

# Competitiveness, Innovation and Productivity: Clearing up the Confusion



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August 2013

The Information Technology  
& Innovation Foundation



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## COMPETITIVENESS, INNOVATION AND PRODUCTIVITY: CLEARING UP THE CONFUSION

To listen to many economists, pundits and policymakers discuss the economics of growth it would be easy to be confused by the commonly used terms: competitiveness, innovation and productivity. These terms are often used almost interchangeably and with little precise meaning. To remedy the situation, this policy memo defines these terms and explains how each is important in driving economic prosperity.

### COMPETITIVENESS

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With the increased globalization of the economy, the term competitiveness has become ubiquitous. But what does it actually mean? Most see the term as synonymous with productivity. Harvard's Michael Porter states, "The only meaningful concept of competitiveness at the national level is productivity."<sup>1</sup> 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."<sup>2</sup> And IMD's *World Competitiveness Yearbook* defines competitiveness similarly, but more broadly, as how an "economy manages the totality of its resources and competencies to increase the prosperity of its population."<sup>3</sup>

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



Thus competitiveness relates only to the economic health of a region's or nation's traded sectors (for the purpose of this memo, the term "region" shall refer to both national and subnational economies). But how do we define health? One definition is jobs. However, if one region's traded sector is highly productive it could have fewer jobs than another region's even if the first region is in fact more competitive. Another definition is value-added—the amount of value that traded sector firms add to the inputs of production that they purchase. This is a closer definition, but fails to control for the size of a region's traded sector economy, i.e. the larger the economy the larger the impact of the value added on competitiveness. In addition, if a region has vastly more imports, even if its traded sectors are producing a large amount, its economy is not holding its own when it comes to competitiveness. But focusing on trade deficits alone fails to account for the fact that a region might run a surplus but do so by subsidizing its exporters (e.g., by manipulating its currency) or erecting barriers to importers (e.g., tariffs). In this case, the trade surplus may not be a reflection of the true competitiveness of the region's traded sector firms, but rather a reflection of the extent of mercantilist aid the traded sector firms receive.

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The true definition of competitiveness is the ability of a region to export more in value added terms than it imports. This calculation includes accounting for "terms of trade" to reflect all government "discounts," including an artificially low currency, suppressed wages in

export sectors, artificially low taxes on traded sector firms and direct subsidies to exports. It also controls for both tariff and non-tariff barriers to imports.

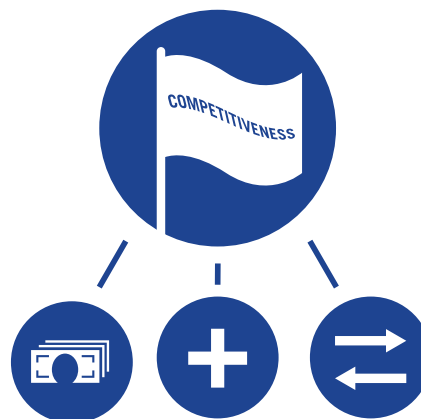
Under this definition, a nation may run a large trade surplus (one component of competitiveness), but if it does so by providing large “discounts” to its exporters or by restricting imports it would not be truly competitive, for such policies would reduce its terms of trade by requiring its residents to give up some of their income to foreign consumers and/or pay higher prices for foreign goods and services.

We can see this by looking at past trends in the U.S. trade deficit. While the rise in the relative price

of imports brought about through the lower value of the dollar in the last half of the 1980s helped reduce the U.S. trade deficit; it also reduced the U.S. terms of trade (the United States could buy fewer

imports for the same quantity of exports). Therefore, U.S. competitiveness was unchanged even as the trade deficit declined. Likewise, the fact that the United States runs a massive trade deficit today but many of its trading partners run surpluses by means of massive “discounting” and import blocking means that we cannot determine with certainty that the U.S. economy is uncompetitive.

In fact, despite numerous studies claiming to compare national competitiveness, no study to date has fully accounted for export discounting and import restricting. While data exists on trade balances for virtually all nations, data on the extent of export discounts and import restricting (especially through non-tariff barriers) are difficult to obtain. Despite this, at a cursory level, it would appear that nations like Austria, Germany, and Sweden would be on a list of competitive economies (they run trade surpluses while also having relatively high wages and limited discounts). In contrast, nations like China (too much discounting) and the United States (too large a trade deficit even when accounting for foreign subsidies) would likely not make the list of competitive economies.



A COMPETITIVE ECONOMY IS ONE WITH A TRADE SURPLUS, FEW BARRIERS TO IMPORTS, AND LIMITED “DISCOUNTS” TO EXPORTERS.

So how does productivity fit into competitiveness? 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. But productivity growth can also be relatively 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. Certainly incomes 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.

## INNOVATION

While competitiveness is almost always incorrectly equated with productivity, innovation is usually defined more accurately, although usually too narrowly. Many see innovation as only technological in nature, resulting in shiny new products like Apple’s iPad or Boeing’s 787 Dreamliner. Still others believe innovation pertains only to the research and development (R&D) activity occurring at universities, national laboratories, and corporations.



While this is all true, it is much too limiting in scope. The Organization for Economic Cooperation and Development properly defines innovation more broadly as “the implementation of a new or significantly improved product (that is, a physical good or service), process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations.”<sup>4</sup> Innovations can arise at many different points in the development process, including conception, R&D, transfer (the shift of the “technology” to the production organization), production and deployment or marketplace usage.

However, even when innovation is defined properly, many equate it with competitiveness and/or productivity. For example, Bloomberg includes productivity as one of its seven variables for ranking the 50 most innovative nations.<sup>5</sup> But while innovation is related to productivity, and for that matter competitiveness, it is not synonymous. There are many innovations that have little to do with productivity or competitiveness. For example, the innovation of the smart electric grid

will help boost electric utility productivity, but will do little to boost competitiveness as electric utility services are not typically internationally traded. Likewise, while the develop-

ment of a new technology to enable better weather prediction would boost quality of life, it would also not directly affect productivity. In contrast, the creation of a new drug, a new kind of airplane or a faster computer chip would not only enhance traded sector industry competitiveness, it would also improve quality of life and/or productivity. So while innovation can increase productivity and competitiveness, it is not synonymous with either.

## PRODUCTIVITY

Productivity is perhaps the most straightforward and easily defined of the three factors. Productivity is economic output per unit of input. The unit of input can be labor hours (labor productivity) or all production factors including labor, machines and energy (total factor of productivity).

$$\text{OUTPUT} \div \text{UNIT OF INPUT} = \text{PRODUCTIVITY}$$

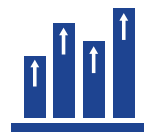
Despite this, many analysts still use the term incorrectly. For example, some argue that moving jobs to China and lowering wages raises productivity because it lowers prices. But while these actions might reduce prices, lower prices are not the definition of productivity. In fact, moving jobs to China might actually decrease productivity since firms in China use fewer machines and are less efficiently organized than firms in the United States.

To understand the sources of productivity, it's important to understand that economies have three ways to grow over the medium and long term: growth in workers, growth in productivity across-the-board and growth in the share of activity in high-productivity industries. The first, growth in the number of workers, is a non-sustainable strategy and more importantly does nothing to increase productivity or per-capita income growth. America would clearly enjoy a larger GDP if the number of workers increased ten percent, but the average income of workers would not necessarily increase.

### THE THREE SOURCES OF ECONOMIC GROWTH



1. GROWTH IN WORKERS



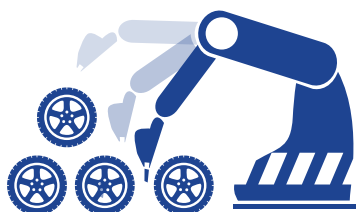
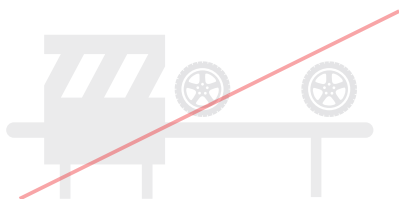
2. PRODUCTIVITY IN ALL INDUSTRIES



3. GROWTH OF HIGH PRODUCTIVITY INDUSTRIES

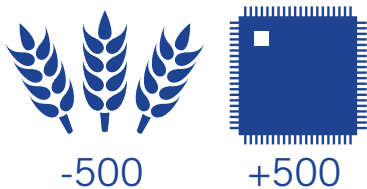
The second—the across-the-board “growth effect”—occurs when a region’s productivity increases not by higher productivity industry sectors becoming a larger share of the economy, but by all sectors, low and high productivity ones alike, getting more productive. For example, retail trade, banking, health care and automobile manufacturing all increasing their productivity. This across-the-board process can happen two ways: if all the firms in an industry increase their productivity or if the low-productivity firms in an industry lose market share to high-productivity firms in the industry (e.g., smaller less productive “bricks and mortar” bookstores go out of business because consumers prefer to buy

e-books). This process of change within industries occurs in all sectors but is not the major way industries become productive. One study found that plant turnover from entry and exit contributes 15 to 25 percent of Canadian manufacturing labor productivity growth, with the other 75 to 85 percent coming from individual firms becoming more productive.<sup>6</sup>



**THE “GROWTH EFFECT” OCCURS WHEN ALL OR MOST INDUSTRIES BECOME MORE PRODUCTIVE**

The third, the “shift effect,” occurs when the mix of low and high-productivity industries, as opposed to firms, in a region changes. For example, if a developing nation loses 500 agricultural jobs (which in developing nations normally have low productivity) and gains 500 software jobs (which normally have higher productivity), overall productivity would increase.



**THE “SHIFT EFFECT” OCCURS WHEN HIGH PRODUCTIVITY INDUSTRIES GROW FASTER THAN LOW PRODUCTIVITY INDUSTRIES**

But which productivity strategy—the growth effect or the shift effect—is the better path to higher productivity? The answer depends in part on the size of the economy and to a lesser degree on the type of sector. The larger the economy, the more important the growth effect is since relatively lower shares of large economies’ output are in traded sectors. Moreover, the more local-serving the sector is, the greater the importance of the growth effect. To understand why, consider an automobile factory in a small city. If its managers install a new computer-aided manufacturing system and raise the plant’s productivity (the growth effect), a large share of the benefits will flow to the firm’s customers around the nation and even around the world in the form of

*The lion’s share of productivity growth in most nations comes not from changing the sectoral mix to higher-productivity industries, but from all industries, even low-productivity ones, boosting their productivity.*

lower prices. The city will benefit only to the extent that its residents buy cars from that factory, if some of the increases in productivity go to higher wages or if the factory is able to employ more workers. In general, even though most nations, especially developing nations like Brazil, China and India, have focused their industrial policies on boosting productivity by changing their industrial mix, the lion’s share of productivity growth in most nations comes not from changing the sectoral mix to higher-productivity industries, but from all industries, even low-productivity ones, boosting their productivity.<sup>7</sup>

**IMPLICATIONS FOR POLICY**

So if competitiveness, innovation and productivity are separate but interrelated, which is most important for a region’s economic well-being? As discussed above, this depends in part on the size of the region. In general, however, productivity is the most important determinant of a region’s overall per-capita income.

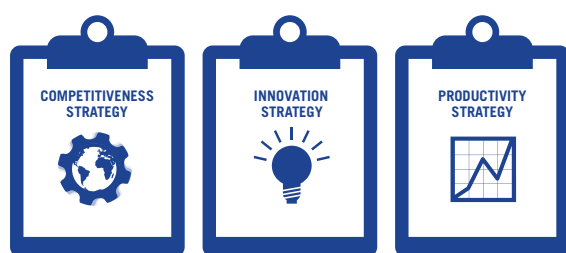
Yet, it would be a mistake to conclude that economies can ignore innovation or competitiveness. Spurring innovation can help productivity and competitiveness. And innovation means that future goods and services will not only be cheaper but better. Spurring competitiveness is important as well. Without competitive sectors, a nation’s standard of living will be

lower since it will have to give up more production to pay for its imports. Moreover, as highlighted in *Innovation Economics: The Race for Global Advantage*, a weak traded sector can have spillover effects on the overall economy, distorting investment patterns and limiting growth<sup>8</sup>. Competitive weakness also creates a stiff headwind that other components of growth (e.g., non-traded sector innovation and productivity) must struggle to overcome. In fact, this competitive weakness explains many of the current problems faced by the U.S. and European economies.

The bottom line is: nations need to have well-articulated and distinct strategies addressing competitiveness, innovation and productivity. No one strategy can effectively address all three factors.

To date, no nation has adequately articulated the differences between these three factors and in turn developed distinct, stand-alone competitiveness, innovation and productivity strategies. Rather, nations tend to meld these together assuming that success in one will lead to success in another. But this is a recipe for underperformance. To truly succeed in today's technology-driven, global economy nations need to develop three distinct strategies: one for success in innovation, one for international competitiveness and one for productivity. Not only will this lead to success in each of the three realms, it will lead to reinforcing policies that benefit all three factors and drive economic prosperity and quality of life.

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### NATIONS NEED WELL-ARTICULATED AND DISTINCT COMPETITIVENESS, INNOVATION AND PRODUCTIVITY STRATEGIES

A traded sector competitiveness strategy should focus specifically on targeted policies—including trade, tax, talent and technology policies—that improve the international competitiveness of a region's traded sector industries.<sup>9</sup> An innovation strategy should focus on the barriers to innovation (e.g., regulatory) and the needed support systems (e.g., investment in R&D, support for technology transfer and STEM education) that can spur more innovation in all three major sectors of an economy (for profit, non-profit and government).<sup>10</sup> Finally, a productivity strategy should examine all major industries and functions in an economy to determine the barriers to growth and the policies that can promote both the growth and shift effects. This includes support for the development of “platform” technologies, such as broadband, smart grids and health IT. While all three strategies are related they are also distinct enough that they deserve to be considered separately by policymakers.



## ENDNOTES

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## ACKNOWLEDGEMENTS

The author wishes to thank the following individuals for providing input: Kathryn Angstadt, Will Dube, Stephen Ezell, Alex Key, and Ben Miller. Any errors or omissions are the author's alone.

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Dr. Robert Atkinson is the president of the Information Technology and Innovation Foundation. He is also the author of the books *Innovation Economics: The Race for Global Advantage* (Yale University Press, 2012) and *The Past and Future of America's Economy: Long Waves of Innovation that Power Cycles of Growth* (Edward Elgar, 2005). Dr. Atkinson received his Ph.D. in City and Regional Planning from the University of North Carolina at Chapel Hill in 1989.

## ABOUT ITIF

The Information Technology and Innovation Foundation (ITIF) is a Washington, D.C.-based think tank at the cutting edge of designing innovation strategies and technology policies to create economic opportunities and improve quality of life in the United States and around the world. Founded in 2006, ITIF is a 501(c) 3 nonprofit, non-partisan organization that documents the beneficial role technology plays in our lives and provides pragmatic ideas for improving technology-driven productivity, boosting competitiveness, and meeting today's global challenges through innovation.

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## GRAPHIC ATTRIBUTIONS

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