of Manufacturers, "Senators Introduce Reauthorization Bill for Ex-Im Bank," February 6, 2026, https://nam.org/senators-introduce-reauthorization-bill-for-ex-im-bank-35691/.

167. Akhtar, "Export-Import Bank: Overview and Issues for Congress."
168. Daniel F. Runde, "The U.S. EXIM Bank in an Age of Great Power Competition" (Center for Strategic and International Studies, June 18, 2024), https://www.csis.org/analysis/us-exim-bank-age-great-power-competition.
169. U.S. International Development Finance Corporation, "About Us," https://www.dfc.gov/who-we-are/about-us.
170. Erin Collinson and Julia Brownell, "Looking Back and Moving Forward: What DFC's 2025 Portfolio Reveals About What Comes Next" (Center for Global Development, January 23, 2026), https://www.cgdev.org/blog/looking-back-and-moving-forward-what-dfcs-2025-portfolio-reveals-about-what-comes-next.
171. Erin Collinson, "DFC Reauthorization: What's New and What It Mean," Center for Global Development, December 18, 2025, https://www.cgdev.org/blog/dfc-reauthorization-whats-new-and-what-it-means.
172. Ibid.
173. U.S. International Development Finance Corporation, "DFC Highlights Landmark Critical Minerals Investments to Strengthen U.S. National Security During State Department Ministerial," news release, February 4, 2026, https://www.dfc.gov/media/press-releases/dfc-highlights-landmark-critical-minerals-investments-strengthen-us-national.
174. James T. Areddy, "How China Became the World's Top Development Financier," *The Wall Street Journal*, November 6, 2023, https://www.wsj.com/world/china/how-china-became-the-worlds-top-development-financier-08509fc9.
175. Ibid.
176. George Ingram, "Reauthorization of the Development Finance Corporation" (Brookings, November 5, 2025), https://www.brookings.edu/articles/reauthorization-of-the-development-finance-corporation/.
177. U.S. International Development Finance Corporation, "Security and Privacy Requirements for Information Technology Procurements" (DFC Office of Information Technology, Policy SA-04), https://www.dfc.gov/sites/default/files/media/documents/DFC_OIT_CISO_Policy_SA-04_Security-and-Privacy-Requirements-for-Information-Technology-Procurements.pdf.
178. Robert Atkinson, "US Development Financing Needs to Stop Rewarding Nations Whose Policies Harm US Companies and Workers" (ITIF, August 2024), https://itif.org/publications/2024/08/12/us-development-financing-stop-rewarding-nations-policies-harm-us-companies/.
179. NSIAD-92-49, "Export Promotion: Federal Programs Lack Organizational and Funding Cohesiveness" (US GAO, January 1992).
180. Forthcoming; ITIF, "The Global Trade Battleground: U.S.-China Competition in Third Markets."
181. Ibid.
182. Office of Public Affairs, "The Department of Commerce Announces American AI Exports Program Implementation" (International Trade Administration, Press Release, October 2025), https://www.trade.gov/press-release/department-commerce-announces-american-ai-exports-program-implementation.
183. "Overview of U.S. defense spending and arms sales in 2025," New York Center for Foreign Policy Affairs, November 29, 2025, https://nycfpa.org/11/29/overview-of-u-s-defense-spending-and-arms-sales-in-2025/; U.S. State Department Bureau of Political-Military Affairs, "Fiscal Year 2024 U.S. Arms Transfers and Defense Trade," January 24, 2025, https://www.state.gov/fiscal-year-2024-u-s-arms-transfers-and-defense-trade/.
184. Daniel Fata and Jerry McGinn, "How to ensure the US and its allies have the weapons they need," *Defense News*, September 17, 2022,

https://www.defensenews.com/opinion/commentary/2022/09/27/how-to-ensure-the-us-and-its-allies-have-the-weapons-they-need/.

185. Alternativechinar, "China is now the Global Superstore of Cutting-Edge and Futuristic Weapons" (TikTok, October 2025), https://www.tiktok.com/@alternativechinar/video/7556388126579641617.
186. Brian Hart, "Where Does China Rank in Global Arms?" Baiguan, May 8, 2024, https://www.baiguan.news/p/where-does-china-rank-in-global-arms.
187. Helena Legarda and Meia Nouwens, "China's Arms Industry Is Increasingly Global—But Don't Expect It to Supplant NATO's Counterparts Any Time Soon," MERICS China Industries Tracker, March 14, 2024, https://merics.org/en/tracker/chinas-arms-industry-increasingly-global-dont-expect-it-supplant-natos-counterparts-any.
188. Ibid.
189. The White House, "Establishing an America First Arms Transfer Strategy," February 6, 2026, https://www.whitehouse.gov/presidential-actions/2026/02/establishing-an-america-first-arms-transfer-strategy/.
190. Marcus Weisgerber, "New U.S. Arms Export Policy Boosts Production of Weapons Important to Pentagon," *The Wall Street Journal*, February 6, 2026, https://www.wsj.com/politics/national-security/new-u-s-arms-export-policy-boosts-production-of-weapons-important-to-pentagon-84871a7b.
191. The White House, "Establishing an America First Arms Transfer Strategy."
192. U.S. Department of State, "FMS 2023: Retooling Foreign Military Sales for An Age of Strategic Competition," May 18, 2023, https://2021-2025.state.gov/fms-2023-retooling-foreign-military-sales-for-an-age-of-strategic-competition/.
193. Maiya Clark, "Identifying—and Fixing—the Real Reason Military Equipment Sales to Our Allies Are Lagging So Badly," The Heritage Foundation, June 23, 2026, https://www.heritage.org/defense/commentary/identifying-and-fixing-the-real-reason-military-equipment-sales-our-allies-are.
194. Tony Bertuca, "State Department 'retooling' foreign military sales process to accelerate weapons deliveries," *Inside Defense*, May 18, 2023, https://insidedefense.com/daily-news/state-department-retooling-foreign-military-sales-process-accelerate-weapons-deliveries.
195. "Foreign Military Financing Of Direct Commercial Contracts," Defense Security Cooperation Agency, https://www.dsca.mil/Programs/Defense-Trade-and-Arms-Transfers/Foreign-Military-Financing/Direct-Commercial-Contracts.
196. Ibid.
197. Phone interview with Daniel Fata, Fata Advisory, LLC, February 12, 2026.
198. Defense Acquisition University, "Steps to Improve Acquisition and Contracting Support to Foreign Military Sales," June 24, 2024, https://www.dau.edu/artifact/steps-improve-acquisition-and-contracting-support-foreign-military-sales.
199. "Third Party Transfers and Foreign Military Sales Teams and Functions," U.S. Department of State, https://2009-2017.state.gov/t/pm/rsat/c14021.htm.
200. Phone interview with Daniel Fata, Fata Advisory, LLC, February 12, 2026.
201. Organization of Economic Cooperation and Development, "Convention on Combatting Bribery of Foreign Public Officials in International Business Transaction" (OECD Report, 2025), https://legalinstruments.oecd.org/public/doc/205/205.en.pdf.
202. Hogan Lovells, "China's 2025 Anti-Unfair Competition Law Revision: A new era of enforcement and accountability," July 25, 2025, https://www.hoganlovells.com/en/publications/chinas-2025-antiunfair-competition-law-revision-a-new-era-of-enforcement-and-accountability.

203. Drew Costello, Brian Ross, and Jordan Basich, "Chinese Investment in Latin America Raises Corruption Risks," Forensic Risk Alliance, December 20, 2023, https://www.forensicrisk.com/news-and-insights/chinese-investment-in-latin-america-raises-corruption-risks.

204. Ibid.

205. Ibid.

206. Karen Freifeld and Sarah Lynch, "Exclusive: China's ZTE may pay over $1 billion to the US over foreign bribery allegations, sources say," *Reuters*, December 11, 2025, https://www.reuters.com/sustainability/society-equity/chinas-zte-may-pay-more-than-1-billion-us-over-foreign-bribery-allegations-2025-12-11/.

207. Samuel Petrequin and Sylvain Plazy, "Belgian prosecutors arrest suspects in Huawei bribery probe targeting EU Parliament," *AP News*, March 13, 2025, https://apnews.com/article/brussels-european-parliament-arrests-corruption-belgium-bribery-b02bc4aa12f312dcbd360070f3853c1b.; "Patrick Ho, Former Head Of Organization Backed By Chinese Energy Conglomerate, Sentenced To 3 Years In Prison For International Bribery And Money Laundering Offenses," press release, U.S. Attorney's Office South District of New York, March 25, 2019, https://www.justice.gov/usao-sdny/pr/patrick-ho-former-head-organization-backed-chinese-energy-conglomerate-sentenced-3.

208. "QuickHits: DOJ's FCPA Shift and Impacts on U.S.-China Operations," Dickinson Wright, 2025, https://www.dickinson-wright.com/news-alerts/quickhits-fcpa-shift-impacts-on-us-china.

209. "Pausing Foreign Corrupt Practices Act Enforcement to Further American Economic and National Security," The White House, February 10, 2025, https://www.whitehouse.gov/presidential-actions/2025/02/pausing-foreign-corrupt-practices-act-enforcement-to-further-american-economic-and-national-security/.

210. "CIA-RDP79-01206A000200030007-1," Central Intelligence Agency, accessed February 2026, https://www.cia.gov/readingroom/docs/CIA-RDP79-01206A000200030007-1.pdf.

211. "Current and Projected National Security Threats to the United States and its Interests Abroad," https://www.intelligence.senate.gov/wp-content/uploads/2024/08/sites-default-files-hearings-currentprojected00unit.pdf.

212. Richard L. Snyder, "Economic Intelligence: A Role for the CIA?" (Consortium for the Study of Intelligence, 1996), https://irp.fas.org/eprint/snyder/economic.htm; Christopher L. Eisgruber, "Balancing Constitutional Rights with National Security," Princeton University, November 22, 2010, https://www.princeton.edu/news/2010/11/22/balancing-constitutional-rights-national-security; U.S. Senate Select Committee on Intelligence, Hearing on Worldwide Threats, 118th Cong., 2nd sess. (2024), https://www.intelligence.senate.gov/wp-content/uploads/2024/08/sites-default-files-hearings-103650.pdf.

213. U.S. Senate Select Committee on Intelligence, Hearing, 118th Cong. (2024), https://www.intelligence.senate.gov/wp-content/uploads/2024/08/sites-default-files-hearings-103650.pdf.

214. Richard L. Snyder, "Economic Intelligence: A Role for the CIA?" (Consortium for the Study of Intelligence, 1996), https://irp.fas.org/eprint/snyder/economic.htm; Christopher Eisgruber, "Balancing Constitutional Rights with National Security," Princeton University, November 22, 2010, https://www.princeton.edu/news/2010/11/22/balancing-constitutional-rights-national-security.

215. Samuel J. Rascoff, "Presidential Intelligence," University of Chicago Law Review 85, no. 4 (2018): 1343–1390, https://lawreview.uchicago.edu/sites/default/files/11%20Rascoff_SYMP_Final.pdf.

216. Dennis DeConcini, "The Role of U.S. Intelligence in Promoting Economic Interests," *Journal of International Affairs*, Vol. 48, No. 1 (1994): 39–57, https://www.jstor.org/stable/24357334; Timothy D. Foley, "The Role of the CIA in Economic and Technological Intelligence," *The Fletcher Forum of World Affairs*, Vol. 18, No. 1 (1994): 135–145, https://www.jstor.org/stable/45289609.

217. Robert D. Atkinson, "China Is Rapidly Becoming a Leading Innovator in Advanced Industries" (ITIF, September 16, 2024), https://itif.org/publications/2024/09/16/china-is-rapidly-becoming-a-leading-innovator-in-advanced-industries/.
218. Ibid.; R. James Woolsey, "Testimony before the House Permanent Select Committee on Intelligence," Federal News Service, March 9, 2000, https://irp.fas.org/news/2000/03/wool0300.htm.
219. Atkinson, "Marshaling National Power Industries to Preserve U.S. Strength and Thwart China's Bid for Global Dominance."
220. Stephen J. Ezell, "Chinese Innovation Mercantilism: An Essential Reading List" (ITIF, June 10, 2021), https://itif.org/publications/2021/06/10/chinese-innovation-mercantilism-essential-reading-list/; Darren E. Tromblay, "From Outside Assaults to Insider Threats: Chinese Economic Espionage" (ITIF, November 3, 2025), https://itif.org/publications/2025/11/03/from-outside-assaults-to-insider-threats-chinese-economic-espionage/; Eli Clemens, "How Some Chinese Companies Obscure Ties to China and What Policymakers Should Do About It" (ITIF, November 3, 2025), https://itif.org/publications/2025/11/03/some-chinese-companies-obscure-ties-to-china-what-policymakers-should-do-about-it/.
221. Central Intelligence Agency, "Mission & Vision," accessed February 20, 2026, https://www.cia.gov/about/mission-vision/.
222. Paul Rosenzweig, "Should American Spies Steal Commercial Secrets?" *Lawfare*, May 13, 2015, https://www.lawfaremedia.org/article/should-american-spies-steal-commercial-secrets.
223. Ibid.
224. Maria Aspan, "Wall Street tumbles as China's DeepSeek jolts AI stocks," *NPR*, January 27, 2025, https://www.npr.org/2025/01/27/nx-s1-5276097/wall-street-stock-markets-tumble-deepseek-ai-tech-stock.
225. Eduardo Baptista, "China's DeepSeek sets off AI market rout," *Reuters*, January 27, 2025, https://www.reuters.com/technology/chinas-deepseek-sets-off-ai-market-rout-2025-01-27/; Aspan, "Wall Street tumbles as China's DeepSeek jolts AI stocks."
226. "Scale AI CEO says China has quickly caught the U.S. with DeepSeek," *CNBC*, January 23, 2025, https://www.cnbc.com/2025/01/23/scale-ai-ceo-says-china-has-quickly-caught-the-us-with-deepseek.html.
227. "U.S. intelligence and commercial espionage debate," *Financial Times*, https://www.ft.com/content/a0dfedd1-5255-4fa9-8ccc-1fe01de87ea6.
228. Tyna Eloundou et al., "GPTs Are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models" (arXiv preprint arXiv:2401.06066, 2024), https://arxiv.org/pdf/2401.06066; Peter Henderson et al., "Foundation Models and the Future of Work" (arXiv preprint arXiv:2401.02954, 2024), https://arxiv.org/pdf/2401.02954.
229. David Aaron, "The U.S. Really Does Want to Constrain Commercial Espionage. Why Does Nobody Believe It?" *Lawfare*, March 25, 2015, https://www.lawfaremedia.org/article/us-really-does-want-constrain-commercial-espionage-why-does-nobody-believe-it.
230. Office of the Director of National Intelligence, "The IC OSINT Strategy 2024–2026" (Washington DC: ODNI, 2024), https://www.dni.gov/index.php/newsroom/reports-publications/reports-publications-2024/3785-the-ic-osint-strategy-2024-2026.
231. Barack Obama, "Presidential Policy Directive—Signals Intelligence Activities," Presidential Policy Directive/PPD-28, January 17, 2014, https://obamawhitehouse.archives.gov/the-press-office/2014/01/17/presidential-policy-directive-signals-intelligence-activities.
232. Joseph R. Biden Jr., "Enhancing Safeguards for United States Signals Intelligence Activities," Executive Order 14086, Federal Register 87, no. 198 (October 14, 2022): 62283–62291,

https://www.federalregister.gov/documents/2022/10/14/2022-22531/enhancing-safeguards-for-united-states-signals-intelligence-activities.

233. U.S. Patent and Trademark Office, The Global Intellectual Property Academy, https://www.uspto.gov/ip-policy/global-intellectual-property-academy.

Notes for Mobilizing for Techno-Economic War, Part 3: Transforming Financial Capitalism Into National Power Capitalism

1. Robert Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
2. Ibid.
3. Ibid.
4. Robert D. Atkinson, "The Case for Policy Transformation to Avoid Losing the Techno-Economic-Trade War With China" (ITIF, February 2026), https://itif.org/publications/2026/02/02/case-for-policy-transformation-avoid-losing-techno-economic-trade-war-with-china/.
5. Andrew Shonfield, *Modern Capitalism: The Changing Balance of Public and Private Power* (Oxford, UK: Oxford University Press, 1969).
6. Alfred DuPont Chandler, Jr., *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, MA: The Belknap Press, 1994).
7. "Ford Crushes Shareholder-First and -Foremost," last modified April 2024, https://www.discerningreaders.com/henry-ford-crushes-shareholder-first-and-foremost.html.
8. Ibid.
9. "Letter to the Editor," *The Union Democrat*, January 5, 2022, https://www.pressreader.com/usa/the-union-democrat/20220105/281522229431936.
10. "Energy and Politics: A Resource Page" (University of Oregon, Kimball Files), 40, https://pages.uoregon.edu/kimball/nrg&plt.htm#1869:1874.
11. Chandler, *Scale and Scope: The Dynamics of Industrial Capitalism*.
12. Adolf A. Berle and Gardiner C. Means, *The Modern Corporation and Private Property* (New York: Harcourt, Brace & World, rev. ed. 1968).
13. Allen D. Boyer, "Activist Shareholders, Corporate Directors, and Institutional Investment: Some Lessons from the Robber Barons," *Washington and Lee Law Review* 50, no. 3 (June 1, 1993): 977–1042, https://scholarlycommons.law.wlu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1768&context=wlulr.
14. "Welfare Capitalism in the 1920s and its Long-Term Effects," Voices of Capitalism, accessed March 2026, https://voicesofcapitalism.com/welfare-capitalism-in-the-1920s/.
15. Marina Whitman, *New World, New Rules: The Changing Role of the American Corporation* (Boston: Harvard Business Review Press, 1999).
16. Michael Useem, *Investor Capitalism: How Money Managers Are Changing the Face of Corporate America* (New York: Basic Books, 1996), 64.
17. Milton Friedman, "A Friedman Doctrine—The Social Responsibility of Business Is To Increase Its Profits," *The New York Times*, September 1970, https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html.

18. William Lazonick, "Innovative Enterprise Solves the Agency Problem: The Theory of the Firm, Financial Flows, and Economic Performance," working paper, Institute for New Economic Thinking, August 2017, 48–49, https://www.ineteconomics.org/uploads/papers/WP_62-Lazonick-IESAP.pdf.
19. Michael C. Jensen and William H. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics* 3, no. 4 (October 1976): 305–360, https://doi.org/10.1016/0304-405X(76)90026-X.
20. Michael C. Jensen and William H. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure", Journal of Financial Economics 3 (1976) 305-360, p. 311.
21. David J. Teece, "The Capabilities Framework v. Agency Theory: Implications for Management" Professor of the Graduate School, University of California Berkley, and Berkley Research Group, AOM Conference, Chicago, August 11, 2024.
22. Ibid.
23. Michael Schrage, "Potato Chips vs. Computer Chips—High Technology Any Way You Slice It," *The Washington Post*, January 21, 1993, https://www.washingtonpost.com/archive/business/1993/01/22/potato-chips-vs-computer-chips-high-technology-any-way-you-slice-it/08a30106-6bed-4076-8252-f64294e0b7d6/.
24. John Steele Gordon, "Wall Street's 10 Most Notorious Stock Traders," American Heritage, Spring 2009, https://www.americanheritage.com/wall-streets-10-most-notorious-stock-traders.
25. Boyer, *Washington and Lee Law Review*, 977–1042.
26. Paul A. Gompers and Andrew Metrick, "Institutional Investors and Equity Prices," *The Quarterly Journal of Economics* 116, no. 1, February 2001, 229–259, https://www.jstor.org/stable/2696448.
27. Jonathan Lewellen and Katharina Lewellen, "Institutional Investors and Corporate Governance: The Incentive To Increase Value," *The Journal of Finance* 77, no. 1, October 2021: 213–264, https://doi.org/10.1111/jofi.13085.
28. Boyer, *Washington and Lee Law Review*, 977–1042.
29. "Energy and Politics: A Resource Page" (University of Oregon, Kimball Files), 138.
30. Roger L. Martin, "Yes, Short-Termism Really Is a Problem," *Harvard Business Review*, October 2015, https://hbr.org/2015/10/yes-short-termism-really-is-a-problem.
31. William Lazonick, "Investing in Innovation: A Policy Framework for Attaining Sustainable Prosperity in the United States" (Institute for New Economic Thinking, 2022), https://www.ineteconomics.org/uploads/papers/WP_182-Lazonick.pdf.
32. Mark S. Mizruchi, *The Fracturing of the American Corporate Elite* (Cambridge, MA: Harvard University Press, 2013), 49.
33. Steve Odland, "Where Have All the Corporate Statesmen Gone?," Committee for Economic Development, August 27, 2013, www.ced.org/blog/entry/where-have-all-the-corporate-statesman-gone.
34. Boyer, *Washington and Lee Law Review*, 977–1042.
35. Greta R. Krippner, "The Financialization of the American Economy," *Socio-Economic Review*, 3, 2005, 173–208, https://www.depfe.unam.mx/actividades/10/financiarizacion/i-7-KrippnerGreta.pdf.
36. Corelli Barnett, *The Collapse of British Power*, (London: Faber, 1972), 85.
37. "Lazonick," (Institute for New Economic Thinking), 37.
38. Lenore Palladino and William Lazonick, "Regulating Stock Buybacks: The $6.3 Trillion Question," working paper, Roosevelt Institute, May 2021, https://rooseveltinstitute.org/wp-content/uploads/2021/04/RI_Stock-Buybacks_Working-Paper_202105.pdf.

39. "BlackRock CEO Warns Top US Firms—Don't Overdo Dividends, Buybacks," *Reuters*, last modified March 2024, https://www.cnbc.com/2014/03/26/blackrock-ceo-warns-top-us-firmsdont-overdo-dividends-buybacks.html.
40. Robert Reich, "Why We Must End Upward Predistribution to the Rich," *Huffington Post,* September 2015, http://www.huffingtonpost.com/robert-reich/why-we-must-end-upward-pr_b_8204796.html.
41. Dean Krehmeyer, Matthew Orsagh, and Kurt N. Schacht, "Breaking the Short-Term Cycle," (CFA Institute, 2006), https://www.cfainstitute.org/sites/default/files/-/media/documents/article/position-paper/breaking-the-short-term-cycle.pdf.
42. John R. Graham, Campbell R. Harvey, and Shiva Rajgopal, "The Economic Implications of Corporate Financial Reporting," *Journal of Accounting and Economics* 40, no. 1–3, 2005: 3–73.
43. "Energy and Politics: A Resource Page" (University of Oregon, Kimball Files), 107.
44. Arona Butcher et al., *Global Competitiveness of U.S. Advanced-Technology Manufacturing Industries: Communications Technology and Equipment* (Washington DC: U.S. International Trade Commission, October 1991), https://www.usitc.gov/publications/332/pub2439.pdf.
45. Robert D. Atkinson, "Who Lost Lucent?: The Decline of America's Telecom Equipment Industry," *American Affairs* 4, no. 3, 2020, https://americanaffairsjournal.org/2020/08/who-lost-lucent-the-decline-of-americas-telecom-equipment-industry/.
46. Jens Beckert and Isabell Stamm, "Capital and the Family," *British Journal of Sociology*, July 2025: 1–12, https://onlinelibrary.wiley.com/doi/10.1111/1468-4446.70015.
47. PricewaterhouseCoopers, "The PricewaterhouseCoopers Global Corporate Deconstruction Survey: Unleashing Value Through Breakups" (PwC, 1998).
48. Andrew Campbell and David Sadtler, "Corporate Breakups," *Strategy* 12 (1998): https://www.strategy-business.com/article/18963.
49. Thomas Gryta and Ted Mann, *Lights Out: Pride, Delusion, and the Fall of General Electric*, (New York: Mariner Books, July 2020), https://www.amazon.com/Lights-Out-Delusion-General-Electric-ebook/dp/B084D28MBV.
50. Michael J. Mauboussin and Dan Callahan, "Cost of Capital and Capital Allocation" (industry report, Morgan Stanley Investment Management, February 2024), https://www.morganstanley.com/im/publication/insights/articles/article_costofcapitalandcapitalallocation.pdf.
51. Hilal Aka, "What Vance Left Unsaid in Paris: America's AI Leadership Hinges on Big Tech Leadership" (ITIF, March 2025), https://itif.org/publications/2025/03/25/vance-paris-america-ai-leadership-big-tech-leadership/.
52. Jack Welch and John A. Byrne, *Straight From the Gut* (New York: Warner Books, 2003).
53. Stefan Raff et al., "What is 'Deep Tech' and why should corporate innovators care?" (faculty publication, MIT Regional Entrepreneurship Acceleration Program), https://reap.mit.edu/assets/What_is_Deep_Tech_Why_Should_Corporate_Innovators_Care_MURRAY_FROLUND_et_al_002.pdf.
54. Ibid.
55. Chiara Criscuolo et al., "Global Engagement and the Innovation Activities of Firms," *International Journal of Industrial Organization* 28, no. 2 (March 2010), 191–202, https://www.nber.org/papers/w11479.
56. Trelysa Long, "An Important Metric Policymakers Should Watch: Foreign Receipts as a Share of GDP" (ITIF, December 2025), https://itif.org/publications/2025/12/19/an-important-metric-policymaker-should-watch-foreign-receipts-share-gdp/.

57. That de-verticalization killed firm-level innovation (among many other things). Interestingly, some newer U.S. firms, such as Tesla, Rivian, and Redwood Materials, have adopted far more vertically integrated structures (and do more in-firm innovation).
58. Clayton Christensen, *Innovator's Dilemma: The Revolutionary Book that Will Change the Way You Do Business* (New York: Harper Business, 2011).
59. The author wishes to thank Sree Ramasawamy for helpful insights for this section.
60. James A. Dorn, "Anatomy of China's Housing Crisis: Ending Financial Repression" (Cato Institute, November 2023), https://www.cato.org/blog/anatomy-chinas-housing-crisis-ending-financial-repression.
61. Sarah Chan, "Financial Repression and Financial Risk: The Case of China," *Post-Communist Economies* 33, July 2020, 119–132, https://www.tandfonline.com/doi/full/10.1080/14631377.2020.1833554.
62. Anthony Goerzen, "Varieties of Capitalism: An Interview with 2025 AIB John Fayerweather Eminent Scholar Peter Hall" (interview, Academy of International Business, April 2025), https://insights.aib.world/article/136474-varieties-of-capitalism-an-interview-with-2025-aib-john-fayerweather-eminent-scholar-peter-hall.
63. Oren Cass, "The Rise of Wall Street and the Fall of American Investment," *American Compass*, March 2021, https://americancompass.org/speculating-wall-street-investment/.
64. Sohrab Ahmari, *Tyranny, Inc: How Private Power Crushed American Liberty—And What To Do About It* (New York: Forum Books, 2023).
65. Malcolm Sawyer and Jonathan Michie, *Capitalism: An Unsustainable Future?* (London: Routledge, 2022).
66. "Rethinking Capitalism: Join the Module," UCL Bartlett Faculty of the Built Environment, October 21, 2025, accessed March 13, 2026, https://www.ucl.ac.uk/bartlett/news/2025/oct/rethinking-capitalism-join-module.
67. Felicia Wong, "The Emerging Worldview: How New Progressivism Is Moving Beyond Neoliberalism" (The Roosevelt Institute, January 2020), https://rooseveltinstitute.org/wp-content/uploads/2020/07/RI_EmergingWorldview_report-202001-1.pdf.
68. David J. Teece, Gary Pisano, and Amy Shuen. "Dynamic Capabilities and Strategic Management," *Strategic Management Journal* 18, no. 7 (1997): 509–33. http://www.jstor.org/stable/3088148.
69. Suzanne Clark, "The 2026 State of American Business: 'A Year for Choosing'," public address, US Chamber of Commerce, January 2026, https://www.uschamber.com/about/suzanne-clarks-2026-state-of-american-business-remarks.
70. Teece, op. cit.
71. "Nationalist Capitalism: Where Profit Meets Patriotism," *Voices of Capitalism*, accessed March 2026, https://voicesofcapitalism.com/nationalist-capitalism/; Rebecca Henderson, *Reimagining Capitalism in a World on Fire* (New York: PublicAffairs, 2021).
72. Santi Ruiz, "Did the CHIPS 'Everything Bagel'…Work?" Statecraft, December 2025, https://www.statecraft.pub/p/did-the-chips-everything-bagelwork.
73. Abir Mandal, "State Corporate Income Tax Rates and Brackets, 2026," Tax Foundation, January 2026, https://taxfoundation.org/data/all/state/state-corporate-income-tax-rates-brackets/.
74. Aswath Damodaran, "Dividends and Taxes: An Analysis of the Bush Dividend Tax Plan," working paper, Stern School of Business, New York University, New York, March 2003, http://pages.stern.nyu.edu/~adamodar/pdfiles/papers/divtaxes.pdf.

75. Robert D. Atkinson, "The Case for Improving America's Research and Experimentation Tax Credit" (The Hill, May 2021), https://itif.org/publications/2021/05/28/case-improving-americas-research-and-experimentation-tax-credit/.
63. John Lester and Jacek Warda, "Enhanced Tax Incentives for R&D Would Make Americans Richer" (ITIF, September 2020), https://itif.org/publications/2020/09/08/enhanced-tax-incentives-rd-would-make-americans-richer/.
76. Rob Atkinson and Michael Lund, *Big Is Beautiful* (MIT Press, January 2018).
77. Corey Husak, "7 Ways the Big Beautiful Bill Cuts Taxes for the Rich" (Center for American Progress, November 2025), https://www.americanprogress.org/article/7-ways-the-big-beautiful-bill-cuts-taxes-for-the-rich/.
78. Adam Lashinsky, "Jamie Dimon slips on a New Cap for the Trump Era," *The Washington Post,* January 2026, https://www.washingtonpost.com/opinions/2026/01/06/jpmorgan-chase-jamie-dimon-resiliency-fund-social-investing/.
79. "We Are Impact Venture Capital Investors," DBL Partners, accessed March 2026, https://www.dbl.vc/.
80. Raff et al., "Deep Tech?"
81. Christian Baha, "Trump Threatens Ending Business with Raytheon," *Baha Breaking News*, January 2026, https://breakingthenews.net/Article/Trump-threatens-ending-business-with-Raytheon/65441918.
82. In 1996, the Wallenberg family's investor fund owned 4 percent of Ericsson but controlled 39 percent of stock. In general, in Sweden, the control multiplier in 2000 was 22 (class stocks having 22 times more voting rights than class b); David Bartal, *The Empire: The Rise of the House of Wallenberg* (1996), 11.
83. Ibid., 9.
84. Ibid., 170.
85. Ibid., 176.
86. "We Believe the World's Best Hope for a Brighter Future Lies in a Strong America," America's Frontier Fund, accessed March 2026, https://americasfrontier.webflow.io/about.
87. "JPMorganChase Launches $1.5 Trillion Security and Resiliency Initiative to Boost Critical Industries," news release, October 13, 2025, https://www.jpmorganchase.com/newsroom/press-releases/2025/jpmc-security-resiliency-initiative.
88. William Lazonick, *Investing in Innovation* (Cambridge: Cambridge University Press, 2023).
89. Ibid.
90. Ibid., 67.
91. David Bonfili and Frank Finelli, "How Capital Markets Can Revive the Defense Industrial Base," *The National Interest*, July 2025, https://nationalinterest.org/feature/how-capital-markets-can-revive-the-defense-industrial-base.
92. Chris Coons, "Sen. Coons, Colleagues Seek To Create New Domestic Manufacturing Investment Corporation," news release, August 21, 2021, https://www.coons.senate.gov/news/press-releases/sen-coons-colleagues-seek-to-create-new-domestic-manufacturing-investment-corporation/.

Notes for Mobilizing for Techno-Economic War, Part 4: Transforming Education and Workforce Policy

1. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
2. Ibid.
3. Robert D. Atkinson, "Mobilizing for Techno-Economic War, Part 3: Transforming Financial Capitalism Into National Power Capitalism" (ITIF, April 2026), https://itif.org/publications/2026/04/13/mobilizing-for-techno-economic-war-part-3-national-power-capitalism/.
4. This section builds off prior work for ITIF by Tim McDonald and Ted Kolderie. Tim McDonald and Ted Kolderie, "The Role of Information Technology in Creating New Kinds of American High Schools" (ITIF, July 2009), https://itif.org/publications/2009/07/16/role-information-technology-creating-new-kinds-american-high-schools/.
5. C. Kirabo Jackson et al., "The Effects of School Spending on Education and Economic Outcomes: Evidence from School Finance Reforms" (working paper 20847, National Bureau of Economic Research, Cambridge, Massachusetts), https://www.nber.org/system/files/working_papers/w20847/w20847.pdf; Catrin Wigfall, "Study Finds Weak Relationship Between Spending and Academic Outcomes," *American Experiment*, November 2025, https://www.americanexperiment.org/study-finds-weak-relationship-between-spending-and-academic-outcomes/
6. Florence Khitsane, "Homework Statistics 2026: Trends, Time Spent, and Learning Impact," *Brighterly*, January 2026), https://brighterly.com/blog/homework-statistics/.
7. Emma Kate Fittes, "Student Engagement in Learning Is Low. A Survey Offers Clues on How to Bring Them Back," EdWeek Market Brief, October 2024, https://marketbrief.edweek.org/meeting-district-needs/student-engagement-in-learning-is-low-a-survey-offers-clues-on-how-to-bring-them-back/2024/10.
8. Ibid.
9. The Nobel Prize (@NobelPrize), "Right now I think too much of our education is focused on memorising facts and not enough on the exploratory process of science," said 2006 medicine laureate Craig Mello…" X, February 3, 2026, https://x.com/NobelPrize/status/2018699526614196293.
10. "Learn You Way," https://learnyourway.withgoogle.com/.
11. "Credit Requirements for High School Graduation in Maryland for Students Who Entered 9th Grade in SY2021-2022 or Thereafter," Maryland State Department of Education, https://marylandpublicschools.org/about/Documents/DSFSS/SSSP/SchoolCounseling/HSGradCreditRequirements_2021Thereafter.pdf.
12. Rena F. Subotnik et al., "Study of the Impact of Selective SMT High Schools: Reflections on Learners Gifted and Motivated in Science and Mathematics" (paper presented at the National Research Council's Workshop on Successful STEM Education in K–12 Schools, Washington DC, May 10–12, 2011), https://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse_072643.pdf.

13. "Welcome to Successful STEM Education," Successful STEM Education, accessed February 2026, https://successfulstemeducation.org/index.php/. Just one example of what must be hundreds of initiatives.
14. Anna Aldric, "Average SAT Scores Over Time: 1972-2024," PrepScholar, https://blog.prepscholar.com/average-sat-scores-over-time.
15. National Center for Education Statistics (Table 318.45, Number and percentage distribution of science, technology, engineering, and mathematics (STEM) degrees/certificates conferred by postsecondary institutions, by race/ethnicity, level of degree/certificate, and sex of student: Academic years 2012–2013 through 2021–2022), accessed February 9, 2026, https://nces.ed.gov/programs/digest/d23/tables/dt23_318.45.asp.
16. "CAT Program Progression," Lakewood High School, accessed February 9, 2026, https://resources.finalsite.net/images/v1760123420/pcsborg/w6i496lpctrisxmzjvsd/catprogramprogression.pdf.
17. "Home," ASMSA Course Catalog, accessed February 6, 2026, https://catalog.asmsa.org/home.
18. "Research," South Carolina Governor's School for Science and Mathematics, accessed February 2026, https://www.scgssm.org/research.
19. National Research Council, *Successful STEM Education: A Workshop Summary* (Washington DC: The National Academies Press).
20. Subotnik et al., "Study of the Impact of Selective SMT High Schools: Reflections on Learners Gifted and Motivated in Science and Mathematics."
21. Jessica Winter, "New York City's Gifted Problem," *The New Yorker,* February 2026, https://www.newyorker.com/news/the-lede/new-york-citys-gifted-problem.
22. "Maker Space and Machinery (Fabrication Lab)" (DC Public Library: Using the Library), https://www.dclibrary.org/using-the-library/maker-space-and-machinery-fabrication-lab.
23. "Educating Tomorrow's Workforce" (Stem+M), https://stem-m.com/.
24. See "Engineering by Design (ITEEA), https://www.iteea.org/engineering-bydesign and also "Workforce Development for K-12" (Milestone C) https://www.milestonec.com/.
25. Annabelle Smith, "Futuristic factory floors, robotic arms and very different type of lessons: The rise of school trips to factories and 'classrooms on the factory floor' in China," *The Daily Mail,* February 2026, https://www.dailymail.co.uk/news/article-15506523/Futuristic-factory-floors-robotic-arms-different-type-lessons-rise-school-trips-factories-classrooms-factory-floor-China.html.
26. "The Cardinal Story" (Cardinal Manufacturing) https://www.cardinalmanufacturing.org/.
27. Michael Lind, "Why bad jobs are the root of America's problems," *The Spectator*, May 1, 2023, https://spectator.com/article/why-bad-jobs-are-the-root-of-americas-problems/.
28. Elizabeth Redden, "41% of Recent Grads Work in Jobs Not Requiring a Degree," *Inside Higher Ed*, February 2020, https://www.insidehighered.com/quicktakes/2020/02/18/41-recent-grads-work-jobs-not-requiring-degree.
29. Michael Lind, "Who Should Pay for College?" *Tablet*, June 2021, https://www.tabletmag.com/sections/news/articles/hamburger-college-michael-lind.
30. Based on the American Academy of Arts and Sciences' *Humanities Indicators* project, which estimated that there were 5.6 million undergraduate enrollments in humanities courses across U.S. institutions in the Fall 2023 semester.
31. This is a very rough estimate based 700,000 undergraduate engineering students enrolled at any given time and engineering undergrads typically carrying four courses per semester. That yields roughly 6 million undergraduate engineering course-seat registrations per year.

32. Kevin Gray, "The Gap in Perceptions of New Grads' Competency Proficiency and Resources to Shrink It" (National Academy of Colleges and Employers, January 2025), https://www.naceweb.org/career-readiness/competencies/the-gap-in-perceptions-of-new-grads-competency-proficiency-and-resources-to-shrink-it.
33. "Specialized STEM Secondary Schools," National Science Foundation, 2011, https://successfulstemeducation.org/resources/specialized-stem-secondary-schools.
34. Thomas K. Lindsay, "Combating the 'Other' Inflation: Arresting the Cancer of College Grade Inflation" (Texas Public Policy Foundation, August 2014), https://www.texaspolicy.com/wp-content/uploads/2018/08/2014-08-RR04-GradeInflation-CHE-TomLindsay-post.pdf.
35. Philip S. Babcock and Mindy Marks, "The Falling Time Cost of College Evidence From Half a Century of Time Use Data" (working paper 15954, National Bureau of Economic Research, Cambridge, Massachusetts), https://www.nber.org/system/files/working_papers/w15954/w15954.pdf.
36. Richard Arum and Josipa Roksa, "Your So-Called Education," *The New York Times*, May 2011, http://www.nytimes.com/2011/05/15/opinion/15arum.html.
37. National Center for Education Statistics, National Assessment of Adult Literacy (Prose literacy by education attainment: 2003), accessed February 2026, https://nces.ed.gov/naal/kf_dem_edu.asp.
38. Richard Arum and Josipa Roksa, *Academically Adrift: Limited Learning on College Campuses* (Chicago: University of Chicago Press, 2011).
39. Paul Fain, "A Troubling Lack of Skills in Literacy and Numeracy" (Open Campus, June 2021), https://www.opencampus.org/2021/06/10/a-troubling-lack-of-skills-in-literacy-and-numeracy/.
40. Doug Lederman, "Graduated by Not Literate," *Inside Higher Ed*, December 2005, https://www.insidehighered.com/news/2005/12/16/graduated-not-literate.
41. American Institutes for Research, "New Study of the Literacy of College Students Finds Some Are Graduating With Only Basic Skills" (news release, January 2006), https://www.air.org/news/press-release/new-study-literacy-college-students-finds-some-are-graduating-only-basic-skills.
42. Laura L. Behling, "Liberal Arts Colleges and the Spellings Commission: Carpe Diem," Wabash, November 2006, https://www.wabash.edu/news/story/4079.
43. Cengage Group, "Cengage Group's 2025 Employability Report Reveals Growing Gap Between Education and Employment" (news release, September 2025), https://www.cengagegroup.com/news/press-releases/2025/cengage-group-2025-employability-report/.
44. "Academic Fraud at UNC" (The Drake Group Education Fund), accessed February 2026, https://www.thedrakegroupeducationfund.org/2022/06/17/academic-fraud-at-unc/.
45. "The State of Skills-Based Hiring 2025" (Test Gorilla), https://www.testgorilla.com/skills-based-hiring/state-of-skills-based-hiring-2025/#sbhr-section-container-0.
46. The Interview Guys, "The State of Skills-Based Hiring in 2025: 85% of Companies Claim It, But Only 1 in 700 Hires Are Actually Affected – A Comprehensive Research Report," *The Interview Guys blog*, December 2025, https://blog.theinterviewguys.com/the-state-of-skills-based-hiring/.
47. Ibid.
48. Vince Haley, Assistant to the President for Domestic Policy Charles Ezell, Acting Director, U.S. Office of Personnel Management, "Merit Hiring Plan" (US Office of Personnel management Memorandum, May 2025), https://www.opm.gov/chcoc/latest-memos/merit-hiring-plan.pdf.
49. "National Survey of Student Engagement" (Center for Postsecondary Research, Indiana University School of Education), accessed February 2026, https://nsse.indiana.edu/nsse/index.html.
50. Melanie Hanson, "College Enrollment & Student Demographic Statistics" (Education Data Initiative, March 2025), https://educationdata.org/college-enrollment-statistics.

51. Cengage Group, "Cengage Group's 2025 Employability Report Reveals Growing Gap Between Education and Employment."
52. "Value and Impact," Polytechnics Canada, accessed February 2026, https://polytechnicscanada.ca/.
53. "Out Members," Polytechnics Canada, accessed February 2026, https://polytechnicscanada.ca/polytechnic-education/our-members/.
54 "Polytechnics and the Future of Work," Polytechnics Canada, accessed February 2026, https://polytechnicscanada.ca/resources/best-practices/polytechnics-the-future-of-work/.
55. Siska Lyssens and Deon Foster, "5 Ways President John Hannah Transformed MSU," *MSU Today*, October 2025, https://msutoday.msu.edu/news/2025/10/5-ways-john-hannah-transformed-msu.
56. "Academic Programs Catalog," Michigan State University, accessed February 2026, https://reg.msu.edu/academicprograms/Print.aspx?Section=110; "Majors at U-M Plus Academic Programs & Fields of Study," College Factual, accessed February 2026, https://www.collegefactual.com/colleges/university-of-michigan-ann-arbor/academic-life/academic-majors/.
57. U.S. Department of Agriculture, National Institute of Food and Agriculture, "History," accessed February 2026, https://www.nifa.usda.gov/about-nifa/who-we-are/history.
58. A second Morrill Act was passed in 1890, aimed at the former Confederate states; "Confederate States of America," *Wikipedia*, last modified February 9, 2026, https://en.wikipedia.org/wiki/Confederate_States_of_America.
59. "SUNY Maritime College," accessed February 2026, https://www.sunymaritime.edu/.
60. "Kettering University," accessed February 2026, https://www.kettering.edu/.
61. Jasmine Leonas, "Colorado School of Mines Named Career Connected Campus," *Mines Newsroom*, November 2024, https://www.minesnewsroom.com/news/colorado-school-mines-named-career-connected-campus.
62. "2010 Eligibility Requirements and Standards," Northwest Commission on Colleges and Universities, https://nwccu.app.box.com/s/yswh4gnmwqsw8j8xdlqf40rc5vomfe60.
63. Department of Education "Intent To Establish Negotiated Rulemaking Committee" (proposed rule by Department of Education, 34 CFR Chapter VI, January 2026), https://www.federalregister.gov/documents/2026/01/27/2026-01620/intent-to-establish-negotiated-rulemaking-committee.
64. "China Policy leads: Analysis," Substack, chinapolicy+briefs@substack.com, https://chinapolicy.substack.com/s/briefs?utm_source=substack&utm_medium=menu.
65. Edward Dutton and Richard Lynn, "Intelligence and Religious and Political Differences Among Members of the U.S. Academic Elite," *Interdisciplinary Journal of Research on Religion* (Vol 10, 2014, Article 1), https://ijrr.web.baylor.edu/sites/g/files/ecbvkj2171/files/2026-03/ijrr10001.pdf.
66. Brian Wang, "Public health and nutrition determines a lot of per capita IQ which determines a lot of per capita GDP" (Next Big Future, March 2011), https://www.nextbigfuture.com/2011/03/iq-correlation-with-per-capita-gdp-and.html.
67. Garett Jones and W. Joel Schneider, "Intelligence, Human Capital, and Economic Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach," *Journal of Economic Growth,* March 2006, https://mason.gmu.edu/~gjonesb/JonesSchneIQ.
68. R. W. Hafer, "New Estimates on the Relationship Between IQ, Economic Growth and Welfare," *Intelligence* (vol. 61, 2017), 92–101, https://www.sciencedirect.com/science/article/abs/pii/S016028961630318X.

69. Ashirafu Shekoloa, "Are the Wealthiest Countries the Smartest Countries?" (Association for Psychological Science, March 2011), https://www.sciencedirect.com/science/article/abs/pii/S016028961630318X.
70. Clarence D. Kreiter et al., "Investigating the Relationship Between National Wealth and National IQ" (working paper, January 2026), https://www.preprints.org/frontend/manuscript/18cec2d9827e40a74e89202c603d6e3b/download_pub.
71. "Hive Mind: How Your Nation's IQ Matters So Much More Than Your Own. Interview with Garett Jones," *Institut Ostrom,* September 2018, https://www.institutostrom.org/en/2018/09/09/hive-mind-how-your-nations-iq-matters-so-much-more-than-your-own-interview-with-garett-jones/.
72. Richard E. Dickerson, "Exponential Correlation of IQ and the Wealth of Nations," *Intelligence* (vol. 34, no. 3, 2006) 291–295, https://www.sciencedirect.com/science/article/abs/pii/S0160289605001078.
73. "About NAGC," National Association for Gifted Children, accessed February 2026, https://www.nagc.org/.
74. David Card et al., "Can Gifted Education Help Higher-Ability Boys From Disadvantaged Backgrounds?" (working paper 33282, National Bureau of Economic Research, Cambridge, Massachusetts), https://www.nber.org/papers/w33282.
75. Ministry of Education Singapore, "Gifted Education Programme," last modified January 2026, https://www.moe.gov.sg/education-in-sg/our-programmes/gifted-education.
76. "Grants for Gifted Students" (Davidson Institute, June 2024), https://www.davidsongifted.org/gifted-blog/grants-for-gifted-students/.
77. Lee Euna, "There Are Eight Gifted Schools (Gifted High School) Nationwide That Were Established…" *Maeil Business Newspaper,* October 2025, https://www.mk.co.kr/en/columnists/11443008.
78. Naureen Ghani, "The South Korean Elite: Teaching and Learning at Seoul Science High School" (PLOS Blogs, January 2018), https://ecrcommunity.plos.org/2018/01/30/the-south-korean-elite-teaching-and-learning-at-seoul-science-high-school/.
79. Kyle Chan (@kyleichan), "I can already tell this will be one of the best articles I read for all of 2026…" X, January 31, 2026, https://x.com/kyleichan/status/2017808015945064542?s=51.
80. Michael Griffith, "Do We Really Need to Fund Gifted Programs?" (Education Commission of the States, May 2016), https://www.ecs.org/do-we-really-need-to-fund-gifted-programs/.
81. Ibid.
82. Scott J. Peters et al., "Gifted Education Advances School Integration and Equity" (Kappan, October 2023), https://kappanonline.org/gifted-education-integration-equity-peters-makel-carter/.
83. Applicants must meet at least three of these qualifications: nationally or internationally recognized prizes/awards for excellence; membership in associations that require outstanding achievements; published material about you in professional or major trade publications; participation as a judge of the work of others in your field; original scientific, scholarly, or business-related contributions of major significance; authorship of scholarly articles in professional journals or major media; employment in a critical or essential capacity for organizations with a distinguished reputation; or a high salary or other remuneration for services.

Notes for Mobilizing for Techno-Economic War, Part 5: Transforming STEM Research Policy

1. Robert Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
2. Ibid.
3. Corelli Barnett, *The Collapse of British Power* (London: Faber, 1972), 85.
4. Vannevar Bush, *Science, the Endless Frontier: A Report to the President on a Program for Postwar Scientific Research* (Washington, DC: United States Government Printing Office, 1945), https://nsf-gov-resources.nsf.gov/2023-04/EndlessFrontier75th_w.pdf.
5. Stephen Kline, "Innovation Is Not A Linear Process" (Taylor & Francis, Vol 28., No 4, August 1985), https://www.jstor.org/stable/24120799.
6. Bush, *Science, the Endless Frontier.*
7. Ibid.
8. Greta Krippner, "The financialization of the American economy" (Socio-Economic review, Vol 3, 2005), https://www.depfe.unam.mx/actividades/10/financiarizacion/i-7-KrippnerGreta.pdf.
9. National Center for Science and Engineering Statistics (Table 2; accessed January 2026), https://ncses.nsf.gov/surveys/federal-funds-research-development/2023-2024#data.
10. Catherine Manning, "Technology Readiness Levels" (NASA, September 2023), https://www.nasa.gov/directorates/somd/space-communications-navigation-program/technology-readiness-levels/.
11. Mark Funk, "Basic Research and International Spillovers," *International Review of Applied Economics*, 2002, 16(2), 217–226, https://doi.org/10.1080/02692170110118911; David Coe and Elhanan Helpman, "International R&D Spillovers" (NBER, working paper 4444, August 1993), https://www.nber.org/papers/w4444.
12. IMF, "Research and Innovation: Fighting the Pandemic and Boosting Long-Term Growth," in *World Economic Outlook: Recovery During A Pandemic* (IMF, October 2021), https://www.imf.org/-/media/files/publications/weo/2021/october/english/ch3.pdf.
13. IMF, World Economic Outlook (IMF, February 2026), https://www.imf.org/en/publications/weo.
14. Paul Davidson, "Why China is beating the U.S. at innovation," *USA Today*, April 2017, https://www.usatoday.com/story/money/2017/04/17/why-china-beating-us-innovation/100016138/.
15. The China National Knowledge Infrastructure (CNKI) was launched in 1996 as a state-backed project run out of Tsinghua University. It is a key national information project led by Tsinghua University, first launched in 1996 in conjunction with the Tsinghua Tongfang Company. Domestically, it has a near-total monopoly on academic literature in China—CNKI hosts an estimated 95 percent of all academic literature written in Chinese, along with government reports and yearbooks containing key statistical datasets covering national defense, industry, telecoms, transport, natural resources, healthcare, and finance.

    Maryann Feldman, "The ex ante assessment of knowledge spillovers: Government R&D policy, economic incentives and private firm behavior" (Science Direct, research Policy Vol 35., Iss 10., December 2006), https://www.sciencedirect.com/science/article/abs/pii/S0048733306001545.

    But the more strategically interesting dimension is its outward reach. CNKI EXPRESS 2.0 describes itself as providing "one-click access to over 300 million literature from more than 600 international

publishing houses in 65 countries and regions" and aims to be a "unified discovery platform for literature in Chinese and other languages." The explicit ambition is to aggregate global science into a single domestically controlled platform accessible to all Chinese researchers.

Di Mao and Jiakeng Chen, "Does the university knowledge spillover promote common prosperity? Empirical evidence from China" (Humanities and Social Sciences Communications, Vol 12., No 532., April 2025), https://www.nature.com/articles/s41599-025-04858-0.

The asymmetry is stark: in March 2023, CNKI announced it would terminate access for universities and research institutions outside mainland China. China was simultaneously expanding its intake of global scientific knowledge through CNKI while cutting off foreign researchers' access to Chinese academic output. Dozens of research universities and institutions in the United States, Taiwan, and Hong Kong—including Georgetown and Notre Dame—were cut off from CNKI's database of statistical and academic publications.

Xiaohong Han and Hua Feng, "The impact of foreign R&D on the innovation performance of China's high-tech industry and its spatial spillover effect" (National Library of Medicine, March 2023), https://pmc.ncbi.nlm.nih.gov/articles/PMC10019641/.

16. Organization for Economic Cooperation and Development (Government budget allocations for R&D by socio-economic objectives), accessed November 14, 2025, https://data-explorer.oecd.org/vis?fs[0]=Topic%2C1%7CScience%252C%20technology%20and%20innovation%23INT%23%7CResearch%20and%20development%20%28R%26D%29%23INT_RD%23&pg=0&fc=Topic&bp=true&snb=9&vw=tb&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_RDS_GOV%40DF_GBARD_NABS07&df[ag]=OECD.STI.STP&df[vs]=1.0&dq=.A..BFTR%2BKF%2BNABS14%2B_T...USD_PPP.Q&pd=2015%2C&to[TIME_PERIOD]=false.
17. Science and Engineering Indicators, "Academic R&D" (Discovery: R&D Activity and Research Publications), https://ncses.nsf.gov/pubs/nsb20257/academic-r-d.
18. Peng Zhang, "China's plan for the next five years (2026–2030)—technology," *Geopolitechs*, October 28, 2025, https://www.geopolitechs.org/p/cpc-central-committees-proposal-for.
19. Ibid.
20. National Natural Science Foundation of China, "Organizational Structure (组织结构)" (NSFC, accessed April 2025), https://www.nsfc.gov.cn/publish/portal0/jgsz/01/.
21. National Center for Science and Engineering Statistics, "Long-Term Trends Show Decline in Federally Funded R&D as a Share of GDP while Business-Funded R&D Share Increases," April 24, 2025, https://ncses.nsf.gov/pubs/nsf25334.
22. The National Science Foundation's Engineering Directorate accounts for less than 10 percent of the NSF budget.
23. National Institutes for Standards and Technology, "President's FY 1996 Budget Seeks More Than $1 Billion For Technology Administration" (NIST, February 1995), https://www.nist.gov/news-events/news/1995/02/presidents-fy-1996-budget-seeks-more-1-billion-technology-administration; "FY2025 National Institute of Standards and Technology" (American Institute of Physics, April 2025), https://www.aip.org/fyi/fy2025-nist-budget-and-appropriations; Federal Reserve Bank of St. Louis (Gross Domestic Product, February 2026), https://fred.stlouisfed.org/series/GDP#; Author's calculations.
24. Robert Atkinson, "The Case for Policy Transformation to Avoid Losing the Techno-Economic-Trade War With China" (ITIF, February 2026), https://itif.org/publications/2026/02/02/case-for-policy-transformation-avoid-losing-techno-economic-trade-war-with-china/.
25. Robert D. Atkinson, et al., "Slowing China's Advance to Avoid Losing the Techno-Economic-Trade War" (ITIF, March 2026), in *National Power Industry Series*, https://itif.org/power-industries/.

26. Keith Bradsher, "How China Built Tech Prowess: Chemistry Classes and Research Labs," *The New York Times,* August 2024, https://www.nytimes.com/2024/08/09/business/china-ev-battery-tech.html.
27. "About KERI," https://www.keri.re.kr/html/en/sub01/sub01_0103.html.
28. Emily Weinstein et al., "China's State key Laboratory System: A View into China's Innovation System" (Center for Security and Emerging technology, June 2022), https://cset.georgetown.edu/publication/chinas-state-key-laboratory-system/.
29. Ibid.
30. "About Us" (State key Laboratory of Physical Chemistry of Solid Surfaces, Xiamen University, September 2023), https://pcoss.xmu.edu.cn/en/About_Us2/Introduction.htm.
31. "NSF announces new initiative to launch and scale a new generation of transformative independent research organizations to advance breakthrough science" (NSF, December 2025), https://www.nsf.gov/news/nsf-announces-new-initiative-launch-scale-new-generation.
32. Andrew Gerard, "NSF Tech Labs FAQs" (Macroscience, January 2026), https://www.macroscience.org/p/nsf-tech-labs-faqs.
33. "Technology Readiness Levels (TRLs): Are You at the Right Stage for Funding?" (Grantify, May 2025), https://www.grantify.io/us-articles/technology-readiness-levels-trls-explained.
34. National Academies of Sciences, Engineering, and Medicine, *U.S. Army Futures Command Research Program Realignment, 2022,* (Washington, DC: The National Academies Press, 2022), https://doi.org/10.17226/3024.
35. "To Do: Establish an Advanced Research Projects Agency for Competitiveness (ARPA–C)" (ITIF, February 2025), https://itif.org/publications/2024/09/16/to-do-establish-an-advanced-research-projects-agency-for-competitiveness-arpa-c/.
36. For example, the Chinese government has supported research universities that are focused on a few narrow technology areas, such as robotics, but do so at enormous depth.
37. Many other nations have national research institutes dedicated to precompetitive commercial technology development, which domestic firms can then commercialize to gain global advantage. The United States has the National Institute of Standards and Technology (NIST), but it focuses on metrology (the science of weights and measures). As such, the United States needs to establish at least one, but ideally five, national industrial research institutes focused on technologies referred to as the "middle technology readiness Level," beyond what universities work on and earlier than most companies work on. They can be modelled after Taiwan's Industrial Technology Research Institute. Robert Atkinson, "China is Rapidly Becoming a Leading Innovator in Advanced Industries" (ITIF, September 2024), https://itif.org/publications/2024/09/16/china-is-rapidly-becoming-a-leading-innovator-in-advanced-industries/.
38. Christine Mui, "'Semiconductor slush fund': How the Trump admin seized control of Biden's $7.4 billion chips initiative" (Politico, September 2025), https://www.politico.com/news/2025/09/30/lutnick-natcast-chips-biden-00576779.
39. David M. Hart, Stephen J. Ezell, and Robert D. Atkinson, "Why America Needs a National Network for Manufacturing Innovation" (ITIF, December 2012), https://itif.org/publications/2012/12/11/why-america-needs-national-network-manufacturing-innovation.
40. "To Do: Establish an Advanced Research Projects Agency for Competitiveness (ARPA–C)" (ITIF, February 2025), https://itif.org/publications/2024/09/16/to-do-establish-an-advanced-research-projects-agency-for-competitiveness-arpa-c/.
41. "Olin College of Engineering," https://www.olin.edu/.
42. "Kettering University," https://www.kettering.edu/.

43. Roslyn Layton, "What the U.S. Can Learn From Denmark's Industrial PhD Program" (ITIF, November 20, 2013), https://itif.org/publications/2013/11/20/what-us-can-learn-denmarks-industrial-phd-program/.
44. "Industrial PhD" (Innovation Fund Denmark, January 2023), https://innovationsfonden.dk/sites/default/files/2024-04/21.03.2023%20Guidelines%20Industrial%20PhD.pdf.
45. U.S. Department of Energy, "Genesis Mission," accessed March 18, 2026, https://www.energy.gov/genesis-mission.
46. Stefano Bianchini et al., "Artificial Intelligence in Science: Promises or Perils for Creativity?," European Commission, Directorate-General for Research and Innovation (Publications Office of the European Union, 2025), https://data.europa.eu/doi/10.2777/6693925.
47. American Association of Colleges and Universities, American Association of Colleges for Teacher Education, American Association of Veterinary Medical Colleges, American Council on Education, Association of Governing Boards of Universities and Colleges, Association of Jesuit Colleges and Universities, College and University Professional Association for Human Resources, Council for Christian Colleges & Universities, Council of Graduate Schools, Council of Independent Colleges, Council on Social Work Education, EDUCAUSE, National Association for College Admission Counseling, National Association of College and University Business Officers, National Association of Independent Colleges and Universities, and National Council of University Research Administrator.
48. Ted Mitchell, "Letter to Michael Kratsios on Docket ID number OSTP-TECH-2025-0100; Request for Information on Accelerating the American Scientific Enterprise" (American Council on Education, December 2025), https://www.acenet.edu/Documents/Letter-OSTP-Scientific-Enterprise-RFI-122225.pdf.
49. Jennifer Washburn, *University, Inc.: The Corporate Corruption of Higher Education* (New York: Basic Books, 2006).
50. Denis O. Gray and S. George Walters, *Managing the Industry/University Cooperative Research Center* (Columbus, OH: Battelle Press, 1998), http://www.ncsu.edu/iucrc/PDFs/PurpleBook/FrontSection.pdf.
51. Donald E. Stokes, *Pasteur's Quadrant: Basic Science and Technological Innovation* (Washington DC: Brookings Institution Press, 1997).

Notes for Mobilizing for Techno-Economic War, Part 6: Transforming Free Trade Agreements Into Strategic China-Defense Partnerships

1. Charles Krauthammer, "The Unipolar Moment," *Foreign Affairs* 70, no. 1 (1990/91): 23–33, https://www.foreignaffairs.com/articles/1990-01-01/unipolar-moment.
2. Francis Fukuyama, "The End of History?" *The National Interest*, no. 16 (Summer 1989): 3–18, https://www.jstor.org/stable/24027184.
3. Robert D. Atkinson and Stephen J. Ezell, *False Promises: The Yawning Gap Between China's WTO Commitments and Practices* (Information Technology and Innovation Foundation, September 17, 2015), https://itif.org/publications/2015/09/17/false-promises-yawning-gap-between-chinas-wto-commitments-and-practices/.
4. Eric O'N. Fisher, review of *Against the Tide: An Intellectual History of Free Trade*, by Douglas A. Irwin, Review of International Economics 6, no. 2 (May 1998): 340–342, https://www.researchgate.net/publication/41752953_Review_of_Against_the_Tide_An_Intellectual_History_of_Free_Trade.

5. Kevin Granville, "The Trans-Pacific Partnership Trade Deal Explained," *The New York Times*, July 26, 2016, https://www.nytimes.com/interactive/2016/business/tpp-explained-what-is-trans-pacific-partnership.html.
6. Robert D. Atkinson et al., "Mobilizing for Techno-Economic War, Part 2: Slowing China's Advance" (Information Technology and Innovation Foundation, March 30, 2026), https://itif.org/publications/2026/03/30/mobilizing-for-techno-economic-war-part-2-slowing-chinas-advance/.
7. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (Information Technology and Innovation Foundation, November 17, 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
8. David Shambaugh, *Breaking the Engagement: How China Won and Lost America* (New York: Oxford University Press, 2025), https://global.oup.com/academic/product/breaking-the-engagement-9780197792421.
9. Office of the United States Trade Representative, *2025 Report to Congress on China's WTO Compliance* (Washington, D.C.: Office of the United States Trade Representative, 2026), https://ustr.gov/sites/default/files/files/Countries%20and%20Regions/China%2C%20Mongolia%20%26%20Taiwan/2025%20USTR%20Report%20to%20Congress%20on%20China's%20WTO%20Compliance%20(Final%202025).pdf.
10. Scott Bessent, "Remarks from Secretary of the Treasury Scott Bessent at The Economic Club of New York's America 250 Gala Dinner: American Economic Statecraft in the 21st Century," June 23, 2026, https://home.treasury.gov/news/press-releases/sb0539.
11 The U.S. Constitution entered force on March 4, 1789.
12. Penn Wharton Budget Model, "Effective Tariff Rates and Revenues (Updated February 23, 2026)," University of Pennsylvania, February 23, 2026, https://budgetmodel.wharton.upenn.edu/p/2026-02-23-effective-tariff-rates-and-revenues-updated-february-23-2026/.
13. Robert D. Atkinson, "How 'National Developmentalism' Built America," *The American Conservative*, March 9, 2023, https://www.theamericanconservative.com/how-national-developmentalism-built-america/.
14. Charles Krauthammer, "The Unipolar Moment."
15. Katelynn Harris, "Forty Years of Falling Manufacturing Employment," *Beyond the Numbers* 9, no. 16 (U.S. Bureau of Labor Statistics, November 2020), https://www.bls.gov/opub/btn/volume-9/forty-years-of-falling-manufacturing-employment.htm.
16. William J. Clinton, "Remarks by the President on China," Johns Hopkins University, Washington, D.C., March 8, 2000, https://clintonwhitehouse6.archives.gov/2000/03/2000-03-08-remarks-of-the-president-on-china.html.
17. William J. Clinton, "Remarks by President Clinton, President Ford, President Carter, President Bush, and Vice President Gore on the North American Free Trade Agreement," Washington, D.C., September 14, 1993, https://clintonwhitehouse6.archives.gov/1993/09/1993-09-14-remarks-by-clinton-and-former-presidents-on-nafta.html.
18. World Trade Organization, "Principles of the Trading System," in *Understanding the WTO*, https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact2_e.htm.
19. Robert D. Atkinson and Michael Lind, "National Developmentalism: From Forgotten Tradition to New Consensus," *American Affairs* 3, no. 2 (Summer 2019), https://americanaffairsjournal.org/2019/05/national-developmentalism-from-forgotten-tradition-to-new-consensus/; Robert D. Atkinson, *National Developmentalism: The Alternative to Neoliberalism and Neo-New Dealism* (Information Technology and Innovation Foundation, January 22, 2024),

https://itif.org/publications/2024/01/22/national-developmentalism-the-alternative-to-neoliberalism-and-neo-new-dealism/.

20. Robert D. Atkinson, *Mobilizing for Techno-Economic War, Part 1: The Case for Policy Transformation* (Information Technology and Innovation Foundation, February 2, 2026), https://itif.org/publications/2026/02/02/mobilizing-for-techno-economic-war-part-1-the-case-for-policy-transformation/.
21. Robert D. Atkinson and Stephen Ezell, "Toward Globalization 2.0: A New Trade Policy Framework" (Information Technology and Innovation Foundation, March 24, 2025), https://itif.org/publications/2025/03/24/globalization2-a-new-trade-policy-framework/.
22. Stephen J. Ezell, *Assessing the State of Digital Skills in the U.S. Economy* (Information Technology and Innovation Foundation, November 29, 2021), https://itif.org/publications/2021/11/29/assessing-state-digital-skills-us-economy/.
23. Stephen J. Ezell, Robert D. Atkinson, and Michelle A. Wein, *Localization Barriers to Trade: Threat to the Global Innovation Economy* (Information Technology and Innovation Foundation, September 2013), https://itif.org/publications/2013/09/25/localization-barriers-trade-threat-global-innovation-economy/.
24. World Trade Organization (WTO), "World Trade Report 2012" (WTO, 2012), 136, http://www.wto.org/english/res_e/booksp_e/anrep_e/world_trade_report12_e.pdf.
25. Daria Taglioni and Hiau Looi Kee, *It's Not (Just) the Tariffs: Rethinking Non-Tariff Measures in a Fragmented Global Economy*, Policy Research Working Paper 11236 (World Bank, October 2025), https://openknowledge.worldbank.org/entities/publication/cc60a414-a245-418c-bc02-c624806c1415.
26. Jürgen Matthes et al., *Key Issues for Reforming the World Trade Organization* (Global Trade and Innovation Policy Alliance, 2021), https://www2.itif.org/2021-gtipa-wto-reform.pdf.
27. Supachai Panitchpakdi and Mark Clifford, *China and the WTO: Changing China, Changing World Trade* (New York: John Wiley & Sons, 2012), 2–4.
28. Stephen J. Ezell and Robert D. Atkinson, *False Promises: The Yawning Gap Between China's WTO Commitments and Practices*.
29. Stephen Ezell, *False Promises II: The Continuing Gap Between China's WTO Commitments and Its Practices* (Information Technology and Innovation Foundation, July 26, 2021), https://itif.org/publications/2021/07/26/false-promises-ii-continuing-gap-between-chinas-wto-commitments-and-its/.
30. Robert D. Atkinson, "We Are in an Industrial War. China Is Starting to Win," *The New York Times*, January 9, 2025, https://www.nytimes.com/2025/01/09/opinion/china-industrial-war-power-trader.html.
31. Alan Yuhas, "Congress Will Abandon Trans-Pacific Partnership Deal, White House Concedes," *The Guardian*, November 12, 2016, https://www.theguardian.com/business/2016/nov/12/tpp-trade-deal-congress-obama.
32. Robert D. Atkinson, *Go to the Mattresses: It's Time to Reset U.S.-EU Tech and Trade Relations* (Information Technology and Innovation Foundation, October 21, 2024), https://itif.org/publications/2024/10/21/its-time-to-reset-us-eu-tech-and-trade-relations/.
33. Robert D. Atkinson, "The Era of Global Free Trade Is Over: Time for the Era of Strategic Partnerships" (Information Technology and Innovation Foundation, January 9, 2026), https://itif.org/publications/2026/01/09/the-era-global-free-trade-over-time-for-era-strategic-partnerships/.

34. Robert D. Atkinson, "A Transatlantic G2 Against Chinese Technology Dominance," Limes (reprinted by the Information Technology and Innovation Foundation), April 5, 2024, https://itif.org/publications/2024/04/05/a-transatlantic-g2-against-chinese-technology/.
35. Robert D. Atkinson and Stephen Ezell, "Toward Globalization 2.0: A New Trade Policy Framework."
36. Stephen J. Ezell, *False Promises II: The Continuing Gap Between China's WTO Commitments and Its Practices.*
37. Nis Grünberg, "Party-State Capitalism Under Xi: Integrating Political Control and Economic Efficiency," *MERICS Paper on China: The CCP's Next Century* (Mercator Institute for China Studies, June 15, 2021), https://merics.org/en/party-state-capitalism-under-xi-integrating-political-control-and-economic-efficiency.
38. Xi Jinping, "Full Text of Xi Jinping's Speech at the First Session of the 14th National People's Congress," *The State Council of the People's Republic of China*, March 14, 2023, https://english.www.gov.cn/news/topnews/202303/14/content_WS641078bac6d0f528699db457.html.
39. Prime Minister of Canada, "Canada-European Union Summit 2023: Leaders' Joint Statement," November 24, 2023, https://www.pm.gc.ca/en/news/statements/2023/11/24/canada-european-union-summit-2023-leaders-joint-statemen.
40. HM Treasury, "2025 UK-China Economic and Financial Dialogue: Policy Outcomes," Government of the United Kingdom, January 11, 2025, https://www.gov.uk/government/publications/2025-uk-china-economic-and-financial-dialogue-policy-outcomes/2025-uk-china-economic-and-financial-dialogue-policy-outcomes.
41. Naoise McDonagh, "Hidden Lessons from China's Coercion Campaign Against Australia," *Australian Outlook* (Australian Institute of International Affairs), February 28, 2024, https://www.internationalaffairs.org.au/australianoutlook/hidden-lessons-from-chinas-coercion-campaign-against-australia/.
42. Ibid.
43. Kyoko Hasegawa, "Chinese tourists ditch Japan for third month running," *The Japan Times*, March 18, 2026, https://www.japantimes.co.jp/news/2026/03/18/japan/chinese-visitors-drop-february/.
44. Esther Goreichy et al., "China's Overcapacity and the EU + German China Policy Under Merz + EU-China Trade," *MERICS Europe China 360°*, May 16, 2025, https://merics.org/en/merics-briefs/chinas-overcapacity-and-eu-german-china-policy-under-merz-eu-china-trade.
45. Corelli Barnett, *The Collapse of British Power* (London: Faber, 1972), 85.
46 Stephen Ezell and Meghan Ostertag, "America Needs an Industrial Strategy for Motor Vehicles" (ITIF, May 2026), https://itif.org/publications/2026/05/11/america-needs-an-industrial-strategy-for-motor-vehicles/.
47. United States of America, *Information Provided by the United States of America on Its Practice Relating to Non-Legally Binding Exchanges and Instruments* (submission to the International Law Commission, 2025), https://legal.un.org/ilc/sessions/76/pdfs/english/nlba_us.pdf.
48. Christopher T. Zirpoli, *Congressional and Executive Authority Over Foreign Trade Agreements*, CRS Report R47679 (Congressional Research Service, updated September 25, 2025), https://www.congress.gov/crs-product/R47679.
49. Some of the trade irritants are numbered in USTR's National Trade Estimate Report, the USTR Special 301 Report on Intellectual Property Protection and Enforcement (also known as the IP Watch List), and USTR's Notorious Market List.
50. Office of the United States Trade Representative, "USTR Initiates Section 301 Investigations Relating to Structural Excess Capacity and Production in Manufacturing Sectors," news release,

March 11, 2026, https://ustr.gov/about/policy-offices/press-office/press-releases/2026/march/ustr-initiates-section-301-investigations-relating-structural-excess-capacity-and-production.

51. Information Technology and Innovation Foundation, "Non-Tariff Attack Tracker," https://itif.org/publications/knowledge-bases/attack-tracker/.
52. Office of the United States Trade Representative, "Chapter 4: Rules of Origin," *Agreement Between the United States of America, the United Mexican States, and Canada*, https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/04-Rules-of-Origin.pdf.
53. Office of the United States Trade Representative, "Free Trade Agreements," https://ustr.gov/trade-agreements/free-trade-agreements.
54. Christopher T. Zirpoli, "Supreme Court Rules Against Tariffs Imposed Under the International Emergency Economic Powers Act (IEEPA)," Legal Sidebar LSB11398 (Congressional Research Service, February 23, 2026), https://www.congress.gov/crs-product/LSB11398.
55. Penn Wharton Budget Model, "Effective Tariff Rates and Revenues (Updated February 23, 2026)."
56. Robert D. Atkinson and Rodrigo Balbontin, "Liberation Day Tariffs Miss the Real Target: China" (Information Technology and Innovation Foundation, April 4, 2025), https://itif.org/publications/2025/04/04/liberation-day-tariffs-miss-the-real-target-china/.
57. Joe Kennedy, "Digital Services Taxes: A Bad Idea Whose Time Should Never Come" (ITIF, May 13, 2019), https://itif.org/publications/2019/05/13/digital-services-taxes-bad-idea-whose-time-should-never-come/.
58. Ibid.
59. Office of the United States Trade Representative, "Chapter 19: Digital Trade," *Agreement Between the United States of America, the United Mexican States, and Canada*, https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/19-Digital-Trade.pdf.
60. Nigel Cory and Robert D. Atkinson, "The Administration Should Disregard Progressives' Unfair Attacks on Its Digital Trade Agenda" (Information Technology and Innovation Foundation, May 25, 2023), https://itif.org/publications/2023/05/25/the-administration-should-disregard-progressives-unfair-attacks-on-its-digital-trade-agenda/.
61. International Trade Center, "The click that crossed borders: How digital trade is rewriting globalization," September 25, 2025, https://www.intracen.org/news-and-events/news/the-click-that-crossed-borders-how-digital-trade-is-rewriting-globalization.
62. Ibid.
63. Robert D. Atkinson and Ian Tufts, *The Hamilton Index, 2023: China Is Running Away With Strategic Industries* (Information Technology and Innovation Foundation, December 13, 2023), https://itif.org/publications/2023/12/13/2023-hamilton-index/.
64. World Trade Organization, *World Trade Report 2025: Making Trade and AI Work Together to the Benefit of All* (Geneva: World Trade Organization, 2025), https://www.wto.org/english/res_e/booksp_e/wtr25_e.pdf.
65. OECD Centre for Entrepreneurship, SMEs, Regions and Cities (CFE), *SME Digitalisation to Manage Shocks and Transitions: 2024 OECD D4SME Survey*, OECD SME and Entrepreneurship Papers (Paris: OECD Publishing, 2024), https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/09/sme-digitalisation-to-manage-shocks-and-transitions_735fc44d/eb4ec9ac-en.pdf.
66. Andre Wirjo, Sylwyn Calizo Jr., and Rodrigo Balbontín, *Stepping Outside the Shadows: Informality and Digitalisation*, APEC Policy Support Unit Policy Brief no. 44 (Asia-Pacific Economic Cooperation, April 2022), https://www.apec.org/docs/default-source/publications/2022/4/stepping-outside-the-

shadows-informality-and-digitalisation/222_psu_informality-and-digitalisation.pdf?sfvrsn=80c289d1_2.

67. Information Technology and Innovation Foundation, "To Do: Launch a Joint Manufacturing Hub Competition With U.S. Allies," Tech Policy To-Do List, last updated February 7, 2025, https://itif.org/publications/2024/09/23/to-do-launch-a-joint-manufacturing-hub-competition-with-us-allies/.
68. Arnold Kling and Nick Schulz, "The New Commanding Heights," *National Affairs*, no. 8 (Summer 2011): 3–19, https://www.nationalaffairs.com/storage/app/uploads/public/58d/e7c/d1b/58de7cd1b6819330495869.pdf.
69. Daniel Yergin and Joseph Stanislaw, *The Commanding Heights: The Battle for the World Economy* (New York: Simon & Schuster, 1998).
70. David Moschella, *Limits to Alliances: In China, the United States and Its Allies Are Just Not Aligned* (Information Technology and Innovation Foundation, September 2021), https://www2.itif.org/2021-limits-to-alliances.pdf.
71. Ian F. Fergusson, Mark A. McMinimy, and Brock R. Williams, *The Trans-Pacific Partnership (TPP) Negotiations and Issues for Congress*, CRS Report R42694 (Congressional Research Service, March 20, 2015), https://nationalaglawcenter.org/wp-content/uploads/assets/crs/R42694.pdf.
72. Brock R. Williams et al., The Trans-Pacific Partnership (TPP): Strategic Implications, CRS Report R44361 (Congressional Research Service, February 3, 2016), https://sgp.fas.org/crs/row/R44361.pdf.
73. Ian F. Fergusson, Mark A. McMinimy, and Brock R. Williams, *The Trans-Pacific Partnership (TPP) Negotiations and Issues for Congress*.
74. Robert D. Atkinson et al.*, A Techno-Economic Agenda for the Next Administration* (Information Technology and Innovation Foundation, June 10, 2024), https://itif.org/publications/2024/06/10/a-techno-economic-agenda-for-the-next-administration/.
75. David Kertai, "America's Cyber Withdrawal Needs a Replacement" (Information Technology and Innovation Foundation, February 9, 2026), https://itif.org/publications/2026/02/09/americas-cyber-withdrawal-needs-a-replacement/.
76. Office of the Director of National Intelligence, "Five Eyes Intelligence Oversight and Review Council," https://www.dni.gov/index.php/ncsc-how-we-work/217-about/organization/icig-pages/2660-icig-fiorc.
77. Stephen Ezell, "An Allied Approach to Semiconductor Leadership" (ITIF, September 2020), https://itif.org/publications/2020/09/17/allied-approach-semiconductor-leadership/.
78 Ibid.
79. Trelysa Long, "America's Innovation Future Is at Risk Without STEM Growth" (Information Technology and Innovation Foundation, September 10, 2025), https://itif.org/publications/2025/09/10/americas-innovation-future-at-risk-without-stem-growth/.
80. Alex Irwin-Hunt, "China's Universities Outpace US Peers Amid Tech Competition," fDi Intelligence, April 30, 2025, https://www.fdiintelligence.com/content/d0a58f39-0ed0-4b58-8c51-477133b6d9e1.
81. Robert D. Atkinson and Hilal Aka, *Defending American Tech in Global Markets* (Information Technology and Innovation Foundation, December 1, 2025), https://itif.org/publications/2025/12/01/defending-american-tech-in-global-markets/.
82. Office of the United States Trade Representative, "Chapter 21: Competition Policy," *Agreement Between the United States of America*, the United Mexican States, and Canada, https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/21_Competition_Policy.pdf.

83. Robert D. Atkinson and Hilal Aka, *Defending American Tech in Global Markets*.
84. Ibid.
85. Christian Bergqvist, ProMarket website, February 19, 2024, https://www.promarket.org/2024/02/19/taking-stock-of-googles-antitrust-troubles-as-the-world-turns-against-it/.
86. New Zealand Ministry of Foreign Affairs and Trade, "Green Economy Partnership Agreement Overview," https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-under-negotiation/green-economy-partnership-agreement-gepa/green-economy-partnership-agreement-overview.
87. U.S. Department of Commerce, "Determination of Foreign Adversaries," 15 C.F.R. § 791.4, https://www.ecfr.gov/current/title-15/subtitle-B/chapter-VII/subchapter-E/part-791/subpart-A/section-791.4.
88. World Trade Organization, "China–Republic of Korea Free Trade Agreement," *Regional Trade Agreements Database*, https://rtais.wto.org/UI/PublicShowRTAIDCard.aspx?rtaid=697; Australian Department of Foreign Affairs and Trade, "China–Australia Free Trade Agreement," https://www.dfat.gov.au/trade/agreements/chafta/Pages/australia-china-fta; New Zealand Ministry of Foreign Affairs and Trade, "New Zealand–China Free Trade Agreement Overview," https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/nz-china-free-trade-agreement/overview.
89. Information Technology and Innovation Foundation, "The G7 Should Spearhead a 'NATO for Trade,' ITIF Urges," news release, May 16, 2023, https://itif.org/publications/2023/05/16/the-g7-should-spearhead-a-nato-for-trade-itif-urges/.
90. Robert D. Atkinson, "What is Chinese 'Innovation Mercantilism' and How Should the UK and Allies Respond?" (ITIF, June 28, 2021), https://itif.org/publications/2021/06/28/what-chinese-innovation-mercantilism-and-how-should-uk-and-allies-respond.
91. Association for Uncrewed Vehicle Systems International, "AUVSI Statement on China's Sanctions Against U.S. Drone Companies," news release, April 7, 2025, https://www.auvsi.org/news/auvsi-statement-on-chinas-sanctions-against-u-s-drone-companies/.
92. John Liu, "US Bans New Foreign Drone Models in a Blow to Chinese Giant DJI," *CNN Business*, December 23, 2025, https://www.cnn.com/2025/12/23/business/us-ban-foreign-drones-dji-intl-hnk.
93. Hyunjoo Jin and Brenda Goh, "Micron to Exit Server Chips Business in China After Ban, Sources Say," *Reuters*, October 17, 2025, https://www.reuters.com/business/autos-transportation/micron-exit-server-chips-business-china-after-ban-sources-say-2025-10-17/.
94. Ibid.
95. USTR, "2025 Report to Congress on China's WTO Compliance" (USTR, 2025), 46, https://ustr.gov/sites/default/files/files/Countries%20and%20Regions/China%2C%20Mongolia%20%26%20Taiwan/2025%20USTR%20Report%20to%20Congress%20on%20China's%20WTO%20Compliance%20(Final%202025).pdf.
96. Ibid., 71.
97. Ibid.
98. Ibid., 72.
99. Ibid.
100. Panitchpakdi and Clifford, *China and the WTO*, 227.
101. Ibid.

102 Stephen Ezell, "False Promises II: The Continuing Gap Between China's WTO Commitments and Its Practices" (ITIF, July 2021), https://itif.org/publications/2021/07/26/false-promises-ii-continuing-gap-between-chinas-wto-commitments-and-its/; USTR, "2025 Report to Congress on China's WTO Compliance," 72.

103. USTR, "2025 Report to Congress on China's WTO Compliance," 72.

104. Ibid., 70.

105. Ibid.

106. Ibid., 71.

107. Ibid., 52.

108. Ibid., 53.

109. Nigel Cory, "America's National Security Concerns Over China Shouldn't Imperil Its Leadership in Technical Standards Development," *Innovation Files*, January 30, 2023, https://itif.org/publications/2023/01/20/americas-national-security-concerns-over-china-shouldnt-imperil-its-leadership-in-technical-standards-development/.

110. Eli Clemens, "How Some Chinese Companies Obscure Ties to China and What Policymakers Should Do About It" (ITIF, November 2025), https://itif.org/publications/2025/11/03/some-chinese-companies-obscure-ties-to-china-what-policymakers-should-do-about-it/.

111. Stephen Ezell, Rodrigo Balbontin, and Eli Clemens, "Comments to the U.S. Treasury Department Regarding the CFIUS Known Investor Program and Foreign Investment Review Process" (ITIF, March 18, 2026), https://itif.org/publications/2026/03/18/comments-to-treasury-department-cfius-known-investor-program-and-foreign-investment-review/.

112. Robert D. Atkinson, "How to Implement CFIUS to Support U.S. Competitiveness" (ITIF, January 2, 2020), https://itif.org/publications/2020/01/02/how-implement-cfius-support-us-competitiveness/.

113. Ibid.

114. Office of Investment Security, USDT, 31 C.F.R. Parts 800-802 (published January 17, 2020).

115. Foreign Investment Risk Review Modernization Act of 2018, H.R. 4311, 115th Cong. (2018).

116. Clemens, "How Some Chinese Companies Obscure Ties to China."

117. U.S. Department of State, "The EXBS Program," https://2009-2017.state.gov/strategictrade/program//index.htm.

118. U.S. Department of Commerce, Bureau of Industry and Security, "Foreign-Direct Product (FDP) Rules," 15 CFR 734.9, accessed July 10, 2026, https://www.ecfr.gov/current/title-15/subtitle-B/chapter-VII/subchapter-C/part-734/section-734.9.

119. U.S. Department of Commerce, Bureau of Industry and Security, "Part 744—Control Policy: End-User and End-Use Based," *Export Administration Regulations*, https://www.bis.gov/regulations/ear/744.

120. Rodrigo Balbontin, "Backfire: Export Controls Helped Huawei and Hurt U.S. Firms" (ITIF, October 2025), https://itif.org/publications/2025/10/27/backfire-export-controls-helped-huawei-and-hurt-us-firms/.

121 Ibid.

122. Daniel Garcia-Macia, Siddharth Kothari, and Yifan Tao, "Industrial Policy in China: Quantification and Impact on Misallocation," IMF Working Paper no. 2025/155 (Washington, D.C.: International Monetary Fund, August 2025), https://www.imf.org/-/media/files/publications/wp/2025/english/wpiea2025155-source-pdf.pdf.

123. Frank Bickenbach et al., "Foul Play? On the Scale of Scope of Industrial Subsidies in China,"(policy brief, Kiel Institute for the World Economy, no. 173, April 2024),

https://www.kielinstitut.de/publications/foul-play-on-the-scale-and-scope-of-industrial-subsidies-in-china-17562.

124. Scott Kennedy, "The Chinese EV Dilemma: Subsidized Yet Striking" (CSIS, June 20, 2024),https://www.csis.org/blogs/trustee-china-hand/chinese-ev-dilemma-subsidized-yet-striking.
125. Stephen Ezell, "How Innovative Is China in Semiconductors?" (ITIF, August 2024), https://itif.org/publications/2024/08/19/how-innovative-is-china-in-semiconductors/.
126. Scott Kennedy, "China's COMAC: An Aerospace Minor Leaguer" (Center for Strategic and International Studies, December 7, 2020), https://csis-website-prod.s3.amazonaws.com/s3fs-public/201204_Kennedy_COMAC.pdf.
127. Stephen Ezell, "China-Induced Global Overcapacity an Increasing Threat to High-Tech Industries" (ITIF, February 27, 2018), https://itif.org/publications/2018/02/27/china-induced-global-overcapacity-increasing-threat-high-tech-industries/.
128. Wood Mackenzie, "China's steel industry at critical crossroads of overcapacity and green transition," news release, April 3, 2025, https://www.woodmac.com/press-releases/china-steel-overcapacity.
129. Stephen Ezell, "China-Induced Global Overcapacity an Increasing Threat to High-Tech Industries."
130. Keith Bradsher, "200 Chinese Subsidies Violate Rules, U.S. Says," *The New York Times*, October 7, 2011, https://www.nytimes.com/2011/10/07/business/us-says-some-chinese-subsidies-violate-trade-rules.html.
131. Office of the United States Trade Representative, "USTR Initiates Section 301 Investigations Relating to Structural Excess Capacity and Production in Manufacturing Sectors," news release, March 11, 2026, https://ustr.gov/about/policy-offices/press-office/press-releases/2026/march/ustr-initiates-section-301-investigations-relating-structural-excess-capacity-and-production.
132. U.S. Bureau of Economic Analysis, Gross Domestic Product (billions of dollars, seasonally adjusted annual rate), FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/series/GDP.
133. World Bank, World Development Indicators (GDP, current U.S. dollars, Japan and United Kingdom; https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=JP-GB.
134. Organization for Economic Cooperation and Development (OECD), *OECD Steel Outlook 2025* (Paris: OECD Publishing, 2025), https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/05/oecd-steel-outlook-2025_bf2b6109/28b61a5e-en.pdf.
135. Stephen Ezell and Meghan Ostertag, "Assessing the Evolving Global Competitiveness of the US Auto Industry" (ITIF, March 2026), https://itif.org/publications/2026/03/23/assessing-evolving-global-competitiveness-of-us-auto-industry/.
136. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance."
137. Rodrigo Balbontin, "Backfire: Export Controls Helped Huawei and Hurt U.S. Firms."
138. Eli Clemens, "Internal Value Chains Remain Dependent on China Even as Multinationals Shift Production to America" (ITIF, February 2026), https://itif.org/publications/2026/02/23/internal-value-chains-dependent-china-multinationals-shift-production-to-america/; https://itif.org/publications/2025/09/17/dont-let-chinese-ev-makers-manufacture-in-the-united-states/.
139. Rodrigo Balbontin, "Backfire: Export Controls Helped Huawei and Hurt U.S. Firms."
140. Robert D. Atkinson et al., "Mobilizing for Techno-Economic War, Part 2: Slowing China's Advance."
141. "Anti-Counterfeiting Trade Agreement (ACTA)," Office of the United States Trade Representative, https://ustr.gov/acta.

142. Office of the United States Trade Representative, "Joint Press Statement of the Anti-Counterfeiting Trade Agreement Negotiating Parties," news release, October 1, 2011, https://ustr.gov/about-us/policy-offices/press-office/press-releases/2011/october/joint-press-statement-anti-counterfeiting-trade-ag; European Parliament, "European Parliament Rejects ACTA," news release, July 4, 2012, https://www.europarl.europa.eu/news/en/press-room/20120703IPR48247/european-parliament-rejects-acta.

143. Federal Bureau of Investigation, "Executive Summary—China: The Risk to Corporate America" (Washington, D.C.: Federal Bureau of Investigation, 2019), https://www.fbi.gov/file-repository/china-exec-summary-risk-to-corporate-america-2019.pdf.

144. Vega Bharadwaj et al., "U.S. Intellectual Property and Counterfeit Goods—Landscape Review of Existing/Emerging Research" (Washington, D.C.: Federal Research Division, Library of Congress, February 2020), https://www.uspto.gov/sites/default/files/documents/USPTO-Counterfeit.pdf.

145. Stephen Ezell, "How Innovative Is China in the Display Industry?" (ITIF, September 2024), https://itif.org/publications/2024/09/16/how-innovative-is-china-in-the-display-industry/.

146. Robert D. Atkinson, "Comments to the U.S. International Trade Commission Regarding Relief for Section 337 Violations in the OLED Display Industry" (ITIF, August 11, 2025), https://itif.org/publications/2025/08/11/comments-to-the-usitc-relief-for-section-337-violations-in-the-oled-display-industry/.

147. U.S. Customs and Border Protection (CBP), "Intellectual Property Rights Seizure Statistics" (Washington, D.C.: CBP, January 2025), https://www.cbp.gov/sites/default/files/2025-01/IntellectualPropertyRightsSeizureStatisticsFiscalYear2024%20FINAL.pdf.

148. Organization for Economic Cooperation and Development, "Global Trade in Fake Goods Reached USD 467 Billion, Posing Risks to Consumer Safety and Compromising Intellectual Property," news release, May 7, 2025, https://www.oecd.org/en/about/news/press-releases/2025/05/global-trade-in-fake-goods-reached-USD-467-billion-posing-risks-to-consumer-safety-and-compromising-intellectual-property.html.

149. The White House, "United States Strategic Approach to the People's Republic of China" (Washington, D.C.: The White House, May 2020), https://2017-2021-translations.state.gov/2020/05/20/united-states-strategic-approach-to-the-peoples-republic-of-china/.

150. James Nurton, "OECD/EUIPO Report: China and Hong Kong Account for 75% of Dangerous Counterfeits," *IPWatchdog*, March 21, 2022, https://ipwatchdog.com/2022/03/21/oecd-euipo-report-china-hong-kong-account-75-dangerous-counterfeits/#.

151. Frank Dillon, "EU may be losing €60bn in annual sales through IP theft in goods and services," *The Irish Times*, June 6, 2019, https://www.irishtimes.com/business/innovation/eu-may-be-losing-60bn-in-annual-sales-through-ip-theft-in-goods-and-services-1.3914540.

152. "Japan Estimates USD 30 Billion Losses from Counterfeit Goods," TAPA APAC, February 2, 2026, https://tapa-apac.org/japan-estimates-usd-30-billion-losses-from-counterfeit-goods/.

153. Trelysa Long, "Tracking R&D Leadership: US Advantage Narrowing as China Gains Ground" (ITIF, February 2026), https://itif.org/publications/2026/02/09/tracking-rd-leadership-us-advantage-narrowing-as-china-gains-ground/.

154. "Indo-Pacific Economic Framework for Prosperity," U.S. Department of Commerce, https://www.commerce.gov/ipef.

155. U.S. Department of Commerce, "Secretary Raimondo, IPEF Ministers Welcome Upcoming Entry into Force of the Clean Economy Agreement, Fair Economy Agreement, and Agreement on the Indo-Pacific Economic Framework for Prosperity (IPEF) and Commit to Continued Progress at Virtual Ministerial," news release, September 23, 2024, https://www.commerce.gov/news/press-releases/2024/09/secretary-raimondo-ipef-ministers-welcome-upcoming-entry-force-clean;

https://isomer-user-content.by.gov.sg/166/6952b438-3aa5-4527-b4bf-f7a097b49d27/ipef_supply_chain_agreement.pdf.

156. Song Hyun-soo, "IPEF Member Countries Conduct 'Critical Mineral Supply Emergency' Simulation Exercise in Seoul; United States Does Not Participate," *Busan Ilbo*, October 22, 2025, https://www.busan.com/view/busan/view.php?code=2025102207033494007 [in Korean].
157. "Minerals Security Partnership," U.S. Department of State, https://2021-2025.state.gov/minerals-security-partnership/.
158. U.S. Department of State, "2026 Critical Minerals Ministerial," fact sheet, February 4, 2026, https://www.state.gov/releases/office-of-the-spokesperson/2026/02/2026-critical-minerals-ministerial.
159. Ibid.
160 Embassy of the Republic of the Philippines, "Philippines Signs MOU on Critical Minerals Supply Chains," news release, February 6, 2026, https://www.gov.uk/government/news/uk-and-us-sign-memorandum-of-understanding-on-critical-minerals.
161. Ibid.
162. Embassy of the Republic of the Philippines, "Philippines Signs MOU on Critical Minerals Supply Chains," https://philippineembassy-dc.org/philippines-signs-mou-on-critical-minerals-supply-chains/.
163. Ibid.
164. "Pax Silica," U.S. Department of State, https://www.state.gov/pax-silica.
165. Rodrigo Balbontin and Stephen Ezell, "Comments to USTR Regarding the Trade Agreement Between the United States, Mexico, and Canada" (ITIF, November 2025), https://itif.org/publications/2025/11/03/comments-to-ustr-regarding-the-usmca-trade-agreement/; Office of the United States Trade Representative, "USMCA: Chapter 19: Digital Trade."
166. USTR, "Chapter 19: Digital Trade."
167. Nigel Cory and Luke Dascoli, *How Barriers to Cross-Border Data Flows Are Spreading Globally, What They Cost, and How to Address Them* (ITIF, July 2021), https://itif.org/publications/2021/07/19/how-barriers-cross-border-data-flows-are-spreading-globally-what-they-cost/.
168. USTR, "Chapter 19: Digital Trade."
169. "AUKUS: The Trilateral Security Partnership Between Australia, U.K. and U.S.," U.S. Department of War, https://www.war.gov/Spotlights/AUKUS/.
170. Trelysa Long, "The United States Should Retain International Graduates to Meet Demand for STEM Talent" (ITIF December 23, 2025), https://itif.org/publications/2025/12/23/the-united-states-should-retain-international-graduates-to-meet-demand-for-stem-talent/.
171. National Science Board, "Characteristics of S&E Degree Recipients," in *Higher Education in Science and Engineering: Science and Engineering Indicators 2024* (Alexandria, VA: National Science Foundation, November 2023), https://ncses.nsf.gov/pubs/nsb202332/characteristics-of-s-e-degree-recipients.
172. Ibid.
173. National Center for Science and Engineering Statistics, *Doctorate Recipients from U.S. Universities: 2024 Data Tables* (Alexandria, VA: U.S. National Science Foundation, August 2025), https://ncses.nsf.gov/surveys/earned-doctorates/2024#data.
174. Robert D. Atkinson, "Who Lost Lucent?: The Decline of America's Telecom Equipment Industry," *American Affairs* 4, no. 3 (Fall 2020), https://americanaffairsjournal.org/2020/08/who-lost-lucent-the-decline-of-americas-telecom-equipment-industry/.
175. Iain Morris, "The Americanization of Ericsson and Nokia," *Light Reading*, November 27, 2025, https://www.lightreading.com/regulatory-politics/the-americanization-of-ericsson-and-nokia.

176. Office of the United States Trade Representative, "USMCA: Chapter 21: Competition Policy," https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/21_Competition_Policy.pdf.

177. Inu Manak and Allison J. Smith, "Tracking Trump's Trade Deals," Council on Foreign Relations, March 17, 2026, https://www.cfr.org/articles/tracking-trumps-trade-deals.

178. International Trade Administration, "NME Countries List and Surrogate Country List Memos," https://www.trade.gov/nme-countries-list.

179. Office of the United States Trade Representative, "USMCA: Chapter 32: Exceptions and General Provisions," https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/32_Exceptions_and_General_Provisions.pdf.

180. Agreement Between the United States of America and the Republic of Indonesia on Reciprocal Trade, February 19, 2026, https://ustr.gov/sites/default/files/files/Press/Releases/2026/02.19.26%20US-IDN%20ART%20Full%20Agreement%20-%20US%20Final%20for%20Website%20sanitized.pdf.

181. Simon Lester, "Comparing the Digital Trade Provisions in the New U.S. Trade Deals," *International Economic Law and Policy Blog*, March 18, 2026, https://ielp.worldtradelaw.net/2026/03/comparing-the-digital-trade-provisions-in-the-new-u-s-trade-deals/.

182. Switzerland Federal Department of Economic Affairs, "Factsheet: Basic principles of the WTO," https://www.seco.admin.ch/dam/seco/en/dokumente/Aussenwirtschaft/Internationale%20Organisationen/WTO/WTO-Grundprinzipien.pdf.download.pdf/Factsheet_Basic%20principles%20of%20the%20WTO_EN.pdf.

183. Inu Munak, "A return to reciprocity in US trade policy" (Hinrich Foundation, January 16, 2024), https://www.hinrichfoundation.com/research/article/trade-governance/a-return-to-reciprocity-in-us-trade-policy; Douglas Irwin, "Clashing Over Commerce: A History of U.S. Trade Policy."

184. Akiko Yanai, "Reciprocity in Trade Liberalization" (IDE APEC Study Center Working Paper Series 00/01, no. 2, Institute of Developing Economies, JETRO, March 2001), https://www.ide.go.jp/library/English/Publish/Reports/Apec/pdf/2000_b.pdf.

185. WTO, "FURTHER PERSPECTIVES ON WTO REFORM COMMUNICATION FROM THE UNITED STATES," March 23, 2026, https://ustr.gov/sites/default/files/files/Issue_Areas/Trade%20Organizations/US%20Further%20Perspectives%20on%20WTO%20Reform%20-%20March%202026.pdf.

186. UN Trade and Development, "Japan—Adds Nine Sectors to the FDI Screening Regime," *Investment Policy Monitor*, April 24, 2023, https://investmentpolicy.unctad.org/investment-policy-monitor/measures/4294/adds-nine-sectors-to-the-fdi-screening-regime.

187. Kyodo News, "Japan to Strengthen Screening of Foreign Investments with U.S.-Style Panel," *Japan Today*, March 18, 2026, https://japantoday.com/category/business/japan-to-strengthen-screening-of-foreign-investments-with-u.s.-style-panel.

188. U.S. Department of Commerce, Bureau of Industry and Security, "Implementation of Additional Export Controls: Certain Advanced Computing and Semiconductor Manufacturing Items; Supercomputer and Semiconductor End Use; Entity List Modification," 87 Fed. Reg. 62,186 (October 13, 2022), https://www.federalregister.gov/documents/2022/10/13/2022-21658/implementation-of-additional-export-controls-certain-advanced-computing-and-semiconductor.

189. Ana Swanson, "Netherlands and Japan Said to Join U.S. in Curbing Chip Technology Sent to China," *The New York Times*, January 28, 2023, https://www.nytimes.com/2023/01/28/business/economy/netherlands-japan-china-chips.html.

190. Gregory C. Allen and Emily Benson, "Clues to the U.S.-Dutch-Japanese Semiconductor Export Controls Deal Are Hiding in Plain Sight" (Center for Strategic and International Studies, March 2023), https://www.csis.org/analysis/clues-us-dutch-japanese-semiconductor-export-controls-deal-are-hiding-plain-sight.

191 Senate Foreign Relations Committee, "Risch, Ricketts, Kim Introduce MATCH Act; Level the Global Playing Field for U.S. Tech," news release, April 8, 2026, https://www.foreign.senate.gov/press/rep/release/risch-ricketts-kim-introduce-match-act-level-the-global-playing-field-for-us-tech.

192. Robert D. Atkinson, "Stronger Semiconductor Export Controls on China Will Likely Harm Allied Semiconductor Competitiveness" (ITIF October 12, 2023), https://itif.org/publications/2023/10/12/stronger-semiconductor-export-controls-on-china-will-likely-harm-allied-semiconductor-competitiveness/.

193. Nigel Cory and Robert D. Atkinson, "Why and How to Mount a Strong, Trilateral Response to China's Innovation Mercantilism" (ITIF, January 2020), https://itif.org/publications/2020/01/13/why-and-how-mount-strong-trilateral-response-chinas-innovation-mercantilism/.

194. Office of the United States Trade Representative, "Joint Statement on Trilateral Meeting of the Trade Ministers of the United States, Japan, and the European Union," news release, May 31, 2018, https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/may/joint-statement-trilateral-meeting.

195. Stephen Ezell, "Strengthening Subsidies Rules to Tackle Trade-Distortions: Perspectives From the High-Tech Sector" (power point presentation at 2019 WTO Public Forum, "Trading Forward: Adapting to a Changing World," October 11, 2019).

196. U.S. Department of the Treasury, "Understanding the National Deficit," Fiscal Data, https://fiscaldata.treasury.gov/americas-finance-guide/national-deficit/; U.S. Department of the Treasury, "Understanding the National Debt," Fiscal Data, https://fiscaldata.treasury.gov/americas-finance-guide/national-debt/.

197. Sovereign Wealth Fund Institute, "North America Sovereign Wealth Fund Profiles," https://www.swfinstitute.org/profiles/sovereign-wealth-fund/north-america.

198. Sovereign Wealth Fund Institute, "Top 100 Largest Sovereign Wealth Fund Rankings by Total Assets," https://www.swfinstitute.org/fund-rankings/sovereign-wealth-fund.

199. Secure and Trusted Communications Networks Act of 2019, H.R. 4998, 116th Cong. (2019), https://www.congress.gov/bill/116th-congress/house-bill/4998/text.

200. Federal Communications Commission, "Secure and Trusted Communications Networks Reimbursement Program," https://www.fcc.gov/supplychain/reimbursement.

201. Ana Swanson and Sheera Frenkel, "Trump Sets Up 'Pax Silica' Fund to Reduce Global Dependencies," *The New York Times*, March 23, 2026, https://www.nytimes.com/2026/03/23/business/economy/trump-pax-silica-fund.html.

202. Ibid.

203. U.S. Customs and Border Protection, "CBP, Mexican Counterparts Sign Agreements for Better Cooperation," March 30, 2018, https://www.cbp.gov/newsroom/spotlights/cbp-mexican-counterparts-sign-agreements-better-cooperation.

204. Simon Romero, "Mexico's Response to Trump's Tariffs: Troops, Cartels and China," *The New York Times*, March 2, 2025, https://www.nytimes.com/2025/03/02/us/mexico-trump-tariffs-troops-cartel-china.html.

205. Graham Hood, "How to Record Your Brand's Rights and Stop Counterfeit Goods at the Canadian Border," Smart & Biggar, June 28, 2021, https://www.smartbiggar.ca/insights/publication/protecting-your-brands-at-the-canada-u.s.-border-how-the-request-for-assistance-program-can-work-for-you.
206. "Anti-Counterfeiting Trade Agreement (ACTA)."
207. Robert D. Atkinson et al., "Mobilizing for Techno-Economic War, Part 2: Slowing China's Advance."
208. Chris Carr and Dave Christy, "US Universities Are Losing Their STEM Doctoral Pipeline," Harvard Business Impact, March 27, 2025, https://hbsp.harvard.edu/inspiring-minds/strategies-us-academic-leaders-stem-doctorial-pipeline.
209. National Center for Science and Engineering Statistics, "Doctorate Recipients from U.S. Universities: 2022," NSF 24-300 (Alexandria, VA: National Science Foundation, September 2023), https://ncses.nsf.gov/pubs/nsf24300/data-tables.
210. Robert D. Atkinson et al., "Mobilizing for Techno-Economic War, Part 2: Slowing China's Advance."
211. The Select Committee on the CCP, "Reset, Prevent, Build: A Strategy to Win America's Economic Competition with the Chinese Communist Party" (The Select Committee on the CCP, December 2023), https://chinaselectcommittee.house.gov/sites/evo-subsites/selectcommitteeontheccp.house.gov/files/evo-media-document/reset-prevent-build-scc-report.pdf.
212. Robert D. Atkinson et al., "Mobilizing for Techno-Economic War, Part 2: Slowing China's Advance."
213. "CIA-RDP79-01206A000200030007-1," Central Intelligence Agency, accessed February 2026, https://www.cia.gov/readingroom/docs/CIA-RDP79-01206A000200030007-1.pdf.
214. Robert D. Atkinson et al. "Mobilizing for Techno-Economic War, Part 2: Slowing China's Advance."
215. Ibid.
216. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance."
217. Ibid.
218. Ibid.
219. Robert D. Atkinson, "The Era of Global Free Trade Is Over: Time for the Era of Strategic Partnerships."

Notes for Mobilizing for Techno-Economic War, Part 7: Transforming Regulatory Policy

1. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
2. ITIF, National Power Industry Series, https://itif.org/power-industries/.
3. Atkinson, "Marshaling National Power Industries."
4. Robert D. Atkinson, "Mobilizing for Techno-Economic War, Part 3: Transforming Financial Capitalism Into National Power Capitalism" (ITIF, April 2026), https://itif.org/publications/2026/04/13/mobilizing-for-techno-economic-war-part-3-national-power-capitalism/; Robert D. Atkinson, "Mobilizing for Techno-Economic War, Part 4: Transforming Education and Workforce Policy" (ITIF, May 2026), https://itif.org/publications/2026/05/13/mobilizing-for-techno-economic-war-part-4-transforming-education-and-workforce-policy/; Robert D. Atkinson, "Mobilizing for Techno-Economic War, Part 5: Transforming STEM Research Policy" (ITIF, June 2026),

https://itif.org/publications/2026/06/17/mobilizing-for-techno-economic-war-part-5-transforming-stem-research-policy/.

5. John W. Mayo, "The Evolution of Regulation: Twentieth Century Lessons and Twenty-First Century Opportunities," *Federal Communications Law Journal 65*, issue 2 (April 2013): 119, http://www.fclj.org/wp-content/uploads/2013/06/65-2-Full-Issue.pdf.
6. Robert D. Atkinson, *The Past and Future of America's Economy* (Northampton, MA: Edward Elgar, 2005).
7. Murray N. Rothbard, *The Progressive Era* (Auburn, AL: Mises Institute, 2017).
8. Stephen Skowronek, "From Patchwork to Reconstitution," in *Building a New American State* (Cambridge: Cambridge University Press, 1982), 165–176, https://doi.org/10.1017/CBO9780511665080.010.
9. Susan E. Dudley, "A Brief History of Regulation and Deregulation," *Regulatory Review*, March 2019, https://www.theregreview.org/2019/03/11/dudley-brief-history-regulation-deregulation/.
10. K. Sabeel Rahman, "Building the Government We Need" (Roosevelt Institute, June 2024), https://rooseveltinstitute.org/wp-content/uploads/2024/05/RI_Building-the-Government-We-Need_Report_062024.pdf.
11. Paul Dans and Steven Groves (eds.), "Mandate for Leadership" (The Heritage Foundation, 2023), https://static.heritage.org/project2025/2025_MandateForLeadership_FULL.pdf.
12. Sean Farhang, "Legislative Capacity & Administrative Power Under Divided Polarization," *Dædalus 150*, no. 3 (Summer 2021), p 49–67, https://doi.org/10.1162/daed_a_01859.
13. Robert D. Atkinson, "America Needs Big Tech to Beat Big China" (ITIF, May 2024), https://itif.org/publications/2024/05/10/america-needs-big-tech-to-beat-big-china/.
14. Daniel Castro, Joshua New, and Matt Beckwith, "10 Steps Congress Can Take to Accelerate Data Innovation" (ITIF, May 2017), https://itif.org/publications/2017/05/15/10-steps-congress-can-take-accelerate-data-innovation/.
15. Corbin Hiar, "The U.S. Will Need to Spend $100 Billion a Year on Carbon Removal," *Scientific American*, April 11, 2024, https://www.scientificamerican.com/article/u-s-carbon-removal-needs-have-a-usd100-billion-price-tag-per-year/.
16. Nina Panizzut et al., "Exploring relationship between environmentalism and consumerism in a market economy society: A structured systematic literature review," *Cleaner Engineering and Technology 2* (June 2021), 100047, https://doi.org/10.1016/j.clet.2021.100047.
17. Alan McQuinn and Daniel Castro, "The Case for a U.S. Digital Single Market and Why Federal Preemption Is Key" (ITIF, October 2019), https://itif.org/publications/2019/10/07/case-us-digital-single-market-and-why-federal-preemption-key/.
18. Joseph V. Coniglio, "Comments to the California Law Revision Commission Regarding the Tentative Recommendation Antitrust Law: Single Firm Conduct" (ITIF, January 2026), https://itif.org/publications/2026/01/13/comments-to-the-california-law-revision-commission-regarding-tentative-recommendation-antitrust-law-single-firm-conduct/; ITIF, "BASED Act Imports EU-Style Regulation to Attack California's Leading Firms, Says ITIF," news release, March 18, 2026, https://itif.org/publications/2026/03/18/based-act-imports-eu-style-regulation-to-attack-californias-leading-firms/.
19. Ash Johnson, "How Congress Can Foster a Digital Single Market in America" (ITIF, February 2024), https://itif.org/publications/2024/02/20/how-congress-can-foster-a-digital-single-market-in-america/.
20. Daniel Castro, Luke Dascoli, and Gillian Diebold, "The Looming Cost of a Patchwork of State Privacy Laws" (ITIF, January 2022), https://itif.org/publications/2022/01/24/looming-cost-patchwork-state-privacy-laws/.

21. Teresa Milano, "The BIPA Litigation Landscape and What Lies Ahead," *Woodruff Sawyer*, April 1, 2021, https://woodruffsawyer.com/cyber-liability/bipa-litigation-landscape/; *Patel v. Facebook, Inc.,* 932 F.3d 1264 (9th Cir. 2019), https://cdn.ca9.uscourts.gov/datastore/opinions/2019/08/08/18-15982.pdf.

22. Joseph Stafford, Michael Duffy, and Ashley Conaghan, "Illinois Supreme Court Finds Insurer Has Duty to Defend BIPA Suit," *Bloomberg Law*, June 18, 2021, https://news.bloomberglaw.com/privacy-and-data-security/illinois-supreme-court-finds-insurer-has-duty-to-defend-bipa-suit; Victoria Cavaliere, "Judge approves $650 million settlement of Facebook privacy lawsuit linked to facial photo tagging," *Business Insider*, February 27, 2021, https://www.businessinsider.com/facebook-settlement-pay-650-million-privacy-lawsuit-biometrics-face-tagging-2021-2.

23. Ryan Mac, Caroline Haskins, and Logan McDonald, "Clearview AH Has Promised To Cancel Relationships With Private Companies," *Buzzfeed News*, May 7, 2020, https://www.buzzfeednews.com/article/ryanmac/clearview-ai-no-facial-recognition-private-companies; Google, "Learn about familiar face detection," Google Home and Nest Help, accessed July 20, 2026, https://support.google.com/googlenest/answer/9268625?co=GENIE.Platform%3DAndroid&hl=en; Amy Korte, "Privacy Law Prevents Illinoisans From Using Google App's Selfie Art Feature," *Illinois Policy*, January 23, 2018, https://www.illinoispolicy.org/privacy-law-prevents-illinoisans-from-using-google-apps-selfie-art-feature/.

24. Doug Brake, "Why We Need Net Neutrality Legislation, and What It Should Look Like" (ITIF, May 2018), http://www2.itif.org/2018-net-neutrality-legislation.pdf.

25. Ash Johnson, "The Path to Digital Identity in the United States" (ITIF, September 2024), https://itif.org/publications/2024/09/23/path-to-digital-identity-in-the-united-states/.

26. Robert D. Atkinson, "Congress Should Side With Consumers on Contact Lenses, Not the Optometry Lobby," ITIF Innovation Files commentary, June 13, 2023, https://itif.org/publications/2023/06/13/congress-should-side-with-consumers-on-contact-lenses-not-the-optometry-lobby/.

27. See, e.g., *Wickard v. Filburn*, 317 U.S. 111 (1942).

28. *California v. ARC America Corp.*, 490 U.S. 93 (1989).

29. *E.I. du Pont de Nemours & Co. v. Federal Trade Commission*, 729 F.2d 128 (2d Cir. 1984).

30. Federal Trade Commission (FTC), "Statement of FTC Acting Bureau of Competition Director Maribeth Petrizzi on Bureau's Motion to Dismiss Request for Preliminary Relief in Illumina/GRAIL Case," news release, May 21, 2021, https://www.ftc.gov/news-events/news/press-releases/2021/05/statement-ftc-acting-bureau-competition-director-maribeth-petrizzi-bureaus-motion-dismiss-request; FTC, "FTC Seeks to Block Microsoft Corp.'s Acquisition of Activision Blizzard, Inc." news release, December 8, 2022, https://www.ftc.gov/news-events/news/press-releases/2022/12/ftc-seeks-block-microsoft-corps-acquisition-activision-blizzard-inc.

31. FTC, "Policy Statement Regarding the Scope of Unfair Methods of Competition Under Section 5 of the Federal Trade Commission Act Commission File No. P221202" (Washington DC: FTC, 2022), https://www.ftc.gov/system/files/ftc_gov/pdf/P221202Section5PolicyStatement.pdf; FTC, "FTC Announces Rule Banning Noncompetes," news release, April 23, 2024, https://www.ftc.gov/news-events/news/press-releases/2024/04/ftc-announces-rule-banning-noncompetes.

32. Senator Mike Lee, "Sens. Lee Tillis Grassley Introduce SMARTER Antitrust Reform," news release, October 27, 2020, https://www.lee.senate.gov/2020/10/sens-lee-tillis-grassley-introduce-smarter-antirust-reform.

33. One Agency Act, H.R.384, 119th Cong. (2025), https://www.congress.gov/bill/119th-congress/house-bill/384.

34. Aidan Mackenzie, "How NEPA Will Tax Clean Energy" (Institute for Progress, July 2024), https://ifp.org/how-nepa-will-tax-clean-energy/.

35. Executive Office of the President Council on Environmental Quality (EOP CEQ), "Length of Environmental Impact Statements (2013-2018) (Washington DC: EOP, 2020), https://ceq.doe.gov/docs/nepa-practice/CEQ_EIS_Length_Report_2020-6-12.pdf.

36. Environmental Protection Agency (EPA), *State College Area Connector Project* (EIS No. 20260019, Washington DC: EPA, 2026), EPA EIS Database, https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=550981.

37. EPA, *Air Force Maui Optical and Supercomputing Site Small Telescope Research Facility* (EIS No. 20250193, Washington DC: EPA, 2026), EPA EIS Database, https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=546272.

38. Joseph S. Shapiro and Reed Walker, "Is Air Pollution Regulation Too Stringent? Evidence from US Offset Markets," CES Working Paper No. 23-27, Center for Economic Studies, U.S. Census Bureau, June 2023, https://www2.census.gov/ces/wp/2023/CES-WP-23-27.pdf.

39. U.S. Environmental Protection Agency, *Air Pollutant Emissions Trends Data* (National Tier 1 CAPS Trends, NOx emissions from highway vehicles, 2024; accessed August 18, 2026), https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data.

40. Ibid.

41. Trelysa Long, "No, Reviving the Robinson-Patman Act Will Not Lead to More Competition or a Better Economy" (ITIF, November 2024), https://itif.org/publications/2024/11/25/reviving-robinson-patman-act-will-not-lead-to-more-competition-better-economy/.

42. See Robert D. Atkinson, *Big is Beautiful: Debunking the Myth of Small Business*, (Cambridge: MIT Press, 2019).

43. Robert D. Atkinson, "Antitrust Can Hurt U.S. Competitiveness," *Wall Street Journal*, July 5, 2021, https://www.wsj.com/opinion/antitrust-can-hurt-u-s-competitiveness-11625520340.

44. Information Technology and Innovation Foundation, "iRobot Bankruptcy and Planned Sale to China-Based Entity Show Risks of Misguided Antitrust Policy, Says ITIF," news release, December 15, 2025, https://itif.org/publications/2025/12/15/irobot-bankruptcy-and-planned-sale-to-china-based-entity-show-risks-of-misguided-antitrust-policy-says-itif/.

45. "China Vows to Rein In Intense Competition, Build Unified Market," *Bloomberg News*, July 1, 2025, https://www.bloomberg.com/news/articles/2025-07-01/china-vows-to-rein-in-intense-competition-build-unified-market.

46. Senator Amy Klobuchar, "After Weak Live Nation-Ticketmaster Antitrust Deal, Klobuchar Introduces Legislation to Ensure Antitrust Settlements Benefit Consumers, Workers, and Small Businesses—Not Special Interests," news release, March 17, 2026, https://www.klobuchar.senate.gov/public/index.cfm/2026/3/after-weak-live-nation-ticketmaster-antitrust-deal-klobuchar-introduces-legislation-to-ensure-antitrust-settlements-benefit-consumers-workers-and-small-businesses-not-special-interests.

47. Jonathan M. Barnett, "Revisiting Antitrust in the Age of Great-Powers Competition," *Network Law Review*, Fall 2025, https://www.networklawreview.org/barnett-great-power-competition/.

48. Office of Technology Assessment, *Industry, Technology and Environment* (Washington DC: 1994).

49. Stuart Benjamin and Arti Rai, "Structuring U.S. Innovation Policy: Creating a White House Office of Innovation Policy" (ITIF, June 2009), https://itif.org/publications/2009/06/24/structuring-us-innovation-policy-creating-white-house-office-innovation/.

50. Lina Khan and Rana Foroohar, "The Future of American Innovation: A Conversation with Lina Khan," Carnegie Endowment, streamed live on March 27, 2024, YouTube video, https://www.youtube.com/watch?v=dP5b82879KM.

51. ITIF National Power Industry Series, https://itif.org/power-industries.

Notes for Mobilizing for Techno-Economic War, Part 8: Transforming Industrial Policy Organization

1. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.

2. Ibid.

3. Milton Friedman, "Interview," *Commanding Heights*, PBS, 2000, https://www.pbs.org/wgbh/commandingheights/press_site/people/friedman_intv.html.

4. Winston Churchill, "The Sinews of Peace" (speech, Westminster College, Fulton, Missouri, March 5, 1946), https://www.nationalchurchillmuseum.org/sinews-of-peace-iron-curtain-speech.html.

5. U.S. Department of State, Office of the Historian, "NSC-68, 1950," *Milestones in the History of U.S. Foreign Relations*, https://history.state.gov/milestones/1945-1952/NSC68.

6. Robert D. Atkinson, "Squaring the Trump Circle: Free Markets and Tariffs," *In the Arena*, May 8, 2025, https://www.policyarena.org/p/squaring-the-trump-circle-free-markets.

7. Corelli Barnett, *The Collapse of British Power* (London: Faber, 1972), 85.

8. Andrew Reamer, "Before the U.S. Tariff Commission: Congressional Efforts to Obtain Statistics and Analysis for Tariff-setting, 1789–1916," in *A Centennial History of the United States International Trade Commission* (Washington, D.C.: U.S. International Trade Commission, 2017), 33–69, https://www.usitc.gov/publications/other/centennial_book/chapter2.pdf.

9. Andrew D. Reamer, 2020, "The Origins of the Survey of Current Business," *Survey of Current Business*, Bureau of Economic Analysis, vol. 100(10), pages 1–4, October, https://ideas.repec.org/a/bea/beascb/v100y2020i10p4.html.

10. Employment Act of 1946, Pub. L. No. 79-304, 60 Stat. 23 (1946), https://www.govinfo.gov/link/statute/60/23.

11. Ibid.

12. Ibid.

13. Bureau of Industry and Security, "Industrial Base Assessments," U.S. Department of Commerce, accessed July 10, 2026, https://www.bis.doc.gov/index.php/other-areas/office-of-technology-evaluation-ote/industrial-base-assessments.

14. The U.S. government conducted such analysis more before the New Deal. For example, see a very insightful analysis of the U.S. manufacturing economy in 1900: U.S. Census Bureau, "1900 Census: Volume VII. Manufactures, Part 1. United States by Industries," last modified March 1, 2016, https://www.census.gov/library/publications/1902/dec/vol-07-manufactures.html.

15. Andrew Reamer, "The Role of Statistics in U.S. Economic Policy: Assessment and Agenda for Action" (presentation, Committee on National Statistics, Washington, D.C., May 6, 2010), http://www.brookings.edu/~/media/Files/rc/speeches/2010/0506_economy_reamer/0506_economy_reamer.pdf.

16. The Employment Act of 1946, which established many of the statistical agencies and programs, was silent on competitiveness.

17. Robert D. Atkinson and Stephen Ezell, "Promoting European Growth, Productivity, and Competitiveness by Taking Advantage of the Next Digital Technology Wave" (ITIF, March 2019), https://itif.org/publications/2019/03/26/promoting-european-growth-productivity-and-competitiveness-taking-advantage.
18. U.S. Bureau of Economic Analysis, Real Gross Domestic Product (billions of chained 2017 dollars, seasonally adjusted annual rate, quarterly; accessed July 10, 2026), FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/series/GDPC1; Sanya Bahal et al., "The Federal Statistical System Provides Immense Value—and Faces Significant Challenges," Bipartisan Policy Center, November 19, 2025, https://bipartisanpolicy.org/explainer/the-federal-statistical-system-provides-immense-value-and-faces-significant-challenges/.
19. Data.gov, catalog search results for "motor vehicles" (accessed July 10, 2026), https://catalog.data.gov/?q=motor+vehicles&sort=relevance.
20. Réka Juhász, Nathan J. Lane, and Dani Rodrik, "The New Economics of Industrial Policy" (NBER Working Paper no. 31538, National Bureau of Economic Research, August 2023), https://drodrik.scholars.harvard.edu/publications/new-economics-industrial-policy; Noah Smith, "Updated Thoughts on Industrial Policy," Noahpinion, April 20, 2026, https://www.noahpinion.blog/p/updated-thoughts-on-industrial-policy.
21. Mariana Mazzucato's official website, accessed July 10, 2026, https://marianamazzucato.com/.
22. Bentley Allan, "Canada at the Frontier: A Framework for Industrial Policy" (Centre for Industrial Policy, April 2026), https://centreforindustrialpolicy.ca/brief/canada-at-the-frontier/; Kathryn Anne Edwards, "Whole Child, Whole Day, Whole Year: Assembling a Comprehensive Child Development System for America" (Roosevelt Institute, June 2025), https://rooseveltinstitute.org/publications/whole-child-whole-day-whole-year/.
23. Industrial Policy Group, "Research and Writing," accessed July 10, 2026, https://www.industrialpolicygroup.com/research.
24. One organization that is in the right direction is the Industry Studies Association, an association of academics studying industry. But its work is usually one level of abstraction up from what policy makers could actually use to make decisions. See: Industry Studies Association, "2025 MIT Conference Recap," June 6, 2025, https://www.industrystudies.org/news/2025-conference-recap.
25. Harvard University Department of Economics, "Courses, Tutorials and Seminars," accessed July 10, 2026, https://www.economics.harvard.edu/courses-tutorials-and-seminars.
26. Harvard University Department of Economics, "Program Requirements," accessed July 10, 2026, https://www.economics.harvard.edu/graduate-program-requirements.
27. Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983), https://www.amazon.com/Reflective-Practitioner-Professionals-Think-Action/dp/0465068782.
28. Ian Fletcher and Marc Fasteau, "The Architecture for a Comprehensive US Industrial Policy," *Industrial Policy for the United States*, April 7, 2026, https://industrialpolicyus.substack.com/p/the-architecture-for-a-comprehensive.
29. Robert D. Atkinson and Clyde Prestowitz, "China's Reaction to the Pandemic Shows Why the U.S. and Its Allies Need a NATO for Trade," *The Washington Post*, May 21, 2020, https://www.washingtonpost.com/opinions/2020/05/20/chinas-reaction-pandemic-shows-why-us-its-allies-need-nato-trade/.
30. John Barrasso and Joni K. Ernst, letter to Teri L. Donaldson, Inspector General, U.S. Department of Energy, regarding the transfer of vanadium redox battery technology to China, September 14, 2022, https://www.energy.senate.gov/services/files/4F5B0769-8175-4481-BEB8-72D8F4C42ADD.

31. Reda Cherif, Fuad Hasanov, and Gary Xie, *Institutions for Industrial Policy: The Foundation of Economic Development* (IMF Working Paper no. 26/63, International Monetary Fund, March 2026), p. 8, https://www.imf.org/-/media/files/publications/wp/2026/english/wpiea2026063-source-pdf.pdf.
32. Ibid, 11.
33. Ibid, 13.
34. Brandi Vincent, "DOD Officially Launches New Economic Defense Unit to Mesh Military Aims With Global Financial Sway," *DefenseScoop*, April 10, 2026, https://defensescoop.com/2026/04/10/dod-economic-defense-unit-edu-steve-feinberg-pentagon/.
35. "The EDU will issue grants, loans, options, equity investments, and purchase commitments to accelerate US defense production through commercial-like deal structuring that also includes private capital commitments and incentive structures," Thomas Daley, Daniel Cook, David Lacker, and Frederick La Violette, "DOW's Economic Defense Unit: Top Points for Defense and Defensetech Companies," DLA Piper, April 7, 2026, https://www.dlapiper.com/en-us/insights/publications/2026/04/dows-economic-defense-unit-top-points.
36. Robert D. Atkinson, "Why the United States Needs a National Advanced Industry and Technology Agency" (ITIF, June 2021), https://itif.org/publications/2021/06/17/why-united-states-needs-national-advanced-industry-and-technology-agency/.
37. Stephen J. Ezell, Adams B. Nager, and Robert D. Atkinson, *Contributors and Detractors: Ranking Countries' Impact on Global Innovation* (ITIF, January 2016), 52, http://www2.itif.org/2016-contributors-and-detractors.pdf.
38. In the early 1980s, Rep. George Brown (D-CA), a subcommittee chair on the House Science Committee, proposed creating a similar entity. Even though there was strong support from the engineering community, and grudging acceptance by NSF, the bill did not progress. See: National Technology Foundation Act of 1985, H.R. 745, 99th Cong. (1985), https://www.govtrack.us/congress/bills/99/hr745.
39. It is difficult to accurately measure productivity in international traded sectors unless the government can accurately distinguish price (including exchange rate changes) from quality changes on imports. BLS has developed a prototype survey to measure this, but has not received the funding to implement it. Lack of this data distorts overall productivity and GDP measures.

    BLS used to produce timely, high-quality international comparisons of labor force, productivity, hourly compensation, and prices for many industrialized countries, but was terminated due to budget cuts. While the Conference Board has taken up production of these statistics, access requires a paid subscription. See: "The Conference Board International Labor Comparisons," The Conference Board, accessed June 22, 2021, https://conference-board.org/ilcprogram.

    What is the location and extent of U.S. multinational overseas facilities? How much capital equipment do they operate? How much R&D is being done? How many employees do they have and what are the wage levels? Where do they sell this output (in other nations, or within the United States)?
40. Datenna, "Structured, Verified Data Intelligence on China," accessed July 10, 2026, https://www.datenna.com/; WireScreen, "Intelligence & Insight on China's Business," accessed July 10, 2026, https://www.wirescreen.ai/.
41. "Asymmetric Competition: A Strategy for China & Technology" (China Strategy Group, Fall 2020), https://beta.documentcloud.org/documents/20463382-final-memo-china-strategy-group-axios-1.
42. Paul J. Bracken, "Net Assessment: A Practical Guide," *United States Army War College Quarterly*, vol. 36, no. 1 (Spring 2006): 90–100, https://www.hsdl.org/?view&did=460780.
43. Gary P. Pisano and Willy C. Shih, "Does America Really Need Manufacturing?" *Harvard Business Review*, March 2012, https://hbr.org/2012/03/does-america-really-need-manufacturing.

44. Industry Studies Association, "2026 Washington, D.C. Conference," June 3–5, 2026, https://www.industrystudies.org/events/2026-washington-dc-conference-v2; Industrial Policy Group, "About the Industrial Policy Group," accessed July 10, 2026, https://www.industrialpolicygroup.com/about.
45. Robert D. Atkinson, "Why America Needs a National Competitiveness Council" (ITIF, December 2021), https://itif.org/publications/2021/12/13/why-america-needs-national-competitiveness-council/.
46. Robert Atkinson, "Why Neither Party Focuses on the Key Economic Issue: Enterprise Capabilities," (ITIF, July 2020) https://itif.org/publications/2020/07/11/why-neither-party-focuses-key-economic-issue-enterprise-capabilities/.
47. Richard Pipes, *Survival is Not Enough: Soviet Realities and America's Future*, (New York, Simon and Schuster, 1984).
48. Ibid.
49. Ibid.
50. Ibid.
51. Robert D. Atkinson, "Mobilizing for Techno-Economic War, Part 1: The Case for Policy Transformation," ITIF, February 2, 2026, https://itif.org/publications/2026/02/02/mobilizing-for-techno-economic-war-part-1-the-case-for-policy-transformation/.

Notes for Mobilizing for Techno-Economic War, Part 9: Finding the Political Will to Transform America's Economic System

1. Robert D. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance" (ITIF, November 2025), https://itif.org/publications/2025/11/17/marshaling-national-power-industries-to-preserve-us-strength-and-thwart-china/.
2. Andrew Shonfield, *Modern Capitalism: The Changing Balance of Public and Private Power* (Oxford, UK: Oxford University Press, 1969).
3. Alfred DuPont Chandler, Jr., *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, MA: The Belknap Press, 1994).
4. Calvin Coolidge, Address to the American Society of Newspaper Editors, Washington, D.C., January 17, 1925, https://www.presidency.ucsb.edu/documents/address-the-american-society-newspaper-editors-washington-dc.
5. Milton Friedman, "A Friedman Doctrine—The Social Responsibility of Business Is To Increase Its Profits," *The New York Times*, September 1970, https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html.
6. Robert D. Atkinson, "Productivity Growth Still Benefits American Workers; Saying It Doesn't Reduces Support for Technological Innovation" (ITIF, June 2023), https://itif.org/publications/2023/06/27/productivity-growth-still-benefits-american-workers-saying-it-doesnt-reduces-support-for-technology-led-growth/.
7. Paul Polman and Lynn Forester de Rothschild, "Why we need a new kind of capitalism" (World Economic Forum, May 2014), https://www.weforum.org/stories/2014/05/can-capitalism-be-inclusive-sustainable/.
8. Klaus Schwab, "Davos Manifesto 2020: The Universal Purpose of a Company in the Fourth Industrial Revolution" (World Economic Forum, December 2019),

https://www.weforum.org/stories/2019/12/davos-manifesto-2020-the-universal-purpose-of-a-company-in-the-fourth-industrial-revolution/.

9. David M. Smick, "Does American Capitalism Need to Be Reimagined?" *The International Economy*, Winter 2026, https://www.international-economy.com/TIE_W26_CapitalismSymp.pdf.
10. Schwab, "Davos Manifesto."
11. Hewlett Foundation, "Hewlett Foundation announces new, five-year $50 million Economy and Society Initiative to support growing movement to replace neoliberalism," news release, December 8, 2020, https://hewlett.org/newsroom/hewlett-foundation-announces-new-five-year-50-million-economy-and-society-initiative-to-support-growing-movement-to-replace-neoliberalis.
12. David M. Smick, ed., "Does American Capitalism Need to Be Reimagined?" *The International Economy*, Winter 2026, https://www.international-economy.com/TIE_W26_CapitalismSymp.pdf.
13. Ben Harris, "Incentive-Based Government Policies Can Help Address Inequality," in "Does American Capitalism Need to Be Reimagined?" *The International Economy*, Winter 2026, 34–35, https://www.international-economy.com/TIE_W26_CapitalismSymp.pdf.
14. Ibid.
15. Mohamed A. El-Erian, "American capitalism risks becoming too reactive in an increasingly unstable world," in "Does American Capitalism Need to Be Reimagined?," *The International Economy*, Winter 2026, 36, https://www.international-economy.com/TIE_W26_CapitalismSymp.pdf.
16. David R. Malpass, "We need a full upheaval in our institutions to allow capitalism to work better," in "Does American Capitalism Need to Be Reimagined?," *The International Economy*, Winter 2026, 38, https://www.international-economy.com/TIE_W26_CapitalismSymp.pdf.
17. Desmond Lachman, "There would appear to be a strong case for the introduction of a universal basic income coupled with serious reform to current social welfare programs," in "Does American Capitalism Need to Be Reimagined?," *The International Economy*, Winter 2026, 39, https://www.international-economy.com/TIE_W26_CapitalismSymp.pdf.
18. Jeffrey M. Jones, "Image of Capitalism Slips to 54% in U.S." (Gallup, September 2025), https://news.gallup.com/poll/694835/image-capitalism-slips.aspx.
19. Mayra Flores (@mayraflorestx), "Democrats now prefer socialism over capitalism. The Democratic Party is the socialist party, and we all have seen what the leftist socialist ideology has done," TikTok video, June 24, 2026, https://www.tiktok.com/@mayraflorestx/video/7655030163578703134.
20. Branko Marcetic, "American Socialists Aren't Tired of Winning," *Jacobin*, December 13, 2025, https://jacobin.com/2025/12/democratic-socialism-municipal-state-strategy; START, "Economic Justice Organizations," accessed October 21, 2026, https://startguide.org/orgs/orgs04.html.
21. John B. Judis, "Can the Democratic Party become Democratic Socialist?" *Foreign & Domestic*, June 28, 2026, https://open.substack.com/pub/johnbjudis/p/can-the-democratic-party-become-democratic.
22. Richard Eskow, "The Only Ethical Model for AI is Socialism," *Current Affairs*, July 12, 2024, https://www.currentaffairs.org/news/the-only-ethical-model-for-ai-is-socialism.
23. United States Congress, Congressional Progressive Caucus, "Progressive Caucus Announces 'New Affordability Agenda'" (April 2026), https://progressives.house.gov/2026/4/progressive-caucus-announces-new-affordability-agenda.
24. Brad Reed, "Fearing Mass Job Loss, Working-Class US Voters Believe Government Must Act to Prevent Economic Disaster," *Common Dreams*, June 23, 2026, https://www.commondreams.org/news/ai-worker-anxiety-poll.
25. Alex Skopic and Nathan J. Robinson, "You Can't Love America Without Hating Capitalism," *Current Affairs*, July 4, 2026, https://www.currentaffairs.org/news/you-cant-love-america-without-hating-capitalism.

26. Richard Conrad, "Democratic Socialism," *Dollars & Sense*, July 1, 2026, https://open.substack.com/pub/richardc145655/p/democratic-socialism.
27. Robert D. Atkinson, "Mobilizing for Techno-Economic War, Part 3: Transforming Financial Capitalism Into National Power Capitalism," (ITIF, April 2026), https://itif.org/publications/2026/04/13/mobilizing-for-techno-economic-war-part-3-national-power-capitalism/.
28. Atkinson, "Marshaling National Power Industries to Preserve America's Strength and Thwart China's Bid for Global Dominance."
29. Atkinson, "Mobilizing for Techno-Economic War, Part 3."
30. Rodrigo Balbontin and Stephen Ezell, "Mobilizing for Techno-Economic War, Part 6: From Free Trade Agreements to Strategic Techno-Economic Agreements" (ITIF, July 2026), https://itif.org/publications/2026/07/27/mobilizing-techno-economic-war-6-free-trade-agreements-strategic-techno-economic-agreements/.
31. Robert D. Atkinson, "Mobilizing for Techno-Economic War, Part 4: Transforming Education and Workforce Policy" (ITIF, May 2026), https://itif.org/publications/2026/05/13/mobilizing-for-techno-economic-war-part-4-transforming-education-and-workforce-policy/.
32. Robert D. Atkinson, "Mobilizing for Techno-Economic War, Part 7: Transforming Regulatory Policy" (ITIF, September 2026), https://itif.org/publications/2026/09/21/mobilizing-for-techno-economic-war-part-7-transforming-regulatory-policy/.
33. ITIF, National Power Industry Series, https://itif.org/power-industries.
34. Francis Fukuyama, *The End of History and the Last Man* (New York: Free Press, 1992).

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