THE COMPETITIVE EDGE:

A POLICYMAKER'S GUIDE TO DEVELOPING A NATIONAL STRATEGY

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The Competitive Edge: A Policymaker's Guide to Developing a National Strategy

BY ROBERT D. ATKINSON | DECEMBER 2017

Few nations, including the United States, have developed sophisticated competitiveness strategies.

In a deeply integrated global economy with a growing number of industries tradeable across borders, more nations are competing for high-value-added, traded-sector industries. These nations know that losing the competitiveness race means fewer jobs and slower growth. Despite this, few nations, including the United States, have developed sophisticated competitiveness strategies. Rather, most competitiveness strategies focus on broad measures such as improving the business environment or supporting better factor inputs for firms. While necessary, these steps do not constitute an effective competitiveness strategy. Policymakers must go much deeper. An effective competitiveness strategy starts with a detailed "SWOT" analysis—assessing strengths, weaknesses, opportunities, and threats—for key traded industries and the country's overall innovation system. It then tailors policy responses according to the findings.

Part I of this report provides an overview of competitiveness, including what it is, why nations need it, and how countries become more or less competitive. It then examines the past and current competitiveness performance of the United States and a selection of other developed and developing nations, highlighting how much less competitive the U.S. economy is today compared to two decades ago. It then discusses the history of competitiveness policies since World War II, how they have evolved, and how they differ between nations.

Part II provides a framework for thinking about competitiveness and national competitiveness policies, including whether nations actually compete and, if they do, on what basis. In addition, given the importance of the work of Harvard's Michael Porter to the competitiveness field, it describes the original Porter framework and explains why it is no longer sufficient to guide national competitiveness efforts. It then examines why nations need a competitiveness strategy and explains why market forces alone will not lead to optimal levels of competitiveness. Finally, it discusses competitiveness policy as strategic positioning, as opposed to simply capabilities development, and it lays out a number of key strategic questions all nations need to address before implementing a serious competitiveness strategy.

Part III lays out a framework for a competitiveness agenda that most nations could use to inform their own agendas. This includes policy recommendations related to market framework conditions, factor inputs, organization incentives, competitiveness-focused R&D investments, industry-specific sectoral policies, trade policy, and finally government organization to develop and implement effective competitiveness policies.

PART I: AN OVERVIEW OF COMPETITIVENESS

This section provides an overview of competitiveness, first defining it and then explaining why nations benefit from greater levels of it.

What Is Competitiveness?

With the increased globalization of the economy, the term "competitiveness" has become ubiquitous. Virtually every nation wants to be more competitive. But what does it mean?

Most have defined the term as synonymous with productivity. When Harvard's Michael E. Porter published *The Competitive Advantage of Nations* in 1990, he stated that, "The only meaningful concept of competitiveness at the national level is productivity."[1] This has since become the de facto definition. The World Economic Forum's *Global Competitiveness Report* defines competitiveness as "the set of institutions, policies, and factors that determine the level of productivity of a country."[2] And the IMD World Competitiveness Center's *World Competitiveness Yearbook* defines competitiveness as how an "economy manages the totality of its resources and competencies to increase the prosperity of its population."[3]

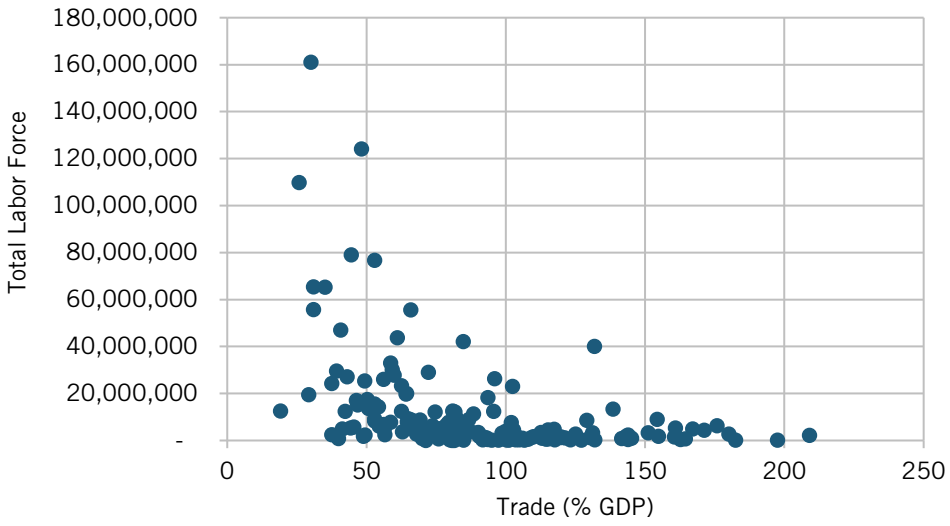
Competitiveness is not synonymous with productivity. Before explaining why this is a misleading and inaccurate definition of competitiveness, it's useful to understand why Porter initially defined competitiveness in this way rather than as having something to do with trade and the ability to compete in global markets. Porter worried that nations seeking to become more competitive would do so by adopting "low-road" strategies: eliminating needed regulations, suppressing wages, and cutting investment in needed functions. To reduce that risk, he defined competitiveness as higher productivity, not simply as a trade surplus, which countries could obtain by taking either the low or high road.

While his intention was right, his definition was highly misleading and it leads toward odd and inaccurate national competitiveness rankings and unfocused policy recommendations. To see why, it's important to start with an understanding of the difference between traded and non-traded sectors. A traded industry is one in which most firms sell a significant share of their output outside a particular geographical area. For example, a printing firm in Michigan that sells printed materials to customers across the United States would be a traded firm from the perspective of the Michigan economy, but a non-traded 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 both the state and national perspective. And a local barber shop in Texas would be a non-traded sector from both perspectives.

Competitiveness is not synonymous with productivity.

Competitiveness, therefore, relates to the ability of a region's or nation's traded sectors to thrive. But how do we define thrive? One definition could be the number of jobs. However, if one nation's traded sector is more productive than another nation's, it might have fewer jobs, but be more competitive. Another definition could be total value-added produced by traded sector firms (value-added measures the difference between final sales and production inputs the firm purchases) as a share of gross domestic product (GDP). This is getting closer to the right definition, but it's not fully accurate. First, it fails to control for the size of a nation's traded-sector economy. This is important because the larger an economy, the smaller the share of the economy that is traded. To see why, consider that a small economy like Denmark is not likely to have its own car or appliance industries so it must trade for them by exporting other goods and services. In contrast, a large economy like the United States has both, and most cars and appliances are produced and consumed in the nation. So, the share of a nation's economy that is comprised of exports is influenced significantly by the overall size of the economy. As Figure 1 shows, there is a 0.39 correlation between the size of the labor force and total trade (exports plus imports) as a share of GDP.

Figure 1: Relationship Between Trade and Size of the National Economy[4]



So, one definition of competitiveness could be whether a nation runs a trade surplus or a deficit. The European Commission is getting at this when it defines competitiveness as "the ability of companies to compete in domestic and global markets."[5] But a narrow focus on trade deficits or global market share of exporting firms fails to control for whether or not a nation is subsidizing its exporters (e.g., by keeping the value of its currency low, keeping wage levels artificially low, giving cash subsidies to exporters, etc.) or erecting barriers to imports (e.g., tariffs and non-tariff barriers). If a nation runs a trade surplus through such mercantilist means, then its surplus would not be a reflection of the true competitiveness of its traded-sector firms. Rather, it would be a reflection, at least in part, of the extent of mercantilist aid and protection its traded-sector firms receive.

Putting this together, we now get closer to the true definition of competitiveness: the ability of a nation to have a strong currency and/or also to run a trade surplus in goods or services. In international trade theory, all else being equal, nations should not run sustained trade surpluses or deficits because currencies should adjust to bring trade into balance. So, in a textbook world, competitiveness would only be defined by the relative strength of a nation's currency. A strong currency achieved while running balanced trade would mean that the nation can import relatively more than it would otherwise. Its "terms of trade" would be strong.

But there is one more factor that needs to be brought into this definition, and that is government-determined "terms of trade" factors. If a nation runs a trade surplus but this results from mercantilist policies, then its business enterprises collectively are not as competitive as the surplus would suggest. These factors reflect all government applied "discounts" to exports and "charges" on imports. The former includes suppressed currency values, suppressed wages in export sectors, artificially low taxes on traded-sector firms, subsidies to exporting firms, and coerced foreign intellectual property transfer. These all lower the costs of traded-sector-firm exports, but do so by a transfer payment from the nation's citizens to foreign consumers. As such, they do not represent a net welfare gain, at least in the short-term. The latter include both tariff and non-tariff barriers to imports that impose higher costs or other market limitations on imports. Again, these provide traded-sector firms with an unfair advantage which comes by increasing costs or reducing choices for the nation's consumers.

Thus, under this definition, a nation may run a large trade surplus, but if it does so by providing "discounts" to its exporters and imposing "charges" on importers, it would not be truly competitive. Such policies reduce its terms of trade by requiring its residents to unnecessarily forfeit some of their income to foreign consumers or domestic producers. Thus, the fact that a mercantilist nation like China runs a large trade surplus does not mean it is truly competitive: As discussed below, much of its surplus is likely related to its mercantilist policies.

Even when a nation's trade balance improves it may not be because a nation gets more competitive. We can see this by looking at past trends in the U.S. trade deficit. Many

argued that the U.S. economy became more competitive toward the end of the 1980s as its large trade deficit shrank. But the reduced trade deficit was in part brought about through the lower value of the dollar in the last half of the 1980s that lowered the price of exports and raised the relative price of imports. This just made the U.S. terms of trade worse (the United States could buy fewer imports for the same quantity of exports). Therefore, true U.S. competitiveness was very likely unchanged even though the trade deficit fell. Likewise, the fact that the United States runs a large trade deficit today but many of its trading partners, especially China, run surpluses by means of massive "discounting" of exports and "charging" for and blocking imports means that the U.S. economy is likely more competitive than a simple examination of the trade deficit would indicate; though clearly the U.S. economy would still have a serious competitiveness challenge even in the absence of these unfair foreign policies.

Competitiveness is the ability of a nation's non-mineral-based traded sectors to effectively compete in global markets in the absence of subsidies and government protections, while receiving a strong price premium that enables strong terms of trade.

There is one important caveat to this definition of competitiveness: the extent to which the trade balance relates to natural resource exploitation. For a nation like Saudi Arabia, for example, which has vast quantities of oil, running a trade surplus should be easy—it doesn't have to import any oil and it can export oil as it is a fungible and relatively scarce commodity (although less scarce than it was a decade ago). But despite this the Saudi economy is actually not very competitive as it runs trade deficits in non-mineral industries (e.g., agriculture, manufacturing, and services). In fact, it is extremely hard for nations with large amounts of mineral production to be truly competitive because of the "Dutch disease." This refers to the negative impact on an economy of anything that gives rise to a significant inflow of foreign currency, such as the discovery and exploitation of large oil reserves, that in turn raises the value of the currency, making produced exports more expensive on global markets.

This gets to the full definition of competitiveness: the ability of a nation's non-mineral-based traded sectors to effectively compete in global markets in the absence of subsidies and government protections, while receiving a strong price premium that enables strong terms of trade. To be sure, most conventional neoclassical economists will reject this definition, arguing that a nation's trade balance is simply a mathematical function of its savings rate. But, as shown below, this is wrong.

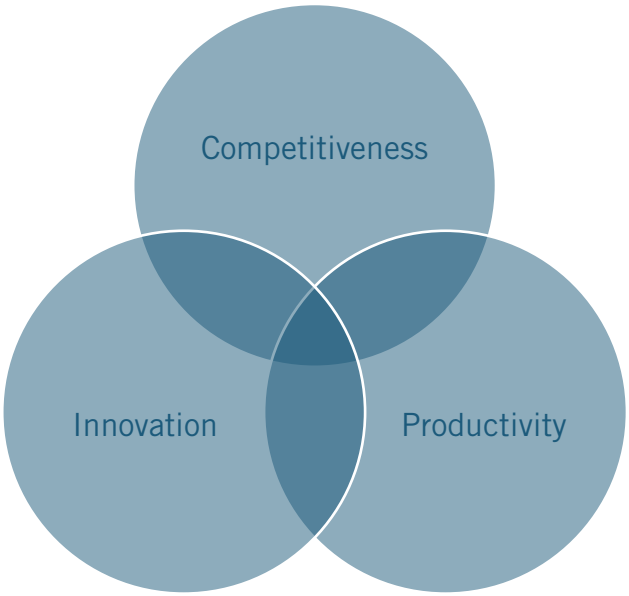
It's not just the trade deficit that determines competitiveness. Heiner Flassbeck writes that, "As long as countries falling behind have the option of adjusting their exchange rates in accordance with inflation differentials, national competitive advantage is impossible to maintain."[6] What Flassbeck is saying is that as long as currency adjusts, sustained trade deficits and surpluses should not be possible. But this too is the wrong way to frame the issue. Yes, currency devaluation can reduce or eliminate a trade deficit, but that doesn't change the nation's competitiveness, which is more about the terms of trade a nation enjoys with other nations.

So, are Porter and his followers wrong? Does productivity play no role in competitiveness? To be sure, productivity growth 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 or limits on imports. But productivity growth can also be largely unrelated to competitiveness if it is concentrated in non-traded sectors. Imagine a nation with strong productivity growth but almost all of it in non-traded sectors like grocery stores, electric utilities, and nursing homes. National income and wages would go up as relative prices in these sectors fall, but firms in traded sectors would only see modest reductions in their costs based on the extent of purchased inputs from non-traded firms.

Competitiveness is also sometimes conflated with innovation, with some arguing that levels of innovation determine competitiveness.[7] But while related, innovation is different. Innovation means developing an improved product (a good or service), production process, marketing method, or organizational method. Just as with productivity, if this innovation occurs in traded sectors, a nation's economy will become more competitive. But innovation in non-traded sectors will have less impact on competitiveness because by definition their output is not sold outside local borders. Figure 2 illustrates the relationship between the three concepts.

Figure 2: The Relationship Between Competitiveness, Innovation, and Productivity



The History of Competitiveness as a Policy Issue

Ever since Adam Smith wrote that, "The whole capital employed, therefore, in such a roundabout foreign trade of consumption will generally give less encouragement and support to the productive labor of the country than an equal capital employed in a more direct trade of the same kind," economists have considered the issue of economic competition between nations.[8] When, 50 years later, David Ricardo wrote that, "Under a system of perfectly free commerce, each country naturally devotes its capital and labour to such employments as are most beneficial to each. This pursuit of individual advantage is admirably connected with the universal good of the whole," he established the frame that

many economists still rely on almost 200 years later when thinking about trade and competitiveness.[9] Ricardo used the famous example of England selling Portugal textiles and Portugal selling England wine to highlight the notion of comparative advantage. Almost 200 years later most of conventional neoclassical trade theory still reflects this limited and misleading view, and therefore significantly holds back more sophisticated thinking about competitiveness. For as John Alic writes, "once a comparative advantage perspective has been adopted, it follows immediately that a trading nation cannot be 'uncompetitive.' Nor does the notion of competitive decline across the board make sense."[10] According to this framework, if the United States loses global market share in advanced industries but exports more waste paper and tourism services, then so be it; that must be its comparative advantage.

"Once a comparative advantage perspective has been adopted, it follows immediately that a trading nation cannot be 'uncompetitive.' Nor does the notion of competitive decline across the board make sense."

Nations have long been interested in competitiveness, although it was not usually called that. Case in point, Alexander Hamilton's 1791 *Report on the Subject of Manufactures*, which introduced the infant industry argument and why federal government needed to support nascent manufacturers in order to build a new nation that could hold its own against global powers like England and France. But by and large most national economies were mostly self-contained, with relatively little trade, at least compared to today's levels, until the mid-1970s. Not surprisingly, until then there was little focus on competitiveness. Prior to the expansion of railroads in the late 1800s most economies were regional in nature, with most production and consumption taking place in areas relatively limited in geographic scope. In the United States, this might have been across a few states; in Europe, it was mostly within individual nations or perhaps across a few small nations. As railroads and steel-based machine tools enabled the factory economy to emerge in the late 1800s, the size of trading regions expanded. However, Europe and the United States were still composed of distinct regional economies. In the United States, there were significant differences between the agricultural and resource-based economy of the South and West and the manufacturing economy of the Northeast and Midwest. It was not until the rise of air travel, widespread deployment of telephony, highway systems, and air conditioning (which made work in hot Southern areas more comfortable) after World War II that the European and U.S. economies each became tied together into a continental and national system respectively. U.S. companies now bought and sold from suppliers and customers throughout the nation, while European firms did so on the European continent. As a result, U.S. international trade went from around 10 percent of GDP in the mid-1960s to more than 30 percent today.

One of the most important enablers of the growth of international trade was a significant drop in the costs of shipping and communications. With the deployment of global fiber-optic networks and reform of the telecom sectors in many nations, the costs of transmitting information plunged while the quality increased.[11] A three-minute telephone call between London and New York City cost over $100 in today's dollars in 1964, but less than 50 cents by the year 2000, and free today with Internet telephony.[12] By the end of the 1990s, information and communications technology (ICT) had gotten cheap enough, powerful

enough, and pervasive enough to begin to transform information-based industries.[13] Containerization lowered the prices of ocean transport.[14] The rise of air transport, including new business models such as FedEx, meant that an increasing share of high-value, low-weight products could be more easily traded. As a result, the value of air-shipped trade grew from almost nothing in 1950 to nearly 30 percent of all international shipping by 1998.[15] And lower air travel costs made it easier for companies to coordinate production and sales around the world. In 1930, transatlantic air travel cost 90 cents per passenger mile, compared with just 14 cents in 2004 (in constant dollars).[16]

Policy changes helped. With the Kennedy, Tokyo, and Uruguay rounds of market opening under the General Agreement on Tariffs and Trade (GATT) from the 1960s to the early 1990s, global tariffs fell dramatically.[17] And with the decline of Communism and the integration of the former Soviet Union and China into the global economy, global markets became much larger.

It was only with the emergence of what we today term globalization that most nations began to focus on competitiveness. Although the term globalization appears to have been first used in the early 1960s, it wasn't until the late 1970s and early 1980s that it become part of the popular vernacular.[18] For example, Theodore Levitt wrote a widely read 1983 *Harvard Business Review* article titled "The Globalization of Markets" in which he said, "Gone are accustomed differences in national or regional preference."[19]

While all this contributed to global prosperity, it meant that national economies were more vulnerable not only to short-term disruptions from outflows of finance, but to longer-term competitive challenges. This was a new, and often uncomfortable, reality. In the post-World War II era, an ingrained attitude developed that the U.S. economy was so superior that no other country could conceivably match it. President Truman boasted that "American industry dominates world markets and our workmen no longer need fear the competition of foreign workers."[20] Indeed, through the early 1970s American industry was globally preeminent. Foreign competition was hardly even on the radar screen of executives or policymakers. The Japanese were known for their toys and transistor radios. The Germans might make good cars and machines, but few Americans bought them. Third-world nations sold America coffee and minerals. But as true globalization emerged in the mid-1970s, U.S. companies were confronted with robust overseas competitors. Epitomized by the Japanese invasion of the automobile market, where Japanese firms went from 9.4 percent of the American market in 1975 to 20.1 percent in 1985, American industry found itself on the defensive. But it wasn't just "rust belt" industries such as auto, steel and textiles that were threatened; high-tech industries such as semiconductors faced stiff competition. As a result of this new competition, the U.S. goods trade balance went from a surplus of $2.6 billion in 1970 to a deficit of $159 billion in 1987.[21] The United Kingdom had gone through a similar but even worse process of deindustrialization starting a decade earlier. But even nations that might be running trade surpluses could not relax, for once more industries became contestable, more companies in other nations sought to contest them and more nations sought to help their companies win. As such, no nation could afford to

blithely ignore the competitiveness challenge. As Rep. Derek Kilmer (D-WA) states, when he was director of an economic development organization in his home district in Washington state, they posted a sign that said, "We are competing with everyone, everywhere, every day, forever." This captures the new reality that most places around the world face, whether they realize it or not.

As a result, by the late 1970s there was increasing concern about competitiveness in the United States. During the presidency of Jimmy Carter from 1977–1981, the federal government began to focus in a more serious way on competitiveness. Initially, the Carter administration tried to respond to these challenges with conventional macroeconomic economic policy tools, but some policymakers gradually realized they needed to do more. One result was the initiation in 1979 of the Domestic Policy Review of Industrial Innovation, which attempted a comprehensive review of the problem and identified a number of solutions. In large part motivated by this review, in 1980 Congress passed the Stevenson-Wydler Technology Innovation Act and the Bayh-Dole Act. The latter legislation permitted institutions receiving federal funds for research to own the rights to any intellectual property produced. The former legislation stated that "technology and industrial innovation are central to the economic, environmental, and social well-being of citizens of the United States."[22] The bill covered a number of initiatives, including the Cooperative Generic Technology Program designed to fund precompetitive research in partnership with industry. The Policy Review highlighted the fact that because of competitive pressures, industry underinvested in early stage, more risky research that could have large positive payoffs for the nation's economy.[23] Before it could be established, however, the Reagan administration zero-budgeted the program and Congress did not restore funding.

In the post-World War II era, an ingrained attitude developed that the U.S. economy was so superior that no other country could conceivably match it.

When the Reagan administration took office, it was committed to shrinking the size of government and reducing regulations and taxes on enterprises so they could be more competitive. However, because increased competitive threats from Japan and Europe continued unabated, the administration also sought to identify policy tools to productively help boost U.S. competitiveness especially through technological innovation. Toward that end, it supported a number of key initiatives. One was the passage of legislation in 1981 establishing a tax credit for business research and development expenditures. The administration also supported the establishment of the Small Business Innovation Research Program in 1982 and, in 1984, the passage of the Cooperative Research and Development Act. In addition, the Reagan administration established the Commission on Industrial Competitiveness. Chaired by John Young, CEO of Silicon Valley company Hewlett-Packard, the commission highlighted how the United States had lost its international competitive position and how innovation was a key to regaining it.[24]

The commission was not the only group shining a spotlight on the issue of competitiveness. As Kent Hughes's book, *Building the Next American Century*, documents, a number of reports and task forces sounded the alarm.[25] Congress created the Competitiveness Policy Council in 1988 to give lawmakers advice. New York Gov. Mario

Cuomo launched his own competitiveness task force. And as mentioned above, Michael Porter's 1990 book, *The Competitive Advantage of Nations,* was highly influential in raising awareness of the issue, although as it turned out, its influence was much stronger in other nations. Many hired Porter and his team to apply his model to their own country.

As a result of this attention, Congress passed a number of important laws, including the Federal Technology Transfer Act of 1986, the National Defense Authorization Act for FY1991, the Technology Transfer Improvements and Advancement Act, and the Technology Transfer Commercialization Act. Perhaps most important was the Omnibus Trade and Competitiveness Act of 1988. Among other things, the act created the Technology Administration in the Department of Commerce, reorganized the National Bureau of Standards into the National Institute of Standards and Technology (NIST), and created a number of programs to help industry with innovation, including the Malcolm Baldrige National Quality Award, the Advanced Technology Program, and the Boehlert-Rockefeller State Technology Extension Program. At the same time, the former Congressional Office of Technology Assessment provided Congress with competitiveness analysis and policy options for a variety of industries, such as steel and electronics.[26]

By the time Bill Clinton was elected in 1992, the nation's competitiveness challenge appeared to be receding. Japan was facing its own problems, in part stemming from the collapse of its property bubble, but more importantly by the significant appreciation of the value of the yen, which helped increase its terms of trade but reduced its trade surplus. Europe was preoccupied with its internal market integration efforts (culminating in the Treaty of the European Union signed at Maastricht in 1992) which were hoped would bear fruit sometime in the future. Moreover, with the rise of Silicon Valley as a technology powerhouse and the success of the IT industry and companies such as Apple, Cisco, IBM, Intel, Microsoft, and Oracle, the United States seemed to be back on top, at least when it came to innovation. The pressure to focus on competitiveness abated, particularly as the trade deficit was just 0.41 percent of GDP (compared to 2.47 percent today).[27] Nevertheless, the Clinton administration took some steps to explicitly foster competitiveness. While there had been a White House National Security Council since 1947 to bring high-level coordination to national security matters, economic matters were less well coordinated and the province of a number of different entities. These included the Treasury and Commerce departments and the Council of Economic Advisers. To improve this situation, President Clinton created the National Economic Council, which, among its other functions, was tasked with helping to better integrate competitiveness issues into overall economic policy.

The administration supported a number of innovation-based competitiveness policies, including increasing funding for federal science agencies such as the National Science Foundation (NSF) and the National Institutes of Health (NIH), and supporting specific industrial technology programs at the National Institutes of Technology and Standards, including the Manufacturing Extension Partnership and the Advanced Technology

Program (a program that provided grants to companies to help them develop new technologies).

In part because of the widely held view that America had solved its competitiveness challenge and was back on top, the United States pressed to allow China to become a member of the World Trade Organization in 2000. This meant that China was now open to massive investment by U.S. companies seeking a low-cost, global production platform. However, because China vigorously resisted expanding imports (in part by artificially keeping the value of its currency low and engaging in a wide array of other harmful mercantilist policies), its net exports to the United States soared, leading to the net loss of around 2 million U.S. manufacturing jobs in the 2000s.[28] The entry of a China largely unencumbered by WTO rules, coupled with the broader integration of low-wage nations into the global trading system enabled by the increased ability of companies to effectively manage global supply chains now meant that the challenge to U.S. industrial competitiveness came not just from developed nations such as Japan and Germany, but also from developing ones such as China and Mexico (for manufacturing) and India (for software and services). As a result, the non-petroleum trade deficit swelled to 3.74 percent of GDP in 2005.

Perhaps because of the widely held view that America had solved its competitiveness challenge, the United States pressed to allow China to become a member of the World Trade Organization in 2000.

However, most pundits and officials in Washington, including virtually all economists, blithely ignored the rising threats. In part, as discussed below, this was because they believed that the nations simply did not compete with each other economically. Partly, many were concerned that if they acknowledged that offshoring was causing U.S. job losses it would embolden protectionist forces that wanted to limit global trade. As a result, the George W. Bush administration and many in the corporate community painted the U.S. competitiveness picture in a more positive light than was the case. For example, the American Competitiveness Initiative report, released in 2006 by President Bush's Domestic Policy Council and Office of Science and Technology Policy (OSTP), maintained that "the American economy is today the envy of the world."[29] RAND's 2008 *U.S. Competitiveness in Science and Technology* report, funded by the federal government, confidently affirmed that, "Despite perceptions that the nation is losing its competitive edge, the United States remains the dominant leader in science and technology worldwide."[30] Such optimistic, if not downright Pollyannaish, statements lulled policymakers from taking needed steps to remedy the growing competitiveness challenge. At the same time, the reluctance of the administration to push back on Chinese mercantilist policies and practices sent a green light to Beijing that it could double down on these strategies with impunity.

A closer look at America's competitive situation suggested that not all was well.[31] Many companies were moving production, including R&D and advanced technology production, to other nations. For the first time, the United States was running a trade deficit in high technology goods. And the overall trade deficit skyrocketed.

As the depth of the U.S. competitiveness challenge slowly became more widely understood, somewhat more attention began to be paid to the need for economic policies to spur

innovation-based competitiveness. At first, the view was that accepting nations such as China into the global trading system would lead to the loss of some U.S. industries and jobs (predominately low-wage, commodity-based production) but also to an increase in other jobs (predominately high-wage, innovation-based services). In large part because of the unwillingness of China and many other nations to put in place policies to reduce chronic trade surpluses and to unfairly favor their own advanced industries while discriminating against foreign firms, the United States ended up losing much more production through increased imports than it gained through increased exports. As a result, a few pundits and policymakers slowly awoke to the fact that the nation needed to respond.

With the 2008 election of President Barack Obama, much of the administration's economic efforts were focused on responding to the financial crisis and Great Recession, which themselves were caused in no small part by the competitiveness failure of the U.S. economy in the prior decade as the financial industry desperately poured money into housing as real investment opportunities shrank from lagging U.S. competitiveness.[32] However, the Obama administration was more ideologically oriented than the Bush administration to the government playing at least some proactive role in competitiveness, as reflected in the president's statement, "in order to be globally competitive in the 21st century and to create an American economy that is built to last, we must create an environment where invention, innovation, and industry can flourish."[33]

The Obama administration published an array of reports detailing components of a national innovation strategy. It published *A Strategy for American Innovation* in September 2009 and updated it extensively in February 2011 and in late 2015. In addition, in January 2012, the administration issued a Congressionally-mandated report providing recommendations for improving the *Competitiveness and Innovative Capacity of the United States*. In 2012, the Obama administration released reports on developing *A National Strategic Plan for Advanced Manufacturing* and *Capturing Domestic Competitive Advantage in Advanced Manufacturing*, which articulated steps the United States could take to revitalize its manufacturing competitiveness.

The Obama administration also proposed specific initiatives directed at manufacturing innovation. In March 2012, the president proposed investing $1 billion to create a National Network for Manufacturing Innovation (NNMI) comprised of 15 Institutes for Manufacturing Innovation that would serve as hubs of manufacturing excellence focused around specific technologies.

But while the Obama administration made some efforts in this direction, much of its domestic policy energies, including efforts to convince Congress to act, were devoted to achieving social policy gains, including in health care, immigration, and the environment. Competitiveness policy never became a top administration priority. Moreover, the competitiveness reports were not really careful, analytical strategies of what the challenges and opportunities were facing the U.S. economy; they were largely laundry lists of what the administration was doing or planned to do. And when it came to trade policy, the

administration did relatively little to push back against foreign mercantilism. Indeed, its early inaction signaled to the Chinese leadership that America would not effectively stand up to China's dramatic rise in "innovation mercantilism." As a result, China ramped up its mercantilist policies.

For their part, some conservative, "free market" Republican members of Congress decried long-standing and effective competitiveness programs, such as the Export-Import Bank, as crony capitalism.[34] And many from across the political spectrum pushed for corporate tax reform following the bromide of "broadening the base, lowering the rate" that would tax all industries the same, regardless of whether they faced international competition or not. Many liberals appear to have abandoned any interest in competitiveness, instead focusing on social policy issues such as immigration, health care, abortion, and identity issues of race, gender and sexual orientation. In their view, government policies such as a more progressive tax code, regulations to limit offshoring, and a higher minimum wage are the tonic to restore U.S. prosperity, or at least wage growth for the bottom half of workers. And the Democratic economic agenda is now increasingly grounded in neo-Brandeisian attacks on big corporations, including ones that need scale to compete in tough global markets. For them, small business is good and big is bad, even though big businesses export a significantly higher share of output than small businesses and provide the underpinnings of U.S. competitiveness.[35]

A growing core of the Democratic economic agenda is now grounded in neo-Brandeisian attacks on big corporations, including ones that need scale to compete in tough global markets.

At the same time, however, some members of Congress have taken note of the importance of competitiveness, particularly with the formation of the Senate Competitiveness Caucus, co-chaired by Senators Chris Coons (D-DE) and Jerry Moran (R-KS), and the passage of some important legislation such as the Revitalize American Manufacturing and Innovation Act, the Trade Secrets Protection Act, making the R&D tax credit permanent, and the establishment of the Manufacturing Engineering Education Grant program.

With the election of President Donald Trump, the issue of competitiveness has been highlighted. Much of candidate Trump's focus on "Making America Great Again" was related to making America competitive again. The President's insistence on getting tough with China and renegotiating many bilateral trade agreements has been a reflection of his focus on increasing U.S. competitiveness. As was his use of the bully pulpit to pressure firms to locate or relocate production in the United States. But the risk is that President Trump's focus on competitiveness morphs into protectionism and isolationism, rather than a targeted and strategic attack on foreign mercantilism. And while some of the Trump administration's tax and regulatory reform efforts would make the U.S. economy more competitive, much of his budget, especially cuts to key R&D, skills, export finance, and manufacturing support programs, would make the U.S. economy less competitive.

Thus, despite the modestly growing awareness of the need for more policies to support innovation-based competitiveness, only modest action has been taken in the last decade. There are a number of reasons for this. One relates to the fiscal condition of the federal government. In FY 2016, the federal government ran a budget deficit of around $590

billion and had a national debt held by the public of around $14.3 trillion. And with the projected increase in the U.S. elderly population, coupled with the deep political resistance to raising the retirement age and increasing taxes on individuals, both numbers are likely to increase over the next two decades. In that environment, finding new resources for a competitiveness policy (either more investment or lower taxes) has been difficult.

Moreover, as discussed below, perhaps the most important factor that limits the development of a more coherent and robust competitiveness policy is the "Washington Consensus," which holds that economies don't really compete and that any competitiveness policy, especially one designed to support traded sectors, is welfare reducing. Brookings economist Charles Schultze laid down the initial salvo more than 40 years ago in his highly influential article "Industrial Policy: A Dissent" where he argued, against historical evidence, that "Government is not able to devise a 'winning' industrial structure. It is not possible in the American political system to pick and choose among individual firms and regions in the substantive, efficiency-driven way envisaged by advocates of industrial policy."[36] Schultze instead advocated taking a page out of the standard economic playbook: better monetary policy and a reduced budget deficit. And with the influential Brookings Institution decreeing what is and is not acceptable, few politicians were willing to embrace competitiveness policy and risk being branded as economically illiterate.

Finally, the term competitiveness has evolved into a term with almost no meaning, becoming all things to all people. To the extent the term is used at all in the United States, it has become a catch-all for anything related to economic and social policy. Harvard's U.S. Competitiveness Project, the home of Porter's initial work, now produces reports like the *Challenge of Shared Prosperity*, which focuses on inequality rather than on competitiveness, or it writes about specific issues that are only tangentially related to real competitiveness, such as energy extraction. Indeed, Harvard's project identifies the following core research tracks, all tangential to real competitiveness: PK–12 education, transportation infrastructure, cluster mapping, middle skills, and unconventional energy. The discipline of competitiveness, at least in the United States, has now lost its way and has become a catch-all for whatever anyone wants it to be.

Why Nations Need Competitiveness

Why should governments focus on boosting competitiveness? The simple answer is that increased competitiveness makes it easier to achieve other economic goals, such as full employment, higher productivity, and a higher living standard. But competitiveness is also a confidence booster that lifts "animal spirits."

To be sure, as the Information Technology and Innovation Foundation (ITIF) wrote in the first report in this series, "Think Like an Enterprise: Why Nations Need a Comprehensive Productivity Strategy," the main way nations, especially larger ones, can increase productivity is not through competitiveness, but by ensuring that all sectors boost productivity.[37] Economists refer to this as the "growth effect." The larger the economy the

more important the growth effect is since as shown above the share of larger economies that are traded internationally is lower than the share in small nations. To understand why, consider that if an automobile plant in a small city raises the plant's competitiveness, the lion's share of direct benefits will flow to the firm's customers outside the city in the form of lower prices. The city will benefit only to the extent that its residents buy cars from that factory, if some of the increases in competitiveness go to higher wages or if the factory is able to employ more workers because it gains market share. But in contrast, if a retail store in a city raises its productivity, the local economy grows because real incomes of the residents will have grown.

The discipline of competitiveness, at least in the United States, has now lost its way and has become a catch-all for whatever anyone wants it to be.

Many neoclassical economists dismiss (wrongly) the notion that any sector is more important than any other, including traded sectors. But traded-sector competitiveness is important because without it a nation's terms of trade decline—that is, a nation must give up more of its goods and services to exchange for what it needs to import. Usually, trade imbalances among countries are balanced through the adjustment mechanism of currency exchange rates. But if this cannot happen, the result is lost jobs and declining wages. And indeed, this is what has happened to the United States over the last decade in particular as it has run up massive trade deficits. The dollar has not declined as much as it should, for three reasons. First, the dollar is still seen as the global reserve currency, with nations buying dollars for security. Second, many investors, including national governments (and not just China's), manipulate their own currency for competitive advantage, which limits the fall of the value of the dollar. And third, U.S. Treasury officials continue to believe that their job is to manipulate the market and defend a strong dollar rather than let the market determine the price. In this situation, unless America's traded-sector firms are more competitive in their own right, the result is lost domestic output and jobs and lagging wage growth, which cascades throughout the economy, acting as a stiff "economic headwind" that overall economic growth must fight against.

At the same time, many in Washington have come to believe that small firms are the real jobs engine of the U.S. economy and that competitiveness can be ignored since the U.S. economy could thrive solely on the backs of small "main street" businesses. Indeed, this "small-is-beautiful" thinking has been the conventional wisdom, even though it is wrong. The lion's share of small "mom-and-pop" firms will not prosper unless larger companies and high-growth, entrepreneurial "gazelle" companies, the vast majority of which are found in traded sectors, prosper. To understand why small "Main Street" firms can't save the economy, it's important to understand the difference between what regional economists refer to as local-serving and export-serving businesses. Consider the Maytag factory that closed in Newton, Iowa several years ago. It was an export-serving business, meaning that it shipped products outside of the local labour market. While a small share of the Maytag washers and dryers coming off the assembly line were sold to local Newton residents, most were sold to customers throughout the nation or even the world, who sent money back to Maytag, which gave some of it to its local workers and suppliers. In contrast, Newton's local restaurants, dry cleaners, clothing stores, and barber shops are local-serving, as the

lion's share of their output is sold to Newton residents, including Maytag workers. If one of these local-serving "Main Street" businesses had gone out of business, it would have had virtually no effect on the output of the Maytag factory. Moreover, another business would more or less automatically emerge or expand to meet local demand. But the Maytag factory closure had an immediate negative impact on the local-serving businesses, whose customers (Maytag workers, its suppliers, and their workers) had much less money to spend locally on meals, haircuts, dry cleaning, and other needs and desires. As Gene Sperling, Director of the National Economic Council under President Obama put it, "If an auto plant opens up, a Walmart can be expected to follow. But the converse does not necessarily hold—that a Walmart opening does not definitely bring an auto plant with it."[38]

The reality is that the majority of U.S. businesses are local-serving. The Census Bureau reports that there are 219,986 doctors' offices, 166,366 auto repair facilities, 151,031 food and beverage stores, 115,533 gas stations, 111,028 offices of real estate agents and brokers, 93,121 landscaping companies, 75,606 nursing homes, 36,246 furniture stores, 28,336 veterinary offices, 15,666 travel agencies, 4,571 bowling alleys, 2,463 amusement arcades, 858 radio networks, and 26 commuter rail systems. These and millions of other local-serving businesses will neither prosper nor suffer principally on the basis of economic policies targeted at them, such as tax cuts or regulatory exemptions. They will not prosper unless large, traded-sector companies (and high-growth entrepreneurial "gazelle" companies) prosper in the United States.

That's because the engines of a nation's competitiveness are in fact not mom-and-pop small businesses, but rather firms in traded sectors, high-growth entrepreneurial companies, and U.S.-headquartered multinational corporations. Although such firms comprise less than 1 percent of U.S. companies, they account for about 19 percent of private-sector jobs, 25 percent of private-sector wages, 48 percent of goods exports, and 74 percent of non-public R&D investment. And, since 1990, they have been responsible for 41 percent of the nation's increase in private labor productivity.[39] This in part explains why workers in large firms earn 57 percent more than workers in companies with fewer than 100 workers.[40] And it's why, besides getting paid more, workers in large companies get 3.5 times more retirement benefits than workers at firms with less than 100 employees, 2.7 times more paid leave, and 2.4 times more health-care benefits.[41]

Increased competitiveness helps improve living standards. When the United States lost over 3 million manufacturing jobs in the 2000s from its loss of global competitiveness, this lowered growth as economic activity shifted out of relatively high-wage manufacturing to lower-wage services while boosting unemployment.[42] Not to mention that this headwind meant that the Federal Reserve kept interest rates low, contributing to the housing bubble and collapse. So, the ability to be competitive, especially in industries and sectors with higher-than median wages, will help boost productivity.

Competitiveness is also important because it provides a positive macroeconomic boost, enabling economies to maintain full employment. Given the basic equation of short-term

GDP growth [ΔGDP = ΔC + ΔI +ΔG + Δ (X-M)] (where C equals consumption, I investment, G government spending, X exports, and M imports), it's clear that if X-M is larger, there will be a more positive GDP effect than if it is smaller or even negative. This is even more true considering the foreign trade multiplier where increased (X-M) creates multiplier effects through increased business from suppliers and increased spending from consumers.

A competitive economy also enables a nation to enjoy more favorable terms of trade through a stronger currency. A strong currency is not a goal, but a result. Keeping a currency high if a nation is not running a trade surplus is simply a selfish way of passing on trade debt to future consumers who at some point will have to consume less (and send the goods and services to foreigners). But if a nation's economy is truly competitive so that it can afford a stronger dollar, this means that for every unit it exports it gets more goods and services in return as imports.

Many neoclassical economists dismiss (wrongly) the notion that any sector is more important than any other, including traded sectors.

Finally, stronger competitiveness appears to play a role in sustaining Keynesian "animal spirits." In his book *The General Theory of Employment, Interest and Money*, Keynes wrote that "Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of animal spirits—a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities."[43] If a national economy is uncompetitive, businesses, workers and consumers are likely to have limited confidence in the future, and this is likely to be self-reinforcing, leading to less investment, risk-taking, and spending, in turn making competitiveness even worse. Thus, competitiveness provides an overall robust tone and confidence, whereas lack of competitiveness generates uncertainty, anxiety, and pessimism.

Competitiveness Performance

For a nation to develop an effective competitiveness policy, policymakers need an understanding of past and present competitiveness performance. However, because of data limitations and the complexity of competitive performance this is extremely difficult to assess.

Still, a number of reports attempt this. The World Economic Forum's (WEF) *Global Competitiveness Report* ranks 138 economies.[44] The IMD World Competitiveness Center's *World Competitiveness Yearbook* ranks 63 economies.[45] The U.S. Council on Competitiveness and Deloitte rank nations on manufacturing competitiveness. But these rankings suffer from a number of serious flaws. First, the World Economic Forum does not measure actual competitiveness performance; it includes no data on trade performance or the share of GDP in high-value-added, traded-sector industries. This is why WEF is able to rank the United States as the third-most competitive nation while IMD ranks it as the most competitive, ignoring that the United States lost more manufacturing output than almost any developed nation in the 2000s and runs the largest trade deficit in the world, including in advanced technology goods.[46] The Council on Competitiveness relies on surveys of CEOs to assess competitiveness, but these are largely unreliable as a gauge, in part because the responses tend to favor larger nations where companies are more likely to

have facilities, and the responses are inherently subjective. This is why the Council can rank the United States manufacturing sector as the second most competitive in the world (China is number one), and confidently predict that by 2020 the United States will be first.

Rather than measure actual competitiveness, these reports include a wide array of factors that may have some relationship to actual competitiveness outcome measures, but most have a tenuous link at best (e.g., inflation rate, life expectancy, etc.) These are not indicators of competitiveness performance; at best, they are only competitiveness inputs.

Moreover, these reports don't take into account national "discounting." For example, in 2016 WEF ranked Switzerland and Singapore as the two most competitive nations, yet it fails to mention that both have been listed as currency manipulators.[47] If these nations are in fact so competitive, why do they feel compelled to manipulate their currency to subsidize exporters and tax importers?

An alternative way of assessing competitiveness would be to simply look at the trade balance. Some studies try to get at that but only look at the export side of the equation. Business reporter Steven Perlberg says that the United States will dominate the global economy in terms of competitiveness because it is "among the largest exporters of goods and services."[48] The Council on Foreign Relations argues that the U.S. economy is competitive because "U.S. exports are at record levels."[49] What neither mention is that U.S. imports are also at record levels. However, the Council does acknowledge that "the sharp rise in the U.S. trade deficit as a percentage of GDP from about 1 percent of the economy in the early and mid-1990s to more than 5 percent by the mid-2000s was clearly a sign of competitive weaknesses."[50]

One reason for the approach these rankings take is that it is difficult to provide a more accurate assessment of national economic competitiveness due to the difficulty of obtaining relevant data. But conceptually such an assessment would examine the non-mineral trade deficit of a nation, the share of exports that are in higher-value-added goods and services, and the actual terms of trade the nation enjoys after "discounts" (e.g., export subsidies, etc.) and import restrictions are controlled for. Absent such measures, nations can get a rough sense of their relative competitiveness by examining a number of factors, including trade balance in non-mineral goods and services, changes in share of net exports in high-value-added sectors controlling for changes in the size of the national economy, and trends in the value of the nation's currency (increasing in value indicates stronger competitiveness).

Unfortunately, despite a plethora of studies claiming to rank nations on their competitiveness, no study has actually done this if by ranking we mean an assessment of non-mineral goods trade performance after accounting for export discounting and import charging. As noted, most rankings define competitiveness as productivity, but then proceed to rank nations on a vast array of other measures, usually not even including productivity.

Besides the fact that they use the wrong definition of productivity, one reason these studies don't rank nations on true competitiveness is that while data exists on trade balances for virtually all nations, data on the extent of export discounts and import charges (especially

through non-tariff barriers) are difficult to obtain and to translate into quantitative terms to make cross-national comparisons. Despite this, and as described below in more detail, it would appear that nations like the Netherlands (a trade surplus of 10.9 percent of GDP), Germany (7.6 percent), Sweden (4.6 percent) and Austria (3.8 percent) would be on a list of the most competitive economies (they run trade surpluses while also having limited "discounts" and "charges").[51] Ireland might be on the list (a trade surplus of 23.2 percent of GDP), but its achievement appears to be contingent largely on "discounting," in this case one of the lowest corporate tax rates in the world.

In contrast, nations like China (too much discounting and too many import restrictions) and the United States (too large a trade deficit even when accounting for foreign mercantilism) would likely not make the list of the most competitive economies. For example, the trade-weighted value of the U.S. dollar is unchanged since 1998, while the non-petroleum trade deficit as a share of GDP is up 87 percent.[52]

Keeping a currency high if a nation is not running a trade surplus is simply a way of passing on trade debt to future consumers who at some point will have to consume less (and send the goods and services to foreigners).

In summary, existing rankings of national competitiveness are largely of little value. If we are to develop better measures, it is incumbent on international trade organizations, such as the World Trade Organization, the World Intellectual Property Organization and the International Monetary Fund to generate comparable data on "discounts" and "charges" for all nations.

PART II: A FRAMEWORK FOR NATIONAL COMPETITIVENESS POLICIES

Why do nations need an explicit competitiveness policy? Won't market forces drive them towards their "natural comparative" advantage, and won't that maximize economic welfare? Won't broad framework conditions (such as stable monetary policy and rule of law) and high-quality factor inputs (education, infrastructure, basic research, etc.) suffice? The answer is no, for two reasons. First, these things have become "table stakes" in the global competitiveness game. When a large share of nations already gets the basics right it is almost impossible to gain competitive advantage by simply meeting these baseline requirements. Nations must go beyond them. Second, there are a host of market failures when it comes to competitiveness, making a government role that goes beyond ensuring good market conditions and adequate factor inputs essential. These include increasing returns to scale, externalities from agglomeration economies and inter-firm learning, and foreign economic policies which distort the markets in other nations.

Nations compete with each other economically to create and capture limited higher-value-added activities in the global economy. And the goal of competitiveness policy is to help a nation's economy continually evolve to create and capture that production as a way not only to boost national income but to establish a strong and regular cycle of growth. In this sense, competitiveness and competitiveness policy are zero-sum activities; some nations will win and others lose. But if all nations compete, especially with "high-road" policies like spurring innovation and skill development, competitiveness policy can be positive sum as it boosts global innovation and productivity.

Competitiveness Policy and Economic Doctrines

Competitiveness is an economic policy issue. Thus, the economic doctrines held by advocates, policy advisors and policymakers play an important role in shaping positions toward trade and competitiveness. And the different doctrines offer significantly different perspectives on these questions. Both at the scholarly and popular levels, the debate over competitiveness has been framed by two basic groups: free traders and protectionists, with the former seeking to expand trade at all turns and defending the outcomes of trade at all times while the latter seek to limit or even roll back global trade and investment.

Neoclassical Economics and Competitiveness

The Washington Consensus on trade and competitiveness is based on the neoclassical (NC) economic doctrine. Because the NC doctrine privileges allocative efficiency over innovation and competitiveness, this has become NCs' primary rationale for and defense of free trade and opposition to competitiveness policy. Holders of the neoclassical doctrine largely reject the notion of competitive advantage because it implies that policy, including trade policy, can be used to alter industrial composition—something they see as by definition reducing allocative efficiency.

Free trade, according to this view, enables the global economy to allocate output on the basis of nations' inherent comparative advantage. Any and all deviations from these market conditions—except, perversely, deviations from the market setting the price of currency, which is justified as defending a strong currency—are rejected as protectionism, "industrial policy," or other pejoratives designed to signal backward thinking. These are more than firmly held views based on objective analysis. As Stephen S. Cohen and J. Bradford DeLong write, it is a "vision [that] was more than merely ideological; it was positively religious."[53]

NCs see the process of trade as involving a set of Pareto improvements designed to reach Pareto optimality: Given an initial allocation of goods among a set of individuals, a change to a different allocation that makes at least one individual better off without making any other individual worse off is called a Pareto improvement. A state of allocation of resources is defined as "Pareto efficient" or "Pareto optimal" when no further Pareto improvements can be made. By definition then, according to NCs, because in their textbook theory no two parties trade unless they both improve their welfare, all trade improves allocative efficiency and consumer welfare, and by definition measures that hinder market-based trade—whether barriers to imports (e.g., countervailing duties, tariffs, non-tariff barriers) or support for exports (e.g., lower taxes on traded sectors, technology policies for traded sectors, etc.)—reduce allocative efficiencies for both nations involved in trade. This, more than any other factor, is why NCs are so vociferous in their defense of trade and opposition of policies to shift comparative advantage.

This focus on static allocation efficiency also explains why conventional economists go to such great lengths to deny that nations might lose competitiveness. For them, any and all competitiveness failures are explained away as either inconsequential ("it didn't really

matter that the United States lost one-third of its manufacturing jobs in the 2000s"), or having nothing to do with competitiveness ("the United States lost one-third of its manufacturing jobs in the 2000s only because of higher productivity in manufacturing"). As ITIF has shown, these claims are not accurate.[54]

This idealized, textbook conceptualization belies the way the world really works, where short-term consumer welfare can be at odds with long-term national economic welfare, and where there can be significant market failures, including national monopsony (as in the case of China), increasing returns to scale, and network effects. In this real world, the neoclassical doctrine quickly fails as a guide to effective trade and competitiveness policy.

One reason for their Pollyannaish views is that conventional economists subscribe to the theory of comparative advantage: the belief that countries all have an advantage in some kind of production relative to others and that it is those products (or services) that they should export and use to trade for things for which their comparative advantage is less. In Ricardo's famous example offered some 200 years ago, Portugal should sell wine to England in exchange for woolen goods from England even if it did not have an absolute advantage in wine. According to NCs, comparative advantage is given, not made, and policies designed to change comparative advantage by shifting a nation's industrial mix (e.g., Portugal trying to develop a woolen industry) will only distort allocative efficiency and make both nations worse off. And if a country loses a particular industry this is natural and even positive because it reflects the workings of the market in ways that enable a nation to find its true competitive advantage. In this conception, if the United States were to lose Boeing to massive government subsidies to its competitors in Canada, Europe, and China, that means that the United States was not meant to have a comparative advantage in aerospace and that its resources can be better allocated to some new and better use.

Despite a plethora of studies claiming to rank nations on their competitiveness, no study has actually done this if by ranking we mean an assessment of non-mineral goods trade performance accounting for export discounting and import charging.

The concept of comparative advantage differs from that of competitive advantage: The theory of comparative advantage states that a country will produce the goods for which it enjoys the lower relative opportunity cost. The theory of competitive advantage holds that a country can develop or acquires attributes (e.g., worker skills, technological capabilities, managerial competencies, scale economies) that allow it to increase its global market share of a particular industry, including new industries that have few linkages to natural resources (such as robotics).

But NCs largely reject the notion of competitive advantage because it implies that policy, including trade policy, can be used to alter industrial composition—something they see as by definition reducing allocative efficiency. This is the principal reason why most NCs deny that the East Asian economic miracle (countries like Hong Kong, South Korea, Taiwan and Singapore) had anything to do with those nations' industrial policies and everything to do with natural economic evolution coupled with the right framework policies, such as good fiscal policy and a strong education system.[55]

This is also why so many holders of the Washington Consensus reject the very notion that nations compete with each other. For to acknowledge that nations compete economically is

to acknowledge that sometimes exchanges are made that are not Pareto-optimal, and once that crack in the logic is opened up, the entire NC trade edifice is at risk of collapse. For example, Paul Krugman asserts that "the notion that nations compete is incorrect … countries are not to any important degree in competition with each other."[56] A senior economist at the Congressional Research Service agrees, writing that international (economic) competitiveness is a "term without rigorous meaning."[57]

This is why NCs remain unconcerned about a nation's loss of any particular industries from loss of competitiveness, for they hold to the "potato chips, computer chips: what's the difference?" view. In other words, for them, there is no fundamental difference between industries; if trade leads to the loss of one industry; it simply reflects a process where a nation's true comparative advantage is revealed. In this tautological thinking, losing any particular industry is good because it brings a nation closer to its "true" comparative advantage. Indeed, no loss can be bad and all loss must be good. NC economist Alan Blinder reflected this view when he wrote, "The TV manufacturing industry really started here… But as TV sets became 'just a commodity' their production moved offshore to locations with much lower wages. And nowadays the number of television sets manufactured in the United States is zero. A failure? No, a success."[58] In other words, there can be no unwanted loss of industry; by definition, such loss has to be welfare-maximizing because consumers were making Pareto-optimal decisions.[59] This is also why so many of them are unwilling to see how other nation's policies might harm the U.S. economy.

In the real world, the neoclassical doctrine quickly fails as a guide to effective trade and competitiveness policy.

One reason the NC trade policy establishment sees trade as always being good is that they view job loss from trade as evolutionary, not devolutionary, because it benefits consumers and frees up resources to enable America to concentrate on its "true" comparative advantage. But NCs equate welfare only with short-term consumer welfare (e.g., consumers benefitting from cheaper TVs, toys, etc.), and ignore the negative impact to welfare from reduced production capability, especially higher-value-added production. And their definition of competitive advantage is self-reinforcing—whatever we lose is by definition lost because we didn't have comparative advantage.

However, by assuming that all jobs lost from trade are positive evolution, these advocates avoid the hard work of really understanding the causes of the loss of an industry. No need to worry that high U.S. corporate tax rates caused the loss because we should have lost the industry anyway; and, after all, we don't even compete with other nations. No need to worry about ill-conceived U.S. antitrust enforcement that essentially forced RCA, the leading television producer in the world until the 1970s, to share its valuable intellectual property on color TVs with Japanese producers, which prior to that lagged far behind RCA.[60] No need to worry about unfair, predatory foreign trade practices, as the Japanese practiced, to take market share in the television industry. It's all just free trade and welfare-enhancing Ricardian comparative advantage working its way out. That is why Anne-Marie Slaughter, head of the New America Foundation and former head of Policy Planning for the U.S. State Department, can write "the rise of China as a major economic power has

been overall very positive for the U.S. economy and the prosperity and stability of East Asia."[61]

This is also why it is so easy for NC economists to contend that America (or other nations, for that matter) do not need an industrial base, even an advanced-technology one. Kenneth Green, a resident scholar at the conservative American Enterprise Institute, writes, "As long as China is selling us the products we need, the location of manufacturing isn't really that critical for the economy."[62] When asked how much manufacturing the United States could really lose and still be economically healthy, the former head of a leading Washington, D.C.-based international economics think tank replied, "Really? Really we could lose it all and be fine."[63]

Because manufacturing is such a large component of U.S. exports, losing it all would make the chronic U.S. trade deficit even worse. As a result, the NC view of trade must include a rationalization to dismiss the trade deficit as a problem. For if the chronic U.S. trade deficit were acknowledged to be a problem, it is a short step to the conclusion that there may be something wrong with the global trading system as currently structured. So, the rationale is not to blame foreign mercantilism or the lack of an effective national competitiveness policy, it's to blame America by asserting that low U.S. savings rates requires overseas borrowing, which by definition requires running a trade deficit.

This view that trade is always welfare-maximizing also explains why holders of the NC doctrine go to such great lengths to deny that the United States could face competitiveness challenges. For to admit that trade might have done something more than harm some individual workers (while boosting overall economic welfare) is to speak the unspeakable. The very notion challenges the entire edifice upon which NC trade theory is premised.

We see this no better demonstrated than by how NCs address the loss of U.S. manufacturing jobs in the 2000s. Indeed, the debate over the structural health of U.S. manufacturing is one wrapped up in the trade debate and has become a proxy for views on whether one supports the comparative advantage view of globalization or not. Unfortunately, rather than present unbiased analysis of the performance of U.S. manufacturing, most NCs engaged in heroic efforts to paint a picture showing that all is well with U.S. manufacturing, even to the point of ignoring the actual data.[64] They do so in part for fear that an accurate portrayal of U.S. manufacturing performance will fan the flames of protectionism, but also because they simply can't conceive that trade could produce such a harmful result.

Innovation Economics and Competitiveness

A better intellectual framework for thinking about trade and competitiveness is "innovation economics." While referred to in a variety of ways (e.g., structuralist-evolutionary, neo-Schumpeterian, or evolutionary economics), ITIF uses the term innovation economics (IE). Over the past two decades, this new economic doctrine has emerged through the work of a wide range of scholars. Unlike neoclassical economics, acolytes of the IE doctrine postulate that innovation (the development and adoption of new products, processes, and

business models) drives growth. IEs make an explicit effort to understand and model those forces and factors conducive to innovative activity. They see innovative advances as resulting from intentional activities by economic actors, including government. Finally, innovation economics focuses on spurring economic actors—from the individual, to the organization or firm, and to broader levels such as industries, cities, and even entire nations—to take actions to become more productive, innovative and competitive.

Unlike NCs who believe that trade is always Pareto-optimal, IEs see not just trade, but all economic activity—especially as it relates to more complex, technology- and innovation-based industries—as involving systemic market failures, to the point where it makes more sense to view advanced economies less as markets and more as complex innovation systems.[65] Moreover, they recognize that nations are engaged in competition with each other to gain economic advantage, particularly in higher value, innovation-based industries.[66] As such, it is possible for nations to lose when it comes to trade, especially if they have weak national competitiveness policies at home (as the United States does) and fail to craft the right trade policies vis-à-vis competitors, in terms of both market access and trade enforcement.

For neoclassical economists to admit that trade might have done something more than harm some individual workers (while boosting overall economic welfare) is to speak the unspeakable.

This is why IEs reject the NC notion that one-sided free trade is welfare-maximizing for a nation. IEs believe that a nation will not benefit from globalization unless its trade policy effectively contests foreign mercantilist distortions. Indeed, adherents of innovation economics temper their support for global trade with the concern that manipulation of the trading system by countries embracing mercantilist policies (e.g., tariffs, unfair taxes, currency manipulation, discriminatory standards, forced localization, forced technology transfer, intellectual property theft, etc.) not only hurts other nations' productivity and innovation, but also leads to lower levels of global growth as companies make investments in places and in types of production that they would not make absent these mercantilist policies.[67] This is why IE adherents advocate for concerted international efforts to move the global trading system away from national economic policies that promote exports in a beggar-thy-neighbor fashion (as is currently the case today in many nations), and toward policies that support domestic innovation and productivity.[68]

Related to this, IEs believe that in a knowledge- and technology-driven global economy, the notion of comparative advantage is an anachronistic throwback that does more to obscure than to clarify. When trade was largely composed of "northern" industrial goods and "southern" raw materials, the framing of comparative advantage may have once made sense. But in a globally integrated economy—where most trade takes place between nations with similar factor endowments; an increasing share of trade is in innovation-based industries (e.g., information and communication technologies, clean energy, life sciences, aerospace, scientific instruments, etc.) and a large share of trade consists of inter-company transfers—the idea that comparative advantage is revealed makes little sense. Much of what nations produce is not ordained. As such, competitive advantage has to be created and continually recreated. And that is supported or harmed in significant part by public policy, including foreign trade policy and domestic competitiveness policy.[69] This is why IEs

believe that any trade policy must be linked to a robust national competitiveness strategy particularly focused on high-value-added industries.

Responding to Conventional Economists' Criticism of the Concept of Competitiveness

As noted above, the conventional neoclassical economists that drive trade policy in the United States are doctrinally skeptical of the very notion of national economic competitiveness. As such, it's worth responding to a number of their assertions.

Countries Compete

Since the notion that "countries don't compete, only companies do" has come to inform so much of U.S. economic and trade policy, it's important to explore the two arguments underlying this assertion. When Paul Krugman says countries don't compete, one component of his argument is that because about 80 percent of the U.S. economy consists of "non-traded" goods and services intended for domestic use, the growth rate of U.S. living standards essentially equals the growth rate of domestic productivity, not U.S. productivity relative to competitors. He maintains that since the domestic, non-traded sectors of an economy really drive its productivity and growth, countries are not competing against one another for economic preeminence.

While Krugman is correct in stating that raising productivity in non-traded sectors (e.g., grocery stores, insurance companies, trucking companies, and so forth) is vitally important to a country's growth, there are two key flaws with this argument. First, as noted above, for smaller and mid-sized economies a greater share of the economy is traded and depends on being globally competitive. Second, regardless of the size of an economy, countries receive significant economic benefits from being more globally competitive. For example, the growth of high-value-added sectors—a predominant share of which are technology or IT jobs traded in international competition—changes the mix of sectors in an economy toward more high-value-added ones, leading to higher productivity, wages, and standards of living.

The second argument underpinning Krugman's assertion is not just partially flawed, it's fundamentally wrong. Krugman reasons that while companies do sell products that compete with each other, the companies and consumers in these nations are also simultaneously each other's main export markets and suppliers of useful imports. Since (in Krugman's view) international trade is not a zero-sum game, even if European or Asian countries gain a larger share of global high-value-added production, this benefits the United States by providing it with larger export markets and access to superior goods at a lower price. In other words, he argues, since trade is inherently win-win in nature, even if the United States lost most of its high-value-added traded sectors (imagine Apple, Boeing, Cisco, Ford, General Motors, IBM, Intel, Merck, Microsoft, and other major global companies laying off the majority of their U.S. workforce), America would still benefit from trade because at least it would receive cheaper imports and have access to larger export markets.

But this assumes that these assets would automatically flow to activities that would be able to produce goods and services that the world wants to buy. Most neoclassical economists would argue that Boeing going out of business, for example, would not hurt the U.S. economy in the moderate term as the economy maintains its historic flexibility and doesn't restrict Boeing's assets from flowing to more productive uses. If the "market" dictates that the United States should not produce passenger jets (or even any manufacturing at all), then they would maintain it's better to redeploy these assets to more productive uses. But there are several glaring problems with this view.

First, it is often not the "market" but mercantilist nations dictating changes in a nation's industrial structure, as governments like Canada, China, France, and Germany all provide large subsidies for their domestic aerospace companies. Second, as innovation economist Greg Tassey argues, "The central failure of current economic growth models is the assumption that shifts in relative prices will automatically elicit a Schumpeterian-type efficient reaction from domestic private markets—namely an adjustment involving development/assimilations of new technologies to replace offshored ones."[28] Certainly, much of Boeing's tangible assets, its physical plant, would likely be redeployed. Some company (probably in China) would buy the advanced dies and other machinery Boeing used to produce planes. (In fact, a multibillion-dollar industry has emerged in the United States that strips parts such as machinery, generators, tools, and dies from defunct American manufacturing plants and ships them to developing countries to be rebuilt, recycled, and reused.)[29] Amazon.com might buy the massive hangars where Boeing makes the planes to use for an e-commerce fulfillment center to sell Stephen King books and Lady Gaga videos.

Much of what nations produce is not ordained. As such, competitive advantage has to be created and continually recreated.

But it's not clear that they would be redeployed in activities producing competitive U.S. exports. To use the Boeing example, the value-added per worker in the aerospace industry (that is, the amount of value that each worker adds to the materials and parts they utilize) is among the highest of any industry, at $133,000 per year. In contrast, the value-added per the average U.S. job is $103,000 per year.[31] But the highly trained scientific workers and technicians that Boeing employs cannot easily go to another firm and put their knowledge and skills to immediate work. The newly unemployed Boeing engineer would more likely apply for a midlevel technician job at a warehouse, and make half of what he or she did before. So even if every Boeing worker and every worker at its suppliers got a new job, most of them would see a big cut in their wages and the nation would be poorer.

This gets to a third problem with the countries-don't-compete view. In most industries at which countries are the most competitive there is a network that has developed over decades. In the United States aerospace industry, it involves original equipment makers (such as Boeing) manufacturing some of the most technologically complex products in history; a network of tens of thousands of specialized parts and component suppliers, including advanced jet engine makers; providers of specialized business services; educational institutions producing skilled workers, knowledge, and discoveries; and testing labs, standards, and other innovation infrastructures, all knit together by a complex system

of interactions and relationships among the players. Losing a piece of this industrial commons due to global competition has externality costs borne by the whole system, but not factored in when firms make individual decisions. So even if the competitor nations stopped their subsidies after they took U.S. market share and the dollar fell significantly, these industries would not naturally return to America. To remain with the aerospace example, to recreate lost domestic production, Boeing would have to recreate all the talent that was lost, not just the talent of its workers, but the collective knowledge embedded in Boeing and in the entire chain of suppliers. But many of the resources—e.g., the organizational knowledge embedded in the company—would have vanished. Moreover, the resources embedded in transferable factors of production (e.g., workers' skills, machines, buildings, etc.) may just as easily flow to new activities that are in lower-value-added activities that pay lower wages. For example, many of the tens of thousands of Boeing workers who combine their knowledge to produce the world's most advanced passenger jet airplanes could easily end up working in organizations that produce much less value per worker, leading to a lower national standard of living.

It is often not the "market" but mercantilist nations dictating changes in a nation's industrial structure, as governments like Canada, China, France and Germany all provide large subsidies for their domestic aerospace companies.

As Michael Peneder writes:

> Because competitiveness did not match any variable known from the existing theoretical canon, it was generally considered non-scientific, a political folly. Occasionally, it met with outright hostility, such as in Paul Krugman's notoriously vivid sermon: 'So let's start telling the truth: competitiveness is a meaningless word when applied to national economies. And the obsession with competitiveness is both wrong and dangerous.'[70]

Peneder goes on to write that "locations compete for activities with high value added as the source of high per-capita incomes and hence (material) well-being. Sometimes they compete directly, as is the case with the promotion of inward foreign direct investments. For the most part, the competition is indirect—that is, for providing favorable business conditions to particular sectors or the general location."[71]

A Nation's Industrial Composition Does Matter: Computer Chips Are More Important Than Potato Chips

Michael Boskin, head of the first Bush administration's Council of Economic Advisers once memorably quipped, "Potato chips, computer chips, what's the difference? A hundred dollars of one or a hundred dollars of the other is still a hundred dollars."[72] Boskin was reflecting the consensus among neoclassical economists that the industrial composition of a nation does not matter, and therefore, by extension, nations should not worry about being competitive in global markets. But there is a difference between industries.

First, some industries, such as semiconductor microprocessors (computer chips) can experience very rapid growth and reductions in cost, sparking the development of related industries, and increase the productivity of other sectors of the economy. In essence, spillover effects from computer chips make potato chip manufacturers more efficient.

Second, jobs producing computer chips require a higher skill level and thus pay more than jobs producing potato chips. Third, if a country loses the computer chip industry to foreign competitors, that value similarly disappears as the industry's supply chains and industrial commons are hollowed out; the neoclassical assumption that residual assets will be redeployed to high-value-added sectors is not necessarily the case. More likely than not, many of the laid-off computer chip workers would end up working in lower-paying sectors. In fact, among the U.S. workers laid off between 2007 and 2009, in 2010 about 75 percent were employed, and of them, approximately 17 percent reported earnings of 20 percent or higher than their previous wages, while approximately 30 percent reported earnings of 20 percent or more below their previous wages.[73]

To be generous, this conventional view that America is not in competition may have accurately described the nation's economy before the emergence of the globalization era prior to the late 1970s. But today, it clearly does not. During the prior national-economy era, if firms could not compete and went out of business, the only issue was making sure that their assets, including employees, were quickly redeployed to other companies that could compete successfully. And they almost always were deployed to firms in the same nation, so while individual workers and sometimes communities such as Buffalo or Cleveland could be hurt, the nation as a whole only had to pay the transition costs (e.g., lost output while the worker was unemployed). When a high-wage, high-value-added steel mill closed in Buffalo but opened in Birmingham, Ala., that production stayed in America. The new mill may have even used some of the same equipment that was moved from Buffalo. Buffalo may have been hurt, but Birmingham was helped. In today's economy, however, knowledge is increasingly the major factor of production and production itself is global. Today, when a software establishment closes or loses market share in America, the establishment that ends up taking that share is often located overseas. And all too often those assets, particularly knowledge, cannot be redeployed at home because they are too specialized. In other words, countries lose not only jobs but also knowledge to foreign competitors. When this happens, nations can become relatively poorer than what they would have been otherwise.

The U.S. Trade Deficit Is a Reflection of a Competitiveness Deficit, Not a Savings Deficit

One key indicator of America's competitiveness challenge is its chronic trade deficit. From 2000 to 2016, the United States has accumulated an astounding $8.5 trillion negative trade balance in goods and services.[74] Yet, the story long told by most conventional economists is that the trade deficit is a simple accounting function—low U.S. savings requires overseas borrowing, which by definition requires running a trade deficit. For example, when the United States first faced competition from Japan and Germany, Brookings economist Barry Bosworth wrote, "I'm afraid that Congress and the White House are so taken with the new interest in competitiveness, that they'll just say to hell with the budget deficit, which is still the core of the problem."[75]

More recently, former George W. Bush economist Greg Mankiw wrote: "My view is that the trade deficit is not a problem in itself but is a symptom of a problem. The problem is

low national saving."[57] Joseph Stiglitz agrees, writing: "A change in the exchange rate would not, moreover, affect the United States' overall trade deficit, which is related to its macro-economic imbalances—the fact that it is saving less than it is investing, a problem exacerbated by the huge fiscal deficit."[76] Surprisingly given their name, the Council on Competitiveness agrees, stating, "These threats [e.g., the trade deficit] stem from global financial imbalances rather than from the inability of American companies or American workers to compete in global marketplaces."[77] If this is true, why does the Council even bother to worry about U.S. competitiveness? Instead, why not merge with the budget-deficit-focused Concord Coalition?

The United States has among the highest corporate tax rate in the world, fails to match many foreign nations in investment in research, and has deteriorating infrastructure. But, according to conventional economists, these factors can have no effect on the ability of business establishments in the United States to thrive in international markets because that is determined solely by our savings rate. By this definition, there is no trade deficit of any size, or loss of any industry or industries, that can be evidence of competitiveness failure.

Conventional economists will maintain that any governmental effort that helps business (excluding indiscriminate tax cuts, regulatory relief, and any subsidies and exemptions for small business) is industrial policy: unproductive subsidies that substitute for the wisdom of the market.

For them the national savings rate always must equal the current account deficit. But as non-neoclassical economist Robert Blecker states, "This identity does not prove causality, and is consistent with other causal stories about the trade deficit."[59] In other words, what the conventional story fails to recognize is that savings is a function of national competitiveness. If, for example, the Chinese stopped intentionally running trade surpluses, the U.S. trade deficit would fall and the Chinese would buy less of our government debt. The result would be a rise in both U.S. exports and interest rates. And both would spur more savings. Higher interest rates would lead more Americans to save. More exports (and relatively fewer imports) would boost U.S. corporate savings. And more jobs and higher wages through exports (exporting firms pay 9.1 percent more than jobs in firms that export less)[60] would boost individual savings and reduce the budget deficit.

Good Competitiveness Policy Is Not Crony Capitalism

The increasingly dominant narrative in the United States, pushed largely by free-market conservatives, is that any government help to businesses engaged in global competition is "crony capitalism." The recent fight over reauthorizing the U.S. Export-Import Bank reflected this ideological view. Jake Novak writes that the Ex-Im Bank is a "very strong symbol of destructive corporate welfare."[78] Veronique de Rugy writes that, "This government bank claims to promote U.S. exporters by lending cheap, taxpayer-backed loans to foreign and domestic corporations. However, in the process, Ex-Im Bank puts millions of consumers, firms and workers at a disadvantage. As such, closing it down is an important first step in the battle against the unhealthy marriage between the government and corporate America."[79]

The Economist reflects this in an article about Dow Chemical CEO Andrew Liveris, writing that Liveris wants "the government to develop a strategy to help American firms compete with foreign rivals. Other countries are acting like companies, he worries. China and its

imitators are following deliberate strategies to create manufacturing jobs. America should behave like a company, too, he argues."[80] The section titled "Subsidies Made in America" states:

> He also wants his adopted home to have one of the lowest rates of corporate tax in the world, as it did in the 1980s. (It now has one of the highest.) Fair enough. But other parts of his plan are more controversial. He wants the government to offer bigger financial incentives for companies to locate in America, both by making the research-and-development tax credit permanent and also by offering tax breaks or grants to build plants in the country.

And under a picture of Liveris, is the caption "Mr. Liveris wants your money." In other words, in the conventional framing, cutting taxes for all corporations is not corporate welfare but providing financing for exports or tax incentives for research and development is.

Conventional economists will maintain that any governmental effort that helps business (excluding indiscriminate tax cuts, regulatory relief, and any subsidies and exemptions for small business) is industrial policy: unproductive subsidies that substitute for the wisdom of the market. Similarly, while many neo-Keynesian liberals don't object to "distorting" the market, they object to large companies getting help, which they derisively call corporate welfare.

As a result, the current economic policy debate in Washington makes little distinction between policies that help companies do something socially beneficial that they would not otherwise do or do as much of (e.g., hiring welfare workers, investing in energy-efficient technology, training workers in broader skills, spending more on research and development, etc.) and simple subsidies that do nothing to help a company become more productive or innovative. The former would include programs that raise the capacity of companies to be more productive and innovative, like the National Institute of Standards and Technology's Manufacturing Extension Partnership (a program to provide technical assistance to help small and medium-sized manufacturers become more productive), or the Ex-Im Bank that helps increase exports. The latter would include programs and policies that give money to companies with no increase in productive or innovative potential, such as agricultural subsidies; protections that subsidize a particular activity, such as federally subsidized flood insurance (an incentive for more homeowners and companies to locate in flood plains); or tariffs on particular products in response to political pressures from particular industries. As the Committee on Economic Development rightly points out:

> Because market failure can require government intervention in the economy, 'crony capitalism' cannot be defined as any and every government intervention. Rather, crony capitalism would constitute government intervention not justified by market failure, but rather as part of a pursuit of a purely private interest through some subsidy (whether delivered through public spending or as a tax preference) or some regulatory protection against fair competition.[81]

Rather than do the hard analytic work of distinguishing between government involvement that is negative sum (crony capitalism) and that which is positive sum, the neoclassical view is to reject any role for government in competitiveness. But this clearly will lead to a reduction of government actions that would boost overall welfare.

Michael Porter's Competitiveness Framework

In short, the neoclassical economics view of trade and competitiveness provides a deeply flawed guide to making policy. A more helpful one is that established by Harvard's Michael Porter. Porter initially wrote about corporate strategy and its determinants on firm competitiveness. In his 1990 book *The Competitive Advantage of Nations*, Porter applied his firm and industry strategy model to nations.

The debate in Washington makes little distinction between policies that help companies do something socially beneficial that they would not otherwise do or do as much of and subsidies that do nothing to help a company become more productive or innovative.

There are many strengths in Porter's framework. First, the focus is not on abstract markets as imagined in textbooks, but on real industries and their enterprises that compete globally. Second, the focus is not on how markets should work in theory, but in how enterprises and economies work in practice. Third, the framework focuses on actual factors determining competitiveness, especially what he terms the "four factors model" of demand conditions; factor conditions; firm strategy, structure and rivalry; and related and supporting institutions. This easy-to-understand framework points policymakers in specific directions to enable them to identify factors that may be supporting or harming national competitiveness.

Limitations of the Porter Framework

Despite the advantages of the Porter framework over the neoclassical framework, today it suffers from several key limitations. First, the framework was developed in the late 1980s and much has changed since, which calls into question at least some of the analysis. Second, in part because the framework was developed by one of the leading scholars of corporate strategy, it is weak on a serious discussion of government strategy. Rather, to the extent it focuses on government policies, it is on capabilities and conditions that help firms, not government strategy.

Porter's analysis was also largely focused on firms, rather than establishments. This made more sense in the 1980s when the U.S. economy was challenged by Japanese firms mostly located in Japan. Even now this appears reasonable; after all, don't firms drive competitiveness? But the problem is that his initial assessment does not adequately differentiate between firms and establishments. With the vast increase in global supply chains over the last three decades and with production systems much more geographically fragmented, it makes more sense to focus not on firms but on high-value-added establishments. Indeed, a nation can have highly globally competitive firms, but if much of their high-value-added work is located in their establishments in other nations, then the country's competitiveness will be less. To be sure, the United States boasts some of the leading firms in the world, but over the last two decades country after country has either

induced or pressured these firms to locate more and more high-value-added work (production, R&D, design, etc.) in their own nations.

Second, because of Porter's focus first and foremost on firms, he assumes that firms, not countries, are decision makers. And indeed, in many nations that remains largely the case. But for some nations, particularly China, the nation and the firm work together to make the decision. The Chinese semiconductor industry did not decide to establish a national semiconductor plan and spend almost $160 billion to subsidize its national champions, in part to acquire more capable foreign competitors. The Chinese government did. The failure to consider the role of national governments as important drivers of firm decisions and competitiveness outcomes misses a key development that has occurred over the last three decades.

Third, Porter underestimated innovation and new entry. He wrote *The Competitive Advantage of Nations* before the rise of the latest iteration of Silicon Valley in the 1990s. Most of his examples of firm innovation were of long-established firms developing new capabilities to adjust to new challenges. But now competitive advantage, particularly in developed nations, is highly influenced by determined, disruptive new entrants. Here is where one wishes Michael Porter and Clayton Christensen could collaborate on a new book, given Christensen's pioneering work on disruptive innovation.

Fourth, one of the most widely studied and implemented parts of Porter's work was the focus on regional industry clusters and their importance to competitiveness. While the concept of the importance of regional agglomeration economies from localization and urbanization effects had been a focus of regional economists and planners for decades before Porter's work, Porter popularized the notion, bringing new attention to this important issue.[82] But while regional clusters are an important factor in national economic competitiveness, Porter gives short shrift to the role of governments in helping to enable and support innovation clusters, incorrectly assuming that they almost always emerge in an organic way and that there is little governments can do here. More importantly, Porter undervalues, if not ignores, the importance of sectoral, rather than regional, policy. The reason the United States is a leader in agriculture, information technology, aerospace and biotechnology is that these are all industries and technologies that national policy has supported, either directly through agencies like the Department of Agriculture or indirectly through the Department of Defense. This oversight stems from Porter's general view that government does not play any real important role in competitiveness, other than to establish the right factor conditions. But all too often where you sit determines where you stand, and when you sit in a business school the risk is that you see the world through the lens of business and ignore the key role government can sometimes play.

This is one of the reasons why so much of the discussion and focus of competitiveness and innovation policy today is on bottom-up emergent efforts, rather than on top down directive efforts. Indeed, many involved in competitiveness policy wrongly believe that the *only* effective efforts are about enabling bottom-up activities. Create accelerators. Empower

nascent entrepreneurs. Support creativity. Decentralize policy. To be sure, these are useful, but as this report argues, they are vastly insufficient especially when some nations are competing by pouring vast resources into top-down strategies to dominate industries. Moreover, this focus wouldn't be bad if it didn't all too often come with a disdainful view that anything that is top down is controlling, inflexible, bureaucratic, and decidedly "old economy."

Finally, and perhaps most importantly, Porter focuses on capabilities, not strategy. His book is not titled *The Competitive Strategy of Nations*, but rather *The Competitive Advantage of Nations*, because he does not believe that governments should be engaged in strategic positioning. He ignores strategy because he believes that only firms drive strategy and national policies can only support firms. It is important to focus on this a bit more deeply since it gets to a key choice nations need to make in crafting competitiveness policies.

Despite the advantages of the Porter framework over the neoclassical framework, it suffers from several key limitations today.

The voluminous business school literature that has been produced since the rise of the corporate strategy movement in the 1960s has tended to focus either on firm positioning (the decisions a firm makes regarding choice of industry and position within an industry) or on firm capabilities (the internal factors such as a learning culture that would enable a firm to thrive.) As Walter Kiechel writes in his book on the history of corporate strategy, "the history of strategy [is] a struggle between two definitions, strategy as positioning and strategy as organizational learning."[83] Some, like Porter, argued that positioning was more important. Others, such as *In Search of Excellence*'s Tom Peters and McGill University's Henry Mintzberg, argued in favor of capabilities. Kiechel goes on to write:

> The point of operational effectiveness is to outdo your rivals on all the activities that result in greater value for customers, which enables you to deliver a superior product for which you can charge more or to offer them what they can get elsewhere but at a cheaper price. Operational effectiveness thus boiled down, for Porter, to pretty much performing the same activities as your competitors, but more efficiently than they do. In contrast—drumroll here—strategic positioning means performing different activities from rivals' or performing similar activities in different ways.[84]

So while Porter has written numerous books on corporate strategy, when it comes to national competitiveness, strategy is largely absent and it is all capabilities: infrastructure, a skilled workforce, an investment climate, etc. This is one reason why virtually all discussions of competitiveness policy focus on capabilities: how to produce more skills; how to improve infrastructure; how to make sure the regulatory system doesn't inhibit competitiveness, etc.

One purported reason for this focus on capabilities is that unlike firms which face a variety of strategic choices (e.g., exit or enter a particular segment or market; focus on innovation or copying; compete on cost or quality; be a first mover or fast follower, etc.) nations supposedly have fewer choices, if any. Not only are nations by definition in more industries, but there is a strongly held view that their strategic choices are constrained by

natural endowments (what neoclassical economists call comparative advantage), and that any attempt to influence strategic direction is picking winners and losers and as such is unwarranted intervention into the free market.

To the extent that neoclassical doctrine has anything to say about a proactive role for the government in spurring competitiveness, it advises supporting what can be termed framework conditions and factor inputs that all firms can benefit from (e.g., free trade, a good regulatory system, better education, and basic research). These certainly can help increase competitiveness, but as described below, they are woefully inadequate as a comprehensive strategy.

To be sure, if a nation does not achieve operational effectiveness its competitiveness will suffer. But in a world where competition is much fiercer and technological and market position options much more diverse, capabilities in the absence of strategy risks losing to the nations that have both the right capabilities and effective strategy. The risk of operational effectiveness as the core of a national competitiveness strategy is that competitors can easily copy it. To gain distinctive competitive advantage, nations have to combine world-class capabilities with strategic positioning. As Cohen and DeLong write in their economic history of the United States, *Concrete Economics*, the key economic questions are "Where do we want to go? What will the new economic space look like? Who will inhabit it?"[85] Leaving these questions up to firms alone is to make the same mistake as the neoclassicalists, who would leave these decisions up to the "market." Moreover, without this strategic analysis and positioning, efforts focused on capabilities will be less effective. Capabilities that better suit the needs of key industries (e.g., electrical engineers to support a nation's high-tech hardware firms) are better than spending the same resources on broad-based capabilities that may or not be effectively aligned to key industries.

Thus, while competitive strategy for the firm involves identifying ways to deal with Porter's five forces that determine the competitiveness intensity of any particular market segment, competitive strategy for the nation should be designed to enable the nation to capture more of the value in the form of higher GDP and stronger terms of trade. In short, national competitiveness strategy is more than the identification and maximization of capabilities—which the lion's share of what national competitiveness work focuses on—it's also positioning.

To be sure, nations are not firms. While all nations have leaders, some with more power than others, no nation has the equivalent of a CEO. Public decision-making is messier, especially in democracies. And while firms have multiple objectives, they have one overriding objective and that is to maximize profits (ideally in net-present value terms). As Kiechel writes "The purpose of [business] strategy became clear… to enrich shareholders."[86] Nations do not have a profit function, and even to the extent they focus on competitiveness they have other objectives in terms of economic policy, such as fairness and opportunity. Moreover, the competitive landscape is different for firms. Most firms face many existing and potential competitors, the latter which often appear to come out of

nowhere. In contrast, there are fewer than 200 nations and their competitive position and threat changes relatively slowly. Notwithstanding these differences, there are good reasons why competitiveness policy should include strategic as well as operational components.

Key Strategic Choices for Nations

Businesses seek strategic advantages to make supernormal profits. As Kiechel writes though, "strategic advantages are competed away more quickly in anything but the most innovative businesses. Business models have shorter life spans than ever before."[87] As applied to nations, this insight raises two key questions. First, how long can nations keep their strategic advantages in this new environment? Second, if nations lose advantages, how do they acquire new ones?

Many involved in competitiveness policy wrongly believe that the only effective efforts are about enabling bottom-up activities. Create accelerators. Empower nascent entrepreneurs. Support creativity. Decentralize policy.

Should national governments rely only on firms to adapt in ways hopefully aligned with national interests, or should governments take on that responsibility? One argument for the latter position is that the interests of firms are no longer so closely automatically aligned with national interests. When Charles "Engine Charlie" Wilson, then the president of General Motors, was asked during his 1953 confirmation hearing to become the U.S. secretary of defense in the Eisenhower administration whether he would be able to make a decision adverse to the interests of GM, he famously answered that he could—but also that he could not conceive of such a situation "because for years I thought what was good for the country was good for General Motors and vice versa." However, as the U.S. economy globalized and U.S. corporations became, in the words of former IBM CEO Sam Palmisano, "globally integrated enterprises," the more accurate statement today would be that sometimes what is good for GM is good for the United States and sometimes it is not.[88] As such, if nations don't take responsibility for their strategic positioning and adaptation, they risk leaving it up to firms. But not only are the interests of firms not always aligned with national interests, even when they are, increasingly firms need the assistance of the state to effectively reposition and compete. As discussed below this does not mean state-directed economies or states that act without deep interaction with the industrial sector. But it does mean that the state independently assesses national competitiveness needs, particularly in the context of strategy.

Porter wrote that most companies could choose from one of three strategic choices: low-cost leader; product differentiation to enable a price premium; and market specialization of a particular niche. Countries have similar choices. Indeed, nations should ask and answer a number of key strategic questions in order to develop an effective national competitiveness strategy.

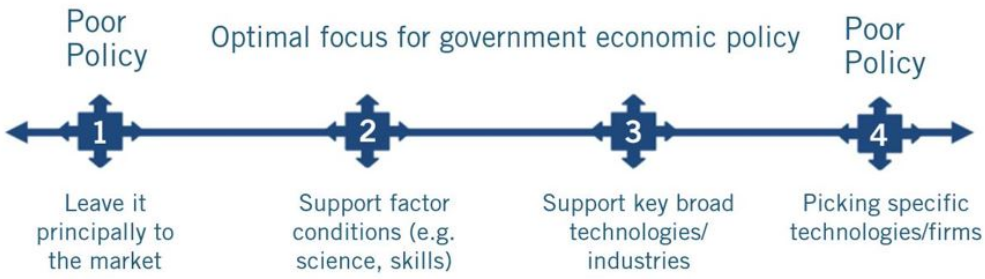
Laissez-Faire vs State-Directed Industrial Policy

At the most strategic level, nations need to decide how interventionist they want to be: Do they want a strategy, and if so how prescriptive should it be? The debate in the United States is usually framed in terms of two choices: Either leave economic growth principally to the market (position 1 in Figure 3), or engage in industrial policy to pick specific technologies and/or specific firms (position 4). For example, one high-ranking Obama

administration economic official stated that the United States would not win the race for global innovation against China if it becomes like China (by which he meant position 4).[89] For him and many others, there are only two choices: American laissez-faire capitalism (position 1) or some kind of foreign-inspired, heavy-handed industrial policy that is just one short step away from nationalized industries and state socialism (position 4).

The laissez-faire view is against competitive policy in principle, holding that policies should not be designed particularly to spur competitiveness or to address the different challenges facing different industries. Government should limit itself to raising revenues, regulating what it needs to (which is not much), managing macroeconomic policy (preferably through monetary policy only), and enforcing the rule of law, all as unobtrusively as possible. Leave it to entrepreneurs motivated by the profit motive (as little distorted by taxes as possible), and growth will naturally result.

Figure 3: Continuum of Government-Market Engagement



The heavy-handed industrial policy view is also clear. Industrial policy is designed to intervene in an economy to support, favor, or restructure specific businesses, such as particular automobile or steel companies, or narrowly defined technologies (e.g., lithium-ion batteries). Industrial policies often seek to pick specific national champion companies or technologies. For example, France's investment of 56 billion francs ($11.4 billion) between 1976 and 1996 in Minitel, a monochrome teletext phone system, is a classic case of a country trying to pick a national champion,[90] as is Groupe Bull, France's state-sponsored computer giant.[91] French president Jacques Chirac's (1995-2007) ill-fated gambit to support a French-backed search engine, Quaero, "as the next Google-killer," was also a clear manifestation of industrial policy.[31] No wonder industrial policy has gotten a bad name with such ill-advised policies.

The choice, however, is not limited to the extremes of laissez-faire or embrace heavy-handed industrial policy. A range of activities exist between those two poles that governments can take to try to spur competitiveness. Effective competitiveness involves engaging at positions 2 and 3 in the continuum: supporting factor conditions (including tax policy designed to encourage innovation and designing incentives to spur institutional innovations such as better technology transfer from universities) and placing strategic bets to support potentially breakthrough nascent technologies (such as the Internet, nanotechnology, human genome mapping, robotics, or advanced batteries) and focusing

on industries rather than specific firms (such as robotics, life sciences, software, machinery, and clean energy), all the while enabling competitive markets and a beneficial business climate.

Focus on Comparative Advantage or Competitive Advantage?

A key strategic choice for many nations, especially ones with abundant, tradable natural resources, is whether they want to compete on the basis of their "natural" comparative advantage or seek to create competitive advantage in industries they may not be as strong in. For example, nations like Australia and Canada, both blessed (or cursed?) with large amounts of oil and other mineral wealth, face a key strategic choice: Do they want their exports to be more focused on natural resources or manufactured goods and services? A focus on exporting things from the ground will mean a stronger currency, which will make it harder for other traded sectors to be competitive. Known as the "Dutch disease," this can lead to an uncompetitive manufacturing sector. These kinds of nations do have choices. For example, Australia and Canada could impose steep extraction taxes on minerals and use the revenues to reduce taxes on manufacturers or invest in manufacturing support programs (e.g., cooperative R&D centers). The higher excise taxes would also reduce mineral exports leading to a more competitive currency valuation.

So while Porter has written numerous books on corporate strategy, when it comes to national competitiveness, strategy is absent and it is all capabilities: infrastructure, a skilled workforce, an investment climate, etc.

Compete on Costs or Value?

The third key strategic choice for most nations, particularly developing nations, is whether to compete on costs or value and innovation. Can't and shouldn't countries compete on both? With regard to business strategy, Kiechel writes, "But can't any company pursue a strategy aimed at creating value and practice ruthless discipline toward costs at the same time?" The answer was that a few, such as Toyota, could, but traditionally companies are good at one or the other.

The same is generally true for nations and subnational jurisdictions. The ideal economy, at least from a competitiveness perspective, is one where all revenues come from natural resource royalties and border-adjustable value added taxes, so that taxes on businesses, especially ones in traded sectors, can be zero. At the same time, much of those "free" taxes would be invested in infrastructure, education, R&D, and tech transfer to help support firms in trade sectors.

Some nations choose to compete more on high value, so that the workforce makes high wages. The advantage of this is clear: High wages are the key goal of economic policy as they support a high living standard. The risk of this strategy is that unless it is supported by high productivity, quality, innovation, and other advantages, a nation may find that its high cost structure makes it less competitive. Nations can support such a structure in part by spurring both public and private investment, including on education and training, R&D, and machinery, equipment, and software.

Some nations choose to compete more on low costs, with low taxes, low wages, minimal regulation and a significant share of intellectual property acquired without paying market price. The advantage of this is that low costs can make a nation a more attractive for

foreign direct investment and can help ensure that the prices of exports are competitive globally. The disadvantage of this strategy is that it makes it harder for a nation to increase wages and living standards, and sometimes innovation.

Competitiveness policies influence whether countries compete on costs or innovation and productivity. And indeed, nations differ not only in where they fall on this factor but on how they change over time. One way to assess this is to look at the compensation costs for a nation's manufacturing workers and a nation's total (business and government) investment in R&D as a share of GDP.

On the first measure, competing on costs, many European nations support high manufacturing wages, including Switzerland, Belgium, Sweden, Germany, and Austria, with average hourly compensation above $45 per hour (in U.S. dollars). Canada, Japan, the UK, and the United States are not able to support as high a standard of living. In these four nations, manufacturing compensation ranges from $27 to $37 per hour. And developing nations like India, China, and Mexico compete more on costs, with much lower manufacturing labor costs, of $1.75, $4.60, and $6.76 per hour respectively.[92] (See table 1.)

On the second measure, value and innovation, nations differ significantly in terms of how much they compete. When it comes to competing on innovation, at least as measured by investment in R&D, Israel and South Korea lead, with investments in R&D exceeding 4 percent of GDP.[93] Other leaders are Germany, Austria, Switzerland, Sweden, and Japan. The United States, at 2.74 percent of GDP, is next. Not surprisingly, many developing nations lag, with Brazil, India, Mexico, and Slovakia investing less than 1.25 percent. Interestingly, southern European nations of Portugal and Italy are more like developing nations when it comes to R&D. (See table 2.)

Nations differ in the direction they are moving over time on these measures relative to other nations. On cost, China's manufacturing compensation increased 736 percent from 2001 to 2014, compared to 107 percent for the 22 nations in the sample. For much of the 1990s and the 2000s, China sought to gain competitive advantage as the low-cost factory of the world, making largely low-value-added manufactured goods. But China's extremely low labor costs increased as productivity increased and workers demanded higher wages. Meanwhile, other low-cost hubs emerged as competitors (e.g., Vietnam, India), so the Chinese government sought to move toward a higher-value-added economy with greater investment and higher-value-added, innovation-based industries. At the same time, China's R&D-to-GDP ratio grew more than twice as fast as the global average growth rate.

The United States is in a different position. Long competing on relatively high compensation and high innovation, America moved toward competing more on costs, less on investment in innovation as it faced stiff competitive challenges in the 2000s. Rather than try to compete principally on innovation, quality, productivity, and other factors, many firms began to compete more on costs, for example, by limiting investment in key factors of production (e.g., machinery and equipment, workforce skills, and R&D) and

keeping wages low (in part by breaking unions, establishing two-tier wage structures, including hiring a larger share of workers as lower-cost contractors). As such manufacturing labor costs increased much less than the average, just 42 percent. At the same time, the federal government cut investments. As a result, federal R&D as a share of GDP is now at the lowest levels since the mid-1950s. Of course, the risk in employing this Goldilocks strategy—neither low cost or high value—is that the United States will have a hard time competing not only with the nations that are focused on high value and innovation but also with nations with cost advantages. The risk is being stuck in the middle, winning on neither cost nor value.

Of the nations in the sample, Japan's manufacturing compensation grew among the slowest, perhaps partly because being next to China forced it to compete more on cost. But Japan is in some ways better positioned than the United States, because it marries these more competitive compensation levels with strong investment in innovation. Its R&D intensity is 21 percent higher than that of the United States, and it has grown that intensity 11 percent while the United States has largely stagnated. Japan still runs a trade surplus, suggesting that this strategy has had some compensating benefits. In contrast, while U.S. manufacturing compensation grew just 42 percent, it still lost millions of manufacturing jobs to trade and runs a large goods trade deficit, indicating that it is competing more on cost, but not successfully.[94]

Nations should ask and answer a number of key strategic questions in order to develop an effective national competitiveness strategy.

A nation like Germany, whose manufacturing labor costs remain among the highest in the world, has been able to remain competitive by relentlessly focusing on high quality, innovation, and specialized niche production where it is harder for others to copy the production "recipe."[95] While its wage levels increased less than the average (98 percent), this rate was more than double the U.S. rate. Its R&D intensity exceeds that of the United States, and it has grown 20 percent over the last 15 years, while U.S. intensity has stagnated.

In contrast, nations like India and Mexico have based their strategies on low costs and competing for internationally mobile investment. To be sure, all these nations have supplemented low-cost strategies with some policies to move up the value chain, but their predominant logic remains cost advantage. Despite some efforts to become a more innovation-based economy Mexico has sought to compete on cost. Its manufacturing wages grew more slowly than any nation in the sample (25 percent), while its R&D intensity remains low but grew modestly, 42 percent. This wage stagnation is one reason why its trade surplus with the United States has grown so much. Contrast that with some Eastern European nations like Slovokia and the Czech Republic where manufacturing compensation grew 380 percent and 213 percent, respectively.

Clearly, being a high-cost, low-innovation nation is problematic, because high costs and low value guarantee a path to a lack of competitiveness. Commonwealth nations of Canada, the UK, and Ireland (as well as Italy) have moderately high manufacturing compensation costs, but average or below-average investments in innovation. (Ireland

compensates for this with a very low corporate tax rate.) The challenge for these nations is to find ways to boost innovation (and productivity) so their higher costs can come without competitive disadvantage.

Conversely, being a low-cost, high-value nation is optimal for competitiveness, but it comes at the expense of higher living standards. In this sense, a nation like China is well positioned—despite strong compensation growth, it still enjoys low costs but is above the world average on R&D intensity. Likewise, Israel and South Korea are well positioned, having below-average compensation costs but world-leading R&D investment.

Being a Follower or a Leader

A fourth key strategic decision for any nation is whether to compete by being a follower or a leader in innovation. The advantage of being a leader—a nation in which more of its traded firms are first to the world in introducing new products, processes, and business models—is that if this first-mover position can be sustained it can generate higher profits, wages, and exports. This is especially true in knowledge-based and network-based industries where an early advantage allows a firm to get customer feedback first and to learn iteratively and quickly, making it hard for competitors to close the gap.

But there are risks to such a strategy. First, innovation is not guaranteed. Firms can spend a lot of money only to find that they fail. Waiting for others to make costly mistakes which the fast follower can learn from can sometimes be the better strategy. Second, taking the risks and investing the resources to be the first mover only pays off if the firm/country can generate sustainable returns from the investment. But with a significant number focused on obtaining intellectual property without adequate payment (e.g., theft, coercive transfer, and weak intellectual property laws and enforcement), the risk is a Little Red Hen syndrome where the leader does all the expensive hard work and the lazy followers get many of the benefits.

But the opposite challenge exists for many nations who have long been followers. If followers want to move to the next level of development and competitive position, they need to move from being a copier to at least sometimes being a global leader. South Korea epitomizes this challenge. For decades, Korea's competitiveness strategy was to be a follower in many of the technologies and industries that firms in more technological advanced nations (e.g., Japan, Germany, and the United States) had pioneered. But with the emergence of large fast followers right on their doorstep (e.g., China and increasingly India and Vietnam), Korea has no choice but to shift its strategy toward being a leader. But this is easier said than done, for it means restructuring the country's education system (less rote learning, more innovation and creative thinking) and their policies to enable more disruptive entrepreneurial innovation and greater respect for intellectual property protection.

Competing on Science or Engineering

The fifth key decision is to compete on science or engineering. Competitive advantage in many industries depends increasingly on innovation. And while there are multiple paths to

competing in innovation industries, the two main paths, at the risk of simplification, are to specialize on science or engineering. Nations differ in their focus on these. Since World War II the United States has thrived on science-based innovation and having a strong science system. Many of the industries that the United States has gained global competitive advantage in (e.g., biotechnology, computers and software, semiconductors) have been more science-based, including computer science. This is not to say that strong engineering has not been a component; indeed, there is no science-based industry that does not include an engineering component. But it is to say that industries differ in the extent they are driven by engineering versus scientific advances and capabilities. Overall the U.S. economy has thrived globally because of relatively strong science capabilities and its strong ability to turn that science into commercializeable products and businesses.

The risk of course in employing this Goldilocks strategy—neither low cost or high value—is that the United States will have a hard time competing with the nations that are focused on high value and innovation as well as with nations with true low-cost advantages.

In contrast, many other nations have built competitive economies more on strong engineering capabilities. Germany and Austria are cases in point, with very strong industries grounded in mechanical and electrical engineering, such as automobiles and machine tool systems.

For some science-based nations, like the United States and the United Kingdom, the challenge is to strengthen engineering. For the notion that a nation can win through science alone is fallacious, because science is a public good that's freely traded around the world, whereas gains from engineering-based innovation are more capturable and appropriable within nations. Basic science funding generates knowledge that is essentially a non-rival, non-appropriable public good that can be quickly adopted and leveraged by foreign competitors. That's why many nations invest much less in basic research and more in applied research compared to the United States. These countries rely in part on the basic research discoveries coming out of U.S. universities and national laboratories, which allows them to concentrate their efforts on turning these scientific discoveries into their own innovative technologies and products which they sell to other nations, including the United States.[96] In other words, investments in science create essential new knowledge that is freely traded around the world, but the application of that knowledge (e.g., through engineering) is critical to creating wealth through new products and processes.

For the last 50 years, the United States could be the global leader as a science-based economy, developing innovations in everything from transistors and mobile phones to lasers, graphical user interfaces, search engines, the Internet, and genetic sequencing. That approach worked well when few nations had the engineering capacity to leverage U.S. scientific advances. But today, many nations, especially China, have strong engineering capabilities that can rely on U.S. scientific advances to generate exportable products. As such, it is not enough to simply invent new technologies in America; the United States must also invest in the ability to manufacture in America products based on those technologies.

The challenge for a nation like China is the exact opposite. China is blessed with a large number of engineers, who can reverse-engineer new-to-the world products. Moreover, by

2018 the Boston Consulting Group expects China to be investing between 25 and 100 percent more in later-stage R&D than the United States.[97] But its science system is much weaker, in part because the Chinese government has not adopted the rigorous peer-reviewed science funding system that leading nations like the United States have. This, coupled with intense pressure for performance from the government, leads some scientists to engage in academic fraud.[98] For China to boost its innovation-based competitiveness, it will need to consistently produce new-to-the-world scientific discoveries and find better ways to commercialize them.

Diversify or Specialize?

The sixth key choice is whether to specialize or diversify. For decades there has been debate in the economic literature about whether places are better off focusing on having a sectorally, functionally, and technologically diverse economy or having a deeper and more specialized one. The debate is a bit similar to that in financial management: Is it better to have a broad investment portfolio akin to index funds in order to reduce risk and volatility (if one stock is down others may be up), or is it better to specialize in a few stocks to capture a greater up side?

As in many areas, the right answer appears to be somewhere in the middle. As technologies and industries have become more complex and multidisciplinary, where many types of knowledge must be combined to gain competitive advantage, there is a real risk that nations will fail if they make too many shallow, thin bets, trying to be good at everything. They risk being good at nothing as in many areas they are going up against competitors with deeper pockets and deeper knowledge bases. A case in point was Brazil's information technology strategy from 2013. This was a government initiative to help Brazil gain competitive advantage in a wide array of IT products and industries, including cybersecurity, cloud computing, cellphone apps, health IT, the Internet of Things, and others. The problem was that to do each area well enough to gain a globally competitive foothold would have required significantly more investments than the government was willing to allocate. Taking a "peanut butter" strategy to R&D policy—spreading it shallowly to many areas—is usually a recipe for failure, especially for small and mid-sized nations without deep pockets.

But focusing on just one or two technology areas can also be problematic, particularly if these are "greenfield" areas where the nation has few capabilities in technologically "adjacent" areas. As Steve Keen writes, "expanding the knowledge that a country contains is thus key to growth, but this does not happen in a haphazard way. Rather, economies can progress by combining knowledge resident in closely related industries to develop new industries, and thus new knowledge."[99] He goes on to note that the key is to "diversify intelligently, based on the industries you currently have."[100] In the case of a country like Brazil, for example, this would suggest that rather than trying to gain competitive advantage in a wide array of technologies where it has few adjacent capabilities, it would be better off specializing in a few where it has related capabilities. For example, given the world-class capabilities that Brazil's Petrobras has in oil and gas exploration, an adjacent

technology area could be information technology related to this, such as seismic sensing and oil and gas rig IOT.

One final note on this. Just as large corporations can afford to invest in a wider array of technologies than smaller ones can, larger countries must be able to have competitive advantage in a wider array of technologies if they are to be able to effectively compete globally across enough industries to afford its imports. In contrast, smaller nations, such as Canada, Singapore, and Denmark, can afford to develop global best-in-class efforts in a much smaller group of technologies and industries. The risk for small countries is that absent access to and penetration of global markets for these innovation-based export industries, they will not be able to gain competitive advantage, for most innovation-based firms require significant economies of scale if they are to succeed, and firms in small markets can only achieve that by gaining global market access.

Attack, Defend, or Attract

Nations need to regularly monitor the health of their various industrial ecosystems, commons and clusters in terms of their strength and the offers being made by foreign competitors.

A seventh key question is how nations should approach their competitors. In the business strategy literature, there is a well-defined concept of businesses either being defenders (having established market share and defending it against competitors) or attackers (where they seek to not just gain market share but actively take it away from the leader). At one level, nations face similar choices. To this can be added the choice to attract—that is, relying on attracting foreign direct investment.

From World War II to the 1970s, the United States was the attacker, developing advanced industry capabilities and taking market share from other nations. Other nations have followed different strategies. For example, from the late 1970s to the mid-2000s China followed the attract strategy. Following the lead of Deng Xiaoping, China's core strategy became attracting cost-based, routine manufacturing from advanced economies. But starting in 2006 when China adopted its national indigenous innovation strategy, China switched to become the attacker, strategically seeking to displace leaders in a wide array of advanced industries, first in their home markets, but increasingly in third-party markets and eventually in the home markets of leaders.

In reality, most nations must assume all three roles, with emphasis varying depending on the current state of their industries relevant to other industries. For nations developing innovative, disruptive industries, like the United States with cloud computing, over-the-top video and fintech, policies that enable business attackers to gain foreign market share from more traditional incumbents are important. But they must also defend existing industries where they have sustainable advantage against attackers. For other nations, like Germany, which has a wide array of strong electro-mechanical firms, it is important to defend their position against attackers (particularly state-backed Chinese firms), although they must also build competencies in new industries.

The Process of Competitiveness Strategy

There are at least five other related conceptual issues that nations need to consider as they develop national competitiveness strategies.

Strategy as Overcoming Economic Gravity

The first is how strategy addresses "economic gravity," or what economists refer to as agglomeration economies. Nations lead in certain industries because they have complementary assets that make it easier for firms to grow and thrive, even in the face of high costs. Regional economists refer to these as agglomeration economies, benefits that firms can take advantage of externally. These can include a pool of skilled workers, a strong local supply base, other firms that firms learn from, and complementary research institutions. Agglomeration economics act as gravitational sinks that keep firms attached and pull in even more complementary activity. Think of Detroit, Mich., from the 1910s to the 1970s, and Silicon Valley from the 1970s to the present.

But there are centrifugal forces in economic geography, not just centripetal ones. Centrifugal forces occur for two reasons. The first are push factors. In many industries, there is a product life cycle where early in the development of a new product the work to develop it and produce early versions occurs in the high-cost, agglomeration cluster because at this stage in the production process, innovation and improvement is more important than cost reduction of routinized production. But that balance between innovation and cost usually changes, particularly if industries and firms don't constantly renew themselves through innovation. And when that happens, production often moves to lower-cost places. The risk of course is that unless the original cluster can continue to grow new seedbeds of innovation, it hollows out, as has been the case with many core cluster regions in the U.S. industrial heartland.

But there are also pull factors. Many nations have well-articulated, extremely well-funded and well-managed operations to induce firms in advanced industries to either move to or expand in their location. For example, organizations like the Singapore Industrial Development Board and IDA Ireland seek to attract complementary assets from around the world to their innovation clusters. Many nations provide generous financial incentives, such as tax holidays, free land, and cash grants. And many nations, although not the United States, have lowered their effective corporate tax rates over the last two decades precisely to attract more foreign direct investment.[101]

The risk for nations whose firms are on the receiving end of those recruitment pitches from foreign governments is how to ensure that a trickle doesn't turn into a flow. For example, in the United States, as many metal forming and assembly suppliers moved to Mexico, other suppliers and eventually original equipment makers (OEMs) did so as well. So, when Indiana's Carrier air conditioning company made the decision to close production operations and move to Mexico—a decision that was partially limited by President Trump's pressure on the firm to keep some production in the United States—it was almost too late. Much of Carrier's suppliers were already in Mexico, having established a competing gravitational cluster.

As such, nations need to regularly monitor the health of their various industrial ecosystems, commons and clusters in terms of their strength and the offers being made by foreign

competitors. This means understanding when and if it makes sense to respond to try to retain key assets. Sometimes it makes sense for a nation to shed some commodity and lower-skill-based production to other lower-cost nations. But sometimes there is a risk that this will relatively quickly move up the value chain, leading to the loss of higher-value-added activities.

At the same time, nations need to also strategically approach the other side of the equation: seeking to attract key assets to their nation. The United States is significantly limited in this by having no national-level industrial recruitment incentive fund and a poorly resourced investment-attraction agency, Select USA, whose very name indicates its lack of focus. Rather than go out and try to attract the kind of firms and operations that would best complement the existing U.S. industry structure, Select USA passively hopes foreign firms will select the United States, at which point it will try to facilitate the process of investment. In contrast, as noted above, some nations use attraction as a core part of their competitiveness strategy, seeking out not just firms in targeted industries but particular firm functions, such as advanced R&D, and these efforts are often bolstered by significant "war chests" to spend on attraction.

Strategy as Positioning on the Next S-Curve of Technological Innovation

If the history of global economic geography teaches us one lesson it is that winners in one generation of technology are often not the winners in the next. This is true at the firm and geographic levels. For example, in business the leading vacuum-tube companies were different from the leading transistor-makers, which were again different from the leading semiconductor-makers. And each was concentrated in a different part of the United States. One reason for this, as discussed by Clayton Christensen, is that most firms are loath to disrupt their own business models and so stay committed too long to older generations of technology, letting new entrants establish a foothold before they have a chance to mount an adequate response.[102] The history of technological innovation is rife with these examples of disruptions between technological generations.

The same dynamic appears to be true for nations. Great Britain led the first two industrial revolutions of the late 18th and early 19th centuries, steam engines and iron. But with the emergence of the third industrial revolution based on steel and electricity, leadership shifted to Germany and the United States. With the emergence of the fourth industrial revolution of the postwar period based on electro-mechanical and science-based chemical technologies, leadership at first shifted to the United States, but rapid followers like Japan caught up, causing much of the competitiveness panic in the 1980s in the United States.

As the fifth industrial revolution grounded in the microprocessor and associated technologies (computing and the Internet) emerged, the United States once again led in its early phases (although much of that leadership had migrated from the East Coast to the West). However, in the last decade the United States has been under intense challenge for IT leadership with the Japan of today—China—which has narrowed the gap through an array of means, some fair and some unfair.[103]

Understanding that major general-purpose technology systems emerge in waves and that these waves power major cycles of growth means that nations need to understand the temporal position of the current wave and how well they are positioned to take advantage of it.[104] A key component of that is to understand when opportunities have passed nations or regions by and that it's time to move on. Many European Union policymakers seem to have a difficult time doing this, as they appear focused on gaining a competitive foothold in the fifth industrial wave (e.g., information technology and the Internet), when in fact much of the development is already set, with the United States as the leader and China as a rapid follower. Europe's focus should instead be more on ensuring that their third- and fourth-wave industries (e.g., chemicals, electronics, machine tools, autos) are competitive, in part by helping them incorporate fifth- and the emerging sixth-wave (artificial intelligence, robotics, autonomous systems, nanotechnology) systems in their products and production systems. At the same time, Europe should work to find areas of the sixth wave that firms in Europe can gain competitive advantage in before others, such as industrial IOT and advanced robotics.

It is possible for governments to insulate competitiveness strategy to a reasonable degree from political pressures.

Identifying Key Sectors

Competitiveness strategy in developed nations should be focused not only on sectors that compete globally, but on sectors that are hard to replicate if they are lost, such as machine tools, computing, biotechnology, and aviation. They shouldn't focus on easy-to-recreate industries like call centers and low-skill manufacturing, because if these are lost due to temporary factors, like a currency spike, they can be re-shored more easily. But even with respect to the first set of industries, most nations, with the exception of perhaps the United States and China, will have to focus on a subset. Competitive advantage in advanced industries has become more difficult to achieve as needed scale economies and technological sophistication has increased over the past few decades. So, most nations, especially smaller ones, will be able to thrive in only a few industries.

There are three major risks in strategic targeting. The first, as discussed above, is casting too wide a net and focusing on too many industries so that nations lose needed specialization and focus. The second is picking industries that, while they might sound appealing, especially if every other nation is targeting the same industry, are actually a poor fit because the nation has little capabilities or adjacent industries. Biotechnology is an example that many nations rightly see as an attractive industry, but one where some have very few existing or adjacent assets that would make it likely or even possible to succeed. The third risk, and one most neoclassical economists raise as a reason to not target, is that the choices will be dictated by political pressure rather than rational analysis. To be sure, public policy of any kind can be affected by lobbying and sectional politics. But it is possible for governments to insulate competitiveness strategy to a reasonable degree from political pressures.

Strategy as It Relates to Size and Location

Given that even with pervasive globalization most trade is still between geographic proximate places, a consideration of location cannot be divorced from competitiveness

strategy. By definition, the strategy of a place like Canada, adjacent to the largest market in the world, the United States, will be different from a place like New Zealand, an island located far from most population agglomerations. As such, in developing a competitiveness strategy, nations need to take into consideration the impact of their location.

For example, both Canada and Austria are in similar positions. Their economies are relatively small and both are located next to large economies that share their language (United States and Germany). For both nations, their "best and brightest" can move to their larger and more prosperous neighbor relatively easily to work in larger and denser technology clusters. And for both, the large companies of their neighbors often enter their domestic markets and succeed because of greater scale economies. This means that to succeed both nations need to focus on smart specialization that creates a gravitational pull sufficient to offset the pull toward their prosperous neighbor. To do that, they need to find areas where they can gain global market share (to gain scale) that are relatively unique so that resources don't flow to similar clusters in their neighboring nations. Contrast that to a nation like Finland, which is at the geographic periphery of Europe, but because it has its own language few Finns move to other nations. As such, its strategy would be different than Austria's, for example.

Competitive advantage stems from firms' ability to acquire new learning. The same is true for nations.

Can Nations Change Strategic Direction?

A final issue nations need to consider in formulating and adapting national competitiveness strategies is whether nations can really change strategic direction. In the business management field, followers of the capabilities view argue that companies can't really change strategic direction. A capabilities advocate like Tom Peters believes that "virtually all the behavior of an enterprise is a pretty much direct inheritance of its gene pool."[105] But a strategy advocate like Porter is more optimistic that companies have degrees of strategic freedom. Both views are likely true. Changing strategy can be done, but it's hard, if for no other reason than firms build up routines, attitudes, internal staff that resist change, and a shared business worldview that often is resistant to serious redirection.

This gets to a key question for national strategy related to the "genetics" of nations—not in a racial or national origin sense—but in an organizational sense. Nations appear to have deeply embedded economic characteristics akin to genes. For example, in its "economic genome" America is blessed with strong entrepreneurial genes, likely because of the orientation of the Founding Fathers and because the majority of individuals who immigrated to American were risk-takers, having taken a huge chance to pull up stakes from a foreign nation, particularly in an era before air travel and telecommunications. In contrast, most European nations have fewer entrepreneurial "genes," in part perhaps because the more risk-averse chose to stay and not immigrate to the new world.[106] Clearly a kind of Darwinian economic evolution occurs on the global economic scene as some capabilities are more effective at creating competitive advantage than others and these change over time. But the key question policymakers really should want to know is whether Lamarckian evolution is possible where organisms adapt in response to environmental changes, passing those adaptations on to their offspring.

Related to this question is whether nations can learn and change. Competitive advantage stems from firms' ability to acquire new learning. The same is true for nations. For example, can nations with a relatively risk-averse and traditional European culture embrace risk-taking and entrepreneurial vigor? There seems to be some evidence that, at least in some nations, such evolution is possible. For example, some Scandinavian nations have made a concerted, widespread push to become more entrepreneurial, in part by acknowledging the need for, supporting and celebrating entrepreneurs. The United States faces a different question. Can it evolve in a way that retains its important and distinctive individualist and entrepreneurial culture while at the same time recognizing that, in the next phase of global economic evolution, those characteristics have to be married with an ability to come together to support collective action, at least some of it organized by the state? The verdict is out on how much Lamarckian national evolution is possible, but one thing that is clear is that national economic evolution is much more difficult without conscious understanding of the need for such evolution.

PART III: COMPETITIVENESS POLICIES

This section lays out generalized steps governments need to take in six areas: establishing key framework conditions; regulatory and tax policy improvement; improving factor input quality; supporting competitiveness-advancing firm behavior; trade policies including limiting unfair foreign competition; and building institutional capabilities.

Before going into detail on this policy framework it is useful to briefly review the prevailing competitiveness policy consensus. As noted above, few competitiveness studies, at least in the United States, consider strategic questions and most ignore supporting firm behavior. Rather, most focus on framework conditions, especially reducing factor costs (e.g., reduced regulation and taxes) or expanding factor inputs (e.g., supporting education, infrastructure, and basic research).

For example, a report from the Boston Consulting Group proposes a seven-step plan to enhance U.S. competitiveness.[107] It assumes that the United States is already competitive and that the U.S. government should do more to persuade companies of this fact so they will move production here. But among its substantive proposals it advocates corporate tax simplification and reforming regulations. And like most studies it highlights the need for skills development and better physical infrastructure.

Harvard's Michael Porter and Jan Rivkin propose an almost identical eight-point plan. They too call for elimination of corporate tax "loopholes" (i.e., incentives), but also for more high-skilled immigration and a balanced budget, and they argue that it's critical to reform K-12 education.

While these and other related agendas are at least focused on the right problem—boosting U.S. global economic competitiveness—they are not comprehensive or strategic enough to significantly move the competitiveness needle, even if they were to be implemented. For restoring U.S. competitiveness policy requires more than a slightly better regulatory system, a tax code that imposes the same effective tax rate on all industries (which could hurt, not

help, competitiveness), and slightly better factor inputs. The remainder of this report focuses on what an effective agenda would be for the United States and most nations.

Key Framework Conditions

Establishing strong framework conditions—ensuring the rule of law, including the ability to enforce contracts; making it easy to do business, including starting and closing a business; supporting flexible labor markets; promoting the optimal levels of competition; securing robust intellectual property protections and stable macroeconomic policies—all contribute to economic competitiveness. Because most competitiveness agenda reports focus on these factors, this report will not go into detail here. A more comprehensive analysis of these factors was done in the ITIF report, "The Indian Economy at a Crossroads."[108] But as noted, these are now just table stakes to play the game, not enough to win it.

When traded-sector business establishments face a competitive disadvantage due to regulation, there can be only two results: they move production to another nation with better regulation, or they lose market share to competitors in other nations.

A Competitiveness-Focused Regulatory and Tax Policy

Tax and regulatory policy clearly can affect the competitiveness of a nation's traded sectors. To be a more positive force, a nation's tax and regulatory policies should be designed with an explicit focus on traded sectors.

Regulatory Policy for Competitiveness

Poorly designed and implemented regulation is especially damaging to industries that compete in international markets. If government imposes unwise regulatory burdens on non-tradable industries that sell only in the domestic economy, such as insurance brokers, dry cleaners, or home builders, it reduces total welfare by limiting competition or unnecessarily increasing costs. But the affected businesses are normally able to pass on the increased costs to consumers. Even if they cannot, they do not suffer any relative disadvantage against their competitors since everyone is in the same boat. And they cannot move their production overseas without giving up their customers.

The situation is very different for traded industries where high regulatory costs can harm producers and reduce jobs without accomplishing any corresponding benefit relative to more efficient regulation. When traded-sector business establishments face a competitive disadvantage due to regulation, there can be only two results: they move production to another nation with better regulation, or they lose market share to competitors in other nations. In both cases they employ fewer workers domestically, and because traded sectors have a much larger multiplier effect on the economy than non-traded sectors, these losses will ripple through the economy, slowing growth and leading to a higher trade deficit.[109]

One way for nations to address this challenge is to establish institutional reforms that provide incentives to regulatory agencies to take competitiveness concerns into account when promulgating and enforcing regulations. National governments can create interagency councils to take a comprehensive look at the competitive environment facing individual traded industries, including the regulatory system. Governments can also institute an ongoing process where they take a comprehensive look at key industries facing strong international competition to determine what changes could improve the

environment in which they operate. Such an effort would have to include a review of existing regulations to see whether any can be streamlined or eliminated.

For example, in many cases regulatory agencies have choices with regard to how they meet public interest goals such as worker safety and environmental protection, and these choices may have significantly different effects on competitiveness. According to one academic study that reviewed the impact of environmental regulations on competitiveness, "The form of regulation may be as important as its stringency in determining the nature of its relationship with competitiveness."[110] But regulatory bodies are sometimes indifferent to these choices, seeking only to achieve their particular goal in the easiest and most straightforward way possible.

To address this, regulatory agencies seeking to impose regulations that affect traded sectors in nontrivial ways should be required to have these regulations undergo a review. In the United States this review could be done by the Office of Management and Budget's Office of Information and Regulatory Affairs (OIRA). For example, environmental regulations that might directly affect how semiconductors are produced would be required to undergo review. However, regulations affecting what local governments must do to treat wastewater would not. While better regulation in the latter area might have second-order impacts on traded sectors (e.g., municipalities' costs could decline, thereby enabling them to reduce business taxes or expand education funding), it would not directly affect traded sectors. Given the limited amount of time and attention available for regulatory review, the highest priority should be placed on reviewing regulations that directly impact traded sectors.

Some nations have begun these kinds of efforts. For instance, in October 2013, France began an effort to develop roadmaps for 34 specific sector technologies in an attempt to increase the country's competitive position in each.[111] The United Kingdom has also experimented with industry-government councils. The Automotive Council UK, for example, was set up in 2009 and involves top officials in government and industry in a collaborative effort to improve the country's competitiveness as a place to produce cars. The Council has focused on a few key tasks, including the development of a technological roadmap for the domestic industry; attempts to boost the presence of U.K. companies in the domestic supply chain; and general efforts to improve the business environment and skills of the workforce.[112] In addition, they examined regulatory issues affecting the industry. Great Britain also provides businesses with a direct means of submitting proposals to its Better Regulation Executive for how specific rules can be improved.[113]

Tax Policy for Competitiveness

Business taxes are often the most direct policy tool nations have for affecting competitiveness. Some nations, such as Ireland, have long used low business taxes as a key to gaining competitive advantage. But what kind of tax policy is best for competitiveness? At one level, this is an easy question: Nations should tax mobile factors of production less than non-mobile ones. This means, all else being equal, taxing individuals more and

companies less, since few individuals move to another nation to reduce their taxes. It also means taxing firms in traded sectors less than firms in non-traded sectors.

Yet, in some nations, especially the United States, policymakers are warned by economists not do to this. William Gale, director of the economic studies programs at the Brookings Institution, sums up this view when he states: "The sine qua non of meaningful tax reform is to clean out and rationalize the exclusions, exemptions, deductions, and credits in the tax system."[114] Translation: get rid of incentives for innovation and investment and just give everyone the same low tax rate regardless of whether the firm is a barber shop or a biotechnology company.

There are two reasons why following this advice would worsen U.S. competitiveness. First, not only is the U.S. statutory corporate tax rate high, but so is the average effective rate compared to major competitors.[115] As such, tax reform that is revenue neutral has no effect on the effective rate. Second, the effective tax rate for U.S. industries differs significantly and most traded sector industries pay less. For example, one rough estimate suggests that the effective tax rate on firms in the United States that are in traded industries (e.g., most of manufacturing) was 10 percent in 2014, while the rate for non-traded industries was 28 percent.[116] By definition, revenue-neutral corporate tax reform would result in the average effective tax rate of firms in traded-sector industries increasing, making them less competitive.

Nations should institute or expand business tax incentives that are more likely to be used by traded-sector firms to support competitiveness-inducing investments.

So, what should nations do? First, they should tax consumption, ideally through border-adjustable value-added taxes or carbon taxes, and use the revenues to pay for lower effective taxes on business, especially in traded sectors. Many nations already do this. Nations with lower corporate tax rates raise more revenues from less mobile sources. These nations use sources of revenues such as value-added taxes and taxes on energy to replace declines in corporate tax revenues. For example, most European nations have used their value-added-tax system (a tax on purchases that is border-adjustable) to offset reductions in their effective corporate tax rates.

Second, nations should institute or expand business tax incentives that are more likely to be used by traded-sector firms to support competitiveness-inducing investments. These include research-and-development tax incentives, innovation boxes where profits from innovation-based products are taxed at a lower rate, and investment tax credits or deductions.

Improving Factor Inputs

It is easier for firms to be competitive if they have access to high quality factor inputs, including a skilled workforce (in part through high-skilled immigration policies), publicly supported scientific and engineering knowledge, and infrastructure, including what Greg Tassey refers to as infratechnologies.[117] Most competitiveness agendas include at least some of these factors.

But nations need to go beyond just providing high-quality generalized inputs and, where appropriate, support factor-specific inputs that relate to the needs of the nation's traded sectors. This can involve support for key freight infrastructure expansion. It can mean establishment of industry-led skills alliances designed to generate the kind of workforce skills that firms in key traded sectors need. It can involve encouraging research universities to better align their work with key traded sectors. For example, the U.S. Congress passed a provision establishing a program to create a national network of "manufacturing universities" which would establish more and stronger industry-university research collaborations and incentivize universities to focus more on training students with the requisite skills to support U.S. engineering-based industries.[118]

And one key area relates to government support of research. In much of the competitiveness policy literature there is a general view that government support of basic science is a key enabler of competitiveness, but that support for applied research or engineering is a step too far, toward the nether lands of industrial policy. There are two problems, however, with an overarching focus on basic research. First, the global spillovers from basic research are quite high. For example, David Coe and Elhanan Helpman found that a 1 percent increase in the R&D capital stock in the United States raised domestic productivity by 0.23 percent and raised the average productivity of 22 developed countries studied by 0.12 percent.[119] The geographic spillovers are higher for basic research than for applied. Second, a predominant focus on basic research, especially research whose topics are chosen only by the researchers themselves, risks not being linked to the needs of the nation's traded-sector firms.

Spurring Competitiveness-Advancing Firm Behavior

Firms can take steps that make themselves more competitive. And governments can play a role in helping them do that. One role is to help suppliers of larger companies become more innovative and productive. There are many ways nations can do this.

Many nations have established extension programs to help small and mid-sized manufacturers (SMEs) adopt new technology and improve productivity. These programs can help SMEs cut costs and improve performance which in turn helps them and their domestic customers become more competitive.

In addition, any national scientific and engineering research strategy needs to be designed to support the technological needs of the nation's key traded sectors. Many nations do this already. For example, on a per-GDP basis, Korea invests 89 times more than the United States on industrially oriented research, Germany 43 times more, and Japan 15 times more.[120]

There are a host of ways to do this. Many nations have established innovation vouchers that provide small firms with cash vouchers they can "spend" at universities and government labs. In the United States, the Small Business Innovation Research program requires federal agencies to allocate a small share of their R&D budgets to small business research projects related to agency mission goals. Nations can also use tax policy to spur

technology partnerships. For example, many nations now provide more generous R&D tax incentives for industry research undertaken in conjunction with universities, research institutes, national laboratories, or multi-firm consortia.[121]

Nations can also develop cooperative research institutes. Germany's 60 Fraunhofer Institutes have long provided a compelling model for performing applied research of direct utility to industry by helping to translate research into commercializeable products.[122] The Fraunhofer Institutes bring together cutting-edge research in an industrially relevant way across a number of sectors and technology platforms (such as advanced machining, optics, photonics, nanotechnology, robotics, advanced materials and surfaces, wireless technologies, and many others) by providing a platform for joint precompetitive research, bilateral applied research with individual firms, prototype manufacturing, and preproduction and cooperative technology transfer arrangements with companies.

Most governments have established innovation-promotion agencies to provide grants to companies for research, either alone or in consortia, including in partnership with universities. All support university-industry partnership grant programs, whereby companies or business consortia can receive grants (usually requiring matching funds) to partner with universities on research projects. For example, Vinnova, Sweden's innovation-promotion agency, gives most of its grants to research consortia involving traded-sector companies and universities.

The fact that many WTO members do not come close to playing by the rules, while pretending that they do, is a testament not only to the ineffectualness of the WTO but also to the willingness of nations to want to have it both ways.

Trade Policies

By definition, national competitiveness depends not only on actions within a nation, but on the actions other nations take. Some nations choose various forms of protectionism as a way to gain competitive advantage. Neoclassical economists reject such steps as self-destructive and irrational. But it's not quite that simple.

To start with, if a nation is one of the 164 members of the World Trade Organization there is a moral case for it not engaging in protectionist, mercantilist policies. By joining the WTO, nations made a commitment to at least try to play by the rules. The fact that many WTO members do not come anywhere close to playing by the rules, all the while pretending that they do, is a testament not only to the current ineffectualness of the WTO but also to the willingness of some nations to have it both ways—to get the protections from the WTO in terms of market access, but to also be able to manipulate the global trading system to their advantage.

Leaving this ethical issue aside, should nations engage in protectionism as a way to gain competitive advantage? While mercantilist policies can deliver gains in employment and economic growth for countries, many are flawed because they lead to a number of unintended and adverse consequences. First, such policies often raise the cost of key capital goods, such as ICTs, which damages capital goods-using industries and lowers innovation, productivity, and economic growth. Second, they can damage countries' participation in global value chains for the production of high-technology products. Third, they can lead to broad economic inefficiencies and lower living standards. Fourth, they cause reputational

harm to a country that can damage its attractiveness as a location for foreign direct investment. Fifth, such policies are fundamentally unsustainable, in part because they reciprocally engender protectionist policies by other nations and lead to unbalanced and unsustainable "dual economies" in many of the countries that implement them. Much of this exhibits prisoner's-dilemma characteristics: If no nation engaged in mercantilism, then everyone would be better off. But if only one does, it may gain. Indeed, to claim that mercantilists are irrational and will eventually realize the error of their ways is not only naïve, it is wrong. "Smart" mercantilism can boost a nation's competitiveness and growth, which is why so many nations practice it.

Combatting Mercantilism

This means that a core component of any nation's competitiveness strategy, at least non-mercantilist nations, needs to be a trade-enforcement agenda that is at least on equal standing with its market-expansion agenda. This means carefully identifying foreign trade and economic policy practices that unfairly harm the competitive position of key traded-sector industries and then using the appropriate array of trade tools to pressure the offending nation to limit its policies. Given that the most damaging mercantilist policies today are carried out by the Chinese government, this means that most nations need to place a particular focus on rolling back Chinese innovation mercantilism.

In the United States, this means developing a national trade strategy and increasing funding for U.S. trade-enforcement agencies. For too many years, the U.S. trade policymaking environment has suffered from underfunding and a lack of strategic direction. The U.S. Trade Representative's Office (USTR) too often engaged in fighting the last wars—the tariff war and the war to sign one more trade agreement, even when the agreement fails to strongly protect U.S. economic interests. The U.S. system is not set up to fight the current war—the war against rampant innovation mercantilism fueled by a wide array of nontariff barriers. As such, the U.S. government should establish strategic trade priorities and policies designed to provide a fair playing field on which establishments in U.S. traded sectors can compete. Ultimately, U.S. trade policy should measure success not by the number of deals signed, but by the overall results achieved.

Attracting Investment

Most countries should seek to attract foreign direct investment that supports the nation's competitiveness strategy. But this should be done through attraction, not compulsion or forced localization. As Georgetown University Professor Ted Moran finds in *Harnessing Foreign Direct Investment for Development*, "the strategy of trying to build up the host country industrial base through imposing domestic content requirements on protected foreign investors…has turned out to be quite disappointing."[123] All too often their operations are subscale and incorporate older technology and quality-control mechanisms. And performance requirements imposed on these investors—such as joint-venture and domestic content requirements—result in fewer backward linkages and less technology transfer than their export-oriented FDI counterparts. In contrast, Moran finds that foreign-owned plants that are built to penetrate international markets, often as part of the parent

multinational's own supply chain, operate with the most advanced technologies and embody the most sophisticated quality-control procedures. And they generate backward linkages to local firms if the host country business climate and worker-training institutions are conducive to the emergence of suppliers. Ultimately, Moran finds that "the positive contribution to host country growth and welfare from FDI projects that are incorporated into the multinational corporation's international supply network is ten to twenty times more powerful than has conventionally been estimated."[124]

Institutional Capabilities for Competitiveness

It's one thing to identify the kinds of policies nations can adopt to drive competitiveness growth. It's another to build the institutional competence and political will to develop and implement the right policies. Toward that end, the single most important step governments can take to boost competitiveness is to make higher competitiveness a principal goal of economic policy, alongside boosting innovation and productivity.

The single most important step governments can take to boost competitiveness is to make higher competitiveness a principal goal of economic policy, along with boosting innovation and productivity.

Once they have done that, governments need an ongoing capacity to effectively and consistently analyze competitive strengths and weaknesses, and threats and opportunities. In the United States, notwithstanding the hundreds of millions of dollars spent every year on the thousands of economists working for the federal government, the exact nature of U.S. capabilities and challenges with regard to the competitiveness of its traded sectors are only weakly understood. At least since after World War II, the federal government has never felt the need to develop strategic economic intelligence to fully understand the competitive position of its traded sectors.

As George Washington University scholar Andrew Reamer notes, the opaqueness and limitations of our national statistical system for measuring innovation, productivity, and competitiveness makes achieving this insight a daunting task.[125] Established after World War II, the U.S. economic statistics system was designed to help facilitate fiscal and monetary policy to avoid another Great Depression, and as such, measured things like the number of houses built and cars manufactured. It did not measure the competitiveness of the pharmaceutical industry or innovation in the auto industry or any other number of important matters, for the assumption was that these things took care of themselves.[126]

If the U.S. federal government is going to develop more effective policies to spur traded-sector competitiveness, it needs to get much smarter. The very existence of government policies (tax, trade, regulation, spending, etc.) means that government inevitably influences competitiveness, sometimes for good, sometimes for ill, but almost always by happenstance. Government would be much better positioned to effectively support competitiveness if it were more strategic, knowledgeable, and coordinated.

To do this, nations should establish a competitive strategy unit that tracks the competitive position of key economic sectors. This entity should have several core functions. The first would be to regularly assess important aspects of overall national traded-sector competitiveness (e.g., trends in FDI, growth of traded-sector jobs and output, changes in global market share of traded sectors, etc.). The second, as Reamer suggests, would be to

develop a "working picture of the nature of competitiveness and innovation, their importance to the nation's economic health, and their sources."[127] The third would be to focus on select traded sectors that are critical to the nation's economic future (sectors where the nation has some competitive edge and where value added and wages are higher than average) and develop strategic roadmaps of how government can promote sector competitiveness. Each assessment would ideally lead to the creation of a public-private partnership to translate the analyses into action.

With regard to the latter function, government agencies normally 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. Medical devices are a good example. In the United States, the Food and Drug Administration reviews the safety and effectiveness of medical devices. The Department of Health and Human Services sets reimbursement schedules. The Department of Defense and the Department of Veterans Affairs procure such devices. But there is little or no coordination across agencies to develop a unified strategy that would orient government policies to support the competitiveness of the U.S. medical device industry, despite the fact that it is a high-value-added sector in which the United States still retains competitive advantage, even though that position is at risk. Accordingly, a competitiveness strategy unit should develop strategic roadmaps and guide interdepartmental collaboration to ensure that the regulatory policies and activities of disparate government agencies are, wherever possible, aligned to promote the global competitiveness of strategic sectors.

Government statistical agencies also need to collect a full array of industrial and firm data that allow analysts to more effectively understand firms' competitive actions and positions. In the United States years of budget constraints have meant that U.S. statistical agencies lack the resources needed to effectively measure key elements of the traded economy. There are numerous examples, many of which should be rectified through increased or restored funding.[128]

Finally, it is not just strategy that matters, it's also agility: the ability of nations to adapt strategy as conditions change. Adaptation is required because the competitive playing field changes. It changes because of technology that changes competitive advantage, geography (competitors' actions), and social factors.

CONCLUSION

Nations with declining economic competitiveness face a very stiff economic headwind, akin to the central bank raising interest rates several hundred basis points. To support national competitiveness national governments will have to go beyond the conventional counsel from economists that getting market conditions and factor inputs right is enough. It is not. Acting in response to market forces alone, most firms will underinvest in competitiveness-enhancing activities. But expecting the optimal array of policies and public programs and actions to emerge on their own in an organic, trial-and-error way is wishful thinking. Nations need smart, analysis-based ongoing national competitiveness strategies

that address all six factors outlined in part three (framework conditions, regulatory and tax policies, factor inputs, spurring competitiveness-advancing firm behavior, trade policy, and institutional capabilities), and they need the political will and bureaucratic means to effectively implement the strategies and tactics emerging from the strategic process. Nations that effectively do this should be able to enjoy the benefits of significantly higher competitiveness growth.

APPENDIX

Table 1: Manufacturing Compensation Costs Per Hour (in U.S. Dollars), 2014[129]

Country	2001	2014	Change Relative to Average
India	0.71	1.75	19%
China	0.55	4.60	304%
Mexico	5.41	6.76	-40%
Brazil	3.63	10.54	40%
Czech Republic	3.75	11.74	51%
Portugal	6.03	12.68	2%
Slovakia	2.69	12.92	132%
Israel	13.00	21.70	-19%
South Korea	9.00	23.77	28%
Singapore	12.20	26.80	6%
Japan	22.40	27.00	-42%
UK	20.70	33.00	-23%
Canada	17.80	34.56	-6%
US	26.00	37.00	-31%
Italy	16.80	37.40	7%
Netherlands	22.00	42.00	-8%
Ireland	17.70	43.40	18%
Austria	21.00	45.00	3%
Australia	15.00	46.00	48%
Germany	25.00	49.50	-4%
Sweden	22.00	50.00	10%
Belgium	25.77	55.60	4%
Switzerland	28.11	64.73	11%
Average	14.66	30.37	0%

Table 2: Total R&D Spending as a Share of GDP, 2013[130]

Country	2001	2013	Change Relative to Average
India	0.60	0.81	35%
China	0.94	1.99	112%
Mexico	0.35	0.50	42%
Brazil	0.90	1.21	34%
Czech Republic	1.11	1.90	71%
Portugal	0.77	1.32	73%
Slovakia	0.63	0.82	32%
Israel	4.19	4.15	-1%
South Korea	2.35	4.19	78%
Singapore	2.02	2.00	-1%
Japan	2.97	3.31	11%
UK	1.63	1.66	2%
Canada	2.03	1.71	-16%
US	2.64	2.74	4%
Italy	1.05	1.31	25%
Netherlands	1.82	1.95	7%
Ireland	1.05	1.58	50%
Austria	2.00	2.97	49%
Australia	1.55	2.11	36%
Germany	2.35	2.81	20%
Sweden	3.91	3.31	-15%
Belgium	2.02	2.44	21%
Switzerland	2.40	3.24	35%
Average	1.70	1.70	0%

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