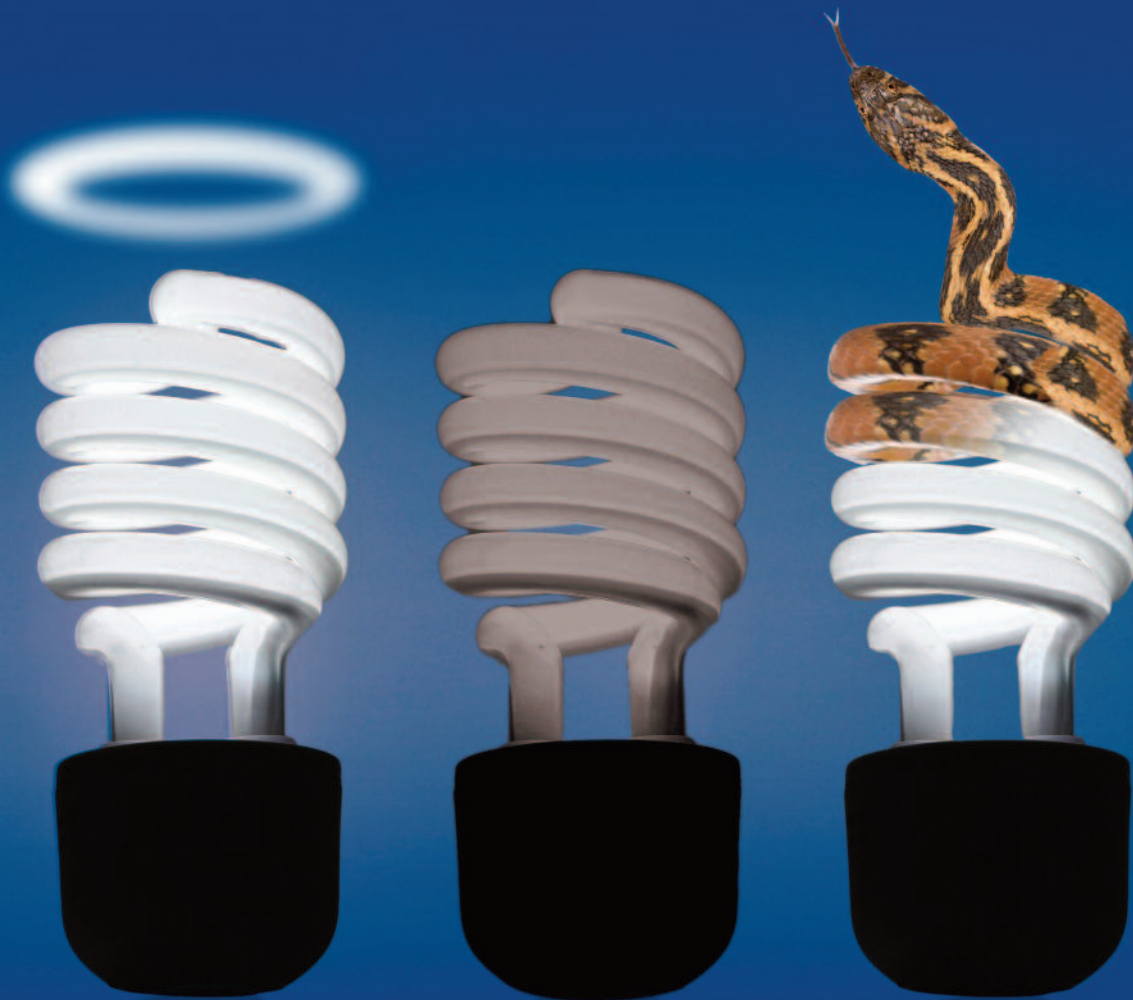


The Good, The Bad, and The Ugly (and The Self-Destructive) of Innovation Policy:

A Policymaker's Guide to Crafting Effective Innovation Policy



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Over the last several decades, the global economic system has become increasingly distorted, as an increasing number of nations have adopted beggar-thy-neighbor innovation policies designed to grow and attract high-wage industries.

INTRODUCTION

From the beginning of the industrial revolution, communities and regions have sought to gain economic advantage, in part by ensuring that firms in their jurisdiction become more productive and innovative, but also in part by trying to gain advantage over neighboring jurisdictions with which they trade. For example, after World War II, U.S. states began to compete against each other for jobs, while European nations competed internally. As global economic integration has become much more widespread, the scope of economic competition has further broadened. What happens in China affects what happens in California and vice versa.

Not only are locales around the globe competing with each other for economic advantage; but also innovation has become a more central driver of growth and competitiveness. In just the past decade, a large number of countries have come to the realization that spurring the innovation economy must be a central component of their economic development strategies. For example, in 2009, the United Kingdom made a conscientious decision to “place innovation at the center of the country’s economic growth strategy.”¹ Some three dozen countries have now created national innovation agencies and implemented national innovation strategies designed specifically to link science, technology, and innovation with economic growth.²

However, this focus on innovation as the route to economic growth creates both global opportunities and threats, because countries can implement innovation policies in either good or bad ways. Countries can implement their innovation policies in a win-win, positive-sum fashion that simultaneously spurs domestic innovation, creates spillover effects that benefit all countries, and encourages others to implement similar win-win policies. But another path countries all too often take seeks to realize innovation-based growth through a zero- or negative-sum, beggar-thy-neighbor, export-led approach. At the heart of these negative-sum policies lies a misguided economic philosophy that many nations have mistakenly bought into: a mercantilism that sees exports in general, and high-value-added exports in particular, as the Holy Grail to success.³ This approach is designed around the view that achieving growth through exports is preferable to generating growth by raising domestic productivity levels through innovation, and it seeks to realize this export-led growth through a variety of negative-sum activities, meaning that their activities make the global economy less prosperous. As Adam Smith observed in *The Wealth of Nations*, by favoring exports, “nations have been taught that their interest consisted in beggaring all their neighbors. Each neighbor has been made to look with an invidious eye upon the prosperity of all the nations with which it trades, and to consider their gain as its own loss.”⁴ Over the last several decades, the global economic system has become increasingly distorted, as an increasing number of nations have embraced this perspective, adopting beggar-thy-neighbor innovation policies to grow and attract high-wage industries.

Countries’ national innovation strategies cover a wide range of individual policy areas, including skills, scientific research, information and communications technology (ICT), tax, trade, intellectual property, government procurement, standards, and regulations. Countries’ actual implementation of any of these policies can be made in positive-sum, zero-sum, or negative-sum fashion. As Figure 1 depicts, innovation policies can be implemented from one of four distinct qualitative perspectives, in ways that either: 1) benefit the country and the world simultaneously (“Good”); 2) benefit the country at the expense of other nations (“Ugly”); 3) fail to benefit either the country or the world (“Bad”); or 4) actually fail to benefit the country but benefit the rest of the world (“Self-destructive”). This report contextualizes countries’ actual implementations of innovation policies against this framework, and argues that, to ensure sustainability of an open and robust international trade system and the largest growth in global GDP and innovation, all countries need to move toward enacting win-win innovation policies (in the upper-left portion of the quadrant in Figure 1) that simultaneously benefit both themselves and the global system. It also asserts that a wide variety of policies that nations adopt in the belief that they are the best way to grow their economies in many cases are in fact not.

Figure 1: The Good, the Bad, the Ugly, and the Self-destructive of Innovation Policy

		World	
		Wins	Losses
Country	Wins	Good	Ugly
	Losses	Self-Destructive	Bad

But before assessing the impact of countries’ specific innovation policies on the global system, this report assesses what innovation is and why it’s important and examines where the locus of countries’ innovative activities are focused. It finds that far too many countries place a dominant focus on exporting tradable goods as their path to economic growth, while neglecting the opportunity to spur economic growth by raising the productivity of the non-traded sectors of their economy, particularly services industries, and especially through the more extensive and sophisticated application of information and communications technology. In most cases, this focus on tradable sectors over domestic productivity leads them to implement mercantilist innovation policies that favor exports, deter imports, and weaken global economic innovation, productivity, and stability. These nations are not so much focused on innovation as on technology mercantilism, specifically the manipulation of standards, markets, currency, etc., to gain an unfair advantage. But this is neither sustainable nor productive. Neither the United States nor Europe can indefinitely serve as import engines for countries making exports their primary path to economic growth. Thus, export-led growth strategies are an unsustainable economic strategy for both the countries that practice them and the rest of the world. At the same time, many countries’ mercantilist policies are ineffective outright; and even those that are effective often are so only over the short-term and not over the medium- to long-term, in

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part because such policies cause nations to eschew or even forego domestic productivity growth and because they reduce adoption of the best technologies for their economies.

Yet nations' decisions individually and collectively on the innovation-based growth strategies they are pursuing affect the global innovation system, because the world is essentially in the adolescent stages of a truly integrated global economy, so countries cannot be thinking about growth from just their own narrow perspective. The world must move beyond seeing the pursuit of economic advantage among nations as a zero-sum game to embracing a perspective that views mutual global prosperity as the goal. Accordingly, countries need to more evenly balance their focus between their traded and non-traded sectors as economic growth and job creation engines, and turn attention toward raising the productivity and competitiveness of the non-traded, especially service-based, sectors of their economies. In addition, countries must deploy robust digital infrastructures and give their firms access to the most sophisticated ICTs, in part by not restricting imports of other countries' ICT products and services. Moreover, countries' innovation strategies must be focused on promoting legitimate innovations that bring genuine new value-added to the world, and not simply on efforts to pilfer or replicate others' innovative activity or to attract productive enterprises away from foreign locations. Ultimately, the only sustainable path to raising living standards for the vast majority of citizens in developing and developed countries alike will be to leverage innovation to raise economies' productivity across-the-board.

The following policy recommendations and policy principles are designed to maximize global growth and innovation through the implementation of Good innovation policies:

Policy Recommendations

- National and international economic, trade, and development organizations, including the World Bank, International Monetary Fund, Overseas Private Investment Corporation (OPIC), Agency for International Development (AID), Export-Import Bank, European Bank for Reconstruction and Development, and others, should both stop promoting export-led growth as a solution to development and tie their assistance to steps taken by developing nations to move away from negative-sum mercantilist policies, thereby rewarding countries whose policies are focused on spurring domestic productivity.
- Policymakers should be cognizant of the nature of countries' innovation strategies, and promote those that benefit countries and the world simultaneously, while pushing back against those that benefit countries at the expense of other nations.
- The World Trade Organization (WTO) should annually publish all new trade barriers (including non-tariff barriers), whether they are allowed by its rules or not.
- The United States, European nations, and others should form a new trade zone, modeled upon the Trans-Pacific Partnership, of like-minded countries committed to the principles of free and fair trade, excluding those countries whose "dominant logic" toward trade is characterized by mercantilist, export-led growth strategies.

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Policy Principles

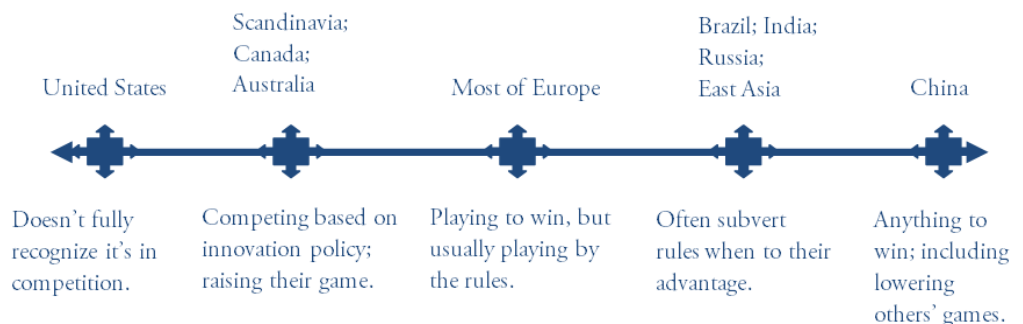
- The central goal of nations' economic policies should be spurring productivity growth and innovation in all firms and sectors, including both their traded and non-traded sectors, and in services as well as goods production. In doing so, countries need to balance the interests of both their workers and their consumers/taxpayers over both the short-term and the long-term.
- Countries' support both for factor conditions—including skills development, investing in innovation infrastructure, supporting knowledge production and transfer, and ensuring the widespread use of ICT—and for competitive domestic markets is fundamental to achieving productivity growth and innovation.
- Fair competition to implement the best “Good” innovation policies forces other countries to ratchet up their game, enhancing the competitiveness of all countries and raising the welfare of all citizens.
- As the WTO has established, markets should set currency rates, not governments; policymakers must insist that countries enjoying the privileges of WTO status adhere to this obligation.
- Corporations should make their own location decisions, not governments. Forcing offsets, transfers of intellectual property, or sourcing of production activities as a condition of market access should be unacceptable.
- Competitive domestic markets let foreign firms in and encourage foreign direct investment (FDI).
- Countries should respect property rights, while being neutral with regard to country of ownership.

WHY GETTING INNOVATION POLICY RIGHT MATTERS

As modern technologies have brought the world ever closer together, global economic competition has become more intense than ever. Government officials in many countries wake up every morning asking how they can do whatever it takes to win in the global competition to achieve economic growth and attract foreign investment and talent to their shores. These governments scratch and claw to win every last business deal and to create every last job they can in their countries, even by taking steps that can only be described as “cheating.” In contrast, while the United States’ unquestioned position as the world’s leading economy over the past half-century has led it to believe it was immune from such ferocious global competition, this is no longer the case.

Part of the problem has been that the United States has simply not believed, or been willing to recognize, that it is in global economic—and innovation—competition with other countries. In part, that’s a result of misguided advice from both neoclassical and neo-Keynesian economists who are on record as saying that countries do not compete, only companies do. As Paul Krugman has argued, “The notion that nations compete is incorrect...countries are not to any important degree in competition with one another.”⁵ So while almost all other countries believe that they are competing in the “World Cup” of innovation, to borrow a recently popular sporting metaphor, the United States, uniquely, doesn’t even think it’s in a competition, “because countries don’t compete.” (See Figure 2 for a sampling of where selected countries stand on a continuum of how they perceive international economic competition and on what basis they choose to compete.) Perhaps the United States just thinks it’s a soccer practice or perhaps a “friendly” (in soccer parlance, an international match not played in a tournament setting) without any permanent consequences. But the reality is that countries are engaged in international economic competition. And just like a soccer match, there must be rules about what constitutes fair and unfair competition.

Figure 2: Examples of the Extent to Which Countries Perceive International Competition and How They Compete



There is nothing sinister about countries engaging in fierce innovation and economic competition and there is nothing wrong with countries competing to win—so long as they are competing according to the rules of international trade established by the global community. Indeed, competition among governments has become a critical factor in determining which economies win and which lose in the increasingly intense process of

Countries' Good, constructive, innovation policies spur other countries to emulate or improve on them, meaning all countries win.

creative destruction.⁶ Governments play a legitimate and crucial role in shaping the innovation capabilities of national economies.

Yet debate about the appropriate level of government involvement in facilitating economic growth has raged for centuries, and has only picked up steam during the recent economic downturn, as countries have increasingly intervened in their economies to spur faltering corporations or direct the location of productive activity. Against this backdrop, there has been much confusion over what initiatives constitute legitimate, constructive “innovation policies” as opposed to unfair and distorting “industrial policies” designed to “pick winners.” Worse, commentators and policymakers often bandy about these terms interchangeably.

As this paper explains, innovation policy constitutes those elements of science, technology, and economic policy that explicitly aim to promote the development, spread, and efficient use of new products, processes, services, and business or organizational models. Innovation policy conscientiously and proactively anticipates and articulates the intersecting roles and relationships of policies in science and technology, research and development, education, workforce training, immigration, tax, trade, intellectual property, and digital infrastructure in creating economic and social welfare.⁷ A country’s innovation policies should not exhibit favoritism to domestic over foreign firms located in the country; all firms located in the country should be able to enjoy the benefits of the country’s innovation policies.

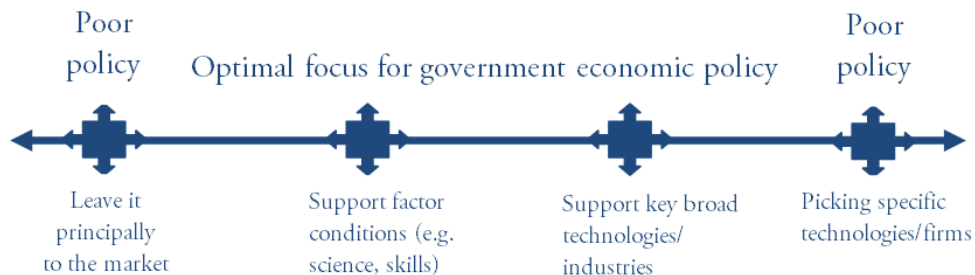
In contrast, industrial policy is designed to intervene in an economy to support, favor, or restructure specific businesses or sectors (such as automobile companies or steel industries). Industrial policies often seek to pick specific national champion companies. For example, France’s investment of 30 million francs (\$4.1 million) in the early 1990s into Minitel, a monochrome teletext phone system,⁸ was a classic case of a country trying to pick a national champion. So was then-French President Jacques Chirac’s gambit to introduce the French-backed search engine Quaero to the world “as the next Google-killer.”⁹ Industrial policy, including picking national champion companies, was a staple of Japanese and South Korean economic growth policy following World War II.

To clarify the differences between innovation policy and industrial policy, it is useful to envision a continuum of government-market engagement (Figure 3), increasing from left to right in four steps from a “laissez faire, leave it to the market” approach to “supporting factor conditions for innovation” to going further by “supporting key broad technologies/industries” to, at the most extreme, “picking specific technologies/firms,” or, in other words, picking winners. Governments support economic growth best by engaging at points 2 and 3 on this spectrum, supporting factor conditions and placing strategic bets to support potentially breakthrough nascent technologies (e.g. nanotechnology, robotics, or advanced batteries) and industries (e.g., broadband telecommunications, life sciences, clean energy), all the while enabling competitive markets. It is generally inadvisable for governments to pick specific winner companies or narrow technologies.

Overall, a nation’s innovation policies should not constrain the innovation-spurring forces of market competition. But at the same time, they should not just rely on intense competition among firms to adequately drive innovation. Too many commentators

postulate a false choice that governments either have to simply get out of the way and enable competitive product markets or just need to develop activist innovation support policies. Nations that want to succeed need to do both.

Figure 3: Continuum of Government-Market Engagement



Thus, when a country intensely competes to win, within the rules of the system, doing so benefits both itself and the world. This is because fair competition forces countries to put in place the right policies on technology transfer, the right tax policies on R&D tax credits, the right corporate tax policies with lower tax rates, the right education policies, etc. In other words, competition forces countries to ratchet up their games, and enact many of the Good policies described in this paper. And if all countries are in the position that they have to raise their game through Good innovation policies, the end result is that the world is much better off. In fact, it's only when one country decides that it doesn't need to raise its game because it thinks it's not in a competition (i.e. the United States), or when countries cheat and engage in Ugly policies, that the world does not only not realize these benefits, but also is actually worse off. Put in terms of our soccer analogy, the world is better off when competition forces all countries' soccer teams to become great soccer teams. Even if it hurts the United States or other countries when Spain's soccer team gets stronger, because the United States has a lesser chance of winning, Spain's quality forces our team to get better. And so the same dynamic holds with the quality of countries' innovation policies in fostering their global economic competitiveness, and that of the rest of the world.

So when the United States expands its R&D tax credit, or France trumps the United States by offering an R&D tax credit six times more generous, or Denmark creates innovation vouchers for small businesses, or the Netherlands and Switzerland offer tax exempt status for profits generated from a newly patented product, or a country lowers its corporate tax rates because its public sector is so efficient, this is all tough, fair competition, like playing a hard-fought World Cup match. Countries' constructive innovation policies spur other countries to emulate or improve on them, and all countries win.

The problem comes when countries start to cheat and contravene the international economy's established rules (as if they were bribing the referees or using studded cleats in soccer). These practices—the Ugly ones enumerated in this report—can indeed help countries win the game. (To be sure, there are some practices that countries think will be good for them, but that in reality aren't; these are the Bad ones so highlighted). But while Ugly practices can work, particularly in the short-run, and will help countries win, using them is just like cheating or rigging the game. And the problem is that not only do these policies harm other countries, they then encourage other countries to cheat, undermining

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the regime utility of the international trading system; thus, the system devolves into a competition where every country is incited to cheat, and beggar-thy-neighbor, and so the overall system decays, the competition becomes worse, and the global economy suffers.

This is why it's critically important for countries to compete intensely, but fairly. First, fair competition generates innovation and some of it spills over and helps other countries. For instance, the United States invents the iPad and then consumers around the world can enjoy the iPad. Or South Korean researchers invent a breakthrough new electric vehicle battery; South Korea may get many of the production benefits, but it creates spillovers from which all countries benefit. Second, innovation forces other countries to raise their game, creating even more global benefits. Thus, all countries should strive to move to the upper left hand corner of innovation policies (described in Figure 1), and this report offers countries a roadmap for how to get there.

To summarize, there is absolutely nothing wrong with countries competing to put in place economic strategies that endeavor to ensure that the wealth that market economies create accrue in greatest measure possible to their citizens—so long as all countries are fairly competing on a level playing field in accordance with the rules of international trade mutually established by the global community. Thus, in some ways, there is a prisoner's dilemma in moving to the Good box. All countries would be better off if everyone moved there, but there is a strong incentive to be the country that cheats while letting others be Good. The United States' challenge is that it thinks it can be Good and that its job is to be a model to other nations; but the problem is that other countries often don't emulate the Good policies, so the United States suffers while others don't. Therefore, U.S. policymakers (and those from other countries desiring to be Good) must be able to distinguish between the kinds of and the effects of innovation policies that countries are putting in place, so that they can identify and nurture the ones that are positive-sum while contesting those that are negative-sum, and try to move these into the win-win category.

WHAT IS INNOVATION AND WHY IS IT IMPORTANT?

Innovation—the improvement of existing or the creation of entirely new products, processes, services, and business or organizational models—drives long-run economic growth and quality-of-life improvements. The U.S. Department of Commerce has estimated that technological innovation has been responsible for as much as 75 percent of the growth in the American economy since World War II.¹⁰ In fact, up to 90 percent of per capita income growth stems directly from innovation. Innovation achieves this impact by enabling the productivity improvements that lie at the core of economic growth; for example, the innovative use of information technologies was responsible for two-thirds of total factor growth in U.S. productivity between 1995 and 2002 and virtually all of the growth in labor productivity.¹¹ Differences in total factor productivity per worker explain 90 percent of the cross-country variation in the growth rates of income per worker.¹²

Innovation also leads to job growth. As the Organization for Economic Cooperation and Development (OECD) found in a definitive review of studies on productivity and employment, “Technology both eliminates jobs and creates jobs. Generally it destroys lower-wage, lower-productivity jobs, while it creates jobs that are more productive, higher-

skilled, and better paid. Historically, the income generating effects of new technologies have proven more powerful than the labor-displacing effects: technological progress has been accompanied not only by higher output and productivity, but also by higher overall employment.”¹³ Using cross-country firm-level data, the OECD has demonstrated that technology-using industries have higher-than-average productivity and employment growth.¹⁴

But innovation drives not just the productivity, income, and employment growth fundamental to long-term prosperity; it also plays a central role in improving citizens’ quality of life. Innovation has been and likely will continue to be central in driving improvements in health care, education, transportation, and environmental protection. Innovation will be indispensable to helping societies address difficult global challenges, such as developing sustainable sources of food and energy, combating climate change, meeting the needs of growing and aging populations, raising billions out of poverty, and achieving shared and sustained global prosperity.

Countries seek to spur more innovation for three primary reasons. First, innovation helps countries realize an economy characterized by a consistently improving standard of living, which can only be achieved by continuously increasing productivity levels. Second, countries seek innovation to boost the competitiveness of their traded sectors in international markets, leading to increased exports and better terms of trade. Finally, they look to leverage innovation in order to continually develop new and more effective ways of meeting societal and individual needs.¹⁵

Innovation traditionally has been understood primarily in a technological context, entailing either the creation of new or improved consumer-product goods, such as the original iPod or its brethren, or enhanced machines or devices, such as lasers and computer-controlled machine tools. But service innovation is also important, as service industries account for more than 80 percent of the U.S. economy and at least 75 percent of most European economies.¹⁶ For example, the auto insurance industry has recently introduced a spate of innovations regarding its business models and service delivery practices, including Allstate’s accident forgiveness policy and Progressive Insurance’s “Name Your Own Price” insurance model. Progressive’s TripSense service leverages technology to empower customers to voluntarily demonstrate their actual driving behavior (e.g. when, where, and what speeds they drive at, if there are instances of aggressive acceleration/deceleration, etc.) through a USB device that plugs into the vehicle’s onboard computer, which the driver uses to upload driving data monthly via home computer. The data enables Progressive to price risk and thus offer insurance coverage to customers individually, instead of as part of a risk pool; by proving their safe driving behavior, customers can receive lower insurance rates. Innovation is transforming virtually all service industries, including retail, logistics, hospitality, health delivery, professional services, retail banking, etc.

Finally, innovation can also be non-technological in nature, including the development of superior organizational models. For example, Cisco Systems recently changed its organizational structure by replacing its command-and-control, top-down divisional structure with 12 councils reporting to an operating committee of 15 top executives and

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CEO John Chambers.¹⁷ The new structure has enabled Cisco to increase the number of markets the company is targeting from 2 in 2007 to 26 today.¹⁸ Firms can also introduce innovation through new business models, unlocking value through what the then-President of Xerox PARC John Seeley Brown called “the architecture of the revenues.” As ITIF documented in its report *The Internet Economy 25 Years After.com*, the Internet has enabled the creation of scores of novel business models that have rewritten the rules of entire industries.¹⁹ Innovation can even occur in innovation processes themselves, such as the increasingly widespread use of “open innovation” principles, which hold that firms must increasingly look outside their walls for innovation opportunities. For example, Proctor & Gamble’s “Connect and Develop” strategy demands that at least 50 percent of the firm’s innovation concepts emerge from outside the company, and employs “innovation intermediaries” such as NineSigma.com and InnoCentive, which leverage the Internet to use prizes to drive innovation “by connecting solution seekers with problem solvers.” The U.S. government has also recently moved to increase the use of prizes and challenges to spur innovation and further open government goals by partnering with the firm ChallengePost to create an online innovation challenge platform that can be used by any federal agency at no cost.²⁰

Larry Keeley of Doblin, Inc. used library science to quantify the volume of innovative activity in global corporations across ten different types of innovation from 1990 to 2000; he found that the vast majority of innovative activity focuses on product offerings and features (e.g. new or improved products or devices). However, when Keeley examined the cumulative value created by those innovation efforts, he found that more than 90 percent of the value came from less than five percent of all innovation efforts, specifically those that pertained to novel business models or innovative use of value chains.²¹ While product innovation remains very important, it often has to be supplemented with innovations in the firm’s business model or value network to prove successful (and sustainable, as competitors can often quickly copy others’ product innovations).

Thus, innovation comes in a multitude of types, including products, services, production or business processes (for goods or services, respectively), organizational models, and business models. Within these dimensions, innovation can arise at different points in the innovation process, including conception, research and development, transfer (the shift of the “technology” to the production organization), production and deployment, or marketplace usage. Figure 4 charts the dimensions of potential innovation opportunity in the innovation value chain, revealing implications for both companies and countries alike.

Figure 4: The Innovation Value Chain

		Phase of Development				
		Conception	Research & Development	Transfer	Production/Deployment	Usage
Type of Innovation	Products			*	*	
	Services					
	Production process					
	Organizational models					
	Business models					

WHERE ARE COUNTRIES' INNOVATION EFFORTS FOCUSED?

To be most effective, countries' innovation activity should be found along all matrices of the innovation value chain—in all types of innovation and along all phases of development. But one of the biggest mistakes countries make with their innovation strategies is that they define innovation too narrowly. In reality, many countries (and companies) focus their innovation activity only on products, and even then, only on a sub-set of products tradable on international markets. Moreover, as Figure 5 depicts, many countries only focus on obtaining the intellectual property for an innovative product and then developing and manufacturing it. For example, take high-tech consumer electronics and information technology products such as compact disc players, high-definition television, or dynamic random access memory (DRAM) chips. In each case, the technology was conceived, researched, and initially developed in the laboratories of American corporations or universities. But in each case, the technology was turned into cost-effective, mass-manufactured, exportable products by Asian companies and countries, which focused mainly on the transfer of the technology and manufacturing production/deployment points of the innovation value chain. More recently, the technological discoveries behind lithium ion batteries,²² compact fluorescent light bulbs (CFLs),²³ and solar panels were pioneered in the United States, but scaled manufacturing of these products has been taken over predominantly by South Korean, Chinese, and Japanese companies.

Figure 5: Focal Point of Innovation in Export-Led Growth Countries

		Phase of Development				
		Conception	Research & Development	Transfer	Production/Deployment	Usage
Type of Innovation	Products			*	*	
	Services					
	Production process					
	Organizational models					
	Business models					

Or take Brazil. Claudio Nehme and Adriano Galvao, advisers to Brazil’s Center for Strategic Management and Studies of Science, Technology, and Innovation, gave a presentation entitled “Defining Long-Term Strategy Plans for Industry Sectors in Brazil” at the 2009 World Futures Society annual conference. They identified six manufactured-product sectors the Brazilian government has picked as targets of the country’s national innovation strategy. Each of the sectors—including airplanes, biotechnology, machine tools, pharmaceuticals, etc.—targeted tradable export products, with no focus on any domestic-serving or non-goods service sectors.

Indeed, building their economies around high-productivity, high-value-added, export-based sectors, such as high-tech or capital-intensive manufacturing sectors, appears to be the path that nations such as China, Germany, Indonesia, Malaysia, Russia, and others are following, in the footsteps of Japan and the Asian tigers Hong Kong, South Korea, Singapore, and Taiwan before them. These countries place the vast majority of their innovation focus on supporting the manufacturing and export of internationally tradable products, while giving very short shrift to their domestic services industries. Essentially, countries employing export-led economic growth strategies overwhelmingly focus on promoting the traded sectors of their economy, often through mercantilist practices, and often at the expense of their non-traded sectors.

This is unfortunate, because export-led growth strategies leave broad swaths of opportunity to innovate in services, business models, and organizational models untapped, despite the fact that this is where 80 percent or more of innovation opportunities lie. Just as Renée Mauborgne and W. Chan Kim describe how companies should find and create “blue oceans” of uncontested market space in their book *Blue Ocean Strategy*, so should countries increasingly focus their innovation activity in these untapped blue oceans.²⁴

One of the biggest mistakes countries make with their innovation strategies is that they define innovation too narrowly.

WHY COUNTRIES PURSUE MERCANTILIST POLICIES

Nevertheless, countries continue to pursue mercantilist policies, and do so on the basis of one or more of the following four beliefs: 1) that mercantilist policies actually do work; 2) that goods, and particularly tradable goods, constitute the only real part of their economy; 3) that moving up the value chain is the primary path to economic growth; or 4) that they should become autarchic, self-producing economies.

For over a generation, U.S. policy toward countries employing mercantilist practices to shift the balance of trade in their favor has been predicated on the belief that these countries are only hurting themselves. In essence, the United States has viewed its policy as benevolently trying to keep countries from unwittingly hurting themselves with mercantilist practices, seeming to believe that if it could only explain a bit more clearly how mercantilists only hurt themselves, they would abandon the practice.

But the reality, as ITIF documents in this paper, is that while some mercantilist policies do not work, some mercantilist practices actually do work and help these countries—at least over the short-term—especially if other countries fail to stand-up to and contest such practices. China’s mercantilist practices have clearly been the principal factor as the country has racked up enormous trade surpluses against the rest of the world. For example, China’s share of world exports jumped from 7 percent to 10 percent between 2006 and 2010.²⁵ The country’s current account (trade) surplus against the rest of the world reached an astounding \$426 billion in 2008.²⁶ China accrued a trade surplus of \$93 billion with the United States—in the first five months of 2010 alone.²⁷ China’s Ugly mercantilist practices, such as manipulating its currency and mandating forced transfer of both intellectual property and physical production as a condition of market access, have in fact boosted the country’s exports and moved productive activity to its shores. Seeing the perceived success of China’s mercantilist strategies has prompted others to follow suit. For example, Japanese companies including Sony and Toyota have demanded their government take action to devalue the yen out of a fear of being undercut by exporters in China, Korea, Singapore, and Taiwan—all countries that aggressively manipulate their exchange rates.²⁸

The truth is that some mercantilist policies can work if a subset of countries is permitted to game the international system while the others don’t step up to force these nations to honor the commitments they’ve made to the rules of the game. At least some are starting to wake up to the threat posed by mercantilist countries. The U.S. National Intelligence Council’s *Global Trends 2025: A Transformed World* report argues that, by 2025, state-directed economies are likely to be a major threat to the United States, countering the view of neoclassical economists who believe that mercantilists only hurt themselves.²⁹ In France, Paul Giacobbi, a Member of the French Parliament, writes, “We must be in no doubt that very large companies, especially Chinese and Indian ones, easily have the resources to absorb entire swaths of our industry. It is not a matter of vainly trying to oppose such developments at the last minute with grand speeches appealing to lazy and harmful notions such as ‘economic patriotism,’ but of preparing intelligently by trying to protect our national interest in a balanced way in an environment of unavoidable globalization.”³⁰ Even some neoclassical economists, such as Paul Krugman, are starting to recognize reality.

The reality is that, while some mercantilist policies do not work, some mercantilist practices actually do work—at least over the short-term—especially if other countries fail to contest such practices.

As Krugman notes, “It’s a world where mercantilism actually works and hurts the other guy. China is in effect exporting its unemployment problem to the United States.”³¹ In essence, China’s policies hurt its consumers while helping its workers. In contrast, the effect on the United States is the opposite; Americans as consumers benefit from Chinese policies, but as workers they are hurt.

Second, as documented previously, many nations believe that goods constitute the only real part of the economy through which they can drive a Keynesian expansion (growth) multiplier and create jobs, largely discounting the crucial role productive service sectors play in fostering robust economic growth. Countries that systematically run mammoth trade surpluses have brought into the Smithian-Ricardian perspective that exports are good (and imports bad), in and of themselves, as a target of economic growth policy.

Flowing from the second proposition is mercantilist countries’ belief that the primary path to economic growth lies in moving up the value chain from low-wage, low-value-added industries to high-wage, high-value-added production. These countries are willing to take short-term losses in order to grow long-term, high-value-added production. In effect, these countries are pursuing the same type of predatory pricing strategies that anti-trust regimes are put in place to limit. In other words, these countries believe they can sacrifice short-term profits for long-term gains in international markets.

Consider the case filed in 1986 by the United States’ Zenith Radio Corp. against Japan’s Matsushita Electric Industrial Co., where American electronics firms alleged, correctly, that Japanese electronics manufacturers were colluding to charge high prices on televisions in Japan so that they could engage in predatory pricing in the United States in order to gain market share and ultimately put U.S. producers out of business. Neoclassical economists viewed this as unlikely, since firms in a true market economy would not only have an incentive to break the cartel and charge lower prices in Japan in order to expand their market share, but also because firms would be unlikely to accept low profits in the United States for a long period of time in order to gain monopoly profits in the distant future. U.S. courts, reflecting the received neoclassical economic wisdom that this type of alleged behavior was irrational and therefore could not exist, sided with the Japanese firm, and in so doing contributed to the decimation of the U.S. television industry.

The reality was that “Japan, Inc.” (that is, the close collaboration between Japanese government and industry) was able to get producers to collude to charge high prices in the home market and lower prices abroad in order to gain market share abroad. They were able to eliminate all competitors in the United States and gain market share, and potentially higher profits, in the United States because of this. Japan’s government turned a blind eye to such collusion (and in fact encouraged it) because Japan’s leaders had decided that their society should pay a short-term societal tax (higher prices paid by Japanese consumers) in order to gain long-term benefits (a larger global market share for televisions made by Japanese companies). Moreover, Japanese firms faced much less short-term pressures from financial markets for quick profits, and so they were able to endure short-term losses overseas. In a like manner, China and other mercantilist countries are following a similar strategy to use mercantilist policies to gain competitive advantage in a host of key industrial

sectors.³² By doing so, they hope to erode the production base of advanced industrial nations, with the goal of ultimately knocking industry after industry out of competition, if possible, in order to reap long-term job gains. Despite the fickle protestations of neoclassical economists that this is irrational, policymakers must be aware that mercantilist countries do seek to compete on such bases.

In effect, mercantilist countries are prepared to incur short-term losses to gain high-value-added production over the long-term. Yet, as explained subsequently, gaining high-value-added production is not nearly as valuable to an economy as raising domestic productivity. Thus, using predatory pricing to move up the value chain has costs as well as benefits for a country (and thus as a policy can be Ugly or Bad). The costs are that such policies: 1) lead countries to ignore—and in fact damage—countries' ability to realize economic growth by raising domestic productivity; 2) are expensive in the short-run, costing more than the benefits; 3) violate fundamental principles of the World Trade Organization; and 4) risk distorting the country's ICT market.

Yet some policies that seek to move countries up the value chain away from low-value-added to high-value added production at the expense of other countries can be effective—and thus constitute an Ugly practice. But certain policies intended to accomplish this are way too blunt, and can do more harm than good, even within this framework. For example, the problem with currency manipulation is that it gives countries a comparative advantage in low-value-added as well as high-value-added industries. Trade policies like currency manipulation that by definition have no targeting to them, and that are just about building a trade surplus, are fundamentally Bad for the country and the world.

A final reason why even targeted policies to manipulate trade to move up the value chain are Bad is that they risk distorting countries' market for capital goods and general purpose technologies such as ICT. General purpose technologies represent fundamentally new technology systems that produce spillover effects by enabling new products or services or by enhancing the productivity of downstream industries. Countries should want to acquire the best GPTs and capital goods that they can, from wherever they are produced. But when countries intervene in currency markets to keep their currencies low to support exporters or to try to increase domestic ICT production, doing so only raises the price of ICTs across the economy. This raises the costs and lowers the quality of every industry in an economy, just for the advantage of protecting a few domestic ICT producers. Countries that implement blanket policies, like currency manipulation, which have no differentiation on value-added sectors simply raise the price of GPTs such as ICT, and thus bring as many disadvantages as benefits.

Finally, some countries pursue mercantilist, export-led growth strategies out of a desire to realize national economic self-sufficiency. Whether it's based on the country's experience with colonial dependency, the incredible poverty the country faced after the Maoist revolution, or simply a desire to return to the position it held centuries ago as the world's largest economy, China's current economic strategy could basically be described as autarky—a desire to become fully economically self-sufficient and free from the need to import goods or services. Chinese policy appears to be to identify every single flow of

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money exiting the country (that is not a government-approved investment in T-bills or equities) that is going to buy foreign products or services, and shut the spigot off. This ambition is evident in China's efforts to establish a domestic base of commercial wide-body jet aircraft production and in its desire to establish indigenous standards across a range of technologies so it need not make royalty payments on intellectual property embedded in foreign technology standards. Through these and similar policies, it is apparent that China fundamentally does not believe in the notion of global specialization and comparative advantage. In essence, China wants an absolute advantage in every single product category. Economist Paul Samuelson confronted this issue clearly when he noted on September 27, 2010 that, "The trouble is that China has never genuinely accepted the basic rules governing the world economy."³³ China's autarchic policies represent an extreme form of mercantilism, to be sure; but they are fundamentally at odds with the principles of an open international trading system that China committed to when it elected to join the WTO. Countries that join the WTO make a commitment to joining a trading system, not an exporting system. If countries wish to pursue autarchic policies, they are free to do so, but they cannot be in the community of nations and they cannot be members of the WTO.

THE COMPLICATED IMPACT OF MERCANTILIST POLICIES

One of the challenges with the trade and globalization debate is that it has tended to be an all-or-nothing debate. On the one hand, some believe that mercantilists only hurt themselves and that any mercantilist practices are inherently bad, for both the country and the world. On the other side of the debate stands a set of apologists for mercantilist countries who argue first that these countries can only grow through exports and second that developed countries are in no position to tell developing countries how to act in any case. This thinking was well encapsulated in a September 26, 2010 op-ed in the *New York Times* by Anatole Kaldetsky, who contends that, "Instead of obsessing over China's currency manipulation as if it were a unique exception in a world of untrammelled market forces, the United States must adapt to an environment where exchange rates and trade imbalances are managed consciously and have become a legitimate subject for debate in international forums like the Group of 20." If Washington doesn't understand this, it will "find itself constantly outmaneuvered in dealings with the rest of the world," Kaldetsky avers.³⁴ But such anything-goes perspectives risk completely undermining any kind of confidence in the ability of free trade to deliver benefits to all parties. The impacts of mercantilist practices are complicated and nuanced; one-size fits all proclamations on either side are neither appropriate nor constructive.

Instead, a more nuanced understanding of the trade, innovation, and globalization debate is required. In evaluating what is "Good" innovation policy and what is "Bad" or "Ugly," it is important to consider both the impacts of innovation policies on the nation adopting them and the impacts on other nations with which they trade. Moreover, some policies may be good for workers, while bad for consumers and taxpayers, or vice versa. In addition, some policies may be beneficial for the economy in the short-run, but harmful in the long-run. Ultimately, to achieve globally shared and sustainable growth for all countries, a balance will need to be established between these competing interests.

Tables 1 and 2 plot the short- and long-term impacts of domestic innovation policies on foreign workers and consumers, respectively. Note that, while mercantilist practices are uniformly deleterious to the interests of foreign workers (investing in the building blocks of innovation is not a mercantilist practice), they are mostly neutral to foreign consumers, or even potentially positive, to the extent that they reduce the cost of foreign imports. Stealing intellectual property, though, hurts foreign consumers, over both the short-run and the long-run, by lowering overall rates of innovation, which gives consumers fewer choices and leads to higher prices (because if other nations didn't steal, companies would not have to charge other consumers more to cover lost revenues). Elected representatives must be mindful, therefore, that other countries' mercantilist practices damage workers' interests much more than consumers' interests.

Over the long-run, as shown in Table 2, countries' investments in the building blocks of innovation spur those countries to make scientific discoveries and develop new technologies, products, or services that ultimately generate spillover benefits for everyone. But policies such as intellectual property theft and incubating national GPT champions are actually harmful to foreign workers and consumers. Countries' creation of national GPT champions is harmful to foreign consumers in the long-run because it means that the best global GPT technology companies lose market share, thereby hurting consumers.

Table 1: Impact of Domestic Innovation Policies in the Short-run on Foreign Workers and Consumers

	Impact on Foreign Workers	Impact on Foreign Consumers
Reducing Costs of Exports	Negative	Positive
Stealing IP	Negative	Negative
Forcing Inward Investment	Negative	Neutral
Blocking, Limiting, or Increasing Costs of Imports	Negative	Neutral
Overall Focus on Export-led Growth	Negative	Neutral
Favoring National Champions in General Purpose Technology	Negative	Neutral
Investing in Building Blocks of Innovation (skills, research, infrastructure and platforms)	Neutral	Neutral

Table 2: Impact of Domestic Innovation Policies in the Long-run on Foreign Workers and Consumers

	Impact on Foreign Workers	Impact on Foreign Consumers
Reducing Costs of Exports	Negative	Positive
Stealing IP	Negative	Negative
Forcing Inward Investment	Negative	Neutral
Blocking, Limiting, or Increasing Costs of Imports	Negative	Neutral
Overall Focus on Export-led Growth	Negative	Neutral
Favoring National Champions in General Purpose Technology	Negative	Negative
Investing in Building Blocks of Innovation (skills, research, infrastructure and platforms)	Neutral	Positive

Tables 3 and 4 assess the impact of domestic innovation policies over the short- and long-run, respectively, on domestic workers and domestic consumers/taxpayers. (Here, the constituency consumers/taxpayers is used to reflect the direct cost to citizens of wasteful government subsidies associated with many mercantilist strategies.) Clearly, the effect of mercantilist policies is decidedly less appealing over the long-term than the short-term for both domestic workers and domestic consumers/taxpayers. Reducing the cost of exports, especially by manipulating currencies, boosts production (increasing employment) over the short-run, but damages the interests of consumers broadly by raising the costs of imports. While IP theft can be good for a country’s workers and consumers/taxpayers in the short-run, over the long-run IP theft stifles incentives for innovation and discourages foreign direct investment, ultimately hurting the countries’ workers and consumers/taxpayers. Forcing inward investment (usually as a condition of market access) does benefit domestic workers, but can have a deleterious impact on consumers/taxpayers, because if countries force inward investment, doing so probably requires costly incentives, which ultimately hurt taxpayers. Blocking, limiting, or increasing the cost of exports and favoring national champions in GPT technologies (notably ICTs) hurts consumers over the short- and long-run, while having at best mixed benefits for producers.

In Table 4, reducing the costs of exports is a mixed policy for workers in the long-run. This is because policies designed to reduce the costs of exports have two primary impacts on workers, either they create more jobs or they raise workers’ wages. But, as explained subsequently, reducing the costs of exports doesn’t create jobs, because exports don’t create

jobs over the long-run. And with regard to wages, if countries are just reducing the cost of all their exports, they are reducing the costs of their low-value-added ones as well as the high-value-added ones, which leaves a mixed impact on wages.

Ultimately, an overall focus on export-led growth, while having a more positive impact on workers initially, deteriorates into having mostly negative impacts on both workers and consumers/taxpayers over the long-term.

Table 3: Impact of Domestic Innovation Policies on Domestic Workers and Consumers/Taxpayers in the Short-run

	Impact on Domestic Workers	Impact on Domestic Consumers/Taxpayers
Reducing Costs of Exports	Positive	Negative
Stealing IP	Positive	Negative
Forcing Inward Investment	Positive	Negative
Blocking, Limiting, or Increasing Costs of Imports	Mixed	Negative
Overall Focus on Export-Led Growth	Mixed	Negative
Favoring National Champions in General Purpose Technology	Mixed	Negative
Investing in Building Blocks of Innovation (skills, research, infrastructure and platforms)	Positive	Positive

Table 4: Impact of Domestic Innovation Policies on Domestic Workers and Consumers/Taxpayers in the Long-run

	Impact on Domestic Workers	Impact on Consumers/Taxpayers
Reducing Costs of Exports	Mixed	Negative
Stealing IP	Negative	Negative
Forcing Inward Investment	Positive	Negative
Blocking, Limiting, or Increasing Costs of Imports	Mixed	Negative
Overall Focus on Export-led Growth	Negative	Negative
Favoring National Champions in General Purpose Technology	Mixed	Negative
Investing in Building Blocks of Innovation (skills, research, infrastructure and platforms)	Positive	Positive

Countries' innovation policies have differing impacts on foreign workers and consumers, and on domestic workers and consumers/taxpayers, over both the short-run and dynamically over the long-run.

WHY MERCANTILIST STRATEGIES ARE FUNDAMENTALLY FLAWED

While mercantilist, export-led growth strategies can deliver some benefits to countries—at least in the short-run—mercantilism is a fundamentally flawed strategy, healthy neither for the countries that practice it nor for the rest of the world. The flaws in mercantilist strategies include the following, explored in turn:

- They are fundamentally unnecessary and counterproductive; countries have much more effective means to drive economic and employment growth at their disposal;
- Many, especially those distorting ICT and capital goods sectors generally, are bad and fail outright;
- They place the wrong emphasis on economic growth; neglecting the far greater and more sustainable opportunity to drive economic growth by raising productivity across-the-board, particularly in non-traded sectors, and particularly through the application of ICTs. In fact, mercantilist policies imperil the health of these sectors;
- They are unsustainable, for both the country and the world;
- They contravene commitments these countries have elected to accept in participating in global trade agreements and undermine the international trading system.

Mercantilist Policies are Unnecessary and Counterproductive

Apologists for China and other countries pursuing mercantilist strategies argue that the only way these countries can grow, create sufficient numbers of jobs, and maintain economic and political stability is through export-led policies fundamentally predicated on running up massive trade surpluses. But journalist James Fallows and others have noted that the logic that suggests that China must “keep Chinese-made products cheap, so Chinese factories will stay busy” is fundamentally flawed.³⁵ Indeed, nations like Brazil and China give relatively short-shift to policies such as spurring ICT adoption and broadband deployment, even while giving significant emphasis to boosting technology exports, because policymakers believe the latter approach is the best way to create jobs. But China (or any other mercantilist country) could achieve full employment just as readily by implementing a loose monetary policy and aggressive fiscal policy and creating a better social safety net so citizens wouldn't feel compelled to save most of their money out of fear for their future security. The notion that the only way countries can achieve a full employment economy is by manipulating the trading system with mercantilist practices and running ever-growing surpluses is illogical. It contradicts basic macroeconomics, which observes that a change in GDP equals the sum of the changes in consumer spending, government spending, corporate investment, and net exports (exports minus imports).³⁶ (For those who remember their macroeconomics, this is the classic $GDP = C + I + G + (Ex - Im)$ formula.) In other words, mercantilist countries could grow just as rapidly, and probably even more so, by pursuing a robust domestic expansionary economy that drives growth through increased domestic consumption, and business or government investment. The point is that when countries are not enduring a recession (which, despite the recent economic downturn, is generally the normal state of affairs), they should really be focusing on productivity growth. If countries have put the right macroeconomic conditions in place, they simply don't need exports to create jobs; they can create as many jobs as they want by expanding domestic productivity. Countries that believe that manipulating the trading system to run up huge trade surpluses is the only way to reach full employment are simply

wrong in the strategy and wrong in the belief, as are the apologists who would defend them.

Moreover, the notion that systematically running up huge trade surpluses is good for an economy is also fundamentally wrong. Running up gaudy, sustained trade surpluses is actually bad for economies. In effect, the \$426 billion current account surplus China accumulated in 2008 did not really boost the nation's living standards, because the \$426 billion represents \$426 billion of value that China transferred outside its borders. China's residents are actually poorer due to this. In fact, if China didn't run these trade surpluses, then Chinese households could see up to a 17 percent increase in their disposable income. In aggregate, this is an enormous figure. China could produce a dramatic increase in its citizens' standards of living if the country no longer ran a trade surplus, and this would simply require that China spend its would-be surplus on imports, instead of on Treasury bills (T-bills). The only reason nations should be exporting is to be able to afford imports, now or in the future, because they either need products or services that they can't produce themselves, or can't produce as well as others.

And what is China doing with its \$426 billion surplus? Would China get the best return by investing in capital equipment to expand domestic production, or by investing in T-bills, as it does? Clearly, China would be much better off if it took its \$426 billion surplus and invested it back into its economy rather than loaning it back to the United States by dumping it into T-bills so that the United States can continue to consume more than it produces. The notion that a poor economy can sacrifice \$426 billion a year in current income out of its economy makes little sense. Rather, China should invest its surplus in buying capital equipment goods—more tractors, medical equipment electric generation stations, machine tools, telecom equipment, computers, etc.—from the rest of the world to build its economy. In effect, China can take its surplus and either consume it or invest it; that is, it can either buy capital goods (computers) or consumption goods (shoes). Now it's understandable why China doesn't want to buy shoes, because China wants to build its economy and to build an economy countries need to save and to invest as opposed to consume. That's fine; but China should be investing substantially in capital goods, and buying them, where appropriate, from the outside. While some will protest that China is already investing to some extent in capital goods, that's not the point; the point is that they could be investing much more.

Mercantilist Policies Distorting ICT Sectors are Bad and Fail Outright

Many mercantilist practices are simply bad. They are ineffective altogether, delivering gains neither over the short-term nor the long-term, and only hurting the countries that employ them. The invocation of import substitution industrialization (ISI) strategies in the 1970s—principally by India and South American nations such as Brazil and Argentina—represents a classic example. In an attempt to spur development of local high-technology industries, such as computers, Brazil placed stiff tariffs on foreign computers and component parts. This had the effect of raising the prices of ICTs for domestic players, inhibiting the diffusion of information technology throughout domestic service sectors such as financial services, retail, and transportation, and causing productivity growth in these sectors to languish. India followed similar practices for many decades. But in reality,

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for every \$1 of tariffs India imposed on imported ICT products, it suffered an economic loss of \$1.30.³⁷ As Kaushik and Singh found in reference to their study of ICT adoption in India, “High tariffs did not create a competitive domestic [hardware] industry, and [they] limited adoption [of ICT by users in India] by keeping prices high.”³⁸ Such import substitution industrialization policies failed because they depended on markets that were too small or too poor to provide economies of scale and on demand conditions that were too isolated to produce globally competitive industries. They typically resulted in inefficient production of bad products by insulated state-owned enterprises.³⁹

Increasing Productivity Across-the-Board is a Better Strategy than Export-Led Growth

Economies—whether national, state, or regional—have three ways to grow over the medium and longer term: growth in population, productivity across-the-board, and shift to high productivity industries. There is a fourth way that some nations believe they can grow: by boosting exports. But as explained above, over the medium- and long-term, export expansion is not by itself a growth strategy.

In the first path, countries can get bigger by increasing their population, and hence number of employed workers. But this is not a sustainable strategy for many nations, particularly given threats to the global ecosystem. Moreover, the “get big” strategy does not improve the incomes or quality of life for individuals, it just leads to countries with more individuals and a larger total GDP.

The second two channels involve boosting productivity. Productivity growth—the increase in the amount of output produced by workers per a given unit of effort—is the most important measure and determinant of economic performance for a nation.⁴⁰ For instance, if U.S. productivity were to grow just one percent faster for the next 40 years than it did during the 1980s, the average American would earn \$41,000 more per year than he or she would have otherwise (in real 2006 dollars).⁴¹

Economies can increase their productivity in two ways. First, firms can become more productive, usually by investing in new technologies or improving the skills of their workers. This is called the “growth effect,” where a nation’s productivity goes up not by some sectors getting bigger or smaller, but by all sectors getting more productive. For example, a country’s retail, banking, and automobile manufacturing sectors can all increase their productivity at the same time.

The second, related, way to increase productivity—called the “shift (or mix) effect”—is more dynamic and disruptive: low-productivity firms and/or industries lose out in the marketplace to high productivity firms and/or industries that are more efficient and can cut prices or boost quality to gain market share. For example, if a developing nation loses 50 agricultural jobs (which in developing nations normally have low productivity) and replaces them with 50 jobs in a software firm (which normally have high productivity), overall productivity would increase, even if the productivity of the software firm did not. This “natural selection” process of dynamic entry and exit can occur within industries or between them. Indeed, a not insignificant share of productivity growth comes from

churning within industries. For example, as Wal-Mart, a firm with high productivity, displaces small, higher-priced retailers (which usually have lower productivity), overall productivity in the retail sector grows. (In fact, Wal-Mart was directly responsible for 5 percent of the jump in U.S. productivity growth from 1987 to 1999 and directly and indirectly responsible for 14 percent of the jump in U.S. productivity growth from 1987 to 1999.)⁴² This process occurs in all sectors. For example, one study of Canadian manufacturing found that plant turnover from entry and exit contributes from 15 percent to 25 percent of manufacturing-labor productivity growth, with the other 75 percent to 85 percent coming from individual plants continuing to become more productive.⁴³ Federal Reserve Bank economists Oliner, Sichel, and Stiroh have also found that the shifting of resources between industries plays a role in boosting aggregate productivity growth.⁴⁴ Across-the-board productivity growth (the growth effect) and shifts in the mix of establishments toward more productive ones (the mix effect) will both contribute to an increase in a nation's productivity and average incomes.

But which productivity strategy—across-the-board growth or the mix effect—is the best path to higher productivity and per capita incomes? The answer depends in large part on the size of the economy and in part on the type of sector. The larger the economy, the more important the growth effect is, while the smaller the economy, the more important the shift effect is. Moreover, the more local-serving the sector is, the more important the growth effect is. 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 lower prices. The city will benefit only to the extent that its residents buy cars from that factory or if some of the increases in productivity go to higher wages instead of only to lower prices.⁴⁵ In contrast, if the city attracts another auto plant where the wages average \$18 per hour to replace a textile firm (with average wages of \$12 per hour) that moved overseas to a low-wage nation (the shift effect), most of the benefits will accrue to residents in the form of higher wages for the workers who moved from the textile plant to the car factory (and from more spending at local-serving businesses like restaurants, dry cleaners, furniture stores, etc). This means that across-the-board productivity growth, rather than a shift to higher-value-added sectors, will be more important for larger areas, including virtually all nations, because their consumers will capture a greater share of the productivity gains. Yet, even for small countries, across-the-board productivity gains are still a vitally important way to become richer, especially through productivity gains in domestic-serving industries.⁴⁶

But to the extent that countries have cared about raising productivity, most have focused on trying to attract higher-wage firms to locate or grow within their borders. Yet, as Michael Porter found in his analysis of traded clusters in substate regions, raising the productivity of all clusters has about the same effect on income as shifting to higher-productivity clusters.⁴⁷ In other words, a strategy of raising productivity in existing traded firms is just as effective as attracting or growing higher-productivity industries. Moreover, raising the productivity of non-traded firms (e.g., firms in industries like retail, health care, services, or even government) whose output is consumed almost entirely by the country's residents can have even larger benefits to the country. Most of the benefits will go to the

area's residents in the form of lower prices for consumers and higher wages for workers. For example, if a city encourages its electric utility to install a smart electric grid system that boosts the utility's productivity, most of the benefits, in the form of lower prices (and higher-quality electric services), will flow to local residents.

Thus, the lion's share of productivity growth in most nations—and especially large- and medium-sized ones—comes not from changing the sectoral mix to higher-productivity industries, but from all firms and organizations, even low-productivity ones, boosting their productivity. Overall, the evidence shows that it is changes in organizations (e.g. businesses, government, non-profits, etc.) that drive productivity, with around 80 percent of productivity growth coming from organizations improving their own productivity and only about 20 percent coming from more productive organizations replacing less productive ones.⁴⁸

This is exactly what recent research from the McKinsey Global Institute has found. McKinsey's 2010 report, *How to Compete and Grow: A Sector Guide to Policy*, found that countries that outperform their peers do not have a more favorable sector mix, but instead have individual sectors that are more competitive and productive.⁴⁹ In other words, it's not share that matters, it's productivity growth in all sectors. Put succinctly, the productivity of a nation's sectors matters more than its mix of sectors. As the McKinsey report elaborates:

Some observers believe that countries can outperform their peers because they have a mix of sectors that have a more favorable growth momentum. But the mix of sectors does not explain differences in the growth performance of countries with similar levels of income at all. The mix of sectors is surprisingly similar across countries at broadly equivalent stages of economic development. It is not the mix of sectors that decides the growth in developed economies, but rather the actual performance within the sectors compared with their counterparts in peer economies.⁵⁰

McKinsey reached these conclusions by calculating the “growth momentum” of six leading developed nations: the United States, South Korea, the United Kingdom, France, Germany, and Japan. The growth momentum calculation takes each country's existing sectoral composition (e.g. the actual share of manufacturing, retail, construction, transportation, agriculture, etc. sectors in each country) and predicts how much that country would have increased its value-added if its sectors grew at the average growth rate of all countries' comparable sectors. It turns out that the growth rate predicted by a country's initial sectoral mix falls into a small band for highly developed countries, from 1.8 percent to 2.3 percent, but that actual growth rates exhibited a much wider spread, from 0.4 percent in Japan to 3.3 percent in the United States, indicating that some countries' sectors are substantially outperforming other countries' sectors. In other words, the comparatively greater productivity performance of U.S. sectors contributed to the U.S. compound annual growth rate between 1995 and 2005 being 0.9 percent larger than would otherwise have been expected, while Japan's comparatively lesser productivity performance growth over that time period was 1.7 percent less than would have been expected.

The lion's share of productivity growth in most nations—and especially large- and medium-sized ones—comes not from changing the sectoral mix to higher-productivity industries, but from all firms and organizations, even low-productivity ones, boosting their productivity.

But these findings apply not just to the developed world; similar results held when applied to a basket of six developing countries—China, India, Mexico, Russia, Brazil, and South Africa. McKinsey found that compound annual growth rates from 1995 to 2005 ranged from 3.5 percent in Brazil, to 5.5 percent in India, to 9.1 percent in China. These actual growth rates differ from the “growth momentum” predicted by these countries’ initial sectoral mixes in 1995. That is, if each country’s sectors had grown at the average growth rate of the six countries’ respective sectors, Brazil’s economy would have been expected to grow by 5.9 percent, India’s by 5.2 percent, and China’s by 5.7 percent. Thus, the variation from this prediction in the actual performance of these countries with their given sector mixes—from positive 3.4 percent in the case of China to negative 2.5 percent for Brazil—explains overall differences in growth. As McKinsey concludes, “this demonstrates the fact that, even if they started with a less favorable sector mix, the fastest-growing countries outperformed their peers in terms of their sector competitiveness.”⁵¹

Now, to be fair, very small countries, such as Uruguay or Singapore, have to focus much more on the traded sectors of their economy than larger countries like Brazil or China, because the traded sector in smaller countries constitutes a larger share of their economy. In other words, small countries tend to have to both import more and to export more. Thus, smaller countries legitimately have to pay more attention to the health of their traded sectors, and when they get a better traded sector, it gives them more of an advantage. But as countries get larger, the ratio of the size of their traded vs. non-traded sectors decreases; their economies shift much more toward the non-traded sectors. Therefore, large and mid-sized nations, such as Brazil, China, India, Indonesia, Mexico, Nigeria, and Russia, should be focusing much more on growth in their non-traded sectors.

Mercantilist, Export-Led Growth Strategies are Unsustainable, In Part Due to a Lack of Focus on Raising Domestic Productivity Levels

But there is another risk with countries’ mercantilist-based, export-led growth strategies: they are unsustainable—both for the world and for the country itself. As *The Economist* observes, “the combined surplus of all the countries pursuing this [export led] growth strategy has been too much for the rich world, especially America, to absorb comfortably. The best insurance against trade protectionism is macro-economic stimulus. Boosting demand at home will decrease the temptation to divert it from abroad.”⁵² Or, as *BusinessWeek* framed the issue on September 26, 2010, “Everyone wants to export their way out of trouble, but can’t.”⁵³ Ultimately, neither markets in the United States nor Europe—nor even both combined—are large enough if nations such as Brazil, China, Russia, and Japan continue to promote exports while limiting imports as their primary path to prosperity, making export-led growth strategies an unsustainable approach for the countries that practice them and for the rest of the world.

Moreover, a predominantly export-led growth focus is unsustainable for countries themselves. Consider Japan. It certainly boasts world-leading exporters of manufactured products—Sony, Toyota, Toshiba, etc.—but because it has never really focused on the non-traded sectors of its economy, only about one-quarter of its economy is growth-oriented, and it noticeably lacks any world-class service firms. And while it does have firms at the cutting edge of manufacturing ICT devices, it trails badly in the usage of

The lack of productivity gains in domestic service sectors can imperil the long-term competitiveness of nations' manufacturing industries producing their traded goods, because service industries boost other industries' competitiveness.

information and communications technology and conspicuously lacks its own eBays, Amazons, and Googles, firms that have leveraged ICT to create new sectors or transform legacy ones. Moreover, Japan's service sectors have achieved but a fraction of Western productivity levels. For example, only 36 percent of Japanese firms purchase online, compared to 66 percent and 65 percent of New Zealand and Canadian firms, respectively.⁵⁴ Japan's retail sector has achieved barely half of U.S. productivity levels, while its construction and food processing industries have reached only 40 and 33 percent of U.S. productivity levels, respectively. With these three sectors accounting for approximately 22 percent of total Japanese employment, the country's economy as a whole suffers badly from lagging service sector productivity, explaining why the whole of Japan's economy, even with some of the world's most productive manufacturing industries, is only 70 percent as productive as America's.⁵⁵ With Japan's share of the global economy falling from 14 percent to 8 percent over the past two decades, the country has entered what *The Economist* describes as a state of "gentle decline."⁵⁶ Countries relying predominantly on export-led strategies risk being a one-trick pony; they may reach the technological frontier and boost growth for a while, but they are liable to languish there, or perhaps even decline if global export markets become saturated, and as countries with more robust service sectors pass them by.

Indeed, the lack of productivity gains in domestic service sectors can imperil the long-term competitiveness of nations' manufacturing industries producing their traded goods, because service industries boost other industries' competitiveness. Like Japan, South Korea is experiencing this phenomenon now. Logistics, financial, consulting, engineering, and software-design industries serve as intermediate inputs to manufacturing industries (in fact, the intermediate demand rate of South Korea's service sector is approximately 40 percent) and play critical roles in boosting their competitiveness.⁵⁷ For instance, market research, technological research and development (R&D), human resource management, business consulting, and financial services play major roles in producing and selling automobiles. But as Kim Jung-Woo of South Korea's Samsung Economic Research Institute (SERI) notes, "Compared to the biggest OECD economies, the productivity of South Korea's service industries appears to be low," with the labor productivity of South Korea's service industries just half that of its manufacturing industries. For example, the per capita value-added of even Korea's most productive service sectors—financial and real estate services—are only 50 percent to 80 percent of the productivity rates of major OECD countries; the per capita value-added of South Korea's wholesale/retail industry is less than 30 percent of U.S. levels. As Jung-Woo cautions, "If South Korean service industries' productivity continues to remain low while their weight in the GDP grows, it could undermine the productivity of the nation's whole economy."⁵⁸

This is why mercantilist policies are only effective over the short-term. By focusing almost entirely on the export-side of its economy, countries like China miss out on the opportunity to raise domestic productivity growth. In essence, China is on a path to becoming another Japan; a country with competitive export sectors, but woefully lagging in domestic services. However, unlike Japan, China will never get there, because it will not be able to generate enough trade surplus (because the United States and Europe are no longer in a position to import sufficient amounts) to get there.

In essence, China is on a path to becoming Japan; a country with competitive export sectors, but woefully lagging in domestic services. However, unlike Japan, China will never get there, because it will not be able to generate enough trade surplus (because the United States and Europe are no longer in a position to import sufficient amounts) to get them there.

Thus, a crucial point that countries fielding export-led growth strategies neglect is that the vast majority of economic benefits from technology, as much as 80 percent, come from the widespread usage of technology, while only approximately 20 percent of the benefits of technology comes from its production. Ultimately, countries' export-led growth strategies miss the greatest opportunity to improve their economic growth: by increasing the productivity of domestic sectors, particularly through the application and diffusion of general purpose technologies such as information and communications technology. GPTs like ICT represent fundamentally new technology systems that change virtually everything, including: what economies produce; how they produce it; how production is organized and managed; the location of productive activity; the skills required for productive activity; the infrastructure needed to enable and support it; and the laws and regulations needed to maintain, or even to allow, it.⁵⁹ GPTs are vital to economic growth because they become pervasive and an integral part of most industries, products, and functions, and because they enable downstream innovations in products, processes, business models, and business organization.

Consider Israel's experience. Israel has been held out as a poster child for high-tech development, and a model to many other nations of how to do it right. But delving into Israel's experience, Lach *et al.* found that while Israel's ICT sector boomed during the 1990s, becoming "a hotbed of innovation and technological advance by worldwide standards," the country's overall productivity remained sluggish, with traditional sectors both in manufacturing and services seemingly unable to benefit from the success of the ICT sector, leading to the emergence of a "dual economy." The authors note that, "The problem with this picture is that such disparities across sectors cannot support the growth of the whole economy over time...A fast-growing GPT-producing sector is not enough to guarantee sustained growth." Lach *et al.* argue that two primary reasons explain why Israel's ICT sector failed to act as a general purpose technology for the entire economy. First, because Israel's ICT sector was overwhelmingly export-oriented—it exported more than 70 percent of its output—other sectors of Israel's economy did not benefit from the rapid and pervasive adoption of the GPT with the concomitant dynamic efficiency gains. Second, government policy in Israel explicitly supported product innovation rather than process innovation, unwittingly creating a bias against the service sectors as well as against process-oriented sectors, such as chemicals and construction.⁶⁰ The authors conclude by reiterating that, "Facilitating the adoption of ICT in traditional industries is crucial to achieving economy-wide growth."⁶¹

India, albeit at a lower level of development, is following a similar path to Israel. For example, a very small share of the output of Indian ICT service firms (less than 5 percent) is consumed in India by Indian firms.⁶² The lion's share is exported. As such, the rest of the Indian economy has extremely low productivity. No doubt the vast majority of countries with export-led growth strategies share these features in common with Israel and India. But clearly, the Indian and the Israeli experiences show that the existence of a successful local ICT-producing sector by itself may not be enough to generate sustained and widespread growth.⁶³

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A related mistake countries make is to believe that new and emerging sectors will be enough to boost economy-wide employment and growth and serve as the key to their economies' future competitiveness. For example, green and cleantech is currently all the rage with governments around the world as they seek ways to promote renewable energy technology such as solar, wind power, and biomass. As McKinsey notes, "this aspiration is consistent with the past when governments saw the development of high-tech clusters including semiconductors as the route to economy-wide competitiveness."⁶⁴ But as McKinsey notes, "governments looking to these sectors as new sources of economic activity and jobs will largely find themselves disappointed," because, "they are simply not big enough to make a significant difference to a large economy's overall growth rate."⁶⁵ Take, for instance, the U.S. semiconductor industry. By driving Moore's law (e.g., increasing processing power and reducing price) for over 40 years, the semiconductor industry has been the most important engine of worldwide economic growth of the past half century. But in terms of overall economic output in 2009, it contributed only 0.4 percent of U.S. value-added, down from 0.6 percent in 2000. Thus, as McKinsey notes, "Even taking into account the spillover benefits generated by innovative sectors, the fact remains that these sectors alone cannot fuel economy-wide growth. Governments therefore need to pursue policy efforts across the broad swath of existing industrial and service sectors."⁶⁶ These findings echo Lach's observation from Israel that, "The notion of one sector serving as the 'locomotive' that pulls the rest of the economy is simply wrong; there are virtually no examples of such cases in economic history. For an economy to experience sustained growth, most of the sectors have to grow in tandem and the productivity gains, which underlie growth, have to be widespread and pervasive."⁶⁷

If neither mercantilist-based, export-led growth strategies nor sole reliance on emerging high-technology industries are the path to sustainable economic growth, what is? The answer is "innovation economics," which holds that the path to higher incomes lies in raising productivity by boosting innovation in all firms in all sectors. And what should countries be doing to bolster the productivity of all sectors of their economy, particularly the lagging domestic, non-traded ones? First, they need to create a climate of competition so that firms are forced to become more productive and innovative. This includes removing regulatory restrictions, incumbent protections, and cross-border trade restrictions that limit competition.⁶⁸ Second, they need to focus on leveraging general purpose technologies, especially information and communications technology, and on building robust digital platforms (e.g., broadband, health IT systems, intelligent transportation systems (ITS), electric smart grids, mobile payment systems, etc.) that can drive productivity and growth throughout their economy. Moreover, they must recognize that micro-economic factors (e.g. product- and labor-market regulations, competition policies, technology policies, etc.) are as important to growth as macro-economic ones (if not more so), and therefore take a sector-based approach to driving economic growth.⁶⁹ Finally, countries must recognize that it is not the amount of capital (financial or human) that nations have that is most important, but how that capital is used.

Consider the retail sector. While McKinsey's report notes that the drivers of growth differ markedly from sector to sector, it observes that for some sectors, such as retail, regulation alone largely explains wide variations in productivity and employment among countries.

Argentina's grocery retail sector is one of the only ones in the world to have experienced large declines in productivity growth over the past two decades.

And because such sectors are so large, policy choices can have a significant impact on an overall economy's GDP. A regulatory environment that allows the expansion of more productive modern supermarkets and convenience stores raises productivity because larger chains can profit from scale benefits in purchasing, merchandising, and store operations. Yet many countries have chosen to protect small-scale mom and pop stores through barriers to foreign direct investment and competitive entry, zoning laws, and restrictions on the size of stores.⁷⁰

As Gabriel Sanchez finds in an excellent study, *Understanding Productivity Levels, Growth and Dispersion in Argentina: The Case of Supermarkets*, Argentina's grocery retail sector is one of the only ones in the world to have experienced large declines in productivity growth over the past two decades, primarily because its large, productive firms have lost market share due to extreme regulatory restrictions placed on them.⁷¹ In this case, rather than creative destruction leading to the exit of less productive firms, discriminatory policies against efficient (larger) firms coupled with lack of enforcement of regulations on smaller and informal firms has meant that less efficient firms (and in many cases firms selling lower quality groceries) actually gained market share. For example, small stores can sell products whose void date has expired, while larger firms are forced to "donate" food to grassroots neighborhood associations. Small grocery stores pay much less in taxes. It can take four years to get a permit for a large grocery store, and regulations limit the size of stores and the maximum number of stores any one firm can operate in an area. Buenos Aires even has zoning laws that ban larger stores. Further, the government imposes price controls on food, but only in larger stores, and the government limits imports of certain items by larger stores. And while local Chinese stores can bring in Chinese immigrants who are paid minimal wages, in bigger stores Sunday work must be paid overtime. Meanwhile, some regions have required hardship pay increases for working in large stores, while the province of Santé Fe banned firings from large stores. No wonder the large efficient stores lost market share, shackled as they were with these burdens. But even while Argentina is lowering its productivity in retail, the country is pursuing mercantilist policies against competitors by imposing high tariffs on computer parts.

But by no means is Argentina alone in restricting competition in its domestic retail sectors. In Japan, laws limiting the entry of large supermarkets and providing incentives for small retailers to stay in business explain the country's high share of family retailers, and their low productivity.⁷² Japan's government subsidizes mom and pop stores with generous loans, while the country's high capital-gains tax rate provides little incentive for owners to sell some of the most valuable real estate in the world. Consequently, Japan's retail sector is 50 percent comprised of mom and pop stores, compared to 25 percent in France, and 12 percent in the United States. The combination of onerous environmental and safety regulations, along with rules stating that no new retail stores greater than 10,000 square feet in size could be opened in Japan, have blocked the evolution of higher-productivity retail formats and kept out foreign competitors, such as France's Carrefour, which aborted its efforts to enter Japan's retail market after just two years.

Likewise, France's introduction in the 1990s of more restrictive regulations on the size of retail outlets halted the sector's productivity growth. India has also long precluded competition in its retail sector by keeping foreign competitors such as Wal-Mart out of its markets. In fact, Wal-Mart has only been able to enter India through a \$100 million joint venture with an Indian company, Bharti, which runs Wal-Mart's stores in India on a co-branded basis.⁷³ Moreover, astonishingly, the Indian government, in an effort to protect its smaller merchants, ordered that Wal-Mart can sell only to wholesalers and business owners and their family and friends.⁷⁴ In effect, Indian consumers cannot buy from Wal-Mart, only small businesses and wholesalers can, many of whom buy at Wal-Mart and then resell the products directly to consumers, often at a substantial additional markup. Even the United States is not immune from anti-competitive practices that inhibit efficiencies in retail markets. For example, every U.S. state has regulations that prohibit consumers from purchasing vehicles online in an attempt to protect automobile dealer jobs.⁷⁵ The state of Maryland passed legislation essentially forcing only Wal-Mart, but not smaller retailers, to provide health insurance to its workers. And in all states except California,⁷⁶ veterinarians are not required to provide owners a written prescription for a pet's medication before dispensing it. As a result, most consumers do not know that they can have their pet prescriptions filled at a pharmacy which may be cheaper than filling them at their veterinarian's office.⁷⁷ Also, just like in Japan, many U.S. communities have passed zoning regulations specifically to thwart "big box" retailers.

Such policies recall scenes from Kurt Vonnegut's classic short story *Harrison Bergeron*, which pictured a dystopian future in which social equality was achieved by handicapping the more intelligent, athletic, beautiful, or capable members of society. Ballerinas had to wear lead weights, and the most intellectually-gifted had to wear headphones that played distracting noises every thirty seconds, have three hundred pounds of weight strapped to their bodies, and wear distorting eyeglasses designed to give them headaches. It was only then that true equality could be achieved. In a like manner, Argentina has put similar lead weights on its efficient big-chain grocery store retailers. Even though they have a 30 percent to 40 percent cost advantage, they have lost market share because they don't enjoy a price advantage because they are taxed, forced to give away free food, pay overtime, etc.⁷⁸ Just like the "Handicapper General" in Vonnegut's story, whose duty it was to impose handicaps so that no one would feel inferior to anyone else, governments in Argentina, Japan, South Korea, France, India, and elsewhere have handicapped the most effective companies in their retail sectors. Of course, these are examples from but one industry sector. Scores of countries jealously guard many of their incumbent firms in non-traded sectors, whether it's European restrictions on cross-border licensing of legal or medical professionals, or constrained competition in financial services because of regulatory restrictions.

In stark contrast, countries that have liberalized their retail sector have seen dramatic improvements in sector productivity, with consequent strong contributions to economic growth. In Sweden, the liberalization of opening hours and zoning regulations unleashed competition, contributing to its retail sector productivity growing 4.6 percent per year for ten years after 1995.⁷⁹ Russian retail productivity has more than doubled in the past ten years, from 15 percent to 31 percent of U.S. levels, because of the increasing market share

Even despite some extremely productive and innovative multinational firms, overall Japanese productivity is just 70 percent of U.S. rates, while South Korea's productivity is just 50 percent of U.S. rates. The gap is even greater in developing nations. Overall productivity in India is but 8 percent of U.S. rates, while Chinese productivity is just 14 percent of U.S. rates.

won by more modern retailers.⁸⁰ In Mexico, opening up the food retail sector to international competition has led to increasing competition and lowered prices, as Mexico saw an explosion in the number of convenience stores from a little more than 1,000 to more than 6,000 in five years. The Mexican consumer has been an outright beneficiary of this increased competitive intensity, as food prices have grown significantly less rapidly than other prices.⁸¹ Many advocates of small, family-run retailers argue that while such stores may cost consumers more, having government policy keep such businesses economically viable is a sacrifice worth making. Yet in a country like Argentina where 7 million impoverished children are chronically malnourished, the cost of food matters.

Thus, raising the productivity of domestic non-traded sectors such as retail is not trivial; it can have profound economic impacts. Even despite some extremely productive and innovative multinational firms, overall Japanese productivity is just 70 percent of U.S. rates, while South Korea's productivity is just 50 percent of U.S. rates. The gap is even greater in developing nations. Overall productivity in India is but 8 percent of U.S. rates, while Chinese productivity is just 14 percent of U.S. rates.⁸² For example, India's retail goods sector productivity is just 6 percent of U.S. levels and the productivity of its retail banking sector just 9 percent of U.S. levels. If India could raise productivity in those two sectors to just 30 percent of U.S. levels, it would raise its standard of living by over 10 percent. Thus, attracting more high-value-added export firms is not likely to be the major path to growth in the long-run, boosting productivity in the vast swaths of the economy that are not traded internationally is.⁸³

A perfect case in point is the United States; although its traded sectors have struggled markedly in terms of progress over the past decade, the United States has outperformed many nations over that time span. How has this been possible? For two reasons: 1) the United States has the most competitive markets for its non-traded sector of any country in the world; and 2) firms in non-traded sectors in the United States generally use more ICT than non-traded firms in other nations, and they use it more effectively than most other nations' firms.⁸⁴ As MIT's Eric Brynjolfsson argues in *Wired for Innovation*, the real benefit of innovative technologies comes from the application of those technologies throughout an economy.⁸⁵ In other words, the widespread use of innovative technologies contributes far more to innovation, as measured by productivity growth, than the production of those technologies. As Brynjolfsson observes, "It is how Wal-Mart uses IT, not who produces the IT or in which country it is produced, that matters."⁸⁶

New OECD analysis at the firm level confirms that ICTs enable innovation. Specifically, the OECD found that the probability to innovate increases with the intensity of ICT use, and that this held true for both manufacturing and services firms and for different types of innovation. For example, Canadian manufacturing firms with high ICT usage are 31 percent more likely to introduce a product innovation, 24 percent more likely to introduce an organizational innovation, and 29 percent more likely to introduce a marketing innovation than firms with low or no ICT usage.⁸⁷ In effect, ICT is "super capital," having an impact on worker productivity three to five times that of non-ICT capital (e.g., buildings and machines). ICT's positive impact on productivity elicits a positive impact on firm profitability: Gao and Hitt find that, in large U.S. firms, every \$1 invested in ICT is

associated with \$25 in market value, while \$1 of non-ICT capital is associated with only \$1 of market value.⁸⁸

These effects hold at the country as well as company level. Indeed, research finds that the growing disparity in productivity growth rates between the United States, Europe, and Japan can be explained by ICT intensity. As ITIF explained in *Boosting European Prosperity Through the Widespread Use of ICT*, after a long period from 1980 to 1994 in which Europe enjoyed greater productivity levels than the United States, since the mid-1990s the United States has experienced a structural shift upward in productivity growth because of ICT, while Germany, Italy, France, and Spain have experienced a structural shift downward in productivity growth.⁸⁹ As a result, the labor productivity gap in the EU-15 relative to the United States widened by 4 percentage points from 96 percent of the U.S. level in 1995 to 92 percent in 2002, when EU-27 productivity stood at only 74 percent of U.S. levels. Bloom *et al.* show that although ICT-producing firms and industries in Europe achieved similar levels of productivity growth as U.S. ICT-producing firms and industries, Europe's ICT-using firms and industries, predominately service sectors such as retail, wholesale, and financial services, failed to achieve equivalent productivity gains as U.S. ICT-using firms and industries.⁹⁰ They found that a doubling of ICT capital stock is associated with 3.9 percent higher productivity for a U.S. multinational, but only 1.6 percent higher productivity for a non-U.S. multinational. In total, because of the impact of the ICT revolution, the U.S. economy is over \$2 trillion larger in terms of annual GDP than it would otherwise be.⁹¹

Jorgenson and Nomura find that investments in ICT can explain the productivity differences since 1990 between the United States and Japan, with Japanese productivity levels falling from 86.1 percent of U.S. levels in 1990 to 79.5 percent today.⁹² Fukao and Miyagawa confirmed this conclusion by finding that Japan's sluggish productivity growth after 1995 was primarily due to insufficient investment in ICT capital.⁹³ Economists have found significant impacts of ICT on the productivity of firms in developing countries as well. For example, ICT usage in China has been responsible for 38 percent of the increase in total factor productivity growth and 21 percent of the country's GDP growth.⁹⁴

In addition to enhancing the competitiveness of individual firms, ICT enables countries to deploy digital infrastructure platforms, including broadband, intelligent transportation systems, health IT, smart grids, genomic systems, etc., that have the power to transform the productivity of entire industries, from education to transportation to health care. These digital infrastructures become platforms for commerce that enable downstream innovation. Governments play a critical role in identifying platform technologies that require industry-government collaboration to be successfully implemented and in facilitating such collaboration. Indeed, for countries to successfully deploy and realize the maximal benefits from many critical digital infrastructure platforms, public and private sectors must collaborate in establishing regulations, funding infrastructure deployment, and encouraging use. For example, health, education, and government tend to be the sectors least penetrated by ICT in quite many countries, and much of the problem is that there are few incentives for innovation in these industries.

In summary, the path to sustainable and high rates of economic growth lies not through mercantilist, export-led growth policies, but rather through raising the productivity of all firms in all sectors, especially through the application of information and communications technologies.

A NEW DIRECTION FOR THE GLOBAL INNOVATION SYSTEM

The global trading system has become rife with mercantilist, protectionist practices as too many nations seek to gain advantage by exporting more and importing less, partly by hobbling foreign firms and economies. It is time for a new approach to globalization.

To begin to craft that approach, the United States needs to work with the Europeans, Canadians, Australians, and whoever else will come aboard to lay out a renewed vision for globalization grounded in the perspective that markets drive global trade; that, in addition to joining the WTO, countries should become signatories to major trade agreements, including the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement, the Government Procurement Agreement (GPA), and the Information Technology Agreement (ITA); that countries adhere to all their trade agreements; that genuine, value-added innovation (especially that which spurs productivity) drives economic growth; that foreign aid policies not support countries' strategies; and that fair competition forces countries to ratchet up their game by putting in place constructive innovation policies that leave all countries better off. There are nations that generally agree with these principles, but there are too many that do not. The nations that do need to take steps to foster a new approach to globalization that seeks globally balanced growth and shared prosperity. This, by definition, will mean getting much tougher with nations that want to engage in Ugly (or Bad) innovation policies. Nevertheless, new agendas are sorely needed to guide countries' economic growth approaches, foreign aid strategies, and trade policies.

In driving toward more globally balanced growth, countries that are too far on one side or the other of the spectrum—whether they are focused too much on export-led growth or focused too much on their domestic, non-traded sectors—need to move toward a middle ground. China, India, and most of the East Asian tigers, along with South American countries such as Brazil and Argentina, are too export-oriented and need to focus much more on raising their domestic sector productivity. In contrast, the United States stands on the opposite side; it does not care nearly enough about the health of its export sectors, which have long withered without Washington noticing. The only sustainable path to raising living standards for the vast majority of citizens in developing and developed countries alike is to raise productivity across-the-board and to generally seek to attain trade balances over the moderate-run; not by having all countries pushing to maximize exports as their principal path to economic prosperity.

To achieve this, developed countries need to work alongside international development organizations to reformulate foreign aid policies to use them as a carrot and stick to push countries toward the right kinds of innovation policies. Two principles need to guide developed countries' foreign aid policies. First, foreign aid should be geared to enhancing the productivity of developing countries' domestic, non-traded sectors; not to helping their export sectors become more competitive on global markets. Second, blatantly mercantilist

Foreign aid should be geared to enhancing the productivity of developing countries' domestic, non-traded sectors; not to helping their export sectors become more competitive on global markets. Countries running up huge trade surpluses should simply not be receiving any foreign aid.

countries engaging in IP theft, manipulating currencies, imposing significant trade barriers, etc. should have their foreign aid privileges withdrawn. In particular, countries running up huge trade surpluses should simply not be receiving any foreign aid. The message to these countries should be that if they want to engage the global community for development assistance, Ugly and Bad policies cannot constitute the “dominant logic” of their innovation and economic growth strategies. If countries are implementing Ugly or Bad innovation policies in a systematic way, we should support them less; if they are implementing Good policies, we should support them more.

Developed countries and international development organizations alike need to stop giving direct foreign aid to countries fielding egregious mercantilist practices. For example, Japan gave China \$1.66 billion in official bilateral development assistance in 2005.⁹⁵ It was not until the end of 2009 that Germany stopped giving foreign aid assistance to China.⁹⁶ Germany had given China €67.5 million in 2007 and India €64 million in 2008. Amazingly, German opposition parties denounced the decision to suspend foreign aid to the world’s second largest economy as a “bad joke” and “arrogant first move in office” by Dirk Niebel, Germany’s new Development Minister, and predicted that the move would have “disastrous consequences.” The United States gave China \$120 million in foreign aid assistance from 2005 to 2008.⁹⁷ In 2009, the World Bank posted \$10 billion in outstanding loans to China, spread across 75 projects. But as Charles Blum, Executive Director of the Fair Currency Coalition, argues, “Every dollar lent to China is a dollar that can’t be borrowed by a poor country in Africa, Latin America, or Asia.”⁹⁸

Another example is the Global Fund to Fight AIDS, Tuberculosis, and Malaria, which pools countries’ donations to fight these pernicious diseases into one coordinated fund that gives resource-strapped countries grants to purchase medicines, build health programs, and prevent these diseases from spreading. The Fund’s founders envisioned the resources going to places like Lesotho, Haiti, and Uganda, where these diseases have reached crisis levels.⁹⁹ But over the eight years since the Fund was launched, China, a country with \$2.5 trillion in foreign currency reserves, has become the fourth-largest recipient of funds, having been awarded nearly \$1 billion, or almost three times more than South Africa, one of the countries most affected by these diseases. While the United States has committed \$5.5 billion and France \$2.5 billion to the Fund over the past eight years, China has donated but \$16 million, and recouped this spending by 60 times. While China has legitimate health concerns, its needs stack up poorly against the expensive opportunity costs exacted on needier countries; especially for a country that was recently able to afford a \$586 billion stimulus package that included new health and education spending of \$27 billion. As Jack Chow, chief U.S. negotiator at the talks that established the Fund, contends, “It is audacious for China to assert that it needs international health assistance on par with the world’s poorest countries.”¹⁰⁰ Yet no one in Washington has raised concern that an amount equivalent to President Barack Obama’s entire fiscal 2011 Global Fund budget request of \$1 billion has gone to a country that not only can afford to pay its own way, but also repeatedly uses mercantilist practices.

Another activity at which the United States must desist is directly supporting foreign companies competing against U.S. companies. For example, the Overseas Private

Investment Corporation, a U.S. governmental corporation whose mission is to help American companies invest overseas, funded a venture investment bank that made high-tech investments in India in technology companies that were competing directly against U.S. companies. OPIC's Web site, which is targeted to American businesses, has included links to organizations such as the Indian Investment Center—a government agency that seeks to induce American companies to move jobs to India—and the Federation of Indian Chambers of Commerce and Industry. OPIC has also guaranteed investments in overseas venture capital funds, many of which invest in high-tech ventures that potentially compete with U.S. companies. For example, the OPIC India Private Equity Fund, administered by the Oppenheimer investment bank, has made investments in Indian companies in banking, computer, and other industries.¹⁰¹

In an even more stunning example, the U.S. Department of Commerce's International Trade Administration has actually hosted conferences for U.S. companies designed to help them invest in foreign nations such as China, even if these companies are closing their U.S. plants and opening up plants in China to sell into the U.S. market.¹⁰² U.S. businesses signing up to attend one such conference could list one of their interests as "opening up an office, warehouse/distribution center, [or] manufacturing facility."¹⁰³ They could find information on "How to Select Locations for your Businesses and who to Partner with in China" and learn about "China's Taxation for Foreign Companies and Joint Ventures post-WTO." The logic behind the Bush Administration's actions was that it believed that if U.S. companies were manufacturing in China, they would be more likely to be competitive in a global marketplace. But these activities are tantamount to the Governor of Michigan setting up meetings to host delegations from Alabama to come and meet with manufacturers in Michigan to see if they could compete and produce more effectively in Alabama. Now, if U.S. manufacturers decide that they can compete more productively offshore than in the United States, they are free to make that decision, but they don't need assistance from the U.S. government in off-shoring U.S. jobs. (The Bush Administration's logic conflated the view that what is good for U.S. corporations is by definition good for the United States. While the old saw that, "What's good for General Motors is good for the United States," may have been generally true in early times, and still remains somewhat true today, the interests of U.S.-based multinational corporations are no longer necessarily uniformly aligned with those of the United States and its citizens. The end goal of economic policy is not raising U.S. firms' competitiveness, it's raising U.S. productivity and creating high-wage, high-value-added jobs in the United States; raising U.S. firms' competitiveness is a means to these ends.)

More recently, President Obama has promised to help China develop commercial jetliners—one of the few high-value-added manufacturing industries at which the United States retains a strong trade surplus.¹⁰⁴ During the same visit at which the President made that announcement, General Electric announced it was joint venturing its entire avionics business with China's state-owned avionics company, which could not have happened without U.S. government participation because of national security considerations and export license requirements. It is one thing for the United States to help companies make investments overseas that help struggling domestic economies with things like water and electricity supply, energy extraction, or enhancing medical care, but quite different to

subsidize investment in foreign countries' high-tech industries competing directly with ours.

While specifics are still emerging, it appears that President Obama's announcement on September 22, 2010 of a new U.S. Global Development Policy may be a small step in the right direction.¹⁰⁵ The approach rightly portrays foreign aid as a vital component of U.S. national-security and economic strategies, observes that sustainable development outcomes should place a premium on broad-based economic growth, and seeks to use a combination of diplomacy, trade, and investment policies to help other countries prosper. Appropriately, its three major initiatives—"Feed the Future," the "Global Health Initiative," and the "Global Climate Change Initiative"—are focused primarily on domestic sectors. This is a much better approach than seeding a Chinese jetliner industry to take on Boeing. But it needs to go further and make U.S. foreign aid contingent on countries' limiting their Bad and Ugly practices and embracing Good practices.

In addition to countries individually, global organizations must work more proactively to combat nations' Bad and Ugly beggar-thy-neighbor mercantilist strategies. International development organizations including the World Bank, the International Monetary Fund, the World Trade Organization, and the OECD, along with national development organizations including the United States' Agency for International Development, OPIC, and Export-Import Bank, and the European Development Bank, need to not only stop promoting export-led growth as a key development tool, but also tie their assistance to steps taken by developing nations to move away from negative-sum mercantilist policies.

In particular, the World Bank should make a firm commitment that it will stop encouraging policies designed to support countries' export-led growth strategies. Indeed, the World Bank should place a moratorium on all such policies. If countries insist on pursuing mercantilist practices, then they would have to do so on their own, because the World Bank would cut off support for countries' Ugly or Bad policies.

Unfortunately, the World Bank isn't really about the world; it's about individual countries. The World Bank country desks (e.g. the Colombia desk or the China desk), and their development professionals, appear to be evaluated at least in part on whether they have spurred economic growth in Colombia or China. For example, the World Bank is funding a project, "Science, Technology and Innovation" in Columbia whose objectives include strengthening the capacity of the Administrative Department of Science, Technology and Innovation ("COLCIENCIAS") to promote investment in research and innovation.¹⁰⁶ In China, the World Bank is funding a \$931 million project to reduce carbon emissions,¹⁰⁷ substantial funds from which, no doubt, will find their way into solar panel or wind turbine export products competing against other countries' products. Also in China, the World Bank is funding a project to increase energy efficiency in Chinese steel mills, enabling the Chinese to lower the cost of their steel exports.¹⁰⁸ And if the World Bank's development professionals can get Colombia to export more computers to the United States, or China more steel to Europe, then they get rewarded. It doesn't matter if Colombia imports fewer U.S. computers in the process of exporting more computers to the United States or if this hurts U.S. producers.

The notion that the only way countries can achieve a full employment economy is by manipulating the trading system with mercantilist practices and running ever-growing trade surpluses is illogical.

Thus, the World Bank sorely needs institutional innovation to begin seeing its mandate as achieving a more globally balanced international economic system. The G-20 countries, as the primary sponsors of the World Bank, must tackle this issue head-on and truly begin focusing on win-win global growth through innovation, and place a major focus on how to restructure international institutions to make this happen. Specifically, the G-20 should demand from the World Bank, within 6 months of the October 2010 G-20 summit, a new strategic plan from the Bank on how it can completely revamp its approach to reward nations that are playing by the rules and to at least try to minimize the Bad and Ugly policies of the nations that aren't.

To be sure, the innovation strategy that the World Bank crafts for truly lagging developing countries, as in Africa, should be distinct from those for more developed nations. Innovation-based growth in Africa will be much more about adopting and leveraging information and communication technologies and improving education, health care, and public infrastructure. For example, a World Bank study of the construction industry in Uganda found that companies making greater use of ICT were more profitable and productive than those that did not. Indeed, ICT has played a vital role in raising productivity and contributing to more efficient markets in developing countries. For example, a World Bank survey of over 20,000 businesses in low- and middle-income countries found that firms that use ICT have faster sales and employment growth and also higher productivity.¹⁰⁹ Accordingly, a recent World Bank study has urged nations to adopt more balanced policies regarding ICT adoption and use, arguing that doing so could lead to stronger economic growth.¹¹⁰ These are the ways the global community should be supporting economic growth in developing countries, not by encouraging businesses to decamp from the developed world and relocate in the developing world.

In addition to modifying their foreign aid policies, developed countries need to reformulate their trade agendas. One of the biggest challenges for the United States and European nations that would contest others' mercantilist strategies is that their trade policies are structured to play "whack a mole." They expend enormous resources to identify, respond to, and combat particular instances of foreign countries' contravening international trade agreements to the detriment of their businesses (the actual harms from which must also be legally established). U.S. or European trade policy rarely rises to the level of broader principles, e.g. insisting that other countries "desist with this generalized practice." As a consequence of U.S. and European trade policies being organized in a legalistic framework to combat unfair trade practices on a case-by-case basis, it becomes difficult for them to put in place a comprehensive trade strategy designed to stimulate competitiveness and innovation.

At the end of the day, developed countries are going to have to abandon the notion that countries using mercantilist policies are somehow going to play by the rules if we just play nice with them. Accordingly, the United States, Europe, and perhaps Japan, if it is so inclined, should create a new trade zone, involving those countries genuinely committed to adhering to the principles of open, free, and fair trade (e.g. those countries/regions from the middle to the left in Figure 2). Countries that insist upon pursuing mercantilist strategies would not be welcomed into this arrangement. The Trans-Pacific Partnership

The World Bank should make a firm commitment that it will stop encouraging policies designed to support countries' export-led growth strategies.

could provide a model for how to organize such a new trade zone. The Trans-Pacific Partnership represents a vehicle for economic integration and collaboration across the Asia-Pacific region amongst like-minded countries—including Australia, Brunei, Chile, New Zealand, Peru, Singapore, Vietnam, and the United States—that have come together voluntarily to craft a platform for a comprehensive, high-standard trade agreement.¹¹¹

Countries that would like to participate in such expanded trade partnerships, whether the Trans-Pacific Partnership or a potential Trans-Atlantic Partnership, must abandon wholesale their mercantilist practices. This proposal is not meant to be Pollyannish; to be sure, every single country, including the United States, has some Ugly and Bad trade policies. It's not to say that only perfect countries with unblemished trade records can participate. But the point is that countries whose "dominant logic" toward trade is export-led growth based on beggar-thy-neighbor mercantilist practices would simply not be invited to participate in this new trade grouping. If countries want the benefits of participating in a global trade system, then they must play by the rules of that system.

Finally, the World Trade Organization must play a much more aggressive role in understanding that what has been transpiring in the global trading system is not occasional and random infractions of certain trade provisions by countries that need to be handled on a case-by-case basis, but rather that some countries continue to systematically violate the core tenets of the WTO because their dominant logic toward trade is predicated on export-led growth through mercantilist practices. The WTO needs to wake up and realize that this constitutes a major threat to global integration. And if the WTO fails to recognize and react to this, it will only lead to more and more isolation and isolationism, and the cause of globalization will be undermined.

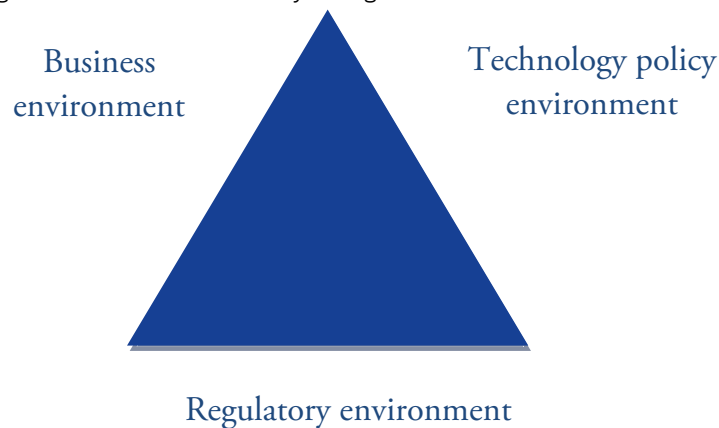
And then there will be even more quizzical speeches like the one Pascal Lamy, the Director General of the World Trade Organization, gave at the Paris School of Economics in April 2010 entitled "Is Comparative Advantage Dead? Not At All."¹¹² Lamy's speech effectively lamented, "Why aren't people understanding all the benefits to free trade?" But that's kind of like asking, "Why aren't people going out in public and shopping?" when every fifth time they go out they get mugged. Maybe it's not that they don't like shopping, but that they don't like getting mugged. Maybe the answer is to crack down on muggers, instead of asking, "What's the matter with you people. Why don't you like shopping anymore?"

THE GOOD, THE BAD, THE UGLY, AND THE SELF-DESTRUCTIVE OF INNOVATION POLICIES

Because innovation is critical, getting innovation policies right is also critical. As such, policymakers need to be able to differentiate between Good, Bad, Ugly, and Self-destructive innovation policies, both so that they can advocate for the right kinds of innovation policies and so that they can distinguish between the types and effects of innovation policies other countries are putting in place, in order to be in a position to support the constructive ones and push back on the destructive ones.

Nations that wish to be innovation leaders must master three components of the innovation ecosystem: the technology policy environment, the regulatory environment, and the business environment, often called “The Innovation Policy Triangle” (as shown in Figure 6) and described subsequently.

Figure 6: The Innovation Policy Triangle



Business Environment: Finance, strategies, and institutions.

1. Vibrant capital markets.
2. Churn and change are accepted, even embraced.
3. High level of entrepreneurship.
4. Cooperation and collaboration is part of the culture.
5. Strong ICT adoption, especially among business.
6. Strong managerial skills.

Regulatory Environment: Provides the right overall framework environment enabling organizations to be innovative.

1. Pro-innovation tax system.
2. Competitive and open trade regime.
3. Ease of starting a business.
4. Transparency and rule of law.
5. Support for competitive product and labor markets.

6. Limited regulations on the digital economy.
7. Government procurements based on performance standards.

Technology Policy Environment: Supports the key building blocks of innovation.

1. Education and skills.
2. Technology research and commercialization infrastructure.
3. Digital technology infrastructure and ecosystem.

This report does not focus on the business environment side of the innovation policy triangle, because it is not something government policy can directly affect, at least not in the short- to moderate-term. (That is, a country's business environment is more reflective of what assets a nation has, e.g., its factor endowments). However, governments' innovation policies do directly influence their countries' regulatory and technology policy environments. This section provides policymakers with a guide to crafting effective innovation policy by examining specific policies that constitute the core of countries' national innovation strategies, and does so by classifying them within the Good, Bad, Ugly, Self-destructive matrix. The section assesses the following nine innovation policy categories: innovation building blocks; scientific research; ICT policy; tax; trade; intellectual property; government procurement; standards; and regulations.

SUPPORTING KEY BUILDING BLOCKS OF INNOVATION

At its heart, building a successful innovation economy is not possible without strong foundational building blocks. These include adequate worker skills, a research infrastructure, and high-performing digital technology infrastructures. This is not to say that these are enough, but it is to say that without them, innovation success will be difficult.

Skills

Countries' programs designed to build citizens' IT skills represent Good innovation policy wherever they are found. Certainly, broadly developing students' IT skills through secondary and tertiary education is vitally important. But IT skills are important at the workforce level as well, and an important component of job retraining programs for displaced workers should be ensuring they have at least baseline proficiency with core IT skills, especially since many service industry jobs (which now account for more than three-quarters of U.S. employment) require some degree of familiarity with information technology systems. At a higher level, the United States' National Science Foundation and Centers for Disease Control have created specialized scholarships in ICT-leveraging industries, such as cybersecurity and bioinformatics, respectively, to build deep pools of talent with highly sophisticated IT skills in these fields.

Domestic Education and Training, Particularly in STEM Fields

Countries' investments in education and skills development are generally Good (win-win) policies, for both the country and the world, and for a nation's workers and consumers. (Consumers benefit from the lower cost and higher-quality products enabled by higher

At the end of the day, developed countries are going to have to abandon the notion that countries using mercantilist policies are somehow going to play by the rules if we just play nice with them.

skilled workers.) In particular, it behooves all countries to support strong science, technology, mathematics, and engineering (STEM) education, especially as more countries recognize the links between STEM education, greater research, and increased innovation. As the OECD observes, “Education systems play a broad role in supporting innovation because knowledge-based societies rely on a highly-qualified and flexible labor force in all sectors of the economy and society. Innovation requires the capacity to learn continually and upgrade skills.”¹¹³ Since innovation and productivity are supported by a highly educated workforce, higher education attainment has become an important component of economic success, particularly in higher-wage nations that can compete less effectively in lower-skilled, routinized work.¹¹⁴

The United States has found specialty math and science high schools (MSHSs) well-suited to addressing the STEM education challenge.¹¹⁵ By creating an environment focused more intensely on science and technology, MSHSs have succeeded in enabling students to study science and math, often at levels far beyond what students in conventional high schools are at. These students can then go on to degrees in math and science at relatively high levels.

Countries can also look for opportunities to leverage government support for advanced education with industry funding. For example, ITIF has proposed that the U.S. National Science Foundation (NSF) create a new NSF-industry Ph.D. fellows program, where industries and NSF split the cost.¹¹⁶ In exchange for their commitment to support residents, companies could direct the Ph.D.’s research to areas of mutual interest. Even if such a program were only available to a country’s citizens, spillover benefits from the new knowledge generated would ultimately inure to the world’s benefit.

Immigration

Depending on how they are implemented, countries’ immigration policies can fall into either the Good, Bad, Ugly, or Self-destructive quadrants. As ITIF explained in its report *Global Flows of Talent: Benchmarking the United States*, a key resource in the global knowledge economy is talent.¹¹⁷ Indeed, “it has become the world’s most sought after commodity.”¹¹⁸ Immigration plays a critical role in contributing to a country’s knowledge pool and creative ability by bringing new perspectives and needed skills and knowledge from other places. This “brain circulation” allows countries to dig deeply into the ever-expanding pools of knowledge and skills that exist beyond their borders, resulting in more innovation and prosperity both in-country and in the world at large. The United States has benefitted immensely from attracting foreign-born talent. At least seven studies have examined the role of immigrants in launching new companies in the United States, and all conclude that immigrants are key actors in this process, creating 15 percent to 26 percent of new companies in the tech-sector.¹¹⁹ While some contend that foreign high-skilled workers drive down the wages of U.S. workers, according to a 2010 study in the journal *Management Science*, foreign workers with H-1B visas earn on average 6.8 percent more than domestic workers, essentially dispelling the myth that H-1B visa holders create a race to the bottom amongst high-skilled firms.¹²⁰

Some other nations that have been less open to high-skilled talent have suffered as a result. For example, Arora, Branstetter, and Dev found that the rise of software-based innovation

had differential effects on the performance of Japanese and American ICT industries, leading to the decline of Japan's ICT industry and the resurgence of Silicon Valley.¹²¹ They show that U.S. ICT firms were better positioned than Japanese ones as ICT innovation became more software intensive, with Japanese firms producing significantly fewer software inventions and relying less on software knowledge in innovation production than their U.S. counterparts.¹²² The authors note that a principal reason why Japanese firms were not able to use software advances as effectively as U.S. firms is that they were not able to overcome their national labor resource constraints. Though there are several explanations for the Japanese ICT industry's difficulty in tapping into foreign knowledge pools, Arora, Branstetter, and Drev suggest a particular cause was that, "Japan's relatively restrictive immigration laws and its long history as an ethnically homogeneous society mitigate against large-scale importation of skilled labor from foreign countries, creating barriers to bringing foreign expertise (or experts) to Japan." They note that America's ability to tap into an increasingly abundant (and increasingly foreign) supply of software engineers may explain how American firms out-produced their rivals, and observe that if institutional reforms in Japan fail to open Japanese labor markets to highly skilled immigrants, it could leave Japanese firms at a disadvantage even in the longer run.¹²³

Open immigration policies for high-skilled workers expand the demand for talent, and create knowledge flows in both directions, both with foreign talent going to the host country, and quite often when those individuals subsequently return to their home countries. Also, foreign countries' open immigration policies can create demand for high-skilled jobs in the home country, as individuals realize that they are indeed able to secure good jobs with their skills. Thus, countries should welcome legitimate competition among nations to appeal to internationally mobile, highly skilled workers. Countries such as Canada have implemented explicit strategies to attract internationally mobile, skilled workers, including highlighting the country's quality-of-life benefits.¹²⁴ Many nations implement policies in favor of high-skill immigration through point systems, by which applicants for immigration receive points for such characteristics as education, work experience, and language skills.¹²⁵ Properly governed, expanding global flows of talent can and should be a win-win proposition for the U.S. and the rest of the world. A global talent pool that expands rapidly and circulates widely will spread prosperity in the context of greater openness and interdependence. Policies that facilitate brain circulation and the creation of international networks of talented people from all over the world can also help combat poverty and underdevelopment.

However, countries should recognize that brain circulation can devolve into brain drain. As the number of talented people is limited everywhere in the short-run, nations should be mindful to ensure that the countries from which they draw immigrants are still able to partake in the fruits of the knowledge economy. To the extent that developed nations focus on attracting high-skilled workers from other nations, they should collectively take care to avoid stripping too much talent from lower income countries, particularly smaller countries and especially in areas of critical human need, such as medicine and education.¹²⁶ For example, some countries' immigration policies target areas in which there is a shortfall of skilled labor in the targeted nation, such as nurses or educators. Consequently, the pool of nurses in some developing countries has been depleted as they depart for more lucrative

Countries should welcome legitimate competition among nations to appeal to internationally mobile, highly skilled workers.

opportunities in the developed world. This is an example of an Ugly immigration policy; good for developed countries, but bad for developing ones (often African nations) losing talent. There is also little evidence that shortages in developed nations in fields like nursing cannot be addressed through a combination of policies, such as better working conditions and pay for nurses and expanded nursing education programs. There is no reason why nations like the United States should be seeking nursing talent from other nations, particularly developing nations.

U.S. immigration policies toward high-tech talent are another matter. It's doubtful that even higher pay for STEM workers will lead to more STEM workers in the United States, in part because most STEM workers are working in traded sectors. That is, if salaries were to rise considerably for STEM professionals, companies would be likely to relocate their jobs offshore. In contrast, nursing jobs can't go offshore (the work must be performed here). Also, it's not clear that expanded education programs, at least in the short- to moderate-term, can solve the problem that the United States needs to import an increasing share of its STEM talent.

The United States is one country that, like Japan, appears to have a Self-destructive immigration policy. Whereas, in the early 2000s, the United States welcomed as many as 195,000 high-skilled foreign immigrants through the H-1B visa each year, the United States now caps the number of H-1B visas issued annually at 65,000. In 2008, 50 percent of highly talented foreign professionals were denied entry to the United States, as 163,000 applicants vied for a mere 85,000 visas.¹²⁷ At least 65,000 applicants were turned away in 2007 as well.¹²⁸ In some cases, foreign engineers are forced to exit the country as soon as they finish their degrees.¹²⁹ Whereas foreign entrepreneurs used to have to come to the United States to find access to capital, technology, and a skilled labor force, they can increasingly find such resources in their home countries, meaning the United States increasingly risks losing out on attracting talented entrepreneurs.

There is some evidence, however, that low-skilled immigration can actually be Good for a country, because from a labor matching perspective, low-skilled jobs could be performed by low-skilled individuals, thereby freeing up moderately skilled people to take moderately skilled jobs. In other words, instead of having someone with a community college degree working in fast food service, someone with a lower skill level could take that job, while the individual with the community college degree could become an accountant. Thus, while some low-skilled immigration can help a country if it enables better labor-skill matching, excessive levels of low-skilled immigration, particularly if it comes at the cost of high-skilled immigration, can impose costs on society, including by limiting overall levels of innovation. Achieving better labor-skill matching in the United States would also address the challenge that, when labor costs are too low for unskilled workers, firms often take a short-sighted view and align their business models around low-skilled labor instead of high-skilled labor.¹³⁰ However, this inhibits the adoption of self-service and other automation technologies that would otherwise be poised to deliver productivity improvements throughout an economy.

Countries with the very worst immigration policies (such as North Korea) shut their borders entirely, preventing high-skilled individuals from entering their country, while precluding reverse knowledge flows by preventing their own citizens' ability to cultivate knowledge in foreign countries and subsequently repatriate it.

Figure 7: Good, Bad, Ugly and Self-Destructive of Skills, Education, and Immigration Policy

		World	
		Wins	Loses
Country	Wins	<p>High rates of secondary and tertiary educational attainment.</p> <p>Open immigration policies appealing to internationally mobile, highly skilled workers.</p> <p>Strong support for STEM education.</p> <p>Achieving better labor-skill matching in countries.</p>	<p>Immigration policies targeted to deplete skilled labor in the developing world.</p> <p>Allowing emigration of only low-skilled individuals.</p>
	Loses	<p>Policies restricting high-skill immigration without limiting low-skill immigration.</p>	<p>Restricting knowledge flows by closing borders entirely to immigration and emigration.</p>

SCIENTIFIC RESEARCH POLICY

Support for scientific research generally is a Good policy, representing a win-win for the country and the world. Raising the international stock of knowledge benefits all countries, for if scientists in Singapore, France, or China develop, for example, new cures for diseases or new clean energy sources, this creates spillover effects that benefit all citizens throughout the world. Governments play a critical role not just by directly funding investments in pre-competitive scientific research, but also by providing incentives for companies to invest in it. This research then becomes available to companies for commercialization. Funding for scientific research will be essential to developing solutions to a range of challenges faced globally, including achieving clean energy production, managing natural resources, meeting the needs of aging populations, expanding agricultural output, and boosting productivity.

Estimates of the return on investment from publicly funded research and development range from 20 percent to 67 percent.¹³¹ Economist Edwin Mansfield estimates that the social rate of return from investment in academic research is as high as 40 percent (updating earlier work estimating the rate of return at 28 percent).¹³² Coe and Helpman find that rates of return on R&D are very high, both in terms of domestic output and international spillovers.¹³³ Block and Keller, in an ITIF report, *Where Do Innovations Come*

From? Transformations in the U.S. National Innovation System, 1970-2006, documented the crucial importance of federal R&D funding to innovation in the United States, noting that in 2006 only 11 of the 88 entities that produced award-winning innovations were not beneficiaries of federal funding.¹³⁴

An economy's productivity level depends in part on its cumulative R&D base and on its effective stock of knowledge, with the two being inter-related. But as Coe and Helpman maintain, "in a world with international trade in goods and services, foreign direct investment, and an international exchange of information and dissemination of knowledge, a country's productivity depends both on its own R&D as well as on the R&D efforts of its trade partners."¹³⁵ And indeed, foreign R&D has beneficial effects on domestic productivity that are stronger the more open an economy is to foreign trade. For example, Coe and 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.¹³⁶

Coe and Helpman observed similar effect across G7 countries (United States, Japan, Germany, France, Italy, United Kingdom, and Canada), finding that a \$100 increase in the R&D capital stock in a G7 country raises its annual GDP by \$123 on average. They also found large international R&D spillovers, concluding that, in 1990, the average worldwide rate of return from investment in R&D in the G7 countries was 155 percent. Thus, international spillovers from R&D are quite substantial. If the worldwide rate of return is as high as 155 percent, whereas countries' own rate of return is 123 percent, the externality is more than double. Finally, Coe and Helpman observed that about one quarter of the total benefits of R&D investments in a G7 country accrue to its trade partners.¹³⁷

Thus, when countries perform their own R&D, the entire world benefits, which is both why governments need to support R&D and why it is so bad when other countries enact policies that limit their support for R&D activity. Theft of R&D-related intellectual property is an ugly strategy that can force companies to transfer technology as a condition of market access or that can force companies to sell knowledge-intensive goods at artificially low prices. In these cases, the losing country as well as the rest of the world suffers. Thus, when Thailand forces foreign pharmaceutical companies to sell drugs significantly below market prices, not only do the countries where the drugs are produced suffer, but the rest of the world suffers as there is less pharmaceutical R&D conducted, by definition, and therefore fewer drug discoveries made. Therefore, the global community needs to establish much stronger international agreements to fund research, and in particular to get the countries that free ride off of others to fund more. Moreover, the impressively high externalities from R&D illustrate just how much intellectual property theft harms not just victim companies and countries, but indeed the entire world (a matter explored in greater depth subsequently).

Coe and Helpman's findings also reinforce the point that R&D is more important to bigger countries than smaller countries, which should focus more on the adoption and usage of technologies than on their development (though certainly all countries should

A 1 percent increase in the R&D capital stock in the United States raises domestic productivity by 0.23 percent and raises the average productivity of 22 developed countries studied by 0.12 percent.

expand their absorptive capacity to receive knowledge generated beyond their borders). For, as Cohen and Levinthal explain, the ability to exploit external knowledge is a critical component of countries' innovative capabilities, and this ability is largely a function of the level of prior related knowledge, which is influenced by the education and experience of the workforce and internal R&D.¹³⁸

A number of countries operate commercial innovation promotion agencies whose mandates are to promote domestic production, innovation, and diffusion, such as the Advanced Technology Program (ATP) and Technology Innovation Partnership (TIP) programs in the United States, or Tekes, Finland's National Technology and Innovation Promotion agency. Are agencies like these, which are focused on domestic production and which require that funding grants go toward development and commercialization of products and technologies inside the country Good, legitimate forms of international competition? They are, so long as all companies, including foreign ones, are eligible to participate. Such programs should be viewed as conceptually akin to the R&D tax credit, in that they should be available to any firm, foreign or domestic, as long as the commercialization activity is performed in-country. The test should be whether the policy instrument is available to all firms.

If governments require that R&D supported by public grants to universities or corporations be performed within the country or region, as for example, the European Union requires in its Seventh Framework Programme for Research, this policy is fine, so long as foreign firms are eligible for the research grants if they conduct the research in-region. Countries that make federally funded R&D investments available only to domestic firms or academic institutions may appear to be supporting a strategy where only the countries' institutions benefit; but in reality, they lose out on global flows of knowledge. This is especially true because probably the best mechanism for efficient cross-border technology transfer is foreign direct investment, where a firm transfers technology and managerial know-how inside itself.¹³⁹ Countries that make foreign firms ineligible to receive R&D grants only end up inhibiting inward FDI flows.

Whether or not outsourcing of R&D is Good, Bad, or Ugly depends on the R&D in question and why the R&D is being outsourced. If the R&D is being outsourced to develop innovations that accommodate the tastes and needs of foreign markets, or to gain access to unique skill sets or clusters, that's Good. But if increased outsourcing of R&D represents an overall loss to a nation because of poor domestic support policies for R&D, then the outsourcing of R&D is Bad.

An Ugly form of R&D policy emerges when countries focus predominantly on investing in applied R&D oriented toward commercialization (that is, R&D focused on actual companies' technology development). In other words, if countries aren't supporting basic research, that is Ugly because all the country's money goes into applied research to gain competitive advantage. The country benefits, but hardly any funding goes toward basic research that can lead to spillovers benefitting the world, meaning the world loses.

Countries also risk a lose-lose scenario when they focus their R&D activity primarily on defense-oriented activities. Countries that disproportionately invest in defense-oriented

development at the expense of basic or applied research or research that could have broader spillover effects do themselves and the global community a disservice. Indeed, many have argued that the focus on defense research has hurt the United States compared to other nations that focus their research investment on civilian technologies.¹⁴⁰ While it's understandable that U.S. agencies such as the Defense Advanced Research Projects Agency (DARPA) have had to recently focus more of their activity on mission-oriented research to "support the warfighter," DARPA's original mission called for research investments that could have broader impacts, leading to successes such as ARPANET, the precursor to the Internet. Both the United States and the world would likely benefit from at least a partial shift back toward DARPA's original vision. As Erica Fuchs notes, "The U.S. government has played an important role in seeding and encouraging new technology trajectories."¹⁴¹

Figure 8: Good, Bad, Ugly and Self-Destructive of Scientific Research Policies

		World	
		Wins	Losses
Country	Wins	<p>Governments funding pre-competitive research.</p> <p>Openness to inward foreign direct investment (FDI).</p> <p>Commercial innovation promotion agencies (provided participation is open to all firms).</p>	<p>Governments funding primarily commercialization-focused R&D and little basic research.</p>
	Losses		<p>Making foreign firms within a nation ineligible to receive R&D grants.</p> <p>Inhibiting foreign direct investment.</p> <p>Countries free-riding off of others' R&D investments.</p> <p>Outsourcing of R&D as a result of poor domestic support policies.</p> <p>Overriding focus on defense-oriented R&D.</p>

ICT POLICY

Technological development and application, particularly of information and communications technology, is the major driver not just of improved quality-of-life, but also of economic growth. Indeed, the integration of ICT into virtually all aspects of the economy and society is creating a digitally-enabled economy that is responsible for generating the lion's share of economic growth and prosperity.¹⁴²

Digital infrastructure applications such as mobile wired broadband, the smart electric grid, health IT, intelligent transportation systems, mobile payments, digital signatures, e-government, and kiosks and other self service technologies are positioned to transform entire sectors of economies. The widespread deployment of next-generation broadband Internet will support a broad range of novel Web-based applications, many of which we can barely imagine today, delivering tremendous benefits to consumers, educational institutions, businesses, society, and the economy.¹⁴³ Therefore, governments should promote national deployment of robust broadband networks and allow access to innovative technologies through efficient spectrum allocation. High-bandwidth fixed mobile networks will provide a platform for productivity increases and innovation, while low-bandwidth networks will limit applications, productivity, and network efficiencies. The more robust the network, the more flexible it can be in adapting new applications, including those important for growth, economic development, and sustainability, such as in health care, education, telecommuting, and entertainment.¹⁴⁴

Studies have found that business use of advanced Internet technology is associated with wage growth. Research from three OECD countries—Denmark, Sweden, and the United States—has found that communities with above average levels of broadband infrastructure experience faster job and firm growth.¹⁴⁵ In a 2010 study, Kolko found that U.S. zip codes that moved from having no broadband provider to having 1 to 3 broadband providers enjoyed employment growth rates 6.4 percent higher than those that did not. Kolko also found a statistically relevant correlation between broadband adoption increases and average pay per employee.¹⁴⁶ And a study of Internet users in the United States found that the use of the Internet is associated with higher wage growth, in part because it imparts higher skill levels.¹⁴⁷

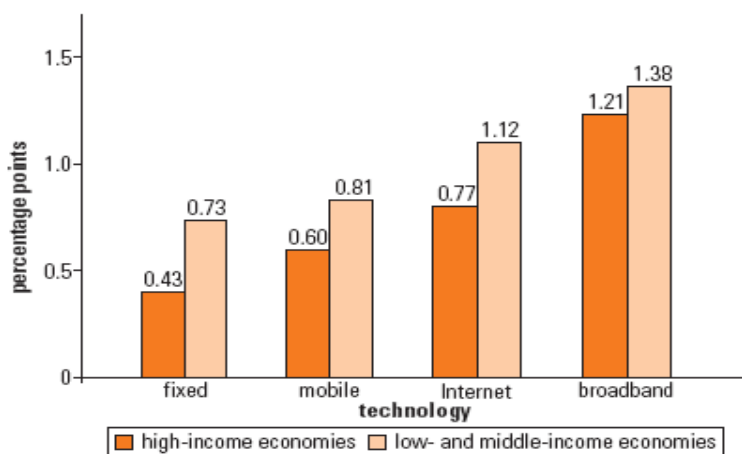
All national policies designed to promote the adoption and use of technology represent win-wins for the country and the world. Whenever countries make broadband Internet access more readily available the entire world benefits because of the network effect—that is, the value of the Internet increases as more people around the world get on it. All countries, including the United States, must pursue policies to close the digital divide, for even if citizens have broadband Internet access, it does them little good if they lack a computer. For example, the United States ranks 12th in the world in broadband adoption not because of the lack of low-cost broadband or the failure of U.S. broadband providers, but because of the lack of computers in the United States. Indeed, U.S. computer ownership rates are 80 percent of the levels in leading nations, such as Japan and South Korea.¹⁴⁸ At the same time, countries with prohibitively expensive broadband service create a disincentive for ICT adoption and use, by businesses and consumers alike. For example, average residential broadband cost as a percentage of monthly household GDP is 38.4

The integration of ICT into virtually all aspects of the economy and society is creating a digitally-enabled economy that is responsible for generating the lion's share of economic growth and prosperity.

percent in the Philippines and 33.6 percent in Vietnam, and less that but still high at 19.4 percent and 17.8 percent in Venezuela and Turkey, respectively. By comparison, average residential broadband for American subscribers costs just 0.5 percent of monthly household GDP.¹⁴⁹

Adoption of advanced information and communications technology is crucial for economic growth in developing countries. As Figure 9 shows, a 10 percent increase in broadband penetration increases per capita GDP growth in low- to middle-income countries by 1.38 percent. A 10 percent increase in mobile phone penetration increases per capita GDP growth by 1.12 percent. One 2005 study found that a developing country with an average of 10 more mobile phones per 100 inhabitants between 1996 and 2003 would have enjoyed 0.59 percent higher per capita GDP growth than an otherwise identical country.¹⁵⁰ Updating this research in 2008, the World Bank found that a 10 percent increase in mobile phone penetration in low- and middle-income economies adds 0.81 percent to annual per capita GDP growth.¹⁵¹

Figure 9: Effect of a 10 Percent Increase in Technology Penetration on Per Capita GDP Growth



Conversely, countries' policies that limit the use or the choice of information technologies, such as restrictions on Internet access or the types of search engines that can be used, are Bad. Such limitations stifle competition, limit an economy's capacity to build upon existing innovations, undermine the ability of an economy to upgrade its own ICT base and thus increase its productivity, and weaken incentives for both domestic and foreign firms to innovate. Countries' overly strict regulations on ICTs can even become Self-destructive.

For example, while implementing considered policies to preserve citizens' privacy is an important duty of government, extreme data privacy regulations can inordinately inhibit commerce in the name of consumer privacy.¹⁵² For example, proposals under consideration in the United States and Europe would limit sharing of certain types of consumer data, medical data, or data stored in the cloud. New evidence from an academic study on the effect of privacy regulations in Europe further bolsters the concern that stricter privacy regulations will have an adverse impact on the Internet ecosystem by reducing the

effectiveness of online advertising and thus reducing the availability of funds to support free or low-cost content, applications, and services.¹⁵³

The Internet is important to the global economy and online advertising is the dynamo powering the Internet’s rapid growth. Worldwide, the Kelsey Group found that Internet advertising reached approximately \$45 billion in 2007, out of a total \$600 billion advertising market, and predicts online advertising will grow to over \$147 billion by 2012.¹⁵⁴ But privacy laws can negatively impact the efficacy of online advertising according to research by Avi Goldfarb at the University of Toronto and Catherine Tucker from MIT.¹⁵⁵ Goldfarb and Tucker analyzed the impact of the European Union’s Privacy and Electronic Communications Directive (2002/58/EC) which was implemented in various European countries and limits the ability of advertisers to collect and use information about consumers for targeted advertising. The authors found that the new privacy laws resulted in an average reduction in the effectiveness of the online ads of approximately 65 percent (where the effectiveness being measured is the frequency of changing consumers’ stated purchase intent). The authors write “the empirical findings of this paper suggest that

Figure 10: Good, Bad, Ugly and Self-Destructive of ICT Policy

		World	
		Wins	Loses
Country	Wins	Nations’ investments in digital infrastructure platforms such as broadband, the smart grid, ITS, mobile payments, etc. All national policies designed to promote the adoption and use of technology.	
	Loses	Overly strict ICT regulations.	Failing to invest in digital infrastructure platforms such as broadband. Excluding foreign competitors from domestic ICT markets. Favoring national ICT “champions.” Restricting the use or the choice of information and communication technologies. Privacy policies legislating expensive revenue- and trade-reducing regulations.

even moderate privacy regulation does reduce the effectiveness of online advertising, that these costs are not borne equally by all Web sites, and that the costs should be weighed against the benefits to consumers.” Further, the authors found that if European advertisers reduced their spending on online advertising in line with the reduction in effectiveness resulting from stricter privacy regulations, “revenue for online display advertising could fall by more than half from \$8 billion to \$2.8 billion.”¹⁵⁶

Policymakers should recognize that privacy, like any other value, must be balanced against other competing interests and can come at a real financial cost to all consumers. Policymakers should tread lightly and focus more on preventing actual harms from privacy violations than on legislating expensive and revenue- and trade-reducing regulations.¹⁵⁷ The evidence clearly suggests that the tradeoffs of stronger privacy laws result in less free and low-cost content and more spam (i.e. unwanted ads), which is not in the interests of most consumers.

China’s recent announcement that it will create its own government-controlled search engine, in an apparent bid to extend its control over the Internet, is an example of a Bad policy that seeks to further weaken foreign Web search engine companies (such as Google’s) ability to compete in China and also threatens market enterprises such as Baidu.com, a private company that runs China’s largest search engine.¹⁵⁸ (The policy is Bad as opposed to Ugly because it distorts the country’s ICT sector, potentially diminishing the productivity potential of other sectors of China’s economy.) Google had already been forced to relocate its Chinese-language search operations to Hong Kong after having to confront the Chinese government’s censorship of its search results and cyber attacks that appeared to originate from hackers in China.¹⁵⁹ Google’s difficulty in winning market penetration in East Asia is evidence of efforts both subtle and overt to limit the company’s growth in those markets. As another example, whereas Google has achieved 90 percent market penetration in Germany, it has only 3 percent of the South Korean search engine market.

TAX POLICY

While the fundamental purpose of tax policies is to raise revenues to support governmental missions, tax policies can be structured in ways that either spur or harm innovation. Moreover, nations compete based on the attractiveness of their tax environments, just as they do based on the attractiveness of their talent or infrastructure base. Relevant tax policies include corporate tax rates, R&D tax credit generosity, tax policies toward foreign-source income, tax policies toward ICTs, and trade-related taxes (although these will be reviewed in the subsequent trade section).

Countries’ effective (as opposed to statutory) corporate tax rates are important determinants in multinational corporations’ decisions on where to locate production and R&D activities. Countries must recognize that effective corporate tax rates are significant factors in the global competition for economic growth and employment creation. Indeed, the most sophisticated countries recognize that their tax levels are an important way they compete internationally, and thus that operating a lean and effective public sector impacts their ability to compete for private-sector economic activity.

Higher corporate taxes have an adverse effect on foreign direct investment and investment rates. For example, a 10 percent increase in the effective corporate tax rate reduces the aggregate investment-to-GDP ratio by 2.2 percent and reduces FDI inflows by 2.3 percent.

Indeed, higher corporate taxes have an adverse effect on foreign direct investment and investment rates. The most important component of corporate taxes is not the statutory tax rate (the rate at which companies pay for their income), but the effective corporate tax rate, which takes into account all the deductions, exemptions, and credits for which companies qualify. A 10 percent increase in the effective corporate tax rate reduces the aggregate investment-to-GDP ratio by 2.2 percent and reduces FDI inflows by 2.3 percent.¹⁶⁰ Consequently, countries with competitive corporate taxes are more attractive to businesses.¹⁶¹ Corporate tax policy thus presents nations with a particular opportunity for rapid advancement. Unlike many structural factors that affect a country's competitiveness, corporate taxes are not tied to the historical or institutional framework of a nation and can be changed with relative ease.

When it comes to corporate tax competition, Europe is more competitive than the United States, with most EU-10 nations having made a conscious choice to keep effective corporate tax rates low in order to become a more attractive location for internationally mobile business investment. In 2008, the average effective corporate tax rate in EU-10 nations was 11.2 percent.¹⁶² While the average effective rate for EU-15 countries, at 20.5 percent, was almost double the rate for EU-10 countries, that rate was still one-third less than U.S. effective corporate tax rates, at 32 percent. While this may come as a surprise, given that government expenditures as a share of GDP are higher in Europe, one reason that Europe is able to afford lower corporate rates is that it raises a significant share of revenues from border adjustable value-added taxes (VATs). Because these are levied on imports but exempted on exports, the European tax system gives companies located inside Europe's borders a double advantage in international markets—lower corporate rates and value-added taxes levied on imports.¹⁶³ Yet imposing their border adjustable value-added taxes on imports while exempting their exports from the tax is an Ugly policy on the part of European countries.

It is, however, important to note that Europe's low effective corporate tax rates are in part a reflection of European countries shifting a larger share of taxes from corporations onto consumers. That is, European countries don't, for the most part, have lower effective corporate taxes because they have smaller governments, but rather because they have shifted their taxes to higher VATs and lower corporate rates, so to some degree they are taxing consumers instead of their corporations.

Along with Japan, the United States has the highest effective corporate tax rate in the OECD. It can cost more than \$1 billion more per factory to build, equip, and operate a semiconductor manufacturing plant in the United States than in other countries, including China.¹⁶⁴ As much as ninety percent of that additional cost (on a \$4 billion factory) is not labor but the cost to comply with taxes and regulations that the United States imposes that other nations do not. High effective corporate tax rates in the United States and Japan constitute Self-destructive innovation policies that encourage multinational firms to locate productive activities elsewhere.

A number of countries are implementing innovative tax policies offering preferential tax treatment to small businesses, especially those engaged in innovative activities. For

example, France's Jeunes Entreprises Innovantes (JEI) program targets young companies that are less than 8 years old, have fewer than 250 employees and less than €50 million in turnover, devote at least 15 percent of their expenditures to R&D, and are independent and not listed on a stock exchange. Measures in the JEI program include: 1) exemption from social costs for all R&D-related employees in the broad sense, (i.e. researchers, technicians, patent attorneys); 2) exemption from corporate income taxes for the first three years and a 50 percent discount for an additional two years up to a ceiling of €200,000 over 36 months; and 3) possible relief from local taxes on properties and buildings for seven years.¹⁶⁵ Canada, France, Norway, and the United Kingdom offer young innovative firms immediate cash payment rather than use of carry-forward or carry-backwards provisions on business losses. Other countries extend favorable depreciation rules for capital expenditures and reduced capital gains taxes after the initial public offerings of qualified small business stock. Within the European Union, governments can give extra incentives to firms less than six years old which spend more than 15 percent of their total revenues on R&D across all regions and sectors without breaking EU state aid rules.¹⁶⁶

Generous research and development (R&D) tax credits represent Good innovation policy. To the extent that R&D tax credits incentivize firms to increase their R&D activities, this has the potential to generate spillover effects that benefit the entire world. However, R&D tax credits must be made available to all firms, foreign and domestic. Countries whose R&D tax credit policies discriminate amongst firms to make them available for domestic but not foreign firms pursue an Ugly policy. Such policies may even become Bad, for both the country and the world, as they make the country less attractive to global multinational R&D and FDI and reduce the possibility for in-country R&D to generate world-benefitting spillovers.

Countries implement R&D tax credits because without them firms would not invest in R&D at societally optimal levels. The knowledge needed to create new products, processes, and organizational forms is not something that can be completely contained within an individual firm. It inevitably spills over to other firms, which can use it without paying the costs of creating it. For example, an entrepreneur develops a new business model that others copy. A university transfers discoveries from the lab to the marketplace. A company makes a breakthrough that forms the basis of innovations that other companies can use. Studies have found that the rates of return to society from corporate R&D and investments in ICT are at least twice the estimated returns to the innovating company itself.¹⁶⁷ Because firms' inability to capture all the benefits of their own innovative activity discourages innovation at the level society needs, countries enact R&D tax credits to help close the gap.

Almost all scholarly studies conducted since the early 1990s have found that the R&D tax credit is an effective tool.¹⁶⁸ U.S. R&D tax credits spur approximately two dollars in private research and development spending for every dollar they cost the government.¹⁶⁹ Other studies have found even greater benefits.¹⁷⁰ Klassen, Pittman, and Reed found that the U.S. R&D tax credit induces \$2.96 of additional R&D investment for every \$1 of taxes foregone.¹⁷¹ A study of the French R&D tax credit found an increase in research investment three to four times the budgetary cost.¹⁷²

U.S. R&D tax credits spur approximately two dollars in private research and development spending for every dollar they cost the government.

France boasts the world's most generous R&D tax credit, providing a subsidy of \$0.425 for every \$1 of corporate investment in R&D.¹⁷³ India, Brazil, and China are to be commended for enacting generous R&D tax credits.¹⁷⁴ In fact, India and Brazil rank 5th and 6th, respectively, out of 38 countries assessed by the OECD's *Science, Technology, and Industry Scoreboard 2009* in tax credit generosity. The United States ranks just 24th. In January 2010, ITIF estimated that if the United States expanded its R&D tax credit (specifically, the Alternative Simplified Credit) from 12 to 20 percent and made it permanent, this would lead to the creation of 162,000 jobs in the near term, a \$90 billion increase in GDP, 3,850 new patents, and pay for itself in terms of increased tax revenues.¹⁷⁵ Since approximately 70 percent of R&D tax credits go toward paying workers, they are also an effective job creation mechanism.

Societies have a legitimate wish to ensure that their governments receive adequate revenues, particularly with growing budget deficits and entitlement expenditures. But the need to raise adequate revenues runs counter to the need to maintain an internationally competitive corporate tax system. Because of this conflict, some see the increase in international competition for mobile economic activity as a "race to the bottom" and would seek to unilaterally withdraw from the competition. This is a motivation for the Obama Administration's effort to limit deferral of foreign-source corporate income. However, nations cannot effectively pull out of the tax competition "game" without negative consequences for their own economic competitiveness, as the United States has seen over the last 15 years with its growing trade deficit.¹⁷⁶

Before discussing the merits of limiting deferral, it's important to briefly review it. The United States is one of only a few nations with a territorial tax system, charging taxes on U.S. companies regardless of where that income is earned. However, under current law, affiliates of U.S. corporations can defer taxes owed the U.S. government until they repatriate the money to the United States. The Obama Administration has proposed limiting deferral so that U.S. corporations pay more taxes immediately, believing this would reduce the incentive for U.S. firms to invest in other nations with lower effective tax rates.

Ending deferral would move to the ideal of what tax economists call "capital import neutrality," where firms should face the same tax rate regardless of where their activities are based. But economists also talk about "capital export neutrality," the concept that a firm should face the same tax rate as other firms in the same jurisdiction. Ending deferral would work against capital export neutrality, because U.S. firms producing overseas for the U.S. market would potentially face higher taxes than foreign firms producing overseas for the U.S. market. Absent global tax harmonization, it is not possible to achieve both import and export capital neutrality.

Let's look at both assumptions behind limiting deferral. The first is that ending deferral will increase revenue. This appears to be likely. However, according to some studies the amount of revenue raised is likely to be less than expected because of the ability of multinational companies to shelter income or to relocate their headquarters operations so that they do not pay the higher U.S. rate. Bartelsman and Beetsma estimate that at the

margin, on average 68 to 87 percent of increased tax revenues from practices like ending deferral are lost due to companies shifting income around nations.¹⁷⁷ They argue that while tighter enforcement of some tax practices like transfer pricing would reduce these shares, if the tax differentials are significant enough, they would encourage companies to move their headquarters and reincorporate in other, lower tax nations.

The second assumption is that ending deferral would lead to more U.S. jobs. On the surface this argument is appealing. If U.S. companies face lower taxes on production overseas than they do in the United States, they have an incentive to move production to low-tax nations and then ship the products (or services) back to the United States. Ending deferral, the argument goes, would level the playing field and stop “subsidizing” the export of jobs. According to this view, investments overseas by U.S. firms are substitutes for investments by U.S. firms in the United States.

But it is not that simple. If U.S. affiliates are in a lower tax nation and sell much of what they produce there to nations other than the United States, then requiring these facilities to pay the higher U.S. tax rate will make them less competitive with firms from other nations that are subject only to the lower national rate. Since these competitor firms enjoy lower costs they are likely to export more, including to the United States, taking market share away from U.S. firms (either producing domestically or in other nations). In this case, making foreign affiliates of U.S. firms pay the higher U.S. rate may not result in more production in the United States; rather, the import rate might be unchanged, but with more coming from foreign firms. In addition, by reducing deferral, U.S. firms would be disadvantaged in buying foreign firms located in foreign nations with lower corporate taxes than the United States, while foreign firms would have an advantage in buying U.S. affiliates located overseas.

Even if there is no substitution effect and no competitive disadvantage to U.S. firms, it’s not clear that limiting deferral actually leads to increased investment in the United States. Desai, Foley, and Hines argue that there is a complementarity between high- and low-tax nations and that “reduced costs of using tax havens are likely to stimulate investment in high-tax countries. These results stand in contrast to the assumptions in much of the tax competition literature and the beliefs of many concerned policymakers.”¹⁷⁸ Likewise Devereux argues that “from a national perspective, it is optimal to exempt outbound investment from tax.”¹⁷⁹

Their logic (and empirical model) is based on the notion that low-tax nations permit foreign investors to avoid some of the tax burdens imposed by domestic authorities, thereby maintaining foreign investment levels in high tax nations. A related reason is that deferral leads firms to keep larger amounts of cash outside the home nation, limiting reinvestment of that money in activities domestically.¹⁸⁰ One study found that deferral leads firms to hold almost double the amount of cash offshore compared to firms that do not face deferral.

Finally, basing taxation on the corporate location of the company could lead companies to relocate to other nations that do not apply territorial tax systems so that they would pay higher U.S. taxes on U.S. income and lower taxes on income from lower tax nations.

Deveraux argues that “in such a setting, there is no rationale for the government hosting the parent company to tax its worldwide income.”¹⁸¹

Thus, at best it appears that ending or limiting deferral could have mixed results, perhaps spurring some activity to locate or remain in the United States but also reducing jobs in the United States by U.S. headquartered companies that serve global operations (e.g., R&D, management, sales, marketing, etc). As Clausen notes, ending deferral would “exacerbate concerns regarding the international competitiveness of U.S. based multinational firms, as U.S. firms would face a tax disadvantage relative to firms based in other countries when operating in low tax markets.”¹⁸²

So which of these results is better for the United States? Is what’s good for GM still good for the United States? It does appear that the United States is better off with strong U.S. multinationals and even better with strong U.S. multinationals that also invest robustly in the United States, especially in high-value-added employment. Rather than limit deferral to try to achieve the latter goal, a more effective step to achieve both goals would be to reduce the effective U.S. corporate tax rate. Doing so would: 1) provide strong incentives for firms to invest in the United States in the building blocks of growth: research, capital equipment and workforce training; and 2) reduce the effective tax rate differentials between the United States and other nations. This would reduce the need for U.S. companies to hold foreign source income overseas and encourage U.S. and foreign companies to invest more in the U.S. than in formerly lower-tax nations.

Given the complications that arise from nations’ differing tax schemes, some have advocated harmonizing global tax systems. In fact, the OECD and the European Union introduced initiatives in the late 1990s designed to do just that, with little success. Absent a much stronger form of global governance (unlikely in the best of circumstances), such efforts will not bear fruit. There is simply too much to be gained by countries “cutting their own deals” with internationally mobile capital, as evidenced by the policies of nations like China who regularly provide special tax incentives to firms to locate there. While regional coordination (e.g., NAFTA, the EU, etc.) might be more attainable, although still difficult, the gains from coordination at this level are quite small.¹⁸³

Even if greater coordination were possible, it may not be desirable. Some studies have found that tax competition has positive economic impacts. For example, Sorenson found that tax competition leads to higher GDP, higher wages, and greater investment than either tax systems of global or regional coordination or tax systems that levy taxes on national location of the corporation (like the United States does).¹⁸⁴ As a result, given the inevitability of corporate tax competition, policymakers need to use it to generate the most beneficial results for their nations. This does not, however, necessarily mean simply cutting rates, but rather cutting effective tax rates by providing much more generous incentives for investment in research and development, new capital equipment, and skills.

Finally, while corporate tax competition can spur growth and investment, it may have negative impacts on income equality. In one model, global tax coordination leads to a 5 percent decline in GDP, but a 1 percent increase in overall social welfare (because lower-income individuals benefit and equal increases for them relative to higher-income

individuals were move valuable to society).¹⁸⁵ But the goal for policymakers should be to achieve gains in GDP that also lead to more income equality. One way to do this is to boost corporate tax incentives for innovation while at the same time raising top marginal rates and other progressive taxes (e.g., individual taxes on dividends and capital), and also raise increasing revenue from taxing activities with clear negative externalities, such as greenhouse gas emissions.

Taxes imposed on ICT products and services constitute Bad innovation policy. For example, the French government recently proposed a tax on online advertising revenues with the money used to subsidize French online content, including music. The tax would fall particularly hard on U.S. firms like Google, Microsoft, Yahoo, and Facebook. Presumably, one of the firms that would get the subsidy is Dailymotion, an online video service that competes with YouTube, a company that the French government has already subsidized to the tune of \$7.5 million.¹⁸⁶ Brazil imposes taxes on Internet use as high as 40 percent, contributing to Brazil having some of the most expensive Internet services in the world.¹⁸⁷

Figure 11: Good, Bad, Ugly and Self-Destructive of Tax Policy

		World	
		Wins	Losses
Country	Wins	<p>High R&D tax credit levels.</p> <p>Low effective corporate tax rates.</p> <p>Preferential tax treatment for young companies, so long as uniformly available to all start-ups.</p> <p>Cutting effective tax rates by providing much more generous incentives for investment in R&D, new capital equipment, and skills.</p>	<p>Discriminatory R&D tax credit policies.</p> <p>Levying border adjustable value-added taxes on imports, but exempting domestic exports from them.</p> <p>Levying taxes on the products of offshore labor.</p>
	Losses	<p>High effective corporate tax rates, encouraging companies to move productive activity offshore.</p> <p>Refusal to recognize that effective corporate tax levels are a factor in determining a nation's competitiveness.</p>	<p>Less generous R&D tax credit levels.</p> <p>Taxes on ICT products and services.</p>

Countries' trade policies seek to help their manufacturing and IT sectors move up the value chain toward higher-value-added production by applying a number of trade-distorting measures, including by manipulating their currencies and by implementing high tariffs, export subsidies, or other non-tariff barriers to trade.

TRADE POLICY

Classic free trade theory states that free trade benefits all countries by allowing each country to specialize in producing the products or services for which it has comparative advantage. By countries specializing in the production of goods or services in which they are the most efficient, international production is maximized and consumers globally benefit by receiving the highest-value, lowest-cost products and services. Thus, in a global market-based innovation economy, free trade can be a positive-sum game in which everybody wins, but only if everyone plays by the rules.

Globally, the number of free trade agreements has dramatically increased over the past decade, with these agreements accounting for an ever-increasing portion of global trade. Almost 400 bilateral or multilateral trade deals were in place by the end of 2007, with many countries and regions aggressively seeking their own bilateral trade agreements. European and Asian countries appear to be more proactive than the United States in entering into free trade agreements. While the European Union currently has 21 trade deals being negotiated or proposed, and South Korea and China have 14 and 13, respectively, the United States only has one (the Trans-Pacific Partnership agreement).¹⁸⁸ Yet data shows that trade between countries substantially increases once trade agreements are put in place. For example, the implementation of the U.S.-Chilean Free Trade Agreement between 2003 and 2008 led to a 341 percent increase in U.S. exports to Chile and a 122 percent increase in U.S. imports from Chile.¹⁸⁹

Empirical data suggests that free trade benefits developed and developing countries alike. A World Bank study of 77 developing countries over a period of 20 years finds that a developing country's productivity is larger the more open it is to trade with industrial countries and the greater its foreign R&D investment.¹⁹⁰ In a study comparing the East Asian countries with the countries of Latin America, the World Bank found that the East Asian countries demonstrated larger flows of trade, FDI, and licensing behavior and suggests that this provides reasons for their relatively stronger technological growth.¹⁹¹ Sjöholm, in a study matching patent citation data with trade data, found that international trade flows encourage knowledge flows.¹⁹² As much as one-half of U.S. and even more of European productivity growth derives from foreign technology acquired through trade, license, and direct investments (including joint-equity ventures and wholly owned subsidiaries).¹⁹³ Moreover, firms that sell in international markets generate more knowledge than their counterparts which sell in national markets only.¹⁹⁴

Evidence also shows that countries' efforts to protect domestic industries from trade can backfire, having a deleterious impact on those sectors' productivity and growth. In a study of government interventions and productivity growth in South Korean manufacturing industries from 1963 to 1983, Jong-Wha Lee assessed the impact of government interventions such as tariffs, import restrictions, credit allocation, and tax incentives on growth rates at the sectoral level.¹⁹⁵ Lee found evidence that "excessive trade protection measures, such as non-tariff barriers and tariff rates, have strong negative effects on labor productivity and total factor productivity in the Korean manufacturing sector."¹⁹⁶ Lee found that not only did trade protections decrease growth rates of labor productivity and total factor productivity, but also that government industrial policies, such as subsidized

credit and tax incentives, were not correlated with total factor productivity growth in favored industries.¹⁹⁷ He goes on to note that South Korea’s economic “success could have been stronger without government intervention,” echoing a 1993 World Bank report finding that South Korea’s success occurred “in spite of” rather than “because of” government interventions.¹⁹⁸

Notwithstanding the benefits that accrue to all countries from a free and fair international trade system, that system is under assault by a series of mercantilist strategies and practices implemented by countries seeking to gain unfair trade advantages in an effort to alter the global terms of trade in their favor. These countries’ trade policies seek to help their manufacturing and IT sectors move up the value chain towards higher-value-added production by applying a number of trade-distorting measures, including by manipulating their currencies and implementing high tariffs, export subsidies, or other non-tariff barriers to trade. As Girma *et al.* observe, “Pushing its industry up the value-added chain is a clear goal of the Chinese government at both the central and local levels.”¹⁹⁹ Governments implement these policies to keep out foreign products (and services), while advantaging their own in an effort to boost local production, ideally to fill demand in both domestic and foreign markets. Some measures, such as currency manipulation, are blanket, economy-wide, trade-distorting policies that affect all industries equally. (For example, government intervention in markets to keep currency rates artificially low raises the cost of low-value-added as well as high-value-added foreign imports, while supporting all domestic producers, low- and high-value-added alike.) Governments also use measures such as export subsidies, tariffs, and taxes to try to target support for specific sectors, usually high-value-added ones.

While most neoclassical free traders argue that all mercantilist, trade-distorting measures are Bad—that is they hurt the nation and the world—the reality is more complicated. There is a reason many nations pursue these policies so vigorously: they think they will benefit. And in some cases they do, and in others they don’t. Whether it’s the former (Ugly policies) or the latter (Bad policies) depends in large part on what type of products/sectors to which the measures are being applied. Countries applying trade-distorting practices to capital goods, and particularly to general purpose technologies such as ICTs, are pursuing a Bad strategy, because doing so both leaves their countries with inferior capital goods and GPTs and distorts the overall global capital goods and GPT marketplace, which need to be global in order to realize optimal scale benefits. For example, countries imposing high tariffs on foreign ICTs are trying to shift domestic consumption toward locally manufactured ICT products, yet doing so means that other firms in the economy often end up purchasing inferior ICTs (higher priced and/or lower quality), if they do so at all.

While such countries hope that at some point their GPT protectionism will translate into superior GPTs and export jobs, this strategy usually backfires. Not only do these policies usually not spur the creation or expansion of domestic ICT industries, they tend to reduce ICT adoption among existing industries. As Kaushik and Singh observe in reference to their study of ICT adoption in India, “High tariffs did not create a competitive domestic [hardware] industry, and [they] limited adoption [of ICT by users in India] by keeping prices high.”²⁰⁰ The importance of ICT to economic growth means that countries such as

Countries applying trade-distorting practices to capital goods, and particularly to general purpose technologies such as ICTs, are pursuing a Bad strategy, because doing so both leaves their countries with inferior capital goods and GPTs and distorts the overall global capital goods and GPT marketplace.

Argentina, Brazil, India, Turkey, and others that have imposed tariffs on computers and computer parts only do themselves a disservice. While India has made progress recently in lowering its tariffs on ICTs, research has found that for every \$1 of tariffs India applied to imported computers, the country lost \$1.30 due to lost spillover effects.²⁰¹

If trade-distorting measures applied to information and communications technology or other general purpose technologies are ineffective, does the strategy make sense on other products? Raising the price of imports of low-value-added products is simply Bad for the country and for the world outright. The nation ends up raising the prices its consumers and businesses pay for goods and to the extent that it creates more domestic jobs in these protected industries, it does little or nothing to raise overall standards of living since the wages and value-added are low. This is one reason why currency manipulation is a Bad policy, for it gives countries an advantage in both high-value and low-value production, while raising the prices of capital goods and ICTs, meaning that their economies will be less productive.

In some cases, however, nations may benefit from import restrictions or export subsidies for high-value added, non-GPT and non-capital goods industries. Automobiles, for example, is a high-value-added industry. If a country intervenes to support auto production through export subsidies or import restrictions, what the country loses in terms of allocation inefficiency (the fact that its automobile prices are higher) it may gain in value-added from higher-wage jobs in the auto sector. The costs of higher-priced autos don't impose a large cost on other producers in the rest of the economy and consumers will just have to pay a bit more for autos. However, this does not mean that such a policy should be acceptable at the global level. Rather, it is an example of an Ugly trade-distorting practice that benefits domestic producers at the expense of foreign ones.

Countries' unfair trade practices include financial measures such as: 1) currency manipulation; 2) financial incentives for domestic players, including export subsidies; 3) tariffs imposed against foreign products and services; 4) trade-distorting tax policies; 5) forced technology transfer as a condition of market access; and 6) restrictions on foreign direct investment. Countries may also seek to shift the terms of trade by applying non-tariff barriers (NTBs) or other technical barriers to trade (TBTs). These include barriers to other countries' service exports, bureaucratic customs processes, and excessive health and safety regulations. Countries' refusal to recognize or protect foreign intellectual property (IP) rights, insistence on developing proprietary standards, or discriminatory regulatory, competition, and anti-trust policies also constitute trade-distorting practices that are reviewed in subsequent sections.

Figure 12: Good, Bad, Ugly and Self-Destructive of Trade Policy

		World	
		Wins	Losses
Country	Wins	<p>Opening economies to and removing restrictions on foreign direct investment.</p> <p>Allowing markets to determine currency rates.</p>	<p>Trade distorting measures—including currency manipulation, high tariffs, export subsidies, taxes, restrictions on FDI, forced technology transfer, etc.—placed on high-value-added, non-GPT, non-capital goods industries.</p> <p>Export restrictions applied to foreign-owned companies.</p> <p>Bureaucratic customs processes arbitrarily constraining trade, including excessive health and safety regulations (imposed upon all industries but GPT or capital goods industries, in which case are Bad).</p>
	Losses		<p>Trade distorting measures—including currency manipulation, high tariffs, export subsidies, taxes, restrictions on FDI, forced technology transfer, etc.—placed on general purpose technologies, especially ICTs, or capital goods.</p> <p>Barriers on imports of foreign countries' service exports.</p> <p>Limiting foreign companies' equity ownership stakes in domestic companies, or allowing foreign companies to enter domestic markets only through joint ventures.</p>

Trade: Financial Barriers

Currency Manipulation

Perhaps the most prevalent and damaging mercantilist practice is the rampant and widespread currency manipulation that many governments engage in today. Many mercantilist countries attempt to shift the balance of trade in their favor by manipulating currency levels by either pegging their currencies at artificially low levels, as China does, or by propping up currency through government purchases, as in the case of many nations, including Japan. Mercantilist countries' artificially low currencies are a vital component of

their export-led growth strategies, making their exported products cheaper and thus more competitive in international markets while making foreign imports more expensive. When nations keep their currency artificially low, the intent is to induce a shift of production from more productive and innovative locations to less productive and innovative ones.

Although this report has endeavored to demonstrate that export-led growth strategies are neither necessary nor sustainable, some countries, such as China, have staked their political and economic stability on export-led job creation driven by artificially cheap currency that puts foreign competitors at a disadvantage. As Robert Cassidy, President Clinton's Assistant U.S. Trade Representative for Asia and China and principal negotiator for the market access agreement that led to China's accession to the WTO, argues, "China has adopted an export-led development strategy, the centerpiece of which is a currency that is undervalued by 20-80 percent, with the consensus leaning toward 40 percent. Thus, China's wages in U.S. dollar terms are 40 percent cheaper than they would be if the currency were allowed to freely float. Similarly, foreign investors receive a 40 percent subsidy to develop operations in China."²⁰²

The Peterson Institute for International Economics concurs, noting that, "the renminbi is now undervalued by about 25 percent on a trade-weighted basis and by about 40 percent against the U.S. dollar."²⁰³ China's government strictly controls the flow of capital in and out of the country. Every day, China buys approximately \$1 billion in the currency markets, holding down the price of the renminbi and thus maintaining China's artificially strong competitive position. China has actually doubled the scale of its currency intervention since 2005, now spending \$30 to \$40 billion a month to prevent the renminbi from rising.²⁰⁴ This subsidizes all Chinese exports by 25 to 40 percent, while placing the equivalent of a 25 percent to 40 percent tariff on Chinese imports, discouraging purchases of other countries' products. Such currency manipulation is a blatant form of protectionism.²⁰⁵ China's competitive undervaluation represents a subsidy to all exports and a tariff on all imports—not just a few. As Fred Bergsten of the Peterson Institute for International Economics observes, "Largely as a result of this competitive undervaluation, in 2007, China's global current account surplus soared to almost \$400 billion [rising to \$426 billion in 2008] and exceeded 11 percent of GDP, an unprecedented imbalance for a major trading country."²⁰⁶

But China is not alone in intervening in markets to manipulate the value of its currency. Trade analysts at the Peterson Institute have found that Hong Kong, Malaysia, Singapore, Taiwan, South Korea, and even Switzerland, in part in an effort to remain competitive with China, also intervene in currency markets and substantially undervalue their currencies against the dollar and other currencies.²⁰⁷ For example, on September 16, 2010, Japan intervened in world currency markets to drive down the exchange rate of the yen by selling an estimated 2 trillion yen (\$23 billion)—the largest such intervention ever—in an effort to devalue the yen against the dollar in an effort to make Japanese exporters more competitive.²⁰⁸

Currency manipulation directly violates international trade law, even though virtually nothing is done to combat such mercantilist practices. The IMF commits member

One reason why currency manipulation is a Bad policy is that it gives countries an advantage in both high-value and low-value production, while raising the prices of capital goods and ICTs, meaning that their economies will be less productive.

countries to “avoid manipulating exchange rates or the international monetary system in order to prevent effective balance of payments adjustment or to gain an unfair competitive advantage over other members.”²⁰⁹ The IMF bylaws call for “discussion” with any countries that engage in “protracted large-scale intervention in one direction in exchange markets.” Additionally, the General Agreement on Tariffs and Trade (GATT), which is now an integral part of the WTO, indicates that “contracting parties shall not, by exchange action, frustrate the intent of the provisions of this Agreement.”²¹⁰ Currency manipulators effectively give their nations’ products and services a subsidy in the global marketplace (export subsidies that, if done explicitly, would likely violate WTO regulations).

Yet more than simply violating international trade law, currency manipulation undermines confidence in globalization by severely distorting global trade, increasing the cost of other countries’ exports, and costing those countries jobs. By raising the costs of foreign exports, currency manipulation retards the development of innovation-based jobs in foreign countries and the development of innovation globally. A central reason why ending currency manipulation is so important is that currency adjustment is the principal way high-wage nations compete with low-wage ones. If a low-wage nation has an absolute advantage over a high-wage one, a falling currency in the high-wage one is the natural adjustment mechanism. This makes imports more expensive and exports cheaper, restoring comparative equilibrium.²¹¹ By disabling the adjustment mechanisms of international commerce, currency manipulators have succeeded in running up unsustainable trade surpluses and undermining confidence in trade’s ability to bring shared global prosperity.

If we are to maximize global growth, the flow of goods, services, and capital should be determined on the basis of actual costs and prices, not on subsidies. Economists have long argued that subsidies produce inefficient results. Yet, manipulating currency to keep it below what market forces would dictate is as pure a subsidy as if the government wrote checks to exporters. Ending currency manipulation would go a long way toward easing opposition to globalization and maximizing its benefits, even for the nations currently propping up their currencies, by promoting a structural rebalancing of their economic growth away from exports and toward domestic demand. This is not to say that nations should not be allowed to manage currency transitions so that they are not overly abrupt. However, systematic manipulation of currencies to gain competitive advantage by beggaring-thy-neighbors needs to stop, and the only way this will happen is if the nations which engage in it less than others (particularly the United States, Canada, and the EU countries) and international organizations agree to cooperate to fight it.

Trade: Financial incentives for domestic players

Financial incentives for domestic companies can include unfair export subsidies as well as favorable tariff or tax policies. All are tantamount to giving domestic companies a financial advantage and each are designed to distort international trade in a country’s favor.

Export subsidies

Export subsidies, payments to a firm for every unit of a product exported, represent attempts by governments to interfere with the free flow of exports. Export subsidies can be specific (a fixed sum per unit) or ad valorem (a proportion of the value of the export).

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Export subsidies distort the pattern of trade away from production based on comparative advantage and, like tariffs and quotas, disrupt equilibrium trade flows and reduce world economic welfare.²¹² Export subsidies can be Ugly or Bad, depending on the type of product the export subsidy is targeted to support.

Despite the fact that the WTO prohibits most subsidies directly linked to the volume of exports, developed and developing countries alike employ unfair export subsidies. For example, in 2007, the European Union (EU) was the second-largest exporter of sugar, in large part because of EU sugar subsidies, while sugar farmers in Mozambique, despite their favorable growing climate and lower production costs, had a difficult time competing in world markets because EU subsidies artificially lowered the world price of sugar.²¹³ The United States fields its own export subsidies, with each U.S. citizen paying approximately \$13 annually to support cotton production and export, helping cotton farmers in the United States but hurting foreign cotton producers by making U.S. cotton exports cheaper than they would otherwise be and lowering the world price of cotton.²¹⁴ Thus, export subsidies targeted to agricultural and commodity products principally benefit only domestic producers, and in total represent a Bad policy that negatively impacts both citizens at home and producers in foreign countries by necessitating higher taxes for the former and lowering commodity prices for the latter.

While export subsidies are found most frequently in agricultural trade, they afflict high-technology products as well. Japan and South Korea give direct subsidies to high-tech manufacturing firms to reach targets for export sales. China spent more than \$15 billion on export-enhancing subsidies for its steel industry in 2007 alone.²¹⁵ The United States has taken legal action at the WTO against China's support of its steel industry, alleging that the country unfairly offers cash grants, rebates, and preferential loans to its steel exporters.²¹⁶ And a number of countries provide their automotive industries with incentives for local export promotion. But these can be very expensive and are often ineffective. For instance, Brazilian state governments competing to host new automotive plants offered subsidies of more than \$100,000 for each assembly job created. But this led mainly to overcapacity and precarious financial positions for Brazilian state governments.²¹⁷ As the McKinsey Global Institute asserts, such export promotion policies "have almost always led to low productivity and higher costs to consumers."²¹⁸

Girma *et al.* did find, however, that Chinese production subsidies (largely geared for export promotion), did, on average, boost firm-level exports, especially in more innovative and capital-intensive industries and for firms with previous export experience.²¹⁹ Looking at production subsidies by examining firm-level data encompassing nearly a half-million Chinese firms from 1999 to 2005, Girma *et al.* found that a doubling of production subsidies led, on average, to a 2.1 percent increase in the level of exports. Their research supports those who argue that subsidies have helped drive China's export success and that subsidies have contributed to China's ability to close the technology gap with the West and enhance the country's export performance.²²⁰ Despite the fact that the Chinese government committed to eliminating or substantially reducing subsidies (particularly those for loss-making state enterprises) as a condition of its WTO accession deal, the country nevertheless reported more than \$2.4 billion of export subsidies in 2005.²²¹

Whether export subsidies on high-technology products are Ugly or Bad generally depends on whether they are applied to high-value-added, capital-intensive manufacturing industries, such as steel or aircraft, or whether they are applied to general purpose technologies such as ICTs. As explained, trade-distorting measures targeting general purpose technology industries are Bad, because they raise the domestic price of ICTs and often lead to the country acquiring inferior ICTs. But trade policies that prove effective in moving countries up the value chain by attracting more high-value-added, non-GPT production activity are Ugly.

But using export subsidies entails risks. For all the problems with the practice of currency manipulation, at least one downside it lacks is that the practice applies to all sectors and industries uniformly; that is, currency manipulation does not “pick winner industries.” Countries’ export subsidy practices, on the other hand, are targeted toward specific industries, and this presents several risks. For one, the government may pick the wrong industries, technologies, or firms to support, thus putting themselves at risk of missing out on opportunities entirely if markets move in a different direction. Moreover, export subsidies run the risk of limiting innovation within companies, by insulating domestic firms from foreign competition and by making them increasingly dependent on the government subsidy, ultimately making them less competitive globally. Whatever their benefits and risks, however, almost all export subsidies constitute a violation of countries’ WTO commitments, unraveling both the legal architecture of global trade and the political goodwill necessary to sustain it.

Tariffs

Tariffs favor domestic goods over imports by making the latter cost more, and thus distort trade flows from what they would be in a free market. Throughout history, nations have used tariffs to make imported goods and services more expensive. Yet, even as developed nations have increasingly come to recognize the benefits from reducing their tariffs, many developing nations continue to claim they need tariffs to protect domestic industries, particularly nascent ICT industries. In general, tariffs represent an Ugly policy that can provide some advantage to domestic producers, thereby hurting foreign companies. But tariffs are particularly pernicious when applied to ICTs, becoming Bad policies hurting the nations that impose them by raising the cost of ICT goods and services, and by causing businesses to invest less in ICT and thus realize lower productivity.²²² For example, Argentina has imposed tariffs on assembled computers, though not on computer parts, with the goal being to create a domestic computer assembly industry. But the result has actually been to create an inefficient computer industry, where up to one-third of computers sold in Argentina are hand-assembled in small shops. Such policies have only served to raise the price of computing technology in Argentina, hurting all sectors of Argentina’s economy.

The WTO’s Information Technology Agreement (ITA) was supposed to eliminate trade-distorting ICT tariffs amongst signatory nations when it was completed in 1996 (and after countries gradually met their commitments). The Agreement covered a wide variety of ICT goods, including computers and components; telecommunications equipment; printed circuits, resistors, and capacitors; semiconductors and components; and set-top boxes with

a communication function. But even years after passage, many countries continue to fail to meet their commitments under the ITA, and in the interim some countries have rewritten their descriptions of certain ICT goods in an effort to circumvent their coverage under the ITA.

For example, in 2005 the European Union applied duties of 14 percent on LCD TVs larger than 19 inches, and in 2007 the EU moved to allow duties on set-top boxes with a communications function as well as on digital still image video cameras. The European Union's action set a dangerous precedent, as other countries proceeded to similarly reclassify ITA-covered goods. India subsequently redefined its description of ITA-covered goods in order to assess 10 percent duties on computer monitors and printers and 7.5 percent duties on digital cameras.²²³ Such maneuvers threatened to render the ITA meaningless. If every nation decided what the ITA covered and what it did not—each with its own interpretation based on the industries it wanted to protect—ICT tariffs would increase across-the-board, forcing up the price of ICT goods and services, reducing productivity, and hurting innovation. Fortunately, on August 16, 2010, a World Trade Organization panel ruled that the European Union's imposition of duties on flat-panel displays, multifunction printers, and television set-top boxes violated the ITA, rejecting the European Union's claim that added functionality since the agreement was reached in 1996 meant that some products were now consumer goods rather than information technology goods.²²⁴

Yet a number of countries, even those that are signatories to the ITA including Indonesia, India, Malaysia, the Philippines, and Turkey, continue to place high tariffs on ICT goods.²²⁵ For example, in Indonesia, some electrical components covered by the ITA have tariffs as high as 15 percent while some imported telephony equipment has 10 percent tariffs. India continues to impose tariffs of 10 percent on solid-state, non-volatile storage devices; semiconductor media used in recording; and television cameras, digital cameras, and video camera recorders. Malaysia imposes duties of 25 percent on cathode-ray tube monitors and all monitors not incorporating television reception apparatus. The Philippines imposes tariffs of up to 15 percent on telephony equipment and on computer monitors. In Turkey, smart phones can cost as much as \$1,000, due in large part due to tariffs.

Countries that have not acceded to the ITA place even higher tariffs on ICT products. For example, China—despite its massive trade surplus with the rest of the world and although it has entered into an ITA-accession protocol—places 35 percent tariffs on television cameras, digital cameras, and video recorders; 30 percent tariffs on cathode-ray tube monitors and all monitors not incorporating television reception apparatus; and 20 percent on printers, copying machines, and facsimile machines. Argentina imposes 26 percent duties on optical media for sound recording and 20 percent for electronic calculators and telephone sets. Likewise, Brazil imposes 20 percent tariffs on cordless handset telephones, electronic calculators, and cathode-ray tube monitors.

Of course, countries impose a wide range of trade-distorting tariffs beyond ICTs that unfairly shut out other countries' products. For example, a Harley-Davidson motorbike

Tariffs are particularly pernicious when applied to ICTs, becoming Bad policies hurting the nations that impose them by raising the cost of ICT goods and services, and by causing businesses to invest less in ICT and thus realize lower productivity.

that would cost just \$17,000, inclusive of taxes, licenses, and registration fees, in the United States costs up to three times that much—between \$40,000 and \$50,000—in countries such as Brazil, Vietnam, and Indonesia due to discriminatory duties and taxes that these governments (and others) levy on American-made Harleys to stifle competition with their local motorcycle producers.²²⁶ American farmers face tremendous obstacles in selling Washington State apples, Montana beef, or Kentucky bourbon because of arbitrary foreign rules, corrupt customs practices, or excessive duties.²²⁷ America’s food and farm sectors lose over \$750 million annually to tariffs that force them to leave significant export opportunities on the table.²²⁸

Trade-Related Tax Policies

While tariffs are the most straightforward way to shift the cost equation in favor of domestic producers, taxes are less obvious but no less effective. In particular, nations may apply a combination of different types of taxes to support domestic producers.²²⁹ However, using taxes to promote exports is complicated by the fact that certain subsidies for goods (although not for services)²³⁰ are a violation of the WTO, while other subsidies are not. In particular, the WTO prohibits subsidies requiring companies that get them to meet certain export targets or to use domestic goods instead of imported goods.²³¹ A nation that chooses instead to give a domestic (but not foreign) manufacturer a tax break, perhaps through a rebate, for example, may not be violating the WTO.²³² This lack of clarity and the difficulty in proving damages enables mercantilist nations to manipulate taxes to support domestic industries, including ICT industries, while avoiding WTO violations.

To achieve their mercantilist goals, nations may choose to manipulate a variety of taxes, including excise and value-added taxes (VATs), as well as countervailing duties (CVDs). An excise tax is levied on the manufacture, sale, or consumption of goods or services. The VAT is similar to the U.S. sales tax and is assessed against businesses at various points in the production of goods or services—usually any time a product is resold or when value is added to it.

For example, several years ago China created a tax scheme that blatantly violated the WTO when it applied a 17 percent VAT to both foreign and domestically produced integrated circuits (ICs) used in the semiconductor industry and gave a rebate on most of the VAT only to companies producing ICs in China for export, but not to companies importing ICs. China implemented this policy in an effort to build up its domestic integrated circuit industry in order to reduce its reliance on U.S. imports. But rather than choosing to increase productivity in the semiconductor industry by promoting R&D or boosting worker skills, China would rather use a discriminatory tax that costs U.S. producers over \$300 million annually.²³³ While China aborted this VAT policy once the U.S. filed a WTO case contesting it, China has since devised another tax policy that favors domestic production of ICT goods and services; this one is not tied to exports so it may not directly violate the WTO. China allows both domestic and foreign companies to deduct the costs of the products they make in China from their corporate income taxes—but only if those products were produced with local parts. While this subsidy may not violate the WTO, it is nonetheless a Bad mercantilist practice since it discriminates against imports of ICT

components. After repeatedly raising concerns about these and other tax policies, the U.S. government filed a WTO case over China's prohibited subsidies in early 2007.

Forced Technology Transfer as a Condition for Market Access

Conditioning technology transfer before foreign companies can enter domestic markets or business alliances such as joint ventures constitutes an Ugly innovation strategy when applied to high-value-added, non-GPT companies and a Bad policy when applied to firms in the ICT sector. The WTO prohibits countries from requiring companies to comply with specific provisions as a condition for market access. But such tactics are nevertheless popular with some mercantilist countries because they help them obtain valuable technological know-how, which they can then use to support domestic technology development in direct competition to the foreign firms originally supplying it. It is one thing if companies want to invest in R&D in other nations as part of their business strategy. It is quite another for them to be coerced into doing so in order to access foreign markets.

Since the WTO prohibits forced technology transfer, mercantilist nations that are WTO members have discovered that they can avoid a WTO violation by "encouraging" technology transfer without formally requiring it. One way is for local government officials reviewing investment applications to make it clear that a quid-pro-quo deal is required for approval. Burying these deals in the fog of bureaucracy enables mercantilist countries to hide their WTO violations.

China is a master of the joint venture and R&D technology transfer deal. In the 1990s, when the country began aggressively promoting domestic technological innovation, it developed investment and industrial policies that included explicit provisions for technology transfer, particularly for collaboration in production, research, and training.²³⁴ So, rather than doing the hard work to build its domestic technology industries, or better yet focus on raising productivity in low-producing Chinese industries, China decided it would be much easier and faster simply to take the technology from foreign companies. The country uses several approaches. One is to get companies to donate equipment. Others include requiring companies to establish a research institution, center, or lab for joint R&D in order to get approval for joint ventures. Several large U.S. companies, including Motorola, IBM, and General Motors Corporation, have since built more than 400 R&D facilities in China. While these companies haven't publicly said they were forced to make these investments or give up technology, it's likely that many had little choice since China's strategy of extorting technology from U.S. companies as a condition for entering the market is an important source of technology transfer from the United States to China.²³⁵

Since the WTO prohibits these types of deals and China is a member, it now hides them in the informal agreements that Chinese government officials force on foreign companies when they apply for joint ventures. They also sometimes require other WTO-violating provisions, such as export performance and local content, to approve an investment or a loan from a Chinese bank.²³⁶ China thus continues to violate the WTO, only more covertly, getting U.S. and other countries' technology and paying nothing in return. Foreign companies continue to capitulate because they have no choice; they either give up

As foreign governments become more sophisticated about how they limit trade, non-tariff barriers (NTBs) and other technical barriers to trade are increasingly taking the place of import taxes and duties.

their technology or they lose out to other competitors in the fast-growing Chinese market.²³⁷

Restrictions on Foreign Direct Investment (FDI)

Competitive domestic markets let foreign firms compete in their markets and encourage foreign direct investment. Research shows FDI can contribute significantly to regional innovation capacity and economic growth. For example, foreign R&D investments have been shown to spur local companies in the receiving country to increase their own share of R&D, leading to regional clusters of innovation-based economic activity. Despite this fact, developed and developing countries alike have moved to artificially restrict foreign direct investment.

For example, France has launched a state sovereign wealth fund to protect French companies from foreign takeovers.²³⁸ Many countries' retail sectors, as noted, aren't fully competitive, including India's, where Wal-Mart was forced to enter into a joint venture to enter the market. India and Malaysia attempted to incubate local automotive industries by imposing additional foreign direct investment barriers and by using trade barriers to shield them from international competition.²³⁹ (When India later exposed its protected automotive firms to global competition, their performance improved significantly.)

Several countries limit foreign investment in domestic telecommunications services, often by arguing that these services are public utilities so it's in the public interest that they should be majority-owned by domestic shareholders or even by the government. Since there are no multilateral trade rules for FDI and the General Agreement on Trade in Services (GATS) commitments only apply to industries where countries have explicitly agreed to open their markets to foreign companies, there is nothing to stop countries from blocking foreign investment in telecommunications services, or any other industry they deem "sensitive." For example, there was nothing to prevent Venezuela from nationalizing its telecommunications services. And while Mexico has signed a trade agreement signaling its openness to foreign direct investment in its telecommunications market, since its telecommunications market is not competitive it doesn't matter; U.S. firms still cannot readily enter Mexico's telecommunications market.

Similarly, several nations prevent foreign companies from having a majority ownership in domestic telecommunications service operators. The Philippine government limits foreign ownership to 40 percent; Thailand allows only 49 percent, as does China.²⁴⁰ These policies restrict market entry for foreign telecommunications service providers, particularly because providing this type of service is very capital intensive. Unless a service provider can afford to spend millions to build a separate telephone network, the only way for it to enter a market is to invest in an existing network. However, it's also very important for foreign firms to be able to have majority control. Thus, mercantilist countries can use foreign ownership limits to have it both ways—to get the benefits of investment without giving up control of a valuable ICT resource. Restricting foreign direct investment is a bad, counterproductive strategy that countries should eschew wherever possible.

Trade: Non-Tariff Barriers (NTBs) & Technical Barriers to Trade (TBTs)

As foreign governments become more sophisticated about how they limit trade, non-tariff barriers (NTBs) and other technical barriers to trade (TBTs) are increasingly taking the place of import taxes and duties.²⁴¹ Such NTBs include Bad obstacles to services exports; arbitrary customs procedures; discriminatory rules and regulations, including those pertaining to health and safety standards; import licensing burdens; and any number of other bureaucratic hurdles.

Trade barriers to service exports

A number of countries place restrictions on the cross-border flow of professional services. For example, China requires American construction, design, architecture, and contracting firms to meet burdensome investment and staffing rules, from which Chinese firms are exempt. The Philippines only allows Filipinos to practice law, medicine, accounting, and engineering.²⁴² Within Europe, despite efforts to develop a common market, some countries refuse to accept the professional licenses of other countries' doctors and lawyers.

Many countries' financial services and express delivery firms face discriminatory regulations and limits in foreign markets. China has closed its pension market to U.S. pension managers. Non-Egyptian banks have not been able to set up new banks in Egypt for 20 years. Meanwhile, India makes it difficult for U.S. banks to set up new branches, and in Thailand, American and foreign banks cannot use off-site ATMs. In Brazil, customers must pay a 60 percent duty on all goods imported by express delivery companies. Other countries give their national post offices unfair competitive advantages by restricting overseas express shipments or by limiting the right of foreign express delivery companies to fully own operations in their country. Some countries—including Japan, China, Egypt, and Thailand—make foreign express delivery companies subsidize regular mail delivery, and others take fees from express companies to subsidize products offered by their national postal operators.²⁴³

Bureaucratic customs processes

Bureaucratic customs processes include the refusal of other countries' valid forms of certification or demanding documents that cannot be legally produced.²⁴⁴ For example, Chile requires phytosanitary certificates for processed-food-product imports from the United States that the U.S. Department of Agriculture cannot issue. In other cases, slow paperwork impedes trade. Argentina took 150 days in 2008 to process import licenses for U.S. toys and practically stopped issuing licenses in 2009. U.S. firms that export rice to some Asian countries can encounter as many as 15 different parties, 24 documents, and 700 pieces of data. Countries' needless customs requirements add some \$650 billion in costs to worldwide trade each year.²⁴⁵ Foreign customs bureaucracy increases the cost of American goods by as much as 15 percent, often pricing otherwise competitive American goods out of the market.²⁴⁶

Health and safety barriers

Many countries apply excessive health and safety standards, such as Sanitary and Phytosanitary (SPS) measures, to block trade and to unfairly shield domestic industries. For example, Argentina and Australia block imports of U.S. apples based on plant disease claims not backed by sound science. China bans imports of U.S. fresh potatoes. Two

different Japanese government agencies require 100 percent of U.S. rice imports to undergo repeated, extensive, and unnecessary testing for hundreds of different chemicals, many of which are harmless. The EU and other countries continue to impose unjustified import bans or labeling requirements on U.S. biotechnology products, despite repeated studies demonstrating their safety.²⁴⁷

Each of these trade-distorting policies and barriers degrade international trade, undermine confidence in trade's ability to produce globally shared prosperity, and reduce global consumer welfare.

INTELLECTUAL PROPERTY (IP) POLICY

In the course of economic history, the introduction of intellectual property rights has had one of the most profound impacts on spurring economic growth. Average global economic growth rates for about one and a half millennia prior to the Industrial Revolution are estimated to have been about zero. Eighteenth century elites in England had more or less the same per capita income as their counterparts had in third century Rome.²⁴⁸ As Douglas North has shown, the inflection point was the development of patent systems in the nineteenth century. By raising the private rate of return closer to the social rate of return, the introduction of intellectual property rights addressed the knowledge-asset incentive problem, allowing inventors to realize economic gain from their inventions, catalyzing economic growth. Today, nations' products and services increasingly rely upon embedded intellectual property. Yet according to the U.S. Commerce Department, theft of U.S. intellectual property is estimated to top \$250 billion annually and cost the United States approximately 750,000 jobs. The International Chamber of Commerce has put the global fiscal loss from intellectual property theft at more than \$600 billion annually.²⁴⁹

Recognition of intellectual property rights is a vital element if global trade and foreign direct investment are to thrive. Without adequate intellectual property protections, there will be less innovation overall and this hurts all nations. A 1986 United Nations Conference on Trade and Development study found that direct investment in new technology areas such as computer software, semiconductors, and biotechnology was influenced by intellectual property rights policy environments.²⁵⁰ A 1989 study by the United Nations Commission on Transnational Corporations (UNCTC) found that weak IP rights reduced computer software direct investment, and a 1990 study by UNCTC found that weak IP rights reduced pharmaceutical investment.²⁵¹ Survey research by the World Bank's International Finance Corporation (IFC) found that, with variations by sector, country, and technology, at least 25 percent of American, German, and Japanese high-tech firms refused to direct invest or joint venture in developing countries with weak intellectual property rights; and a later study confirmed with actual foreign direct investment data the survey findings.²⁵² An Institute for International Economics study of World Bank data concluded that weak intellectual property rights reduce flows of all these commercial activities, regardless of levels of national economic development.²⁵³

Yet the recognition of intellectual property rights in international trade has remained a contentious issue. In 1994, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement obligated all WTO members to offer and honor product and process

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opportunities and
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protections.*

patents for 20-year terms for nearly all types of inventions “in all fields of technology, provided they are new, involve an inventive step, and are capable of industrial application.”²⁵⁴ But a number of countries that have pursued export-led growth practices, including Brazil, Argentina, and India, have continued to oppose the concept of TRIPS, including throughout the Uruguay Round of multilateral trade negotiations, and have issued sustained critiques of the World Intellectual Property Organization (WIPO) and of the international intellectual property regime the United Nations agency administers.²⁵⁵

The source of this resistance is a belief that the TRIPS Agreement amounts to a form of ‘economic imperialism’ on the part of developed countries.²⁵⁶ For example, Argentinean law and economics scholar Carlos Correa contends, “The monopoly rights granted by intellectual property rights [are] regarded as an instrument to avoid further catching-up based on imitative paths of industrialization; that is, as a tool to freeze the comparative advantages that had so far ensured U.S. technology supremacy.”²⁵⁷ That perspective is not limited to developing country proponents. A report by the United Kingdom’s Commission on Intellectual Property Rights asserted, “The immediate impact of intellectual property protection is to benefit financially those who have knowledge and inventive power, and to increase the costs of access to those without. This is obviously relevant to the distribution of gains between developed and developing societies.”²⁵⁸ A Lord of the UK Parliament claimed that “the monopolies of the rich countries help to perpetuate a world in which one half of the people are affluent and the other half are starving” because of TRIPS.²⁵⁹ However, Argentina’s and Brazil’s assertion to the WIPO membership that “even in developing countries that may have a degree of absorptive technological capacity, higher standards of IP protection have failed to foster the transfer of technology through foreign direct investment and licensing” is both inconsistent with economic theory and flatly contradicted by the empirical research just presented.²⁶⁰

There are three central problems with the notion that it’s unfair for developed nations to have advanced technology and developing nations not to have it. First, developing countries attempts to acquire technology in negative-sum fashion are Bad because they have the effect of reducing global technology production. Moreover, these countries benefit significantly from the use of the technology created in the developed world. For example, it’s unlikely a developing country would have invented the computer by itself. Instead of blaming developed countries, developing countries should be thanking them for investing in the future so all countries can benefit. Second, developing countries should really ultimately be growing their economies through domestic sector productivity, as the McKinsey Global Institute report explained. The above complaints are just political excuses these countries are offering in an effort to acquire foreign technology or products for free. In truth, these countries have more than enough tools at their disposal to develop their economies without having to steal technology or to force others to give it to them. Third, the calls that it’s unfair for developed nations to have technology while developed countries don’t ignores the role of specialization in trade. Developed countries aren’t asking the Brazilians for their sugarcane IP so that developed countries can use it to grow ethanol. Countries should specialize where they have comparative advantage.

Ironically, developing countries' own economic development opportunities and intellectual property development potential are inhibited by their own weak intellectual property protections. For instance, the lack of effective protection for intellectual property rights has limited the introduction of advanced technology and innovation investments by foreign companies in China, reducing potential benefits to local innovation capacity.²⁶¹ Brazil's insistence on tampering with intellectual property rights has damaged the development of its pharmaceuticals industry. For example, in 1999 Brazil passed its Generics Law, which allows companies to legally produce generic drugs that are perfect copies of patented drugs, a clear violation of TRIPS. While Brazil's government claims that generic manufacturers must show that they behave within the "laws and rights" of the global economy, even Brazil's government itself has moved to violate foreign firms' patent rights. During price negotiations with U.S. manufacturer Abbot Laboratories, Brazil's Minister of Health threatened the company's patent on Kaletra, an anti-AIDS drug, if Abbot did not lower its price on the drug in Brazil.²⁶² Though Abbot relented, slicing Kaletra's price in half, the damage was done. As Jorge Raimundo, President of Interfarma, the Brazilian association for scientific research, observes, "Because of the continued danger that patents will be violated, employment in Brazil's scientific research sector dropped from 24,000 in 1999 to 20,000 in 2006. Until 1999, Brazil was attracting annual investments worth about \$350 million [in pharmaceutical research]. In 2005, that figure dropped to about \$90 million. The investments are moving instead into Mexico, South Korea, and other countries."²⁶³ As a result of such policies, the pharmaceutical industry has become increasingly cautious about making new investments in Brazil. Moreover, there is evidence that overall corporate R&D intensity is decreasing in Brazil, even as it increases in Mexico and South Korea, no doubt in part due to policies such as this that have caused some FDI to depart Brazil for other destinations. Indeed, ITIF's *Atlantic Century* report found that while corporate investment in R&D as a percentage of GDP (corporate R&D intensity) declined by 13 percent in Brazil from 1999 to 2006, corporate R&D intensity increased in South Korea by 55 percent and in Mexico by 129 percent over that time period.²⁶⁴

To see how the most extreme form of intellectual property theft can hurt a country, one need look no further than the case of Somalia. Somalia turns a complete blind eye to property theft, intellectual or physical. In effect, Somalia's economic strategy is outright piracy by stealing from ships sailing by. Clearly this is a Bad strategy, because no company in its right mind would invest in Somalia with this level of piracy occurring.²⁶⁵

Still, countries' perspectives on intellectual property largely depend on their level of development, and too many governments do little to combat piracy, counterfeiting, and forgery (sometimes governments are even themselves the thieves). Countries far from the technological frontier may believe that an Ugly practice of stealing intellectual property is an effective strategy, if they can get away with it. Indeed, while Grossman and Helpman found that intellectual property theft does actually help countries in the short-run, they found that IP theft stifles incentives to embark on home-grown technology development, thus hurting countries and making intellectual property theft a Bad strategy in the long-run.²⁶⁶ For countries further up the value chain, embracing IP theft means that their own companies lose innovative capacity, making IP theft a Bad strategy all around. But many mercantilist countries may not care about IP theft until they reach technological

While Grossman and Helpman found that intellectual property theft does actually help countries in the short-run, they found that IP theft stifles incentives to embark on home-grown technology development, thus hurting countries in the long-run.

equilibrium with developed countries, at which point they may suddenly begin to care about IP enforcement.

Yet despite the fact that negotiators enshrined the right to access intellectual property into the TRIPS Agreement, requiring developed countries to provide incentives for their companies to transfer technology to least-developed countries, mercantilist nations have decided that this is not enough. In addition to turning a blind eye to digital content theft, some actively promote it when they force ICT companies to transfer technology such as product designs, software code, or technical specifications. For example, some countries make technology transfer, whether through certification procedures, FDI requirements, or location of R&D activity, a requirement for selling a product or service in their market. Mercantilist nations use these unfair tactics to give their companies a competitive advantage by enabling them to get their competitors' technology for free, even while they run large trade deficits that could be going to pay for technology.

Other countries withhold intellectual property rights protection as a bargaining chip in trade matters to give domestic companies an advantage over foreign companies. For example, Brazil's foreign ministry has professed to withhold intellectual property agreements while awaiting reduced American barriers to Brazilian orange juice. Meanwhile, Brazilian exports have generally suffered. They are largely non-competitive internationally because, in the absence of robust intellectual property protection, Brazilian companies are unwilling to devote resources to internal research, the kind of activity which would improve product quality and create newer and better products and services for export.²⁶⁷

Moreover, many countries, including Brazil, let competitors take a "free ride" on foreign companies' clinical data by allowing them to use it prematurely to get marketing approval for their own competing products. Other countries impose or threaten "compulsory licensing" to undermine valuable drug patents. The production and export of counterfeit drugs in countries such as India, Indonesia, Brazil, and Taiwan is rampant. Up to 10 percent of drugs on world markets are fake. Meanwhile, pirated software accounts for more than 60 percent of the software used in Asia, Central and Eastern Europe, and Latin America. In many countries, software piracy rates exceed 90 percent. In Russia, 65 percent of sound recordings are pirated, leading to estimated losses for legitimate record labels of \$2.7 billion.²⁶⁸

A new initiative, the Anti-Counterfeiting Trade Agreement (ACTA), is seeking to establish international standards for intellectual property (IP) rights enforcement outside of the traditional international organizations such as the WTO and WIPO. Because ACTA is essentially a treaty amongst nations, it would be more able to outline what constitutes IP violations by other countries and give victim nations greater recourse. Doing so would help stem the growing trend of individuals, organizations and nations systematically stealing, extorting, or otherwise gaining foreign intellectual property without paying for it.²⁶⁹

In closing, it's worth mentioning a study by Harbaugh and Khemka, which found that more extensive, as opposed to intensive, copyright enforcement reduces piracy while also lowering consumer prices and increasing consumer surplus.²⁷⁰ They note that when copyrights are only enforced for high-value buyers such as corporate and government users,

the copyright holder is forced to charge higher prices. But extending enforcement down the demand curve broadens the copyright holder's captive market, reduces prices toward the monopoly level, and increases sales of legitimate copies. Since both copyright holder profits and consumer surplus can increase due to more extensive enforcement, the classic tradeoff between the incentive to generate intellectual property and the welfare cost of monopoly power can be avoided.

Harbaugh and Khemka note that, from an international perspective, if copyright piracy or patent infringement is prevented in richer countries but not in poorer countries, it becomes possible for IP holders to price discriminate across countries, meaning they can charge a higher price to the captive market and a discounted price to the non-captive market. Harbaugh and Khemka conclude that more extensive copyright enforcement across nations (within a reasonable range) can help both producers and consumers by lowering the price and increasing sales of legitimate copies, without reducing total consumption of the good (meaning also that increased enforcement need not interfere with the efficiency gains from network effects).²⁷¹

Figure 13: Good, Bad, Ugly and Self-Destructive of Intellectual Property Policy

		World	
		Wins	Loses
Country	Wins	Recognizing domestic and foreign firms' intellectual property rights.	Intellectual property theft, in the short run. Forced intellectual property transfer as a condition of market access.
	Loses		Intellectual property theft, in the long run, as it creates a disincentive for home-grown technological innovation and will ultimately convince foreign firms to investing in-country

GOVERNMENT PROCUREMENT POLICY

Governments are the world's largest procurers of goods and services. Within the OECD, government contracting accounts for an estimated 15 percent of total GDP.²⁷² For example, the U.S. government records \$2.73 trillion in federal expenditures annually, just under 20 percent of U.S. GDP. While a large portion of those expenditures are transfer payments, clearly U.S. government spends hundreds of billions of dollars on government procurement annually. Thus, ensuring fair and open government procurement practices has become an important aspect of realizing free global trade. Moreover, the sheer extent of government procurement activity positions governments to drive innovation through their procurement practices.

Governments can reorient their procurement policies to become strong drivers of innovation.

Indeed, governments can reorient their procurement policies to become strong drivers of innovation. For example, a study by Rothwell finds that over longer time periods, state procurement policies triggered greater innovation impulses in more areas than did R&D subsidies, and they did so without any “buy domestic” requirements.²⁷³ Some countries have made progress in this regard. For example, the United Kingdom has made innovation a clear goal of its procurement process for years. The UK’s Department of Trade and Industry (DTI) requires all levels of government to consider innovation when awarding government contracts. It has also developed public-private partnerships to help public sector employees with “unconventional but innovative procurement projects.”²⁷⁴ In Australia, agencies are encouraged to single out innovative ideas by evaluating extra-unique features of proposals as a separate criterion. Finland includes “innovativeness” among the criteria for public procurement and reserves a percentage of appropriations granted to administration agencies to go toward innovation and development activities.²⁷⁵ While these countries recognize that innovation should be a key element of government procurement, according to a report by the European Union, “the United States has a strategic orientation in their public procurement as well, but not primarily connected to innovation.”²⁷⁶

Governments should view innovation as an explicit goal of their procurement process. When practical, governments should be early adopters of new technology rather than solely relying on industry to lead the way. Through technological leadership in its purchases, governments can play an important role in spurring markets and proving concepts. For example, government agencies can pursue green ICT initiatives by establishing telework policies and creating telework best practices. Governments can lead on promoting adoption of digital signatures for e-government applications.²⁷⁷ Governments can also buy leading edge vehicles (like plug-in hybrids) for their vehicle fleets and take the lead in adopting energy-efficient green building practices. As Bob Peck, public-buildings commissioner for the U.S. General Services Administration notes, “We’re so huge, we make markets. We’ll be the proving ground for innovation in the building industry.”²⁷⁸ Funds in the American Recovery and Reinvestment Act (ARRA) will retrofit 3 out of every 4 U.S. federal buildings with optimized heating, cooling, and lighting systems that could save as much as 55 percent on energy costs per building while boosting demand for geothermal heat pumps, LED lighting, and other energy-saving products.²⁷⁹

Unfortunately, many nations’ procurement policies have long favored domestic players, effectively blocking foreign companies from successfully bidding for public procurement contracts. For example, before the enactment of the U.S.-Peru Free Trade Agreement, Peru applied a 20 percent price preference for local companies against American bidders on covered bids.²⁸⁰ China has put in place “indigenous innovation” policies that explicitly discriminate against foreign-owned companies when it comes to procurement. China sees such procurement practices as “a cornerstone of a new catching up strategy that increasingly relies on the innovative capabilities of indigenous firms.”²⁸¹ While there is nothing wrong with countries using open, competitive government procurement policies to drive innovation, when countries apply blatant measures to discriminate against foreign-owned companies in government contracting it becomes an unacceptable practice (even more so when government-directed state owned enterprises account for a large share of a nation’s economy).

The Chinese government developed its indigenous innovation policy concept to boost the creation and commercialization of proprietary ideas and technologies by Chinese companies. But while it's one thing to encourage domestic innovation, it's quite another to use those policies as a shield to keep others out. China revealed the true intent of its indigenous innovation approach in November 2009 with its indigenous innovation product accreditation scheme—a list of products invented and produced in China that would receive preferences in government procurement in China.²⁸² To be eligible for preferences under the originally conceived program, products would have had to contain Chinese proprietary intellectual property rights and the original registration location of the product trademark had to be within the territory of China. While many governments have included domestic content requirements for procurement, intellectual property ownership requirements lie outside international practice and act as a barrier for most foreign companies—even those that have invested significantly and manufacture in China—seeking to sell to China's massive government procurement market. The impact of China's indigenous innovation requirements can be readily seen in the wind energy equipment sector, where China's procurement policies are aimed at ensuring that most new wind energy equipment purchased by Chinese companies (many of which are state-owned) will be: 1) made in China; 2) based on Chinese-owned intellectual property (under its indigenous innovation policy); and 3) embody Chinese technical standards. As a consequence of these policies, foreign wind turbine producers saw their share of China's wind turbine market crater from 75 percent in 2004 to 15 percent in 2009.²⁸³ Depending on how it is implemented, China's proposed approach to indigenous innovation can be a Bad or an Ugly practice that runs counter to the powerful trend of open, collaborative innovation and undermines the country's goal of becoming an innovative society. It's a Bad practice when China's indigenous innovation policies are focused on capital goods or ICTs and an Ugly practice when they are focused on other high-value-added goods. Moreover, such practices are wholly antithetical to both the obligations and the spirit of the WTO's Government Procurement Agreement (GPA), which China has failed to accede to, despite repeated promises to do so over the past ten years

But governments that perfunctorily favor domestic bidders over foreign ones in government procurement contracts hurt themselves and their own citizens if they have not thoroughly evaluated the merits of foreign bidders' products and services in a good-faith effort to select best-value bids. Businesses and citizens suffer by receiving inferior technology, products, or services, while often paying more for that privilege (domestic workers benefit, however, especially if an indigenous industry can be established).

Moreover, government procurement practices that unfairly favor domestic players also undermine the principles of global free trade and contravene the legal obligations of countries under the GPA. The Agreement, signed by the United States and 38 other countries, prohibits restrictions on government purchases between member countries, stating that companies in other signatory countries will be treated no less favorably than domestic companies in accordance with the principles of national treatment and non-discrimination. Unfortunately, a number of countries pursuing export-led growth practices—including Brazil, China, and India—are not signatories to the WTO's Government Procurement Agreement.

As bad as preferential treatment for domestic players is, an even worse situation arises when governments fail to legally procure—or outright pirate—products or services made by foreign companies. Perhaps the most egregious example is China, where despite a 10-year-old government order, at least 80 percent of government computers run versions of Microsoft Windows operating systems that were illegally copied or otherwise not purchased; not to mention scores of other Western software packages that are also unfairly pilfered. (Microsoft CEO Steve Ballmer estimates that as much as 95 percent of the copies of Microsoft’s Office software and 80 percent of its Windows operating systems are pirated in China.)²⁸⁴ It is no wonder the United States runs an outlandishly large deficit with China when U.S. consumers, businesses, and government agencies pay for their products and services, but even their government fails to pay for ours. Another challenge in this vein is corruption in public procurement practices. Gerwin and Kim found corruption to be a significant barrier to trade generally and to government procurement contracts in at least 25 of the top 58 U.S. export markets.²⁸⁵

Figure 14: Good, Bad, Ugly and Self-Destructive of Government Procurement Policy

		World	
		Wins	Loses
Country	Wins	<p>Fully considering bids from foreign firms when awarding government procurement contracts.</p> <p>Governments leading by example and making performance and innovation an explicit goal of their procurement processes.</p>	<p>Government agency use of illegally copied or pirated software or services.</p> <p>Indigenous innovation product accreditation schemes that give preferences to local non-ICT products in government procurement.</p>
	Loses		<p>Indigenous innovation product accreditation schemes that give preferences to local ICT products in government procurement.</p> <p>Government corruption in public procurement practices.</p>

The OECD estimates that complying with country-specific technical standards can add as much as 10 percent to the cost of an imported product.

STANDARDS POLICY

The development of voluntary, consensus-based global standards for products and technologies benefits producers and consumers alike. Internationally compatible standards enable businesses to leverage technologies and manufacture products efficiently at economies of scale by reducing the cost that would otherwise be involved in producing specific variations of products to meet different jurisdictions' standards. Consumers benefit from technology standards every time they are able to use the same USB port across multiple computing or consumer electronics products, to use their cell phone in different countries, to communicate using data and audio standards, and even to plug in their lamps without burning down their house.²⁸⁶ Standards have become increasingly important because they directly affect at least 80 percent of world trade, and because they are ubiquitous in ICT products and services.²⁸⁷

Yet nations are increasingly using mandatory standards as a mercantilist tool to block or limit foreign companies' access to their markets and to support domestic industries, especially ICT industries.²⁸⁸ By imposing unfair standards-related measures on imports, foreign governments are gaming the international trading system on behalf of their domestic industries and imposing additional costs that harm consumers and degrade international trade. The OECD estimates that complying with country-specific technical standards can add as much as 10 percent to the cost of an imported product.²⁸⁹

There is nothing unfair or unusual about governments participating in standards-setting, as long as governments do not dominate the process, interfere with the consensus, or mandate certain standards. But mercantilist nations take advantage of the standards-setting process by preventing foreign companies, organizations, or governments from participating and by mandating standards that either block or limit access to their markets for foreign goods and services or that support the development of domestic goods and services. Whether standards manipulation constitutes a Bad or an Ugly practice follows the same logic elucidated previously in the trade section. Standards manipulation leading to higher cost ICTs or capital goods represents a Bad practice that harms the entire economy. Standards manipulation occurring in high-value-added, non-GPT industries constitutes an Ugly practice.

Countries that develop discriminatory domestic standards generally have two goals. First, they hope to give local companies a competitive advantage by keeping foreign competitors out of the market. Second, they seek to avoid having to pay royalties on foreign intellectual property. But countries play a risky game when they try to manipulate technology standards. With regard to the first goal, the risk is that even if the domestic standard helps native businesses by keeping foreign competitors out, it compromises their ability to compete in international markets, because they tend to focus on developing products attuned to their home markets' unique standards and don't gain experience with global standards.

Such has been the case with Japan's "Galapagos Island Syndrome," in which the country's unique standards for second- and third-generation mobile networks contributed to its mobile phone manufacturers, including Panasonic, Sharp, and NEC, being successful at

home but having difficulty exporting to foreign markets.²⁹⁰ In the 1990s, Japan set a standard for its second-generation (2G) wireless network that was rejected everywhere else. While Japanese mobile network operators like DOCOMO responded by developing hugely popular e-commerce and content services such as i-Mode, the standard also increased the country's isolation from the global market; hence the "Galapagos Island Syndrome," referring to the advanced yet isolated species Charles Darwin found on the isolated island. When Japan quickly adopted its own 3G standard in 2001 while the rest of the world tarried, it essentially made Japanese phones too advanced for most markets.²⁹¹ The rapid growth of Japan's cell phone market from 1995 to 2005 gave Japanese companies little incentive to sell their products on overseas markets (which lagged technologically at the time), but when growth in the Japanese market dried up by the late 2000s (while growth in the rest of the world took off), Japanese mobile manufacturers remained locked into Japan's fragmented and isolated marketplace, and proved unable to adapt to the demands of global markets for mobile devices.

In essence, countries' strategies to develop unique standards to shield domestic firms from international markets are often inherently illogical; in the event the unique standard is successful in building a successful domestic market, such firms are often unable to export successfully on global markets. This particularly suggests that smaller countries should never attempt to manipulate standards, because the odds of getting the standard wrong are high, and in any case they are unlikely to have sufficient market power to compel the rest of the world to adhere to their standard. Even larger countries and regions, such as Europe or China, take a risk in attempting to manipulate standards, especially if the standard is either inferior or does not become a global standard. Moreover, even if the domestic standard succeeds in excluding imports, it often ends up raising the price of the product domestically.

China has perhaps been the most aggressive country in manipulating technology standards. For example, China has attempted to give its wireless telecommunications equipment manufacturers and operators a competitive advantage by developing a domestic standard and then forcing foreign companies to adopt it for their Chinese products and operations.²⁹² In addition to mandating standards, the Chinese government dominates the process and runs it without international consensus. It drafts most standards without foreign, or even public, input. If foreign representatives are allowed to participate at all they can only be observers without voting rights.²⁹³ Thus Datang Corporation, a Chinese energy company, developed the country's domestic 3G wireless standard (TD-SCDMA—Time Division-Synchronous Code Division Multiple Access) with explicit Chinese government support, little foreign participation (only minor technology development by Siemens, a Germany company), and without consensus.²⁹⁴

One of the primary reasons why China seeks to manipulate technology standards is so that its firms won't have to pay royalties on embedded foreign intellectual property, while by creating indigenous technology standards that are required to go into Chinese products, it can force foreign firms to pay royalties to Chinese firms. Thus, China's goal with TD-SCDMA was to force foreign telecommunications equipment manufacturers to adopt the standard in order to sell their products to Chinese service providers in the potentially huge

There are a growing number of international ICT standards that most countries have adopted through a regular, open, industry-led standards-setting process for which China is currently trying to establish its own domestic proprietary standards.

and lucrative 3G wireless market. Not only would they be forced to design their equipment to conform to the standard, they also would have to pay royalties to Datang to use it. The only problem for China was that TD-SCDMA needed a lot of development before it could compete with the existing 3G standards—CDMA2000 and W-CDMA. That made China hold off granting wireless licenses for operators to deploy 3G services until TD-SCDMA was ready for prime time. The delay in issuing licenses gave the existing standards an advantage because they already had subscribers around the world, including in Asia. It also gave foreign telecommunications equipment providers time to design their equipment so that it would be compatible with all the 3G standards, including TD-SCDMA.²⁹⁵ In 2008, the Chinese government forced China Mobile, the world's largest mobile operator, to adopt TD-SCDMA technology, but the firm has had difficulty because of the lack of TD-S handsets. In the meantime, Chinese handset manufacturers Huawei and ZTE have been doing well enough abroad with no help from the TD-SCDMA standard.²⁹⁶

Because the Chinese government knows that it has considerable “market power” over foreign companies due to its sheer size, it knows that unless challenged by other governments or the WTO it has considerable leeway in unilaterally setting standards to favor domestic firms and force foreign firms to pay licensing fees. Such was the Chinese government's motivation when it announced that by June 2004 the Wireless Local Area Network Authentication and Privacy Infrastructure (WAPI) standard would be mandatory for both domestic and foreign companies to use for Wi-Fi technology going into computers, even though an international standard had existed since 1997.²⁹⁷ While the government claimed WAPI was justified because it was more secure than the existing standard, there was no evidence of this. Its true motivation was to force foreign companies to pay license fees to Chinese companies and to surrender U.S. technology. In particular, before U.S. companies could use the standard they needed to obtain the encryption algorithms and to do that they had to give up proprietary technical specifications to their Chinese competitors. When the United States government threatened to file a WTO complaint against China for violating the WTO's Technical Barriers to Trade (TBTs) agreement by creating a standard that constituted a trade barrier, China dropped its mandate.²⁹⁸ However, this has not deterred the Chinese government from continuing to support the standard by requiring WAPI to be used in all government procurement.

Whereas the WAPI requirements originally applied onto to computers, now China is seeking to extend the WAPI standard to mobile handsets. China has now made it a *de facto* (if not *de jour*) requirement that any mobile handset device with wireless capability sold in the country have the WAPI chip in the handset, in order to receive “Type approval” to sell on the Chinese market. While manufactures can place WiFi chips in mobile devices, China's requirement means that companies can't put just a WiFi chip in their mobile handset devices, but must also include a WAPI chip (meaning the user would have to figure out which to enable). This is an example of a Bad innovation policy that creates a disadvantage for the WiFi technology, which is a long-established global standard, while adding costs for handset manufacturers (and customers) and degrading the customer experience.

In fact, there are a growing number of international ICT standards that most countries have adopted through a regular, open, industry-led standards-setting process for which China is currently trying to establish its own domestic standards, several of which the country is seeking to make compulsory in products sold in China. (Figure 15 summarizes several of these proprietary technology standards.) What’s the value to the global economy of having a competing standard such as WAPI when the global community has already collaboratively developed an effective standard such as WiFi? The answer is that China is in many cases tweaking existing international technology standards, and then taking the new standard back through the standards-setting process, with the hope that it can get the new standard approved and not have to pay royalties on the foreign intellectual property embedded in the original standard.

Figure 15: Chinese ICT Standardization

Technology—Product Category Effected	International Standard	Chinese Standard
Wireless—Home Networking	WiFi	WAPI
Wireless—Mobile TV	3G; WiMAX	TD-SCDMA;McWii
Wireless—Storage	RFID	China RFID
Security—Personal Computers	TPM (Trusted Protocol Manager)	TCM (Trusted Cryptographic Manager)
Consumer Electronics—Terrestrial TV	DVB-T	DTMB (Compulsory)
Consumer Electronics—Satellite DTV	DVB-S	ABS-S
Consumer Electronics—IPTV	Open IPTV	CCSA
Video Codec	Various MPEG formats	AVS
DRM (Digital Rights Management)	Marlin, OMA DRM, or DTCP-IP	China DRM

In another example, both the Chinese and Korean governments have supported the development of mandated domestic radio frequency identification (RFID) standards, without international participation or consensus. Neither country wants to pay royalties to use the existing electronic product code (EPC) standard developed through a consensus process by EPCglobal with both U.S. and foreign participants. In China, the Ministry of Industry and Information Technology (MIIT) has supported research on RFID as one of six ICT-related projects in its five-year plan. However, work has not proceeded very far and other parts of the government support the EPC standard. The South Korean government is taking a more deliberate approach by making development of a domestic RFID standard a key part of a government-supported system that will tie together all of the country’s

Countries play a risky game when they try to manipulate technology standards; even if the domestic standard helps native businesses by keeping foreign competitors out, it compromises their ability to compete in international markets.

broadband networks.²⁹⁹ The system will include a new South Korean RFID standard that products will have to conform to in order to interoperate with the new government-supported system. Since South Korea plans to use the system to tie together every broadband and wireless service throughout the country, the South Korean standard will have a huge advantage over the EPCglobal standard.

Again, the problem with these countries' policies is not that their governments are involved in standards setting; it's that they are doing so without international participation or consensus and then forcing the standard on the market in order to keep out foreign competition. Foreign companies that want to do business in these countries will be forced to redesign their products and systems, at great expense, to conform to government-mandated domestic standards. Thus, standards manipulation presents a classic collective action problem. While countries' industries can reap rewards from proprietary standards, the costs to everyone else are spread out; but nevertheless, global economic output is lowered.

An ugly standards practice governments engage in is attempting to manipulate the standards-setting process in other countries to prevent foreign firms from obtaining access to those markets. For example, European electrical manufacturers are trying to shape Brazil's new electrical standards so they favor European technology and shut out American products. The European Union also leverages its presence in international standards bodies such as the International Standards Organization (ISO), where it has 27 votes to other countries' single vote, to shape competition. By that standard, the United States should have 50 votes, one for each state.

Related to technical standards are countries' product labeling standards designed to add additional costs for foreign producers or to limit or complicate their access to domestic markets. For example, some countries impose arbitrary definitions on certain products, such as some European countries' attempts to redefine "extra virgin" olive oil in a way that would exclude American olives.³⁰⁰ Other countries use "state-of-origin" labels or other burdensome labeling requirements. For example, Israel requires U.S. auto parts manufacturers to label their parts with the U.S. state of origin, while parts from other countries need only include the country of origin. Taiwan requires U.S. exports of furniture and electronics to be marked with expiration dates, as if they were foodstuffs.³⁰¹

Unnecessarily burdensome certification requirements, including requirements for in-country testing of imports, constitute another set of Bad standards-related trade barriers when applied to ICT products. For example, China and South Korea have recently established procedures that require foreign companies to submit their ICT products for a review that is both time-consuming and costly and one that could give Chinese and South Korean ICT companies access to U.S. intellectual property. In China, since August 2003, U.S. companies that want to sell ICT equipment, devices, appliances, and components must undergo a safety and quality review in order to obtain a China Compulsory Certification (CCC) mark. The CCC is similar to the Underwriters Laboratory (UL) safety certification mark for electronic and other products in the United States, but with two important differences. First, unlike the CCC mark—which is compulsory, as suggested

Figure 16: Good, Bad, Ugly and Self-Destructive of Standards Policy

		World	
		Wins	Loses
Country	Wins	<p>Membership in the International Standards Organization.</p> <p>Eliminating standards barriers by aligning technical regulations through trade agreements, as NAFTA did.</p>	<p>A country mandating proprietary standards that block or limit market access for foreign goods and services, particularly if the country is positioned to reshape the global market around its standards.</p> <p>Certification requirements, including in-country testing of imports, subjecting imports to expensive and time-consuming reviews, for high-value-added non-GPT products.</p> <p>Discriminatory product labeling standards applied to non-ICT products from specific countries.</p> <p>Manipulating the standards-setting process in other countries to prevent foreign firms' from obtaining access to those markets.</p>
	Loses		<p>Countries manipulating standards on GPTs, such as ICT, or capital goods.</p> <p>A country mandating proprietary standards that block or limit market access for foreign goods and services, particularly if the country is not positioned to reshape the global market around its standards.</p> <p>Setting standards, even if non-proprietary, substantially outside of international norms. (E.g. Japan's Galapagos Island syndrome.)</p> <p>Countries' failure to actively engage in international standards setting bodies.</p>

by its name—the UL is a voluntary industry standard. Second, the UL is a non-profit and independent organization that is not affiliated with either the U.S. government or any U.S.

companies. Only UL employees, who are required to sign a confidentiality agreement, perform product evaluations and tests. Conversely, the CCC mark is administered by the China National Regulatory Commission for Certification and Accreditation, a government organization. More importantly, the technical committees that evaluate the products for the CCC mark include industrial and other experts that may be affiliated with Chinese competitors, who could get access to intellectual property and other design information. While it would be virtually impossible to know if outright theft has occurred, the U.S. government is concerned enough to have raised this issue in its annual 2007 National Trade Estimate Report.³⁰² Moreover, China has now mandated that information security testing and certification be conducted in government-affiliated laboratories for a range of information technology products in the government procurement arena.

In summary, in today's global markets, interoperability is vitally important for many products, particularly information and communication technology products, and customers place a premium on compliance with commonly recognized, voluntary international standards that emerge in the competitive market. Nations should promote the use of voluntary international standards and avoid national deviations unless necessary to fulfill legitimate objectives. Voluntary international standards ensure interoperability, enable cheaper dissemination of inventions, and reduce the costs of additive innovation. Voluntary standards established with the consent of all stakeholders should be assumed to fulfill the necessary requirements for products to be placed on global markets and should be considered an effective alternative to mandatory regulations.³⁰³

REGULATORY POLICY

Regulation is crucial to the proper functioning of market economies. But when countries implement poor regulations, they distort markets and reduce competition in many ways, such as by enacting discriminatory anti-trust policies or by allowing anti-competitive activities on the part of the countries' state-owned enterprises. These distortions lead to fewer choices and higher prices for domestic consumers, thus hurting the local economy and impeding its innovation ability.

Anti-trust policy

There is increasing interest in aligning countries' anti-trust policies, if for no other reason than that multinational firms increasingly face conflicting anti-trust regimes and multiple and time consuming anti-trust approval processes.³⁰⁴ Achieving more consistency between national anti-trust regimes would enable a more robust global economy.

While anti-trust policy (and economic policy generally) in the United States is designed to foster short-term consumer interests, in many other nations anti-trust policy is designed to promote producer interests. Consequently, anti-trust all too often becomes the tool of choice for mercantilist nations because it flies under the radar screen of global trade governance organizations.

European anti-trust officials, and to a lesser extent European Union courts, still hold on to a populist approach to anti-trust, with a greater focus on defending the interests of producers (firms and workers), and particularly those of European producers over non-European producers.³⁰⁵ McGowan and Cini portray EU anti-trust policy, particularly

merger policy, “as an example of economic regulation, and therefore, as an interventionist tool used by governments to structure the operations of markets.”³⁰⁶ They go on to note that:

While EU competition policy has a goal of consumer welfare, it also has other goals including protecting small and medium enterprises, redistribution of wealth, enhancing EU economic competitiveness, and EU economic integration. We see this in the blocking of the Boeing/McDonnell Douglas merger in the early 1990s, when concern for the economic wellbeing of the EU champion, Airbus, was a strong motivating factor in the Commission’s placement of significant restrictions on the merger. In particular, the EU approach to competition policy is to give more weight to industrial engineering—to creating particular kinds of market structures, particularly ones that favor EU competitiveness.³⁰⁷

Anti-trust has all too often become the tool of choice for mercantilist nations because it flies under the radar screen of global trade governance organizations.

This industrial policy approach to anti-trust on the part of Europe is apparent in a number of key cases. In 2001, the European Commission blocked the merger of Honeywell and General Electric, two U.S. technology companies, on anti-trust grounds despite the fact that the U.S. Department of Justice had already approved the deal. In the Microsoft case, while both the United States and the European Commission opted for behavioral (as opposed to structural) remedies, the Commission’s decision went much further than the United States’, both in 2004 when it required Microsoft to sell a separate version of Windows without the Media Player application and in 2006 when it imposed a fine of \$357 million on Microsoft. Most recently the Commission has taken action against Intel regarding its sales practices. It is hard to imagine European competition authorities bringing a case against Microsoft if, for example, Microsoft were a French firm headquartered in Paris, or denying the merger of GE and Honeywell if they were German and Finnish companies (as Siemens and Nokia are in their partnership). Moreover, their decisions are aided by the fact that the large fines levied on U.S. firms go to EU coffers, rather than to consumers worldwide based on their relative share of purchases. In this sense, these kinds of anti-trust actions become a tax on global producers (and ultimately consumers) to the benefit of the country engaging in the action, and are thus Ugly policies.

Many Asian nations employ similar anti-trust practices. When South Korean anti-trust authorities bring cases against foreign firms, like Qualcomm, sometimes at the behest of domestic competitors, they are placing national industrial interests ahead of consumer interests (not to mention the rule of law). Likewise, the Korea Fair Trade Commission (KFTC) jumped into the “battle” against Microsoft by initiating an investigation based on complaints that may have come from South Korean companies such as Daum Communications and NateOn (of SK Communications), both of which had been complaining that Microsoft’s Instant Messaging application was hurting their businesses. The KFTC later expanded its investigation to focus on Microsoft’s Media Player, which competes with similar products made by SANView and DideoNET, also Korean companies. The KFTC not only required Microsoft to provide two versions of its product, one without the Media Player and Windows Messenger applications, it also required Microsoft to promote its competitors’ player and instant messaging products through links

to icons on the Windows desktop. Moreover, the KFTC fined Microsoft \$34.5 million. While the new Chinese anti-monopoly laws are only now being implemented, it is likely that they will be implemented in just as nationalistic a way, if not more so than is being applied in Europe and South Korea.

Whether anti-trust policies are Ugly or Bad follows the same logic previously delineated with regard to ICT sector-distorting policies. Anti-trust actions that seek to hinder foreign ICT firms (such as Europe's moves against Microsoft and Intel) are Bad for countries that pursue them because they raise prices on general purpose technologies and often preclude domestic industries from having access to the most sophisticated technologies. They are Bad for the world (e.g. for other countries) because they inhibit the competitiveness of those countries' firms in foreign markets, and because they generally lower the overall rate of global innovation. Restrictive anti-trust policies applied to other industries, such as industrial controls (e.g. Europe's blockage of the Honeywell/General Electric merger) or commercial jet aircraft (e.g. Europe's blockage of the Boeing/McDonnell Douglas merger in the early 1990s), are Ugly, ultimately seeking to advantage domestic producers at the expense of foreign ones.

Competition policies

As the former head of the McKinsey Global Institute, William Lewis, has argued, perhaps there is no factor more important to driving economic growth as the presence of competitive markets. As Lewis finds, "Differences in competition in product markets are much more important [than differences in labor and capital markets]. Policies governing competition in product markets are as important as macroeconomic policies."³⁰⁸

In other words, when countries design policies of all kinds to spur competition, organizations have to respond by becoming more productive or innovative if they wish to survive. But unfortunately, all too many nations think of competition policy as a way to protect firms, particularly domestic firms, from competition. One reason is that competition authorities who lack robust evidentiary procedures and/or economic analysis experience may use competition law in a way that intentionally or unintentionally favors domestic industries. But a better approach than manipulating policies, such as anti-trust, is to use competition policy to shape market environments, forcing companies to innovate to survive. Sound competition laws can enhance efficiency and consumer welfare while protecting the competitive process in a non-discriminatory manner and complementing intellectual property laws.

One easy way countries can foster competition is to make it easier to start a new business, a process that is needlessly complex and time consuming in too many countries. For example, in 2008, it took an average of 17 months to start a business in Korea.³⁰⁹ It took 152 days to start a business in Brazil in 2007.³¹⁰ Yet the evidence clearly shows that delays caused by entry regulations are associated with lower rates of firm entry.³¹¹ Countries such as Portugal have streamlined and quickened their new business registration procedures, with dramatic results. Portugal's "On the Spot Firm" initiative enables new businesses to register with the government online in just 45 minutes, and has been so successful that 60,000 new firms formed that way in just two years.

Another way to spur competition is to reduce or eliminate government monopolies. In many nations, monopoly practices are designed to block foreign companies from competing against entrenched domestic monopolies. For example, the European Union appears to be favoring two European suppliers of enriched nuclear fuel and imposing strict limits on imports of nuclear fuel from the United States.³¹² In China, a monopoly created by the People's Bank has been allowed to operate electronic payment systems for Chinese currency credit cards, cutting leading foreign companies out of the sector. In fact, on September 15, 2010, the United States brought a case against China before the WTO alleging unfair restrictions preventing foreign companies from providing electronic payment services in the country.³¹³ Meanwhile, in Japan, a government monopoly manages and strictly regulates the import of U.S. rice into the country. These are all Bad policies because they limit the incentives of domestic producers to become more efficient and innovative, while at the same time hurting foreign producers.

Finally, regulatory policies other than for legitimate objectives such as the protection of national security and health, safety, or the environment impede trade and constitute Bad policy. Inappropriate or badly drafted regulations result in substantial costs or inefficiencies being imposed upon both the impacted sector and the economy as a whole. The direct result of imposing inappropriate regulations on a particular sector are likely to be higher costs, higher prices, misallocation of resources, a lack of product innovation, and poor service quality.³¹⁴

Figure 17: Good, Bad, Ugly and Self-Destructive of Regulatory Policy

		World	
		Wins	Loses
Country	Wins	Aligning countries' anti-trust policies to address conflicting anti-trust regimes and accelerate time-consuming approval processes.	Using anti-trust policy to favor the interests of domestic non-GPT high-tech, high-value-added domestic producers over foreign ones. Using anti-trust policy as a surreptitious form of industrial policy.
	Loses		Using anti-trust policy to favor the interests of domestic ICT industries over foreign ones. Inordinate complexity in countries' new business registration processes. Defense of domestic monopolies designed to shut out foreign competition.

CONCLUSION

Competition for global innovation leadership among countries has only intensified over the past decade, as countries strive to gain advantage in the increasingly innovation-based global economy. This has created both global opportunities and threats, because countries can implement their innovation policies in ways that are either Good, benefitting the country and the world simultaneously; Ugly, benefitting the country at the expense of other nations; Bad, failing to benefit either the country or the world; or Self-destructive, actually hurting the country while benefitting others. All too often, countries are electing to pursue mercantilist, trade-distorting, beggar-thy-neighbor approaches that view exports as the Holy Grail to economic success. While such mercantilist practices sometimes fail, in many cases they do succeed—at least over the short-run—in having the desired effect of moving countries to higher-value-added production activities, often at the expense of foreign nations, and especially if other nations do little to contest the practice. Policymakers must be able to distinguish these types of Ugly innovation policies from Good ones, in order to be able to move the world to a new approach to globalization that recognizes that the only sustainable path to raising living standards for the vast majority of citizens in developed and developing countries alike will be to leverage innovation to raise economies' productivity across-the-board in all firms all sectors.

ENDNOTES

- ¹ Annabelle Malins, British-Consul General, “Address to National Trade Council,” April 15, 2010.
- ² Stephen Ezell, “America and the World—We’re No. 40!” *Democracy: A Journal of Ideas*, Issue 14, Fall 2009, <http://www.democracyjournal.org/article.php?ID=6703>.
- ³ Robert D. Atkinson, “Time to End Rampant Mercantilism,” *G8/G20 Summit 2010*, 124-126, http://www.itif.org/files/G8G20_RAAtkinson.pdf.
- ⁴ Adam Smith, *An Inquiry Into the Natures and Causes of the Wealth of Nations* (New York: The Modern Library, 1937).
- ⁵ Paul Krugman, “Competitiveness: A Dangerous Obsession,” *Foreign Affairs*, March/April 1994, http://www.ucema.edu.ar/~agaletto/krugman_competitiveness.pdf.
- ⁶ Gregory Tasse, “Globalization of Technology Based Growth: The Policy Imperative,” *The Technology Imperative*, ed. Gregory Tasse (Northampton, MA: Edward Elgar Publishing, 2007).
- ⁷ Stephen Ezell, “America and the World—We’re No. 40!”
- ⁸ Dermont McGrath, “Minitel: The Old New Thing,” *Wired*, April 18, 2001, <http://www.wired.com/science/discoveries/news/2001/04/42943>.
- ⁹ Victoria Shannon, “Quaero gets off the ground to challenge Google,” *The New York Times*, March 21, 2008, <http://www.nytimes.com/2008/03/21/technology/21iht-quaero24.html>.
- ¹⁰ Ideas in Action with Jim Glassman, “Is America Suffering an Innovation Gap?” July 9, 2010, <http://www.itif.org/media/america-suffering-innovation-gap>.
- ¹¹ Robert D. Atkinson and Andrew S. McKay, *Digital Prosperity: Understanding the Economic Benefits of the Information Technology Revolution*, Information Technology and Innovation Foundation, March 2007, 1, http://www.itif.org/files/digital_prosperity.pdf.
- ¹² Elhanan Helpman, *The Mystery of Economic Growth* (Cambridge, MA: Belknap Press, 2004).
- ¹³ Organization for Economic Co-operation and Development, “The OECD Jobs Study: Facts, Analysis, Strategy,” 1994, <http://www.oecd.org/dataoecd/42/51/1941679.pdf>.
- ¹⁴ Organization for Economic Co-operation and Development, “Technology, Productivity and Job Creation: Best Policy Practices,” 1998, <http://www.oecd.org/dataoecd/39/28/2759012.pdf>.
- ¹⁵ Robert D. Atkinson *et al.*, “Innovation Policy on a Budget: Driving Innovation in a Time of Fiscal Constraint,” Information Technology and Innovation Foundation, September 24, 2010, <http://www.itif.org/files/2010-innovation-budget.pdf>.
- ¹⁶ Tekes, *Seizing the White Space: Innovative Service Concepts in the United States*, *Technology Review*, 205, 2007, 72-74, http://www.tekes.fi/en/document/43000/innovative_service_pdf.
- ¹⁷ Ben Worthen, “Seeking Growth, Cisco Reroutes Decisions,” *The Wall Street Journal*, August 6, 2009, <http://online.wsj.com/article/SB124950454834408861.html>.
- ¹⁸ Jon Ingham, “Cisco’s Management Experiment,” August 16, 2009, <http://blog.social-advantage.com/2009/08/ciscos-management-experiment.html>.
- ¹⁹ Robert D. Atkinson *et al.*, *The Internet Economy 25 Years After.com*, Information Technology and Innovation Foundation, March 2010, 35, <http://www.itif.org/files/2010-25-years.pdf>.
- ²⁰ U.S. General Services Administration, “GSA Provides Innovation Challenges Platform, Drives Open Government,” May 27, 2010, <http://www.gsa.gov/portal/content/129637>.
- ²¹ Larry Keeley, “Taming of the new workshop,” Doblin, Inc., November 2003. (A slide deck containing similar slides is available at <http://www.slideshare.net/whatidiscover/invention-vs-innovation>.)
- ²² Don Lee, “Battery recharges debate about U.S. manufacturing,” *Chicago Tribune*, May 16, 2010, http://articles.chicagotribune.com/2010-05-16/business/ct-biz-0516-green-manufacture--20100516-5_1_battery-lithium-ion-cordless-power-tools.
- ²³ Peter Whoriskey, “How innovation killed the lights,” *The Washington Post*, September 8, 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/09/07/AR2010090706789.html?sub=AR>.
- ²⁴ W. Chan Kim and Renée Mauborgne, *Blue Ocean Strategy* (Boston, MA: Harvard Business School Press, 2005).
- ²⁵ Robert Samuelson, “A Trade War With China?” *RealClearPolitics.com*, September 27, 2010, http://www.realclearpolitics.com/articles/2010/09/27/a_trade_war_with_china_107310.html.
- ²⁶ Phil Levy, “Global imbalance redux,” *Foreign Policy*, August 25, 2010, http://shadow.foreignpolicy.com/posts/2010/08/25/global_imbalance_redux.

-
- ²⁷ Bloomberg News, “China’s Widening Trade Surplus Puts Wen Under Yuan Pressure,” August 10, 2010, <http://www.businessweek.com/news/2010-08-10/china-s-widening-trade-surplus-puts-wen-under-yuan-pressure.html>.
- ²⁸ Anatole Kaletsky, “Blaming China Won’t Help the Economy,” *The New York Times*, September 26, 2010, <http://www.nytimes.com/2010/09/27/opinion/27kaletsky.html>.
- ²⁹ U.S. National Intelligence Council, “Global Trends 2025: A Transformed World,” http://www.dni.gov/nic/PDF_2025/2025_Global_Trends_Final_Report.pdf.
- ³⁰ Paul Giacobbi, “The attraction of France for foreign investors,” April 15, 2010, <http://www.paul-giacobbi.org/attachment/219867>.
- ³¹ Peter Coy, “Five Options for Tackling Trade with China,” *Bloomberg BusinessWeek*, June 23, 2010, http://www.businessweek.com/magazine/content/10_27/b4185004907871.htm.
- ³² Robert D. Atkinson, “Why China Needs to End Its Economic Mercantilism,” *The Huffington Post*, January 30, 2008, http://www.huffingtonpost.com/robert-d-atkinson-phd/why-china-needs-to-end-it_b_84028.html.
- ³³ Robert Samuelson, “A Trade War with China?” *RealClearPolitics.com*, September 27, 2010, http://www.realclearpolitics.com/articles/2010/09/27/a_trade_war_with_china_107310.html.
- ³⁴ Kaletsky, “Blaming China Won’t Help the Economy.”
- ³⁵ Atkinson, “Why China Needs to End Its Economic Mercantilism.”
- ³⁶ Ibid.
- ³⁷ P.D. Kaushik and Nirvikar Singh, “Information Technology and Broad-Based Development: Preliminary Lessons from North India,” UC Santa Cruz Economics, Working Paper No. 522, July 2002, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=344830.
- ³⁸ Ibid.
- ³⁹ Rudiger Dornbusch and F. Leslie, C.H. Helmers, eds., *The Open Economy: Tools for Policymakers in Developing Countries* (New York: Oxford University Press, 1988).
- ⁴⁰ Robert D. Atkinson and Daniel K. Correa, *The 2007 State New Economy Index: Benchmarking Economic Transformation in the States*, Information Technology and Innovation Foundation, February 2007, 6, http://www.itif.org/files/2007_State_New_Economy_Index.pdf.
- ⁴¹ Ibid.
- ⁴² Author’s calculations based off data from: McKinsey Global Institute, “US Productivity Growth 1995-2000: Understanding the contribution of ICT relative to other factors,” October 2001, 8.
- ⁴³ John R. Baldwin and Wulong Gu, “Plant Turnover and Productivity Growth in Canadian Manufacturing,” Statistics Canada, No. 11F0019MIE, No. 193, April 2003, 9, <http://www.statcan.gc.ca/pub/11f0019m/11f0019m2003193-eng.pdf>.
- ⁴⁴ Stephen D. Oliner, Daniel E. Sichel, and Kevin J. Stiroh, “Explaining a Productive Decade,” FEDS Working Paper 2007-63, December 2007, 6, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1160248.
- ⁴⁵ When firms are in competitive markets (including competitive labor and product markets), the benefits of productivity increases flow to consumers in the form of lower real prices.
- ⁴⁶ To see why, consider a nation in which average productivity among existing firms increases 2 percent per year for five years. After five years, the nation’s productivity is up by almost 11 percent. To achieve a similar increase in total productivity through an industry mix strategy, a nation would have to replace 20 percent of its jobs with average value-added per worker with jobs having a value-added of over 50 percent more, an unlikely transformation at best.
- ⁴⁷ Michael E. Porter, “The Economic Performance of Regions,” *Regional Studies*, 37.6-7 (August/October 2003): 568.
- ⁴⁸ Robert D. Atkinson, “How Can We Boost Productivity?” *National Journal Expert Blogs-Economy*, August 9, 2010, <http://economy.nationaljournal.com/2010/08/how-can-we-boost-productivity.php>.
- ⁴⁹ McKinsey Global Institute, “How to compete and grow: A sector guide to policy,” March 2010, http://www.mckinsey.com/mgi/reports/freepass_pdfs/competitiveness/Full_Report_Competitiveness.pdf.
- ⁵⁰ Ibid, 26.
- ⁵¹ Ibid, 27.
- ⁵² *The Economist*, “Industrial design: Can governments help revive innovation and trade?” October 1, 2009, <http://www.economist.com/node/14530154>.

-
- ⁵³ Simon Kennedy, "When Everybody Exports, Nobody Wins," *Bloomberg BusinessWeek*, September 26, 2010, 16-17, http://www.businessweek.com/print/magazine/content/10_39/b4196016894680.htm.
- ⁵⁴ Atkinson *et al.*, "The Internet Economy 25 Years After.com," 22.
- ⁵⁵ William H. Lewis, "The Power of Productivity: Wealth, Poverty, and the Threat to Global Stability," Presentation to the Information Technology and Innovation Foundation, May 6, 2008, 7, <http://www.itif.org/files/LewisPresentation.pdf>.
- ⁵⁶ *The Economist*, "Strength amid paralysis," July 15, 2010, <http://www.economist.com/node/16591237>.
- ⁵⁷ Kim Jung Woo, "International Comparison of the Korean Service Industries' Productivity," Samsung Economic Research Institute, *Weekly Insight*, April 14, 2008, 10-15.
- ⁵⁸ Ibid.
- ⁵⁹ Robert D. Atkinson, *The Past and Future of America's Economy: Long Waves of Innovation that Power Cycles of Growth* (Northampton, Massachusetts: Edward Elgar, 2004).
- ⁶⁰ Saul Lach, Gil Shiff, and Manuel Trajtenberg, "Together but Apart: ICT and Productivity Growth In Israel," Centre for Economic Policy Research, February 2008, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1094469.
- ⁶¹ Lach *et al.*, "Together but Apart: ICT and Productivity," 4
- ⁶² Robert D. Atkinson, Personal communication with officials from Tata Group in 2007 in India.
- ⁶³ Lach *et al.*, "Together but Apart: ICT and Productivity," 30.
- ⁶⁴ McKinsey Global Institute, "How to compete and grow," 29.
- ⁶⁵ Ibid, 29-30.
- ⁶⁶ Ibid, 29-30.
- ⁶⁷ Lach *et al.*, "Together but Apart: ICT and Productivity," 3.
- ⁶⁸ Lewis, "The Power of Productivity."
- ⁶⁹ Atkinson, "Time to End Rampant Mercantilism."
- ⁷⁰ McKinsey Global Institute, "How to Compete and Grow," 35.
- ⁷¹ Gabriel Sanchez, "Understanding productivity levels, growth and dispersion in Argentina: the case of supermarkets," February 13, 2008, http://www.merit.unu.edu/MEIDE/papers/2009/1236010806_GS.pdf.
- ⁷² McKinsey Global Institute, "Why the Japanese economy is not growing: Micro barriers to productivity growth," July 2000.
- ⁷³ Knowledge at Wharton, "Will Wal-Mart Succeed in India? Perhaps...But It Won't Be Easy," December 14, 2006, <http://knowledge.wharton.upenn.edu/india/article.cfm?articleid=4133>.
- ⁷⁴ Emily Wax, "India's First Wal-Mart Draws Excitement, Not Protest," *The Washington Post*, July 13, 2009, <http://www.washingtonpost.com/wp-dyn/content/article/2009/07/12/AR2009071202176.html>.
- ⁷⁵ Robert D. Atkinson and Mark Cooper, "A cure by way of the consumer," *Washington Times*, December 17, 2008, <http://www.washingtontimes.com/news/2008/dec/17/ailing-auto-industry/>.
- ⁷⁶ *State of California*, "2010 Lawbook for Pharmacy," http://www.pharmacy.ca.gov/laws_regs/lawbook.pdf
- ⁷⁷ *Consumer Reports*, "Veterinary care without the bite," June 2003, <http://www.consumerreports.org/Pets/Vets dispense pharmaceuticals, but few states mandate the most basic price disclosure or even a written prescription for consumers who want to price shop>.
- ⁷⁸ Sanchez, "Understanding productivity levels, growth and dispersion in Argentina," 21.
- ⁷⁹ McKinsey Global Institute, "How to compete and grow," 36.
- ⁸⁰ Ibid, 36.
- ⁸¹ Ibid, 37.
- ⁸² Atkinson, "Time to End Rampant Mercantilism."
- ⁸³ Robert D. Atkinson, "Globalisation, New Technology and Economic Transformation," in *Social Justice in the Global Age*, ed. O. Cramme and P. Diamond (Cambridge: Polity Press, 2009).
- ⁸⁴ Nicholas Bloom, Raffaella Sadun, and John Van Reenen, "Americans do I.T. Better: US Multinationals and the Productivity Miracle," (Revised version of) NBER Working Paper 13085, August 2, 2009, <http://www.stanford.edu/~nbloom/ADIB.pdf>.
- ⁸⁵ Erik Brynjolfsson and Adam Saunders, *Wired for Innovation: How Information Technology is Reshaping the Economy* (Boston, MA: The MIT Press, 2010).
- ⁸⁶ Brynjolfsson, *Wired for Innovation*, 51.

- ⁸⁷ Organization for Economic Co-operation and Development, *Measuring Innovation: A New Perspective*, 2010, 87, <http://www.oecd.org/dataoecd/29/29/45188243.pdf>.
- ⁸⁸ Guodong Gao and Lorin M. Hitt, "Information Technology and Product Variety: Evidence from Panel Data," 2004, <http://opim.wharton.upenn.edu/~lhitt/files/itvariety.pdf>.
- ⁸⁹ Robert D. Atkinson, "Boosting European Prosperity Through the Widespread Use of ICT," Information Technology and Innovation Foundation, November 2007, 1-2, <http://www.itif.org/files/EuropeanProductivity.pdf>.
- ⁹⁰ Bloom, Sadun, and Van Reenen, "Americans do I.T. Better: US Multinationals and the Productivity Miracle."
- ⁹¹ Atkinson *et al.*, "The Internet Economy 25 Years After.com," 43.
- ⁹² Dale W. Jorgenson and K. Nomura, "The Industry Origins of the US-Japan Productivity Gap," *Economic Systems Research*, 19 (2007): 315-41, http://sanken.keio.ac.jp/publication/KEO-dp/105/DWJ_KN_2007Feb3.pdf.
- ⁹³ Kyoji Fukao and Tsutomu Miyagawa, "Productivity in Japan, the US, and the Major EU Economies: Is Japan Falling Behind?" *RIETI Discussion Paper Series*, 07-E-046, (2007), <http://www.rieti.go.jp/jp/publications/dp/07e046.pdf>.
- ⁹⁴ Atkinson and McKay, *Digital Prosperity*, 2.
- ⁹⁵ Thomas Lum, "U.S. Foreign Aid to East and South Asia: Selected Recipients," Congressional Research Service, October 8, 2008, <http://www.fas.org/sgp/crs/row/RL31362.pdf>.
- ⁹⁶ TheLocal.com, "Germany Plans to Stop Giving Foreign Aid to China," October 30, 2009.
- ⁹⁷ Lum, "U.S. Foreign Aid to East and South Asia: Selected Recipients."
- ⁹⁸ Manufacturing and Technology News, "World Bank Lends China Gobs of Money," Volume 17, No. 9, May 31, 2010, 2.
- ⁹⁹ Jack C. Chow, "China's Billion Dollar Aid Appetite," *Foreign Policy*, July 19, 2010, http://www.foreignpolicy.com/articles/2010/07/19/chinas_billion_dollar_aid_appetite.
- ¹⁰⁰ Ibid.
- ¹⁰¹ The OPIC Investment Funds Department, <http://www.opic.gov/investmentfunds/>.
- ¹⁰² Robert D. Atkinson, "Meeting the Offshoring Challenge," *Progressive Policy Institute*, July 2004, 10, http://www.ppionline.org/documents/offshoring2_0704.pdf.
- ¹⁰³ Ibid.
- ¹⁰⁴ Clyde Prestowitz, "The \$64 Trillion Question (Part I)," *The New Republic*, June 22, 2010, <http://www.tnr.com/article/economy/75733/the-64-trillion-question-part-1>.
- ¹⁰⁵ WhiteHouse.gov, "Fact Sheet: U.S. Global Development Policy," <http://www.whitehouse.gov/the-press-office/2010/09/22/fact-sheet-us-global-development-policy>.
- ¹⁰⁶ The World Bank, "Colombia: Science, Technology and Innovation," <http://web.worldbank.org/external/projects/main?pagePK=64312881&piPK=64302848&theSitePK=40941&Projectid=P117590>.
- ¹⁰⁷ Manufacturing and Technology News, "World Bank Lends China Gobs of Money."
- ¹⁰⁸ The World Bank, "China: Baotou Iron & Steel Energy Efficiency Project," <http://web.worldbank.org/external/projects/main?pagePK=64312881&piPK=64302848&theSitePK=40941&Projectid=P102568>.
- ¹⁰⁹ Moshe Khalid and Charles Kenny, "The Next Decade of ICT Development: Access, Applications and the Forces of Convergence," World Bank, Washington, D.C., June 1, 2006, http://www-wds.worldbank.org/servlet/main?menuPK=64187510&pagePK=64193027&piPK=64187937&theSitePK=523679&entityID=000090341_20061219144328.
- ¹¹⁰ Christine Qing, Zhen-Wei, and Alexander Pitt, "Contribution of Information and Communication Technologies to Growth," *World Bank Working Paper*, 24, 2004.
- ¹¹¹ "USTR FACT SHEET: Trans-Pacific Partnership," Office of the United States Trade Representative, <http://www.ustr.gov/about-us/press-office/fact-sheets/2009/november/ustr-fact-sheet-trans-pacific-partnership>.
- ¹¹² Manufacturing and Technology News, "Inside The Head Of The World's Top Trade Regulator," Volume 17, No. 9, May 31, 2010, 9.
- ¹¹³ Organization for Economic Co-operation and Development, *Measuring Innovation: A New Perspective*, 46.

- ¹¹⁴ Robert D. Atkinson and Scott M. Andes, “The Atlantic Century: Benchmarking EU and US Competitiveness,” Information Technology and Innovation Foundation, February 2009, 10, <http://www.itif.org/files/2009-atlantic-century.pdf>.
- ¹¹⁵ Robert D. Atkinson, “Eight Ideas for Improving the America COMPETES Act,” Information Technology and Innovation Foundation, March 2010, 2, <http://www.itif.org/files/2010-america-competes.pdf>.
- ¹¹⁶ Ibid, 4.
- ¹¹⁷ David Hart, “Global Flows of Talent: Benchmarking the United States,” Information Technology and Innovation Foundation, November 17, 2006, <http://www.itif.org/files/Hart-GlobalFlowsOfTalent.pdf>.
- ¹¹⁸ Adrian Wooldridge, “The Battle for Brainpower,” *The Economist*, October 7, 2006, 3.
- ¹¹⁹ David Hart, Sultan Aces, and Spencer Tracy, Jr., “High-tech Immigrant Entrepreneurship in the United States,” July 2009, <http://www.sba.gov/advo/research/rs349tot.pdf>. See page 35 of the report for a table comparing studies of the foreign-born share of high-tech entrepreneurship in the United States.
- ¹²⁰ Robert D. Atkinson, “H-1B Visa Workers: Lower-Wage Substitute, or Higher-Wage Complement,” Information Technology and Innovation Foundation, June 9, 2010, <http://www.itif.org/files/2010-H1B-Visa.pdf>.
- ¹²¹ Hashish Arora, Lee Branstetter, and Mate Drev, “Going Soft: How the Rise of Software Based Innovation Led to the Decline of Japan’s IT Industry and the Rise of Silicon Valley,” NBER Working Paper 16156, July 2010, 1, <http://www.nber.org/papers/w16156>.
- ¹²² Ibid, 30.
- ¹²³ Ibid, 39.
- ¹²⁴ Surrender Gera and Tahitian Songsakul, “Benchmarking Canada’s Performance in the Global Competition for Mobile Talent,” *Canadian Public Policy*, Vol. XXXIII, No. 1, 2007, <http://economics.ca/cgi/jab?journal=cpp&view=v33n1/CPpv33n1p063.pdf>.
- ¹²⁵ Hart, “Global Flows of Talent.”
- ¹²⁶ Ibid, 14.
- ¹²⁷ Andrew Berger, “The H-1B Visa Dilemma, Part 1: A Broken System,” *TechNewsWorld*, July 13, 2008, <http://www.technewsworld.com/story/The-H-1B-Visa-Dilemma-Part-1-A-Broken-System-62994.html?welcome=1215965192>.
- ¹²⁸ Interview with Kara Calvert, Information Technology and Industry Council, July 15, 2008.
- ¹²⁹ Declan McCullagh, “Intel CEO: U.S. faces looming tech decline,” *CNET News*, August 24, 2010, <http://www.infowars.com/intel-ceo-u-s-faces-looming-tech-decline/>.
- ¹³⁰ Robert D. Atkinson *et al.*, “Innovation Policy on a Budget,” 19.
- ¹³¹ “Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology,” National Academy of Sciences, National Academy of Engineering, Institute of Medicine, ISBN: 0-309-65463-7 (2005); available: <http://www.nap.edu/catalog/11463.html>.
- ¹³² Edwin Mansfield, “Academic Research and Industrial Innovation: An Update of Empirical Findings,” *Research Policy*, 26, no. 7-8 (1998): 773-776.
- ¹³³ David T. Coe and Elhanan Helpman, “International R&D Spillovers,” *European Economic Review*, 39 (1995), 859-887, http://www.nber.org/papers/w4444.pdf?new_window=1.
- ¹³⁴ Fred Bloch and Matthew Keller, “Where Do Innovations Come From? Transformations in the U.S. National Innovation System, 1970-2006,” Information Technology and Innovation Foundation, July 2008, http://www.itif.org/files/Where_do_innovations_come_from.pdf.
- ¹³⁵ Coe and Helpman, “International R&D Spillovers,” 859.
- ¹³⁶ Ibid, 872.
- ¹³⁷ Ibid, 874.
- ¹³⁸ Wesley Cohen and Daniel Levinthal, “Absorptive Capacity: A New Perspective on Learning and Innovation,” *Administrative Services Quarterly*, 35, (1990): 128-152.
- ¹³⁹ Udo Zander and Bruce Kogut, “Knowledge and the Speed of Transfer and Imitation of Organizational Capabilities: An Empirical Test,” *Organization Science*, Vol. 6, no. 1, (January-February 1995): 76-92, <http://orgsci.journal.informs.org/cgi/content/abstract/6/1/76>.
- ¹⁴⁰ Lewis M. Branscomb *et al.*, *Beyond Spinoff: Military and Commercial Technologies in a Changing World* (Boston: Harvard Business School Press, April 1992).

- ¹⁴¹ Erica Fuchs, “The Role of DARPA in Seeding and Encouraging Technology Trajectories: Pre- and Post-Tony Tether in the New Innovation Ecosystem,” October 14, 2008, http://www.itif.org/files/DARPA_ITIF.pdf.
- ¹⁴² Atkinson and McKay, *Digital Prosperity*, 1.
- ¹⁴³ Robert D. Atkinson *et al.*, “The Need for Speed: The Importance of Next-Generation Broadband Networks,” Information Technology and Innovation Foundation, March 5, 2009, <http://www.itif.org/files/2009-needforspeed.pdf>.
- ¹⁴⁴ APEC Digital Prosperity Checklist [DCPL], Infrastructure: Communications Principle 5, November 2008.
- ¹⁴⁵ W. Lehr, C. Osorio, S. Gillett, and M. Sirbu, “Measuring Broadband’s Economic Impact,” *Broadband Properties*, (December 2005): 12-24, <http://www.broadbandproperties.com/2005issues/dec05issues/Measuring%20Broadband%20Eco%20Impact,%20Lehr,%20Gillett,%20Sirbu.pdf>; Reed and Hagen, Ministry of Science, Technology and Innovation, 2005.
- ¹⁴⁶ Jed Kolko, “Does Broadband Boost Local Economic Development?” *Public Policy Institute of California*, January 2010, <http://www.ppic.org/main/publication.asp?i=866>.
- ¹⁴⁷ Paul DiMaggio and Bart Bonikowski, “Make Money Surfing the Web? The Impact of Internet Use on the Earnings of U.S. Workers,” *American Sociological Review*, 73, no. 2 (April 2008): 227-250, <http://www.ingentaconnect.com/content/asoca/ast/2008/00000073/00000002/art00003>.
- ¹⁴⁸ Robert D. Atkinson, “The Truth, and Nothing but the Truth, about U.S. International Broadband Rankings,” Information Technology and Innovation Foundation, May 12, 2010, <http://www.itif.org/files/2010-BB-rankings.pdf>.
- ¹⁴⁹ Ben Piper, “Global Broadband Scorecard 2010: Broadband Composite Index (BCI) Rankings,” *Strategy Analytics*, July 2010.
- ¹⁵⁰ Catherine L. Mann, “Accelerating the Globalization of America: The Role for Information Technology,” (Washington, D.C.: The Institute for International Economics, June 2006), 82-83b.
- ¹⁵¹ The International Bank for Reconstruction and Development, “2009 Information and Communications for Development: Extending Reach and Increasing Impact,” The World Bank 2009, <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTIC4D/0,,contentMDK:22229759~menuPK:5870649~pagePK:64168445~piPK:64168309~theSitePK:5870636,00.html>. See also, Asheeta Bhavnani *et al.*, “The Role of Mobile Phones in Sustainable Rural Poverty Reduction,” The World Bank, ICT Policy Division, July 15, 2008, http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/The_Role_of_Mobile_Phones_in_Sustainable_Rural_Poverty_Reduction_June_2008.pdf.
- ¹⁵² Atkinson *et al.*, “Innovation Policy on a Budget,” 17.
- ¹⁵³ Daniel D. Castro, “Stricter Privacy Regulations for Online Advertising Will Hurt the Free Internet,” Information Technology and Innovation Foundation, September 2010, <http://www.itif.org/files/2010-privacy-regs.pdf>.
- ¹⁵⁴ “Interactive Advertising Revenues to Reach US\$147 Billion Globally by 2012, According to The Kelsey Group’s Annual Forecast,” The Kelsey Group, February 25, 2008, <http://www.kelseygroup.com/press/pr080225.asp>.
- ¹⁵⁵ Avi Goldfarb and Catherine E. Tucker, “Privacy Regulation and Online Advertising,” August 5, 2010, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1600259.
- ¹⁵⁶ *Ibid.*
- ¹⁵⁷ Castro, “Data Privacy Principles for Spurring Innovation.”
- ¹⁵⁸ David Barboza, “China to Build State-Run Search Engine,” *The New York Times*, August 13, 2010, <http://www.nytimes.com/2010/08/14/technology/14search.html>.
- ¹⁵⁹ *Ibid.*
- ¹⁶⁰ Simeon Djankov *et al.*, *The Effect of Corporate Taxes on Investments and Entrepreneurship*, The World Bank, 2008, <http://www.doingbusiness.org/documents/AEJ-Manuscript.pdf>.

- ¹⁶¹ There is a strong negative correlation (-0.48) between the indicators' effective business tax rates and inward FDI, indicating that countries that maintain a competitive corporate tax rate are much more likely to have robust inward FDI.
- ¹⁶² Atkinson and Andes, "The Atlantic Century: Benchmarking EU and US Competitiveness," 20.
- ¹⁶³ Ibid.
- ¹⁶⁴ Declan McCullagh, "Intel CEO: U.S. faces looming tech decline."
- ¹⁶⁵ Organization for Economic Co-operation and Development, *OECD Innovation Strategy*, 2010, 97.
- ¹⁶⁶ Ibid.
- ¹⁶⁷ See Charles I. Jones and John Williams, "Measuring the Social Return to R&D," *Quarterly Journal of Economics*, 113 (1998): 1119-1135; Edwin Mansfield, "Social Returns from R&D: Findings, Methods, and Limitations," *Research Technology Management*, 34 (1991): 24-27; Eric Brynjolfsson, Lauren Hitt, and Shinkyu Yang, "Intangible Assets: How the Interaction of Information Technology and Organizational Structure Affects Stock Market Valuations," *Brookings Papers on Economic Activity* 1, (2000): 137-199.
- ¹⁶⁸ Robert D. Atkinson, "Expanding the R&E Tax Credit to Drive Innovation, Competitiveness and Prosperity," Information Technology and Innovation Foundation, July 24, 2007, <http://www.itif.org/files/AtkinsonRETaxCreditJTT.pdf>.
- ¹⁶⁹ Mike Zapler, "R&D tax credit prized by tech firms held hostage in Washington," *San Jose Mercury News*, September 4, 2010, http://www.mercurynews.com/politics-government/ci_15990903?source=rss&nclick_check=1.
- ¹⁷⁰ Coopers and Lybrand, "Economic Benefits of the R&D Tax Credit," 1998.
- ¹⁷¹ K. Klassen, J. Pittman, and M. Reed, "A cross-national comparison of R&D expenditure decisions: Tax incentives and financial constraints," *Contemporary Account Research*, 21(3), (2004): 639-680.
- ¹⁷² Note that R&D performed by EU affiliates in the United States reached almost \$20 billion in 2005. Likewise, U.S.-owned affiliates performed over \$17 billion in R&D in the European Union in 2005.
- ¹⁷³ Organization for Economic Co-operation and Development, *OECD Science, Technology, and Industry Scoreboard 2009*, 2009, 79, http://www.oecd.org/document/29/0,3343,en_2649_34409_42690461_1_1_1_1,00.html.
- ¹⁷⁴ Stephen J. Ezell and Scott M. Andes, "ICT R&D Policies: An International Perspective," *IEEE Internet Computing*, July 7, 2010, <http://www.itif.org/files/ICTRandD.pdf>.
- ¹⁷⁵ Robert D. Atkinson, "Create Jobs by Expanding the R&D Tax Credit," Information Technology and Innovation Foundation, January 26, 2010, <http://www.itif.org/files/2010-01-26-RandD.pdf>.
- ¹⁷⁶ Robert D. Atkinson, "Effective Corporate Tax Reform in the Global Innovation Economy," Information Technology and Innovation Foundation, July 2009, 6, http://www.itif.org/files/090723_CorpTax.pdf.
- ¹⁷⁷ Eric Bartelsman and Roel Beetsma, "Why Pay More? Corporate tax avoidance through transfer pricing in OECD countries," *Journal of Public Economics*, 87 (2003).
- ¹⁷⁸ Fritz Foley, Mihir Desai, and James Hines, "The Demand for Tax Havens," *Journal of Public Economics*, 90 (2006): 513-31.
- ¹⁷⁹ Alan Auerbach, Michael Devereux, and Helen Simpson, "Taxing Corporate Income," *NBER Working Paper Series No. 14494* (2008).
- ¹⁸⁰ Fritz Foley, Jay Hartzell, Sheridan Titman, and Garry Twite, "Why Do Firms Hold So Much Cash? A Tax-Based Explanation," *Journal of Financial Economics*, 86 (3) (December 2007): 579-607.
- ¹⁸¹ Auerbach, Devereux, and Simpson, "Why Do Firms Hold So Much Cash? A Tax-Based Explanation."
- ¹⁸² Kimberly A. Clausing, "The Role of U.S. Tax Policy in Offshoring," Reed College, Department of Economics, Portland, Oregon, June 2005, 27, http://www.brookings.edu/es/commentary/journals/tradeforum/2005btf_clausing.pdf.
- ¹⁸³ Peter Sorenson, "International Tax Coordination—Regionalism Versus Globalisation," *Journal of Public Economics*, 88 (2004).
- ¹⁸⁴ Peter Sorenson, "International Tax Competition: A New Framework for Analysis," *Economic Analysis and Policy*, 33 (2003): 179.
- ¹⁸⁵ Sorenson, "International Tax Competition: A New Framework for Analysis."
- ¹⁸⁶ *The Economist*, "Helicopters at the Ready", January 16, 2010, 63, http://www.economist.com/node/15276706?story_id=15276706.

- ¹⁸⁷ Rachel Glickhouse, "Brazil's Tax and Debt Burden," *Latin American Thought*, March 17, 2010, <http://latamthought.org/2010/03/17/brazils-tax-and-debt-burden/>.
- ¹⁸⁸ Ed Gerwin and Anne Kim, "Why We Need Fairer Trade: How Export Barriers Cost America Jobs," *Third Way*, July 2010, 18, http://content.thirdway.org/publications/318/Third_Way_Report_-_Why_We_Need_Fairer_Trade-How_Export_Barriers_Cost_America_Jobs_.pdf.
- ¹⁸⁹ Ibid, 16.
- ¹⁹⁰ David T. Coe, Elhanan Helpman, and Alexander W. Hoffmeister, "North-South R&D Spillovers," *The Economic Journal*, 107 (1997): 134, <http://www.jstor.org/pss/2235275>.
- ¹⁹¹ Carl J. Dahlman, "Technology Strategy in East Asian Developing Economies," *Journal of Asian Economics*, 5, (1994): 541.
- ¹⁹² Fredrik Sjöholm, "International Transfer of Knowledge: The Role of International Trade and Geography," *Weltwirtschaftliches*, Archive 97 (1996): 132.
- ¹⁹³ Jonathan Eaton and Samuel Kortum, "Trade in Ideas: Patenting and Productivity in the OECD," *Journal of International Economics*, 40, (1997): 251.
- ¹⁹⁴ Rosanna Pittiglio, Edgardo Sica, and Stefania Villa, "Innovation and Internationalization: The Case of Italy," *Journal of Technology Transfer*, 34 (2009): 588-602.
- ¹⁹⁵ Jong-Wha Lee, "Government Interventions and Productivity Growth in Korean Manufacturing Industries," NBER Working Paper No. 5060, March 1995.
- ¹⁹⁶ Ibid.
- ¹⁹⁷ Ibid.
- ¹⁹⁸ Ibid.
- ¹⁹⁹ Girma *et al.*, "Can production subsidies explain China's export performance?" *Vox*, July 8, 2008, <http://www.voxeu.org/index.php?q=node/1373>
- ²⁰⁰ Kaushik and Singh, "Information Technology and Broad-Based Development."
- ²⁰¹ Ibid.
- ²⁰² Howard Richman *et al.*, "Straight talk from Clinton's trade negotiator," June 14, 2008, http://www.americanthinker.com/2008/06/straight_talk_from_clintons_tr_1.html.
- ²⁰³ Fred Bergsten, "Beijing Is Key to Creating More US Jobs," *Foreign Policy*, April 14, 2010, <http://www.iie.com/publications/opeds/oped.cfm?ResearchID=1545>.
- ²⁰⁴ Ibid.
- ²⁰⁵ Ibid.
- ²⁰⁶ Ibid.
- ²⁰⁷ Bruce Katz and Jonathan Rothwell, "5 Myths about U.S. exports," *The Washington Post*, September 5, 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/09/03/AR2010090302208.html>.
- ²⁰⁸ Gary Dorsch, "Foreign Currency Wars Fuel Gold's Rally to \$1,300 /oz," *Kitco.com*, September 22, 2010, <http://www.kitco.com/ind/dorsch/sep222010.html>.
- ²⁰⁹ Bergsten, "Beijing Is Key to Creating More US Jobs."
- ²¹⁰ Ibid.
- ²¹¹ Atkinson, "Globalisation, New Technology and Economic Transformation."
- ²¹² Scott Beaulier and Joshua Hall, "Export subsidies," http://www.scottbeaulier.com/Export_Subsidies_jch1.doc.
- ²¹³ M. Frith, "Bitter Harvest: How EU Sugar Subsidies Devastate Africa," *The Independent*, June 22, 2005, <http://www.independent.co.uk/environment/bitter-harvest-how-eu-sugar-subsidies-devastate-africa-496137.html>.
- ²¹⁴ M. Helling, S. Beaulier, and J. Hall, "High Cotton: Why the United States Should No Longer Provide Agricultural Subsidies to Cotton Farmers," *Economic Affairs*, 28 (2), (2008): 65-66.
- ²¹⁵ Robert E. Scott, "That 'Buy America' Provision," *The New York Times*, February 11, 2009, <http://roomfordebate.blogs.nytimes.com/2009/02/11/that-buy-american-provision/>.
- ²¹⁶ Anthony Faiola, "Trade Barriers Could Threaten Global Economy," *The Washington Post*, March 18, 2009, <http://www.washingtonpost.com/wp-dyn/content/article/2009/03/17/AR2009031703218.html>.
- ²¹⁷ McKinsey Global Institute, "How to compete and grow," 43.
- ²¹⁸ Ibid.
- ²¹⁹ Girma *et al.*, "Can production subsidies explain China's export performance?"
- ²²⁰ Ibid.

- 221 Ibid.
- 222 Kaushik and Singh, “Information Technology and Broad-Based Development.”
- 223 “Get tariff data,” The World Trade Organization, http://www.wto.org/english/tratop_e/tariffs_e/tariff_data_e.htm.
- 224 “W.T.O. Rules Against European Union on Tariffs for Electronics,” *The New York Times*, August 16, 2010, http://www.nytimes.com/2010/08/17/business/global/17wto.html?_r=1&partner=rss&emc=rss.
- 225 “Tariff Download Facility,” The World Trade Organization, <http://tariffdata.wto.org/>.
- 226 Gerwin and Kim, “Why We Need Fairer Trade,” 1.
- 227 Ibid, 2.
- 228 Ibid, 8.
- 229 Julie A. Hedlund and Robert D. Atkinson, “The Rise of the New Mercantilist: Unfair Trade Practices in the Innovation Economy,” Information Technology and Innovation Foundation, June 2007, 10, <http://www.itif.org/files/ITMercantilism.pdf>.
- 230 Negotiations are ongoing with respect to including treatment of subsidies for services in the General Agreement on Trade in Services (GATS).
- 231 “Understanding the WTO: The Agreements, Anti-dumping, subsidies, safeguards: contingencies, etc.,” The World Trade Organization, http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm8_e.htm.
- 232 However, countries can complain if they can show that any subsidy hurts their interests, such as when a tax hurts foreign companies trying to compete in that nation’s market. If the companies can prove damage from the tax, the WTO considers this an “actionable subsidy,” or one that a country can claim violates the WTO. The difficulty is that it may be hard to prove specific damage because the WTO doesn’t cover subsidies for services.
- 233 Susan Krause, “China’s Industrial Policies Conflict with WTO Rules, Experts Say,” *The Washington Post*, June 2, 2005, <http://www.america.gov/st/washfile-english/2005/June/20050602131737asesuark0.4519007.html>.
- 234 Bureau of Industry and Security, U.S. Department of Commerce “Technology Transfer to China,” 1999, <http://www.bis.doc.gov/defenseindustrialbaseprograms/OSIES/DefMarketResearchRpts/ChinaGuides/China1.pdf>.
- 235 Krause, “China’s Industrial Policies Conflict with WTO Rules, Experts Say.”
- 236 Office of the U.S. Trade Representative, *2007 National Trade Estimate Report on Foreign Trade Barriers*, 2007, http://www.ustr.gov/sites/default/files/uploads/reports/2007/NTE/asset_upload_file855_10945.pdf.
- 237 Hedlund and Atkinson, “The New Mercantilists,” 23.
- 238 Faiola, “Trade Barriers Tighten with Global Slump.”
- 239 McKinsey Global Institute, “How to Compete and Grow,” 46.
- 240 Hedlund and Atkinson, “The Rise of the New Mercantilists,” 30.
- 241 Gerwin and Kim, “Why We Need Fairer Trade,” 3. The President’s 2009 Trade Policy Agenda recognized that non-tariff trade barriers have grown in significance for U.S. exporters.
- 242 Ibid, 10.
- 243 Ibid.
- 244 Ibid, 8-9.
- 245 Ibid, 9.
- 246 Asia Development Bank and United Nations Economic and Social Commission for Asia and the Pacific, “Designing and Implementing Trade Facilitation in Asia and the Pacific,” November 2009, 5, http://aric.adb.org/pdf/Trade_Facilitation_Reference_Book.pdf; New Zealand Ministry of Foreign Affairs and Trade, “Trade Matters—Trade Facilitation—Clearing Up Red Tape,” May 2006, <http://www.mfat.govt.nz/downloads/NZ-WTO/tradematters-tradefacilitation.pdf>.
- 247 Gerwin and Kim, “Why We Need Fairer Trade,” 6.
- 248 Michael Ryan, “Intellectual Property and Economic Growth,” Creative and Innovative Economy Center, http://www.law.gwu.edu/Academics/research_centers/ciec/Documents/Notes%20on%20Creativity/IP%20and%20Economic%20Growth.pdf.
- 249 Christopher Burgess and Richard Power, “How to Avoid Intellectual Property Theft,” *CIO Magazine*, July 10, 2006, http://www.cio.com/article/22837/How_to_Avoid_Intellectual_Property_Theft.

- ²⁵⁰ United Nations Conference on Trade and Development, *Periodic Report 1986: Policies, Laws, and Regulations on Transfer, Application, and Development of Technology*, TD/B/C.6/133 (1986).
- ²⁵¹ United Nations Commission on Transnational Corporations, *New Issues in the Uruguay Round of Multilateral Trade Negotiations*, E.90.II.A.15 (1989); UNCTNC, *The Determinants of Foreign Direct Investment: A Survey of Evidence*, E.92.II.A.2.
- ²⁵² Edwin Mansfield, *Intellectual Property Protection, Direct Investment, and Technology Transfer: Germany, Japan, and the United States*, International Finance Corporation Discussion Paper, No. 27 (1995); Jeong-Yeon Lee and Edwin Mansfield, *Intellectual Property and U.S. Foreign Direct Investment*, *Review of Economics and Statistics*, 78, (1996): 181, <http://www.jstor.org/pss/2109919>.
- ²⁵³ Keith E. Maskus, *Intellectual Property Rights in the Global Economy* (Washington, D.C.: Institute for International Economics, 2000).
- ²⁵⁴ Michael Ryan, "Useful Knowledge and the Development Agenda Debate at the World Intellectual Property Organization," Creative and Innovative Economy Center, June 2006, 2-3, http://www.law.gwu.edu/Academics/research_centers/ciec/Documents/Notes%20on%20Creativity/WIP_O_Dev_Agenda.pdf.
- ²⁵⁵ *Ibid*, 3.
- ²⁵⁶ *Ibid*, 4.
- ²⁵⁷ Carlos M. Correa, "Intellectual Property Rights, the WTO and Developing Countries," 4, (2000).
- ²⁵⁸ Report of the Commission on Intellectual Property Rights, *Integrating Intellectual Property Rights and Development Policy*, (2002), http://www.iprcommission.org/papers/pdfs/final_report/CIPRfullfinal.pdf.
- ²⁵⁹ Lord Sydney Templeman, *Intellectual Property*, *Journal of International Economic Law*, 1, (1998): 604.
- ²⁶⁰ Ryan, "Useful Knowledge and the Development Agenda Debate," 21.
- ²⁶¹ Xiolan Fu, "Foreign Direct Investment, Absorptive Capacity and Regional Innovation Capabilities: Evidence from China," University of Oxford, October 2007, <http://www.oecd.org/dataoecd/44/23/40306798.pdf>.
- ²⁶² Knowledge at Wharton, "Generic Drugs in Brazil Are a Hard Pill for Big Pharma to Swallow," January 16, 2006, <http://www.wharton.universia.net/index.cfm?fa=viewArticle&cid=1086&language=english>.
- ²⁶³ *Ibid*.
- ²⁶⁴ Atkinson and Andes, *The Atlantic Century*, 12.
- ²⁶⁵ Jeffrey Gettelman, "The Pirates are Winning!" *The New York Review*, October 14, 2010, 35-36, <http://www.nybooks.com/articles/archives/2010/oct/14/pirates-are-winning/>.
- ²⁶⁶ Gene Grossman and Elhanan Helpman, *Innovation and Growth in the Global Economy* (Cambridge, Massachusetts: The MIT Press, 1991).
- ²⁶⁷ Robert M. Sherwood, "Some Things Cannot Be Legislated," *Cardozo Journal of International and Comparative Law*, 10, (Spring 2002): 37.
- ²⁶⁸ Daniel D. Castro, Richard Bennett, and Scott M. Andes, "Steal These Policies: Strategies for Reducing Digital Piracy," December 2009, Information Technology and Innovation Foundation, <http://www.itif.org/events/steal-these-policies-strategies-combating-digital-piracy>.
- ²⁶⁹ Robert D. Atkinson, "ITIF Comments on the Federal Efforts Against IP Infringements," Information Technology and Innovation Foundation, 2010, <http://itif.org/publications/itif-comments-federal-effort-against-ip-infringement>.
- ²⁷⁰ Rick Harbaugh and Rahul Khemka, "Does copyright enforcement encourage piracy?" *Journal of Industrial Economics*, Vol. 58, Issue 2, (June 2010): 306-323, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1615805.
- ²⁷¹ *Ibid*.
- ²⁷² Gerwin and Kim, "Why We Need Fairer Trade," 14.
- ²⁷³ R. Rothwell, "Technology based small firms and regional innovation potential: the role of public procurement," *Journal of Public Policy*, Vol. 4, no. 4, (1984): 307-332.
- ²⁷⁴ Fraunhofer Institute, "Innovation and Public Procurement: Review of Issues at Stake," Fraunhofer Institute Systems and Innovation Research, 2005, http://cordis.europa.eu/innovation-policy/studies/full_study.pdf.
- ²⁷⁵ SITRA, "Making Finland a leading country in innovation: Final report of the Competitive Innovation Environment Development Programme," 2005, http://www.eib.europa.eu/attachments/general/events/forum_2005_article1_en.pdf.

- ²⁷⁶ Fraunhofer Institute, “Innovation and Public Procurement: Review of Issues at Stake.”
- ²⁷⁷ For additional related proposals, see: Daniel D. Castro and Robert D. Atkinson, “Ten Ideas for Policymakers to Drive Digital Progress,” *IEEE Internet Computing*, Vol. 13, no. 2, March/April 2009, <http://www.itif.org/files/IC-TenIdeas.pdf>; Daniel D. Castro and Robert D. Atkinson, “The Next Wave of E-Government,” *StateTech Magazine*, 2010, <http://statetechmag.com/events/updates/the-next-wave-of-e-government.html>.
- ²⁷⁸ Michael Grunwald, “How the Stimulus is Changing America,” *Time*, August 26, 2010, <http://www.time.com/time/nation/article/0,8599,2013683,00.html>.
- ²⁷⁹ *Ibid.*
- ²⁸⁰ U.S. Department of Commerce International Trade Administration, “Top U.S. Export Markets,” 2009, 8-35, <http://trade.gov/publications/pdfs/top-us-export-markets-2009.pdf>.
- ²⁸¹ Jakob Elder and Luke Georghiou, “Public procurement and innovation—Resurrecting the demand side,” *Research Policy*, 36 (2007): 949-963, http://dimetic.dime-eu.org/dimetic_files/EdlerGeorghiou2007.pdf.
- ²⁸² Information Technology Industry Council, “China Policy,” http://www.itic.org/index.php?src=gendocs&ref=china_policy&category=trade.
- ²⁸³ Dewey & LeBoeuf LLP for the National Foreign Trade Council, “China’s Promotion of the Renewable Electric Power Equipment Industry,” March 2010, i-vi, 27-29, May 18, 2010, <http://www.nftc.org/default/Press%20Release/2010/China%20Renewable%20Energy.pdf>; United States Trade Representative, “National Trade Estimate Report on Foreign Trade Barriers,” May 17, 2010, 1, 6, <http://www.ustr.gov/about-us/press-office/reports-and-publications/2010>.
- ²⁸⁴ Mark Lee and Bruce Einhorn, “Microsoft’s Ballmer Says China Piracy Is a Problem,” *Bloomberg BusinessWeek*, May 24, 2010, <http://www.businessweek.com/news/2010-05-24/microsoft-s-ballmer-says-china-piracy-is-a-problem-update1-.html>.
- ²⁸⁵ Gerwin and Kim, “Why We Need Fairer Trade,” 13.
- ²⁸⁶ Hedlund and Atkinson, “The Rise of the New Mercantilists,” 23.
- ²⁸⁷ Donald Purcell, “Globalization and Technology Standards: The Case for Expanded U.S. Leadership,” January 13, 2009, <http://www.itif.org/events/globalization-and-technology-standards-case-expanded-us-leadership>.
- ²⁸⁸ Hedlund and Atkinson, “The Rise of the New Mercantilists,” 23.
- ²⁸⁹ University of Colorado at Boulder, Institute of Behavioral Science, Research Program on Political and Economic Change, “The Costs of Complying with Foreign Product Standards for Firms in Developing Countries: An Econometric Study,” Working Paper PEC2004-0004, May 19, 2004, 7, <http://www.colorado.edu/ibs/pubs/pec/pec2004-0004.pdf>.
- ²⁹⁰ Hiroko Tabuchi, “Why Japan’s Cellphones Haven’t Gone Global,” *The New York Times*, July 20, 2009, <http://www.nytimes.com/2009/07/20/technology/20cell.html>.
- ²⁹¹ *Ibid.*
- ²⁹² Hedlund and Atkinson, “The Rise of the New Mercantilists,” 25.
- ²⁹³ The Chinese government sets industry standards through the Ministry of Industry and Information Technology (MIIT) and the Commission of Science, Technology, and Industry for National Defense (COSTIND), and the Standardization Administration of China (SAC) registers the standards approved by these government bodies. Richard P. Suttmeier, Ziangkui Yao, and Alex Zixiang Tan, “Standards of Power? Technology, Institutions, and Politics in the Development of China’s National Standards Strategy,” *National Bureau of Asian Research*, (January 2006): 13-14.
- ²⁹⁴ The Chinese government was involved in supporting the development of TD-SCDMA since it was based on a wireless local loop (WLL) standard originally developed by Beijing Xinwei in a joint venture with the Chinese State Planning and Reform Commission, and the Ministry of Posts and Telecom.
- ²⁹⁵ Mure Dickie, “China Poised to Make the 3G Connection,” *The Financial Times*, January 8, 2007, 16.
- ²⁹⁶ *The Economist*, “Picking winners, saving losers,” August 7, 2010, 68, <http://www.economist.com/node/16741043>.
- ²⁹⁷ The Institute of Electric and Electronic Engineers (IEEE) 802.11.
- ²⁹⁸ In the letter, jointly signed by U.S. Trade Representative Robert Zoellick, Secretary of Commerce Donald Evans, and Secretary of State Colin Powell, the U.S. expressed concern that foreign suppliers would be required to “enter into joint ventures with Chinese companies and transfer technology to them” and that “compelled investment and technology transfer would appear to be inconsistent with China’s

-
- WTO commitments.” Letter from Bush Administration Officials to Beijing Protesting Wi-Fi Encryption Standards,” *Bloomberg BusinessWeek Online*, March 15, 2004, http://www.businessweek.com/magazine/content/04_11/b3874018.htm.
- ²⁹⁹ The system is called “IT839,” which provides a “ubiquitous sensor network” encompassing eight services, three infrastructure projects, and nine new or upgraded devices.
- ³⁰⁰ Gerwin and Kim, “Why We Need Fairer Trade,” 5.
- ³⁰¹ *Ibid.*
- ³⁰² Office of the U.S. Trade Representative, “2007 National Trade Estimate Report on Foreign Trade Barriers.”
- ³⁰³ Asia-Pacific Economic Cooperation, “Information Notes on Good Practice for Technical Regulation,” 5.
- ³⁰⁴ Robert D. Atkinson and David Audretsch, “Economic Doctrines and Approaches to Antitrust,” Information Technology and Innovation Foundation, Forthcoming.
- ³⁰⁵ Alberto Pera, “Changing View of Competition, Economic Analysis and EC Antitrust Law,” *European Competition Journal*, (June 2008): 142.
- ³⁰⁶ Lee McGowan and Michelle Cini, “Discretion and Politicization in EU Competition Policy: The Case of Merger Control,” *Governance*, Vol. 12, Issue 12, (1999): 176, <http://onlinelibrary.wiley.com/doi/10.1111/0952-1895.971999097/abstract>.
- ³⁰⁷ *Ibid.*
- ³⁰⁸ William Lewis, *The Power of Productivity* (Chicago, Illinois: The University of Chicago Press, 2005, <http://www.press.uchicago.edu/Misc/Chicago/476766.html>).
- ³⁰⁹ Kim Jong-Nyun, “Korean Firms Come Out Winners from Global Crisis,” *SERI Quarterly*, Vol. 3, no. 3, July 2010, 39.
- ³¹⁰ Organization for Economic Co-operation and Development, *OECD Innovation Strategy*, 109.
- ³¹¹ A. Ciccone and E. Papaioannou “Red Tape and Delayed Entry”, *Journal of the European Economic Association*, 5(2-3), (2007): 444-458.
- ³¹² Gerwin and Kim, “Why We Need Fairer Trade,” 14.
- ³¹³ Kathy Chen and Kris Maher, “U.S. Bill on China Gains Momentum,” *The Wall Street Journal*, September 16, 2010, <http://online.wsj.com/article/SB10001424052748704652104575493791456903512.html>.
- ³¹⁴ Manatu Aorere, “New Zealand and the World Trade Organization: Non-Tariff Barriers,” January 25, 2008, <http://www.mfat.govt.nz/>.

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