

# THINK LIKE AN ENTERPRISE: WHY NATIONS NEED COMPREHENSIVE PRODUCTIVITY STRATEGIES

Executive Summary

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# Think Like an Enterprise: Why Nations Need Comprehensive Productivity Strategies

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## EXECUTIVE SUMMARY

Paul Krugman famously wrote, “Productivity isn’t everything, but in the long run it is almost everything.”<sup>1</sup> He is right: Increased living standards depend on increased productivity. But what can policymakers do to raise productivity? Most economists would start their answers by tamping down expectations, arguing that government can do little, other than perhaps to get out of the way. This is why Krugman went on to conclude, “So what are we going to do about productivity growth? Nothing.”<sup>2</sup> Others offer only vague palliatives such as spurring competition, increasing public spending on education and science, and improving macroeconomic policy. But policymakers desiring higher productivity would be well advised to look beyond such advice from purveyors of the “dismal science,” because conventional economics is of little help in understanding the sources of productivity growth, much less in providing useful or actionable advice on productivity policy.

Fortunately, other schools of economic thought, particularly *innovation economics*, and other disciplines, such as business administration, have discovered a myriad of ways in which public policies can drive productivity growth. Moreover, this work shows that a nation’s productivity growth will in fact lag unless governments implement smart and comprehensive productivity policies. These policies include the traditional advice of getting market conditions right and providing factor inputs to firms, such as a skilled workforce. But they also go beyond the conventional solutions, which are grounded in a neoclassical economics framework that imposes a straitjacket on policymakers. The conventional theory holds that the only thing government can do is to remove barriers and fix policy failures so that firms reacting to price signals can do whatever they may choose to drive productivity.

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This overly passive framework ignores the complexity and enterprise-like nature of economies, which actually require more strategic productivity policies. As such, any effective productivity policy needs to go beyond the standard limits to embrace four other key components:

1. Incentives, including tax policies, to encourage organizations to adopt more and newer tools to drive productivity. The array of market failures is considerable when it comes to firms developing and adopting better tools to drive productivity. In particular, governments should use the tax code to provide incentives for acquisition of new capital equipment.
2. Policies to spur the advance and take-up of systemic, platform technologies that accelerate productivity across industries. Many of the information technologies central to driving future productivity have chicken-or-egg network effects which mean that adoption will lag unless governments adopt smart, technology-specific policies.
3. A research and development strategy focused on spurring the development of productivity-enabling technologies, such as robotics. The most important factor driving future productivity will be the development of better tools, including machines and materials. Governments need to focus a much larger share of their R&D budgets on advancing technologies that will reduce the need for labor.
4. Sectoral productivity policies that reflect the unique differences between industries. In terms of productivity and productivity policy, industries differ in significant ways. Generic market conditions or factor supply policies do not reflect these key differences. Any effective national productivity policy will need to be grounded in analysis-based, sector-based productivity strategies.

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Finally, for nations to put in place sophisticated productivity policies, the single most important step is to establish productivity as the principal economic policy goal, ahead of other factors such as stable prices, low unemployment, or reduced income inequality. After that, nations need to establish the institutional capacity to conduct sophisticated productivity analysis, including sectoral analysis. Only after such analysis will nations be positioned to identify the right policies for productivity growth. Without a sophisticated understanding and approach to productivity policy, nations' productivity performance will lag behind their potential.

It is impossible to estimate the potential productivity gains that nations can achieve by putting in place sophisticated and comprehensive productivity policies as described in this report, but it is entirely reasonable to believe that the gains could be significant. In fact, if the United States and other developed nations were to adopt these policies, it is quite possible they could raise their annual labor productivity growth rates by 1 percentage point or more.<sup>3</sup> The gains for less-developed nations that are further from the production-possibility frontier are likely to be at least double that.

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Part I of this report provides an overview of productivity, including what it is, why nations need to accelerate it, and how it grows through shifts in enterprises and technology. The report then examines the current debates about whether productivity kills jobs (it does not) and whether it still benefits workers as it has in the past (it does). Getting this debate right is critical because a growing, if not already prevalent, meme holds that robots are about to replace workers on an unprecedented scale. Not only is this view utterly wrong, it is also dangerous, for if people believe it then policymakers are much less likely to want to put the productivity policy “pedal to the metal.”

The report then reviews productivity performance in the United States and other developed and developing nations. It analyzes the current debate about the future of productivity—stagnation versus exponential acceleration—and concludes that if nations adopt the right productivity policies, the best they can hope for is a revival of the strong productivity growth rates many enjoyed in the 1950s and 1960s.

Part II provides a framework for thinking about national productivity policies, including how the prevailing neoclassical and neo-Keynesian economic doctrines provide a poor guide to productivity policy and why market forces alone will not maximize productivity. Public goods, externalities and other enterprise failures, and system interdependencies for development and adoption of productivity-enhancing tools all mean that markets alone will not maximize productivity.

Finally, Part III lays out a comprehensive and actionable agenda for spurring productivity growth, which most nations can use as a guide in tailoring their national productivity policy agendas. This agenda includes policy recommendations related to market framework conditions, factor inputs, organization incentives, productivity-focused R&D investments, systemic chicken-or-egg issues, industry-specific sectoral policies, and the ways in which governments need to organize themselves to advance effective productivity policies.

## **PART I: OVERVIEW OF PRODUCTIVITY**

Productivity is a measure of output per unit of input. The best way to raise productivity is to help workers work more efficiently by reorganizing work processes and providing better tools, or by using better technology or business models to eliminate the need for some work.

Governments should make productivity growth their principal economic policy goal because without increased productivity it will be impossible to raise living standards in a sustainable way. The need for higher productivity is obviously much more acute in developing economies, where the average per-capita income is just \$6,000 per year, but it is needed in even the richest nations, particularly because the ratio of workers to dependents will fall as more workers reach retirement age.

### **Why Productivity Does Not Kill Jobs**

In the wake of the Great Recession, a new narrative emerged that productivity driven by increasingly powerful information technology (IT)–enabled “machines” is the cause of slow job growth, and that accelerating technological change will only make things worse. But

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what the pundits are attributing to anemic productivity growth actually has its roots in the painful and slow recovery from the greatest financial crisis since the Great Depression.

The “productivity kills jobs” argument is refuted not only by data and econometric studies, but also by logic, because it fails to consider second-order effects, which include people spending the savings generated from productivity increases, creating jobs in the process.

The argument that “this time will be different” is also wrong. No evidence suggests that the pace of technological change is accelerating or that technology is transforming most occupations. For example, a widely cited study claiming that 47 percent of U.S. jobs could be eliminated by technology appears to be wildly overoptimistic.<sup>4</sup>

Many argue that productivity not only kills jobs; it does not even benefit workers with jobs. Some argue that technological innovation will only exacerbate inequality, with only a few “robot owners” capturing future gains. Despite these claims, the evidence suggests that productivity has benefited the average worker and will continue to do so.

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### **How Productivity Grows: Enterprise and Industry Shifts and Technology**

Productivity can grow in two ways: the growth effect (when most industries increase their productivity) and the share effect (when more-productive industries gain share at the expense of less-productive ones). Despite the fact that many nations, including China and India, have focused on the share effect (trying to grow high-tech industries or become more knowledge-based), the growth effect is by far the most important driver of productivity, especially in middle-sized and large economies. Emerging and middle-income nations need to adopt growth-focused, rather than share-focused, productivity strategies if they want to escape from the so-called middle-income trap.

The growth effect can drive productivity two ways. The first is when the productivity of all firms in an industry increases. The second is when an industry’s productivity increases because more-productive firms gain market share at the expense of less-productive firms. These two processes of productivity growth occur within all sectors but at different rates.

But why does one firm become more productive than another? The answer appears to be that they adopt better tools and use them more effectively. Productivity can continue to grow until all establishments have adopted all available technologies and made any available changes in the production system to fully take advantage of the tools. At this point, further growth depends on the development of better tools—innovation.

At any particular time, not all technologies have the same impact on productivity growth. For most economies today, the tools that are most effective in raising productivity are information and communications technology-based (ICT). These digital tools include hardware, software, and telecommunications networks, and increasingly tools that incorporate all three components, such as computer-aided design and manufacturing systems and self-service kiosks.



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## Why Has Productivity Growth Stagnated in Developed Nations?

Economists are generally puzzled as to why productivity growth in developed nations has slowed. One explanation is that the gains are occurring but that official government statistics do not measure them properly. However, recent research suggests that the size of this gap has not grown enough to account for the slowdown.

One factor appears to be lower levels of investment in capital equipment compared to prior decades. One reason companies may not be buying more tools is that they may have difficulty in getting the full benefit from them. This is likely true for information technology platforms that exhibit chicken-or-egg dynamics.

Finally, it appears to be harder to raise productivity now. We may be approaching the top of the current ICT-powered S-curve for technology-driven productivity. Despite the hype, most ICT innovations are less transformative than those of a decade or two ago. In addition, many industries that have lagged in ICT adoption exhibit significant barriers to robust adoption. Moreover, many of the gee-whiz applications tech enthusiasts point to as proof that they must be driving productivity—artificial intelligence (AI), autonomous vehicles, drones, and easy-to-use robots—are still nascent and not likely to be widely adopted for decades.

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## The Future of Productivity: Stagnation, Revolution, or More of the Same

A great debate has recently emerged about the future of productivity. On the one hand, stagnationists such as Robert Gordon and Tyler Cowen suggest that advanced economies have “picked all the low hanging fruit” for productivity advancement and are in for a long period of stagnation.<sup>5</sup> On the other, techno-utopians such as Erik Brynjolfsson and Klaus Schwab see us poised on a “third industrial revolution” about to drive never-before-seen gains in productivity. Both are likely wrong.

Stagnationists make a number of key mistakes. First, they apply an atom-based standard to technological change. In other words, only if an innovation is in physical form (skyscrapers, plumbing, cars, etc.) is it real innovation. But this misses the fundamental point that most of today’s innovations are not based on changes in atoms but in bits (digital *systems*) that allow economic activities to be conducted more productively.

Second, if technological possibilities have been exhausted, then we should expect to see productivity slowdown across all firms. In fact, the OECD reports that the most globally advanced firms have continued robust productivity growth, hardly evidence of stagnation.<sup>6</sup>

Even if today’s tools are less powerful at driving productivity growth than those of a decade ago, it does not mean that tools will not get better. In fact, there is no reason to believe that the next innovation wave will not be more powerful than the current system. However, the next wave is not likely to be powerful and cheap enough to move the needle on productivity in advanced nations for at least another 15 to 20 years.

Finally, there is no reason why nations not at the leading edge of technology adoption could not experience robust productivity growth for the next several decades as they catch up with the leaders.

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In contrast to stagnationists, techno-utopians proclaim that we are poised on the edge of a new industrial revolution, even greater than prior ones. Because of this, they argue that productivity growth rates will soon skyrocket. But techno-utopians make two key mistakes. First, they assume that the current pace of IT-based change, grounded in Moore's Law, will continue or even accelerate. Moore's Law, however, has actually slowed down by half over the last 12 years and evidence of this changing anytime soon is scant. Second, they assume that much of the economy is based on bits rather than atoms and easily automated by IT. But Moore's Law shows no sign of emerging in food production, haircut production, or even blog production.

## **PART II: A FRAMEWORK FOR NATIONAL PRODUCTIVITY POLICIES**

Given that most organizations benefit from increased productivity, why do governments need proactive productivity policies? The reality is that not only do a host of market failures abound when it comes to productivity growth, the entire frame of market failure is also faulty. Rather than conceive of an economy as a large market with self-interested actors transacting on the basis of price, it is more accurate to think of an economy as a large, integrated enterprise that requires coordination of activities that individual enterprises will not effectively undertake on their own.

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Unfortunately, neoclassical economics has little to say about productivity, with many economists counseling policymakers to do nothing other than get out of the way, because for them government intervention distorts the workings of the free market, producing allocation inefficiency. To the extent that neoclassical economics has anything to say about a proactive role for the government in spurring productivity, it is to support market conditions and factor inputs that all firms can benefit from (e.g., free trade, reduced regulations, better education, more scientific research, etc.).

These broad market conditions and factor input improvements are necessary but insufficient to maximizing productivity. Thus, the first step for policymakers seeking to maximize productivity is to embrace an alternative economic doctrine grounded in understanding of the economy as an integrated, complex enterprise. Known by a variety of labels (innovation economics, endogenous growth theory, evolutionary economics, and neo-Schumpeterian economics), this approach is grounded in understanding that productivity is less about markets and more about organizations and systems, in particular about how technology is developed and deployed to drive productivity.

## **PART III: PRODUCTIVITY POLICIES**

If nations are to effectively drive productivity growth, they need to go beyond conventional advice and embrace an array of policies focused on driving productivity by all organizations (large and small; business, nonprofit, and governmental), particularly policies focused on remedying market failures at the firm level, supporting R&D into productivity-enhancing technologies, and establishing the right industry sector policies to maximize productivity. Even though few studies embrace these last three policy areas, they are the best opportunity for most nations to raise productivity. This report lays out policy steps governments need to take in five areas: framework conditions, factor inputs, organizational incentives, R&D and system productivity policies, sectoral policies, and government institutional changes.

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## Framework Conditions

Framework conditions refer to the overall economic system in which organizations operate. One condition includes stable fiscal and monetary policies that get the balance right between controlling inflation and supporting full employment. Other conditions include a rule of law that market participants can trust, including the ability to enforce contracts and protect tangible and intellectual property; regulations and processes that make it easy to start and close a business; labor and product market regulations that allow firms to boost productivity; and reasonably competitive domestic markets.

One key productivity policy is firm size agnosticism. In other words, nations should eliminate policies favoring small firms over larger firms because as a class small businesses are less productive.<sup>7</sup> Yet most nations have policies that protect and favor small businesses that result in their producing a larger share of output than they would absent these policies. Two areas of policy need to be rolled back: special benefits to small businesses and discriminatory policies that place tax and regulatory burdens only on large businesses. The former policies, unless carefully targeted to potential high-growth *gazelle firms*, or designed to bolster their productivity levels (such as NIST's Manufacturing Extension Partnership program), simply keep the share of the economy produced by small businesses larger than it otherwise would be.<sup>8</sup> The latter policies not only slow the growth of larger firms, they also slow the growth of smaller firms that do not want to lose their special protections that come from being small.

Developing-nation governments should also work to significantly reduce the size of their informal sectors. In addition, those working in the development field need to recognize that informality is a drag on productivity growth, not a progressive force.<sup>9</sup>

A final component of supportive framework conditions is a culture supportive of productivity. Economies in which support for raising productivity is widespread will be able to be more successful than societies where productivity is viewed with skepticism or fear. In many developing nations, suspicion of productivity is widespread and support for *featherbedding*, the practice of intentionally employing more workers than are needed to do the job, is deep-seated. In many developed nations, a new skepticism of productivity (the benefits go only to corporations) or fear of it (it kills jobs) is prevalent. Overturning these attitudes is key to driving productivity growth.

## Supporting Factor Inputs

Organizations not only need the right market framework conditions to enable them and provide the incentive to increase productivity, they also need the right external factor inputs, including physical and digital infrastructures, a skilled workforce, and scientific research output.

## Organizational Incentives

Productivity grows when organizations and industries produce more with fewer inputs. Therefore, an effective productivity policy focuses on increasing capital investment, particularly in machinery, equipment, and software. Policies that lower the cost of capital equipment relative to the cost of labor will increase the substitution of technology for labor



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and increase productivity. Therefore, an appropriately set minimum wage and limits on low-skill immigration make it more economical for organizations to substitute capital for labor. At the same time, policies to reduce the cost of capital equipment will lead to more equipment investment. This means eliminating taxes and tariffs on capital goods as well as other policies that raise the price of capital goods, including mandatory domestic consumption rules, forced offsets, and local production requirements. In addition, policies that reduce the after-tax cost of capital goods, such as accelerated depreciation or investment tax credits, will increase the number of investable projects.

Finally, corporate governance affects investment. At least in the United States, evidence suggests that equity market pressures and other distortions lead firms to invest less in capital expenditures in an effort to boost short-term equity values.

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### **R&D and System Productivity Policies**

If nations are to maximize productivity, governments need policies to advance innovations that boost productivity (e.g., R&D on robotics) and widespread deployment of system tools (e.g., technology platforms).

Firms acting alone, even if supported by factor inputs and incentives to buy better tools, will fail to capitalize on some opportunities to be found in the gaps between firms and industries. A key gap relates to platforms. If the only productivity tools were individual tools that each organization could buy, the productivity challenge would be much easier. But many tools are shared by multiple organizations and cannot be effectively used without interfirm and interindustry coordination. These tools are platforms that many organizations, sometimes in multiple industries, rely on jointly for productivity.

Today most platforms are ICT-based and include the smart grid, mobile payments, digital signatures, the Internet of Things, health IT systems, and others. Government roles regarding platforms must be based on pragmatic analysis. Often, though, good platform policy involves government being a lead adopter. Governments could provide digital signature capabilities for individuals getting a passport, for example. They can adopt mobile payment systems for their own payment processes. They can fund smart cities and intelligent transportation projects.

The most important factor in driving productivity will be technological innovation that makes it easier to replace workers with machines, that increases the lifetimes of products while reducing waste, and that reduces human dysfunction. Yet few governments have designed their scientific research programs around productivity in part because they believe that this involves “picking winners.” A productivity-focused research agenda should involve conducting a formal assessment of the scientific and engineering research areas most likely to support productivity and then significantly increasing funding in these areas. Two key technologies will be robotics and artificial intelligence. Another area is the development of longer-lived materials, many based on nanotechnology. Finally, biological innovations, especially around new treatments for physical and mental illnesses, hold great promise for reducing health-care costs and improving labor force participation.

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## Sectoral Policies for Productivity

Productivity policy cannot be fully effective unless it is grounded in an understanding that industries differ significantly with regard to their productivity dynamics. Any effective national productivity policy needs to be based on an in-depth analysis of individual industries and when appropriate broader production systems. Industries include firms in the same industry. Systems are broader and go beyond any particular industry. For example, the construction industry involves firms that actually build things. But the construction system is broader, including providers of materials inputs (e.g., sawmills), designers (e.g., architects), and builders (e.g., carpenters, welders, etc.) and even building owners. Economies are composed of a wide array of systems, including transportation systems, information systems, transaction systems, health systems, and others.

Thus, effective productivity policies have a sectoral component that analyzes productivity performance and opportunities within industries and assesses policies to remedy problems. These policies can relate to government procurement, supporting precompetitive R&D, reforming and aligning regulations, and others.

Finally, in most economies, governments themselves account for significant share of output. Because they do, they should adopt technology-enabled productivity strategies with the explicit goal of being able to cut headcount while producing the same or higher level of services.

## Government Institutional Changes

It is one thing to identify the kinds of policies nations can adopt to drive productivity growth. It is another to build the institutional competence and political will to develop and implement the right policies. To that end, the single most important step governments can take to boost productivity is to make higher productivity the principal goal of economic policy. Legislatures should require that their nation's major economic policy bodies have advancing productivity as a core mission.

This is not enough, however. To effectively drive productivity-enhancing policies, nations need a dedicated productivity agency or commission. A number of nations have established productivity commissions, but these largely focus on market conditions and factor inputs, and devote much less attention to firm incentives and productivity-specific policies for R&D, platforms, and sectors.<sup>10</sup>

Each government agency needs to develop an explicit productivity policy, not only for internal productivity, but also externally in the areas of the economy they influence. For example, the U.S. Department of Agriculture should support a comprehensive program to support agricultural mechanization with a goal of mechanizing as much agricultural work as possible to reduce the need for workers, especially low-wage workers.

Finally, global organizations should focus less on helping nations become more competitive (the shift strategy) and more on helping them become more productive (the growth strategy). The United Nations, the IMF, the World Bank, and others should be benchmarking best practice productivity practices, especially in less-than-fully market-

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based industries, such as health care, government services, and so on. They should be explaining to policymakers in developing nations that productivity does not kill jobs and that policies that make it harder to substitute capital for labor are holding back their growth, not enabling it.

## **CONCLUSION**

Without productivity growth, sustained income growth is not possible. The best way for a nation to improve productivity is not to spur the development of a few high-tech industries, but to ensure that all economic activities are done in ways that maximize outputs relative to inputs. To do so, nations 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 productivity-enhancing activities. Moreover, many industries are structured in ways that will lead to productivity underperformance absent sectoral-based productivity policies. In addition, maximizing productivity requires economy-wide technology platforms and development of these platforms often lags in the absence of supportive government policies. Finally, 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 national productivity strategies that address all five factors, and they need the political will and bureaucratic means to effectively implement the strategies. Nations that do this effectively should be able to enjoy the benefits of much-needed and significantly higher-productivity growth.

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## ENDNOTES

1. Paul Krugman, *Age of Diminished Expectations: U.S. Economic Policy in the 1990s* (Cambridge, MA: MIT Press, 1990).
2. Ibid.
3. An earlier edition of this report incorrectly read, “1 percent or more.”
4. Carl Benedikt Frey and Michael A. Osborne, “The Future of Employment: How Susceptible Are Jobs to Computerisation?” (working paper, Oxford Martin School, University of Oxford, Oxford, September 17, 2013), accessed April 18, 2016, [http://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf).
5. Robert Gordon, “The Demise of U.S. Economic Growth: Restatement, Rebuttal And Reflections” (NBER working paper no. 19895, National Bureau of Economic Research, Cambridge, MA, February 2014), accessed March 10, 2016, <http://www.nber.org/papers/w19895>.
6. OECD, *The Future of Productivity* (Paris: OECD, July 2015), accessed March 8, 2016, <http://www.oecd.org/eco/growth/OECD-2015-The-future-of-productivity-book.pdf>.
7. Danny Leung, Césaire Meh, and Yaz Terajima, “Firm Size and Productivity” (working paper, Bank of Canada, 2008), accessed March 8, 2016, <http://www.econstor.eu/handle/10419/53956>.
8. “Small Is Not Beautiful,” *Economist*, March 3, 2012, accessed March 8, 2016, <http://www.economist.com/node/21548945>.
9. WIEGO, “Policies & Programmes,” Women in Informal Employment: Globalizing and Organizing, accessed March 7, 2016, <http://wiego.org/informal-economy/policies-programmes>.
10. See, for example, how the New Zealand Commission defines how productivity, New Zealand Productivity Commission, *Why Is Productivity Important?*, accessed March 8, 2016, <http://www.productivity.govt.nz/about-us/why-is-productivity-important>; Australia’s enabling legislation speaks of a wide array of goals, with increasing efficiency as only one (see “Productivity Commission Act 1998,” accessed April 14, 2016, <https://www.comlaw.gov.au/Details/C2014C00554>).

## ERRATUM

This executive summary was updated on June 16, 2016 to correct a data point on page 2. See endnote 3 for details.

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Robert D. Atkinson is the founder and president of ITIF. Atkinson's books include *Innovation Economics: The Race for Global Advantage* (Yale, 2012), *Supply-Side Follies: Why Conservative Economics Fails, Liberal Economics Falters, and Innovation Economics is the Answer* (Rowman & Littlefield, 2006), and *The Past And Future Of America's Economy: Long Waves Of Innovation That Power Cycles Of Growth* (Edward Elgar, 2005). Atkinson holds a Ph.D. in city and regional planning from the University of North Carolina, Chapel Hill, and a master's degree in urban and regional planning from the University of Oregon.

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