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Cheating as a Way to Win the Race

INNOVATION MERCANTILISM AS THE STRATEGY OF CHOICE

Since the beginning of the Industrial Revolution, communities, states, and nations have sought to gain economic advantage, in part by ensuring that firms in their jurisdiction become more productive and innovative, but also by trying to gain advantage over neighboring jurisdictions with which they trade. For example, after World War II (WWII), U.S. states began to seriously compete with each other for jobs and investment, while European nations increasingly competed within the European Common Market. Now, as global economic integration has become much more widespread, the scope of economic competition has substantially broadened. Today, what China does affects what happens in California, and vice versa. As places around the globe compete with each other for economic advantage, their innovation capacity has become a vital element of this competition.

However, the race for global innovation advantage creates both global opportunities and threats, because countries can implement their innovation policies in ways that are either "good," "bad," or "ugly."[1] As chapter 6 explains, good innovation policies include countries increasing their investments in scientific research, incentivizing industrial research and development (R&D), promoting information technology (IT) deployment and adoption, and educating a world-class workforce. As figure 7.1 illustrates, a country's "good" innovation policies are positive for the world, as discoveries, inventions, and innovations made in one nation ultimately spill over to the benefit of citizens worldwide.

		World	
		WINS	LOSES
Country	WINS	Good	Ugly
	LOSES	Self-Destructive	Bad

Figure 7.1 The Good, Bad, Ugly, and Self-Destructive of Innovation Policy

But many countries are increasingly adopting a negative-sum, beggar-thy-neighbor, "innovation mercantilist" approach that seeks to realize innovation-based growth by manipulating global trade to boost their exports and reduce imports while forcing foreign technology and innovative activity to come to their shores. Policies such as forced technology transfer and intellectual property theft can help the nation that is implementing them but hurt the world, and hence are "ugly" (see figure 7.1). And sometimes countries adopt policies that they think will help them but which only end up hurting them (such as high tariffs on important capital goods, like computers), and thus are "bad."

But in both such cases, countries have bought into a misguided mercantilism that views exports in general and high-value-added exports in particular as the Holy Grail to economic success.[2] As Adam Smith observes 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."[3]

Classic free-trade theory holds that free trade benefits all countries by allowing each to specialize in producing the products or services for which it has comparative advantage. This in theory maximizes international economic welfare, benefiting consumers worldwide by giving them access to

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 everybody plays by the rules.

Yet, notwithstanding the benefits that accrue to all countries from free international trade, this system is under assault by a number of innovation mercantilist countries. Such nations are not as focused on innovation as they are on innovation mercantilism, specifically the manipulation of currency, markets, intellectual property (IP) rights, standards, foreign technology and direct investment, and so forth, to gain unfair advantage favoring their technology exports and companies in international trade. Their goal is not to increase the global supply of jobs, productivity, and innovative activity, but rather to induce their shift from the rest of the world to themselves through means that are sometimes "good," but that in all too many cases are either "ugly" or "bad."[4] As more and more nations adopt innovation mercantilist practices, it becomes even more compelling for additional nations to join them. As such, the most important challenge from innovation mercantilism is that it will fragment and drag down the entire global trading system. While innovation mercantilism is the dominant logic of several nations' innovation policies, China is by far the most egregious practitioner.

China: How to Win Enemies and Influence Industries through Systemic Mercantilism

Because it is the largest and most pernicious innovation mercantilist, China gets the lion's share of attention when it comes to innovation mercantilism. While China is engaged in many "good" policies (as chapter 6 describes), the Chinese government does not believe that these are enough for them to win the race—and to China, winning the race doesn't just mean winning, but beating its competitors in the process. To dominate the race, China has turned to a wide array of innovation mercantilist practices.

Perhaps China's most pervasive and damaging mercantilist practice is its rampant and widespread currency manipulation. China manipulates its currency by pegging the renminbi near to the dollar at artificially low levels in an attempt to shift the balance of trade in its favor. This currency

manipulation is a central feature of China's export-led growth strategy, designed to make its exported products cheaper and thus more competitive on international markets, while making foreign imports more expensive. The overall intent is to induce a shift of production to China, but the effect is all too often to shift production from more productive and innovative locations to a less productive and innovative one in China. And one result of refusing to spend the money it earns from exports is massive current account reserves. As of November 2011, China had accumulated $3.2 trillion worth of foreign currency reserves, a jump of 33 percent since 2009 and larger than any nation's reserves at any time in history.[5]

China has staked its political and economic stability on export-led job creation driven by artificially cheap currency that puts foreign competitors at a distinct disadvantage. As Robert Cassidy, President Clinton's assistant U.S. trade representative for Asia and China and principal negotiator of the agreement that led to China's World Trade Organization (WTO) accession, argues, "China has adopted an export-led development strategy, the centerpiece of which is a currency that is undervalued by 20 to 80 percent, with the consensus leaning toward 40 percent."[6] China's government strictly controls the flow of capital in and out of the country. Every day, China buys about $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 $30–40 billion a month to prevent the renminbi from rising.[7] This subsidizes all Chinese exports by approximately 25 to 40 percent, while placing the equivalent of a 25 to 40 percent "tariff" on Chinese imports. Such currency manipulation is a blatant form of protectionism. 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 and exceeded 11 percent of GDP, an unprecedented imbalance for a major trading country."[8]

China is not alone in intervening in markets to manipulate the value of its currency. Trade analysts at the Peterson Institute for International Economics have found that at least fifteen other countries—including Argentina, Brazil, Hong Kong, India, Indonesia, Israel, Malaysia, Singapore,

Korea, the Philippines, Taiwan, Thailand, Turkey, South Africa, and even Switzerland—also intervene in currency markets, substantially undervaluing their currencies against the dollar and other currencies.[9] In part, they do so in an effort to remain competitive with China.[10] As William Cline and John Williamson of the Peterson Institute write, "A handful of high-surplus countries are intervening in a fashion that is perverse for the reduction of international imbalances. These are the principal countries with major undervaluations of currencies (and correspondingly large excesses of current account surpluses over targets for international norms) that are nonetheless preventing market correction of currency valuation."[11] China, of course, is in that category, as it has long fixed the value of the renminbi to the dollar, but Japan, Hong Kong, Malaysia, Singapore, and Taiwan are also in this category.

Even nations with large and sustained trade surpluses manipulate their currencies, addicted to the high that below-market priced currency provides. In 2010, Japanese companies urged that their government take action to devalue the yen for fear of being undercut by exporters in China, Korea, Singapore, and Taiwan.[12] Despite the fact that Japan has run trade surpluses with the world for more than twenty-five years, on September 16, 2010, Japan intervened in world currency markets to drive down the exchange rate of the yen by selling an estimated two trillion yen ($23 billion)—at that time, the largest such intervention ever—in an effort to devalue the yen against the dollar in order to make Japanese exporters more competitive. Japan came back to the well again in August 2011, with the largest-ever single-day currency intervention, valued at an estimated 4 trillion yen ($48.29 billion).[13] Nevertheless, China is the linchpin to the system of currency undervaluation that compels other nations to also intervene in markets to manipulate the value of their currencies, and this ends up hurting European and American economies in particular, especially since neither the dollar nor the euro is manipulated for competitive advantage.

Despite the fact that currency manipulation directly violates international trade law (under International Monetary Fund rules, it is prohibited, and it may be actionable under WTO rules), virtually nothing is done to combat it. Yet currency manipulation undermines confidence in globalization by

severely distorting 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 that may have a more natural comparative advantage, thereby retarding the development of innovation globally. This is because currency adjustment is the principal way that 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 nation is the natural adjustment mechanism to restore comparative equilibrium.[14] 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 produce shared global prosperity.

But currency manipulation has another, perhaps even more destructive impact. By artificially reducing the cost of labor compared to capital, it is moving the world production system more toward labor and away from capital. In other words, it reduces global productivity because it distorts the global production system into using relatively fewer machines. The Boston Consulting Group (BCG), in an analysis of low wage competition from China and India, describes the phenomenon this way:

> In the developed world, most industries have invested heavily in automation and have also simplified product design in order to reduce labor content. In low cost countries, where high labor content is less costly than high automation, the tradeoff between capital and labor is radically altered. . . . Product design and manufacturing processes will need to be adjusted accordingly; screws may once again be cheaper than welds, and built-up assemblies may become cheaper than more complex integral designs.[15]

BCG goes on to write in biased and overblown but accurate terms, "This source of advantage is rooted in the reintroduction of skillful human hands into highly sophisticated assembly processes, replacing costly monolithic machines." The BCG report even describes how one Western company eliminated all conveyer belts in its Chinese factories. In other words, we are heading backward as a world, to an era when companies used much more hand labor. It's one thing if this process happens naturally in an unmanipulated marketplace where more labor comes onto the global marketplace.

But to artificially exacerbate this trend through currency manipulation and large subsidies hurts global productivity.

Yet currency manipulation is just one arrow in the Chinese mercantilist quiver. It has many more. One is tariffs, a process like currency manipulation, but that targets higher prices for only select imports. For example, China—despite its massive trade surplus and although it has entered into the WTO's Information Technology Agreement (ITA)-accession protocol to reduce trade barriers on IT products—places 30 percent tariffs on color video monitors with TV tuners and turntable record decks; 24.5 percent on video monitors; 20 percent on printers, copying machines, and facsimile machines; and 20 percent on video recording or reproducing apparatus.[16] Overall, China's most-favored nation (MFN) applied tariff rates (simple average of all products) of 9.6 percent are almost three times higher than America's (3.5 percent).[17] Moreover, only 46 percent of imports enter China duty-free, whereas 76.3 percent of imports enter the United States duty-free.[18]

Production and export subsidies are also among China's favored innovation mercantilist practices. 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 agreement, China spent more than $15 billion on export-enhancing subsidies for its steel industry in 2007 alone.[19] 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 China's level of exports, showing that China's unfair production subsidies have boosted the country's export performance.[20]

But China's subsidies go far beyond steel. According to Caing Statistics, over 90 percent of Chinese-owned companies listed on public markets in 2010 were granted government subsidies.[21] This compelled the U.S. Trade Representative's Office in October 2011 to counter-notify nearly two hundred Chinese subsidy programs to the WTO that China had failed to notify, the majority of them pertaining to China's solar and wind power industries.[22] Irrespective of whether or not those subsidies are found to violate the WTO, the very fact that China did not report them violates the country's

commitments under the WTO agreement. Subsidies notifications are required annually under WTO rules, so that other countries can study the subsidies and determine whether any of them violated trade rules that prohibit using government money either to help companies buy market share in other countries or to discourage imports. However, since becoming a WTO member in December 2001, China's only notification came in 2006 and was very incomplete, in part because it only addressed subsidies at the national level, but not the numerous subsidies offered by China's provinces and municipalities. As U.S. Trade Representative Ron Kirk notes, "This lack of transparency severely constrains the ability of WTO members to ensure that each government is playing by the rules."[23] And some of these subsidies are contingent upon Chinese companies not buying imported supplies. For example, the central government provided subsidy grants of $6.7 million and $22.5 million to Chinese wind turbine manufacturers that agreed not to buy imported components.[24] Such subsidies are doing extensive damage to U.S. and foreign firms in not just the clean energy but also many other industries. As Ben Santarris of SolarWorld, a German solar panel manufacturer, explains, "Pervasive and all-encompassing Chinese subsidies are decimating our industry."[25]

The Chinese government also provides tax subsidies, particularly to Chinese-owned companies to help them compete with foreign-owned companies in China. A case in point is the German enterprise software provider SAP. Because Germany's SAP does well in China's enterprise resource planning (ERP) software market, the government gives hefty tax rebates to domestic players such as the Kingdee International Software Group, which has become the biggest ERP software supplier to midsized Chinese enterprises.[26] Likewise, in an effort to favor Chinese-owned car companies, China exempted forty-nine Chinese electric and fuel cell cars from sales taxes but made sure that no imported cars were eligible for the exemption.

A principal arrow in China's mercantilist quiver is to force requirements on foreign companies with respect to intellectual property, technology transfer, or domestic sourcing of production as a condition of market access. While the WTO prohibits China from requiring companies to comply with specific provisions as a condition of market access, it is a paper tiger when it comes to requiring China to live up to the rules. More than any

nation, China can use this tactic to dramatic effect because it has such a large market of more than one billion customers to which multinational corporations desperately want to have access. Because China is still largely a technologically developing nation, forcing companies from developed nations to transfer their technology (or, in many cases, just downright stealing it) is a faster way to innovation success than engaging in the hard work to move up the technology learning curve, as European and American companies have had to do. And then China uses this newfound technological prowess to turn the tables on the "developed" companies, by combining their newly acquired advanced technology with low wages (and government subsidies) to take global market share away from them.

China is indeed the undisputed master of the joint venture and R&D technology transfer deal. China's government unabashedly forces multinational companies in technology-based industries—including IT, air transportation, power generation, high-speed rail, agricultural sciences, and electric automobiles—to share their technologies with Chinese state-owned or influenced enterprises as a condition of operating in the country. For example, Chinese officials normally force multinational companies to form joint ventures with its national champions and transfer the latest technology in exchange for business opportunities. Companies that resist are simply excluded from projects and refused permission to invest. The Chinese government uses the restrictions to drive wedges between foreign rivals vying to land big projects in the country in order to induce them to transfer their technologies that state-owned enterprises require to catch up. Although the WTO prohibits mandatory technology transfers, the Chinese government maintains that incentivized transfers, whereby companies trade technology for market access, are purely business decisions.[27] Thus, China continues to violate the WTO, only more covertly, getting the technology of developed countries and paying nothing in return. Foreign companies continue to capitulate because they have no choice; they either give up their technology or lose out to other competitors that are willing to make the essentially Hobson's choice.[28] Industrial organization economists refer to this type of market as monopsonistic: having one buyer that can set largely whatever terms it wants against competitive sellers.

One example is the evolution of China's high-speed rail market. In early 2009, the Chinese government began requiring foreign companies that wanted to bid on high-speed railway projects to form joint ventures with the state-owned equipment producers, CSR and CNR. Certainly not willing to just import the trains and equipment, China stipulated that multinational companies could hold only a 49 percent equity stake in the new companies, that they had to offer their latest designs, and that 70 percent of each system had to be made locally. Competing foreign rail manufacturers—like France's TGV, Japan's Kawasaki, and Germany's Siemens—had no choice but to go along with these stipulations, even though they realized that their joint-venture partners would soon become their rivals outside China.[29] But this was not sales; this was sales and tech transfer. The winning bidder, Kawasaki, had to develop the local supply chain for train components and teach the Chinese engineers—by sharing their entire know-how and catalog of technologies, and even bringing Chinese engineers to its Japanese manufacturing facilities for training.

While the foreign multinationals are still importing the most sophisticated components, such as traction motors and traffic-signaling systems, today they account for less than 20 percent of China's high-speed rail market. Meanwhile, CSR and CNR have acquired many of the core technologies, applied them with stunning quickness, and now dominate China's local market. Moreover, they have become major players in the $110 billion international rolling-stock market, having built high-speed railways in several developing countries, including Saudi Arabia, Turkey, and Venezuela (several for which the Chinese government has cofunded the railway modernization projects).[30] They've also made inroads in developed markets, with CNR recently winning rail contracts in Australia and New Zealand, all the while outbidding their forced mentor Kawasaki because they got much of their technology for free and then massively subsidized production and exports.

And now the Chinese companies are in negotiations to supply high-speed rail to the state of California. As the *New York Times* surreally explains, "Nearly 150 years after American railroads brought in thousands of Chinese laborers to build rail lines across the West, China is poised once

again to play a role in American rail construction. But this time, it would be an entirely different role: supplying the technology, equipment, and engineers to build high-speed rail lines."[31] Without a trace of irony about how China came to be so competitive in high-speed rail, Zheng Jian, director of high-speed rail at China's Railway Ministry, said: "We are the most advanced in many fields, and we are willing to share with the United States." And not only is China offering to build California's 215 mph bullet train, it even generously offered to finance some of the construction (no doubt out of its trade surplus with the United States). Of course, California would still have to invest billions, including for Chinese rail components and engineering services. Imagine that—America's own stimulus dollars potentially going to help deepen its trade deficit with China. But as any neoclassical economist would advise, if the free market dictates that China's firms are bringing the most attractive offer to the table, then why not?

Rail is far from the only industry where China uses unscrupulous practices against foreign multinationals. We see it in industry after industry. For example, Ford Motor Company has opened several automobile plants in China, but as a condition of access, it had to do so as part of a joint venture with Chinese automobile producer Chang'an Motors so that Chang'an could learn from Ford. Moreover, the Chinese government required Ford to establish two R&D laboratories employing at least three hundred Chinese engineers. In another gambit to squeeze advanced electric vehicle technology out of Western auto manufacturers, the Chinese government announced in September 2011 that it will not let General Motors or Ford qualify for tax incentives that Chinese residents can receive for purchasing electric cars unless GM and Ford transfer proprietary and valuable electric vehicle technology to China.[32]

The CEO of a large multinational telecommunications equipment company shared with us that he opened a large R&D facility in Beijing employing more than five hundred scientists and engineers. When asked if he did this to access Chinese engineering talent, he responded bluntly: "Unless I promised the Chinese government that I would open up an advanced technology lab there, I was told that I would not be able to sell to the Chinese telecommunications providers" (most of which are de facto controlled by the Chinese government).

China knows it can get away with these threats because its market is so large and fast growing. Another case in point involved a Chinese state-owned enterprise engaged in dumping the chemicals for a particular herbicide that a U.S. company sold (that is, selling it below what it costs to make in order to gain market share). The company told the Chinese agricultural minister that it was planning to bring a complaint before the WTO. The minister responded that if the case were brought, the company would lose access to the Chinese market. Needless to say, the U.S. firm did not bring the case, even as it continued to lose global market share and jobs in the United States.

At least these "tech transfer" efforts have the veneer of being voluntary agreements between two parties (even if one of the parties has a proverbial gun to its head). But China doesn't stop there. It engages in outright theft and in fact is the world's leading IP thief. Some might object to this term as too harsh, but it's not clear what other term to use when one party takes property from the owner without compensation.

The U.S. International Trade Commission estimates that in 2009 alone Chinese theft of U.S. intellectual property cost almost one million U.S. jobs and caused $48 billion in U.S. economic losses.[33] 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 in China are pirated.[34] That estimate is backed up by the Business Software Alliance's *Global Software Piracy Study, 2009*, which provides data on unlicensed software units as a percentage of total software units installed in a country and which finds that 79 percent of software units installed on Chinese computers have been pirated.[35] There are 240,000 Internet cafés in China that rely on illegal copies of entertainment software.[36] Chinese firms even export technology to the United States that allows users to illegally circumvent encryption protection so they can pirate video games without paying for them. As bad as it is that private citizens and companies steal foreign software, the fact that government agencies fail to legally procure—or outright pirate—products or services made by foreign companies is downright outrageous. Despite a ten-year-old government order, at least 80 percent of Chinese 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. It's no wonder the United States runs an outlandishly large trade deficit with China when U.S. consumers, businesses, and government agencies pay for their products and services, but even the Chinese government fails to pay for America's.

And China is not only going after the technology of developed countries. China's insatiable voraciousness for foreign technology includes pilfering it from impoverished developing countries as well. Consider the case of Step Technologies, a small start-up based in Accra, Ghana, that allows customers to monitor and control their home security system through mobile devices. Step Technologies partnered with a Chinese manufacturer to make the control devices for the home security system, and transmitted the technical details of what was required for the device's production to the manufacturer. However, over the next several months, Step Technologies noticed something peculiar—devices identical to Step Technologies' began appearing in the market without the company's permission and without the manufacturer paying a licensing fee. Veterans of Ghana's IT sector were unsurprised, telling us outright: "Of course the Chinese manufacturer stole the idea."[37] Despite the fact that China's gross domestic product (GDP) is 192 times greater than Ghana's (and its GDP per capita seven times greater), China is unrepentant in its systemic national strategy to take IP from whomever, and wherever, it can.

Nor is China's piracy confined to digital products; it's rampant on analog products as well. For example, the U.S. Customs and Border Protection agency found that 79 percent of imports of U.S. trademark-infringing goods came from China (and an additional 10 percent came from Hong Kong).[38] In a telling example of this "analog" piracy, the global agriculture firm Monsanto decided to open production and research facilities for advanced corn technology in China and proceeded to develop experimental fields growing genetically enhanced corn. It wasn't long, however, before the advanced corn was systematically stolen, clearly an effort by the Chinese government to gain access to the IP embedded in Monsanto's corn. Shortly after that, one Chinese producer of corn seeds saw a dramatic acceleration in its technological capabilities. In Guangzhou recently, Rob Atkinson visited an "electronics mall" (in actuality, a large building with

hundreds of independent, inefficient vendors) and saw scores of vendors selling fake iPods with the Apple logo clearly affixed (and also clearly fake). When asked if these were real, the vendors insisted that they were. Now, this was not in some back alley far away from official eyes, but within a mile of the provincial government headquarters. More recently, Chinese "entrepreneurs" even opened twenty-two fake Apple stores, unlawfully mimicking Apple's brand and logo, to the extent that its employees wore Apple branded shirts.[39]

Many in China view piracy as simply a different kind of business model. There's the make/buy IP business model, and the steal IP business model. Both are seen as legitimate. In an article in *The Journal of Science and Technology Policy in China*, edited by the Chinese Academy of Sciences, Sheng Zhu and Yongjiang Shi write about how the cell phone "cluster" in Shenzen called Shanzhai is "turning to the Shanzhai ethos, starting with producing counterfeited mobile phones to rebel against the expensive world-leading brands. . . . The Shanzhai idea of rebellion has evolved into a desire to take on global corporations by producing copies of the world leading brands."[40] The view is that this kind of rebellion is almost "Robin Hood-like" as it provides cell phones for the masses at the expense of the greedy, rich Apples, Nokias, and LGs of the world. The authors go on to note how those in central government "tend to tacit consent the phenomenon."[41]

So great is China's desire to incorporate and assimilate Western technology that it supports industrial espionage to steal trade secrets. A case in point was the charges made in 2012 by the U.S. Department of Justice against a business person with alleged links to the Chinese Communist Party. He is charged with paying former DuPont engineers for help in designing a chemical compound that Chinese firms are not yet capable of making.[42]

This kind of rampant technology theft not only hurts foreign companies (and jobs back in their home countries) it also gives Chinese companies a significant leg up on the competition because they can get IP without having to pay for it. A case in point is Autodesk, based in San Rafael, California, and the global leader in making computer-animated design software (used to design bridges, buildings, manufactured parts, and so forth) and computer-generated imagery. Autodesk's software brought you the world

of Pandora in James Cameron's *Avatar*. But now Autodesk is experiencing a Pandora's box of Chinese IP theft, finding its software widely pirated by Chinese manufacturing firms. Furthermore, Chinese firms are competing against U.S. manufacturers who have to factor the cost of the Autodesk software into the prices they charge, a cost that most Chinese manufacturers avoid. We can call this the "piracy subsidy" they enjoy, but try bringing a court case to get compensation. In China, even when the law is enforced, the penalties are usually a slap on the wrist. One example is *Wuyang Company v. Microsoft, Adobe, and Autodesk*. This was a case where Guangzhou Wuyang Steel Structure Corporation was found to have systemically used pirated copies of U.S. software from these three U.S. companies. While it is one of the few cases that have been prosecuted, the company received a fine of just 1.3 million yuan ($198,000), presumably much less than the actual value of the software it pirated.[43]

China also has used its judicial system to gain unfair advantage, designing its monopoly policies to block foreign companies from competing against entrenched domestic monopolies. For example, a monopoly controlled 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. This forced the United States to bring a case against China before the WTO in September 2010, alleging that unfair restrictions were preventing foreign companies from providing electronic payment services in China.[44] And China's new antimonopoly law has struck fear into the hearts of many U.S. and European Union (EU) antitrust experts, who fear that it will be used as a club against foreign companies operating in China.

Another way China gains unfair advantage is through its government-owned and government-influenced enterprises. Output of state-owned enterprises (SOEs) still accounts for about 40 percent of GDP.[45] And despite Chinese promises to curb SOEs, they have grown in the last decade. For example, the state-owned Assets Supervision and Administration Commission indicates that the assets of its firms have grown from the equivalent of 60 percent of GDP in mid-2003 to 62 percent of GDP in mid-2010.[46] Given their control over vast sectors of the economy, China's central and provincial governments use the power of the purse strings for unfair mercantilist practices as well. These enterprises, many of which compete directly with foreign firms, receive significant benefits from all levels of Chinese government. A major benefit is not to have to make a profit. An in-depth study by the Unirule Institute, an independent Chinese think tank, found that in 2009 the return on equity for SOEs was about half the rate of non-state-owned enterprises, a substantial "subsidy" in and of itself. But for their government granted advantages, including preferential financing from state banks and free land, Chinese SOEs would have operated at a 6.29 percent loss during the period 2001 to 2009.[47] The ability to consistently lose money amounts to a considerable subsidy compared to private foreign firms that must charge enough to make a reasonable profit.[48]

China also uses government procurement as a mercantilist tool. Though China promised to accede to the Government Procurement Agreement as soon as possible as part of its entrance to the WTO in 2001, ten years have elapsed without it doing so. China's government procurement law even includes a provision requiring that goods and services be purchased domestically. This is a considerable policy tool since at least 20 percent of goods and services in China are purchased by government.[49]

But China goes beyond just buying domestically, to preferentially buying from Chinese firms rather than foreign ones producing in China. For example, a U.S. auto manufacturer with a joint venture in China has told some of its U.S.-based suppliers that the provincial authorities where it is based have required it to source from Chinese-based and -owned suppliers. China uses the same practices in clean energy. China's government requires that most new wind energy equipment purchased by Chinese companies (most of which are state-owned anyway) be: (1) made in China; (2) based on Chinese-owned IP; and (3) compatible with Chinese technical standards. These indigenous innovation policies contributed to foreign wind turbine producers seeing their share of China's wind turbine market crater from 75 percent in 2004 to 15 percent in 2009.[50] In fact, foreign companies did not win a single central government–funded wind energy project in China between 2005 and December 2010.[51]

China went even further in 2009 with its "indigenous innovation product accreditation" scheme—a list of products invented and produced in China that would receive preferences in Chinese government procurement.[52] To

be eligible for preferences, products would have to contain Chinese proprietary IP rights. Moreover, the original registration location of the product trademark needed to be within China. Not surprisingly, almost no products made at foreign-invested Chinese facilities received accreditation. For example, of the 523 accredited products listed in the Shanghai municipal government's catalog, only 2 were made by foreign-invested enterprises (FIE)—both from Chinese-foreign joint ventures with majority Chinese ownership.[53] Of 42 products listed in the Beijing catalogue, only 1 came from an FIE. On Nanjing's list, there were none.[54]

Discriminating in government procurement on the basis of intellectual property rights lies outside accepted international practice and acts as a barrier for most foreign companies—even those that have invested significantly and manufacture in China—seeking to sell to China's significant government procurement market. But China sees it as a powerful tool to unfairly gain advantage. As Thomas Hout and Pankaj Ghemawat describe in the *Harvard Business Review*, China's goal with its indigenous innovation policy is no less than "creating a tipping point in which multinational corporations will have to locate their most-sophisticated R&D projects and facilities in China, enabling it to eventually catch up with the U.S. as the world's most advanced economy."[55]

It was only after considerable pressure from foreign companies and governments that the Chinese State Council rescinded these indigenous innovation product catalogs at all levels of government in December 2011. Whether this will have any real effect is too early to tell. The Chinese governments could very well continue to use the product catalogs as informal guides to procurement decisions.[56]

Finally, China uses discriminatory product standards to keep out foreign products and avoid paying IP royalties. Most standards are developed by a voluntary standards process led by the private sector—think Internet and e-mail standards, for example. But China wants to use standards to unfairly gain advantage and has been perhaps the world's most aggressive country in manipulating technology standards. In fact, in 2007, only 46.5 percent of China's national standards were equivalent to international standards.[57] In addition to mandating specific 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.[58] For example, China has attempted to give its wireless telecommunications equipment manufacturers and operators a competitive advantage by developing a proprietary 3G wireless standard and then forcing foreign companies to adopt it for their Chinese products and operations.[59] Thus, Datang Corporation developed China's domestic 3G standard (TD-SCDMA—Time Division-Synchronous Code Division Multiple Access) with explicit Chinese government support, little foreign participation, and without global consensus. China's goal was to force foreign telecommunications equipment manufacturers to adopt the standard in order to sell their products to Chinese service providers in China's potentially huge and lucrative 3G wireless market. Not only would they be forced to design their equipment to conform to the standard (thus raising their costs) but they also would have to pay royalties to Datang to use it.

Because the Chinese government knows that it has considerable "market power" over foreign companies due to its market's sheer size, it knows that unless challenged by other governments or the WTO, it has significant leeway in unilaterally setting standards that favor domestic firms and force foreign ones 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 as the wireless protocol for all computers sold in China, even though the international standard, WiFi, already included four different security methods. While the government claimed that WAPI was justified because it was more secure than the existing standard, the consensus is that, in fact, it is a technically inferior standard.[60] Its true motivation was to force foreign companies to pay licensing fees to Chinese companies and to surrender U.S. technology. In particular, before American companies could use the standard, they needed to obtain the encryption algorithms, which required them to give up proprietary technical specifications to their Chinese competitors. It took the U.S. government threatening to file a WTO complaint against China for violating the WTO's Technical Barriers to Trade Agreement (for creating a standard that constituted a trade barrier) for China to drop its mandate.[61]

However, this has not deterred the Chinese government from continuing to support the standard by requiring that WAPI be used in all government procurement. Nor has it deterred China from trying to extend the WAPI standard (which originally applied only to computers) to mobile devices. China has now made it a de facto requirement that any mobile handset device with wireless capability sold in the country have the WAPI chip in order to receive approval for sale on the Chinese market. While manufacturers can still place WiFi chips in mobile devices, China's requirement means that companies must also include a WAPI chip (the user has to figure out which to enable). This will only add costs for handset manufacturers (and customers) while degrading the customer experience.

These are not isolated examples. In fact, there are dozens of international IT 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, many of which the Chinese government is seeking to make compulsory in products sold in China.[62] 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 none, of course. In fact, it makes IT more expensive and less effective. But China continues to manipulate technology standards so Chinese firms won't have to pay royalties on embedded foreign IP while at the same time creating indigenous technology standards that it requires to be used for products sold in China, thereby forcing foreign firms to pay royalties to Chinese firms.

Thus, while Western countries predominantly play by the rules of free trade, China is playing by its own set of rules, all the while brazenly refusing to adhere to the commitments it made under its WTO accession protocol or to enter into subsequent WTO agreements, such as the Government Procurement Agreement, despite repeated promises to do so. Charlene Barshefsky, who as U.S. Trade Representative under President Bill Clinton helped to negotiate China's 2001 WTO entry, argues that the rise of powerful state-led economies like China undermines the international trading system. When such countries decide that "entire new industries should be created by the government," they tilt the playing field against the private sector. Barshefsky argues that such mercantilist actions raise "significant

and profound—almost theological—questions about the rules [of international trade] as they exist."[63] Indeed, the threat is profound and how it evolves will determine the shape of the global economy for the next century.

Other Players in the Mercantilist Game

To be sure, China is not the only nation that relies on innovation mercantilism to gain position in the race for global innovation advantage. Argentina, Brazil, India, Malaysia, Russia, Taiwan, and Vietnam, among others, also pursue mercantilist-based, export-led growth strategies, although none to the extent of China. Again, we see these types of mercantilist practices with regard to intellectual property theft, steep tariffs on IT products and services, discriminatory procurement and regulatory practices, and export subsidies.

Take IP theft, for example. IP theft reduced global trade by 5 to 7 percent in 2007.[64] IP theft hits the United States particularly hard, as eighteen million Americas are employed in IP-intensive industries and more than half of all U.S. exports rely on IP.[65] In the United States, IP-intensive industries pay their employees nearly 60 percent more than others, and output and sales per employee are more than double those of non-IP-intensive industries.[66] But according to the U.S. Commerce Department, counterfeiting of U.S. merchandise alone is estimated to top $250 billion annually and cost the United States approximately 750,000 jobs.[67]

Yet recognition of IP rights remains a contentious issue. In 1994, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement obligated all WTO members to offer and to honor product and process patents for twenty-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."[68] But a number of countries that have pursued export-led growth practices, including Argentina, Brazil, China, and India, oppose the TRIPS Agreement, believing that TRIPS amounts to a form of "economic imperialism" on the part of developed countries.[69] Argentinean law and economics scholar Carlos Correa argues that "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."[70] This perspective is not limited to developing country proponents. A report by the United Kingdom's Commission on Intellectual Property Rights (IPR) asserted that "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."[71] And even a Lord of the British parliament claimed that the impact of TRIPS on the world economy is 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."[72]

Despite the fact that negotiators enshrined IP-access rights into TRIPS, requiring developed countries to provide incentives for their companies to transfer technology to least-developed countries, for mercantilist nations this is not enough. Despite the fact that many of the technologies these countries are using to improve their quality of life and to spur their economic growth were produced because companies and governments in developed nations invested hundreds of billions of dollars in risky R&D to create them, mercantilist developing nations want the technology for free or at a steep discount. Moreover, they already enjoy advantages from low wages and minimal regulations; on top of this they want to be able to steal technologies that developed nations have a competitive advantage in. Two reasons these countries reject TRIPS and want to continue pilfering IP from others is because it's easier than making expensive investments themselves and because, at least over the short term, IP theft works. Indeed, research by Grossman and Helpman shows that IP theft actually does help countries in the short run.[73] However, they also find that IP theft stifles the incentives of countries to embark on homegrown technology development, thus hurting countries over the long run.

Some, like New Democrat Network's (NDN) Rob Shapiro, argue that America shouldn't really worry about IP theft because "in the end, developing nations will have no other option [than] to adopt modern IP protections."[74] But to paraphrase John Maynard Keynes, in the long run, we're all dead. In other words, developing countries can do significant damage to developing economies through IP theft in the near and moderate terms.

Others argue that because China's rampant IP theft shows little sign of abating, we should just give up fighting it. Zachary Karabell argues that since China steals so much IP, it's a waste of time to try to fight it (or forced technology transfer) and that the United States would be better off just trying to stay ahead and keep developing new IP faster than the Chinese can steal it.[75] But this is as nonsensical as saying during the cold war that it made no sense to try to stop the Soviets from stealing U.S. weapons technology.

Western countries need a far more nuanced and unified approach to IP theft. While Karabell thinks we should give up altogether and Shapiro suggests that developing countries will eventually just have to give in to adopting modern IP protections, what's needed is for the United States, Europe, and Japan to: (1) make a continued and concerted push for strong IP rights in international trade agreements; (2) staunchly enforce existing IP rights; and (3) develop and adhere to a consensus among policymakers that—in contrast to what U.K. parliamentarians or its IPR Commission believes—IP protections are beneficial for developed and developing countries alike.

Ultimately, developing countries' own economic development opportunities and IP development potential are inhibited by their weak IP protections. For instance, the lack of effective protection for IP rights has limited the introduction of advanced technology and innovation investments by foreign companies in China, reducing potential benefits to local innovation capacity.[76] Likewise, Brazil's insistence on tampering with IP rights has severely damaged the development of its pharmaceuticals industry. For example, in 1999, Brazil passed its Generics Law, which allowed Brazilian 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 demonstrate that they behave within the "laws and rights" of the global economy, even Brazil's government has moved to violate the patent rights of foreign firms. During price negotiations with U.S. manufacturer Abbott Laboratories, Brazil's minister of health threatened the company's patent on Kaletra, an anti-AIDS drug, if Abbott did not lower its price on the drug in Brazil.[77] Though Abbott relented, slicing Kaletra's price in half, the damage was done.

Jorge Raimundo, president of Interfarma, the Brazilian association for scientific research, explains: "Because of the continued danger that patents will be violated, employment in Brazil's scientific research sector

dropped from twenty-four thousand in 1999 to twenty thousand 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, Korea, and other countries."[78] In other words, such policies have made the pharmaceutical industry increasingly cautious about making new investments in Brazil. Moreover, there is evidence that corporate R&D intensity is decreasing in Brazil, even as it increases in Mexico and Korea, no doubt in part due to policies like the Generics Law that have caused foreign direct investment (FDI) to depart Brazil for other destinations.[79]

But IP theft is not the only tactic in use. While a major focus of the international trading system has been to remove tariff barriers, countries have gone to great lengths to evade tariff reduction commitments and high tariffs persist on a number of high-tech products and services. For example, despite being a signatory to the WTO's Information Technology Agreement (ITA), the EU attempted to rewrite descriptions of certain IT goods in an effort to circumvent their coverage under the ITA. In 2005, the EU applied duties of 14 percent on LCD TVs larger than nineteen inches, and in 2007, it moved to allow duties on set-top boxes with a communications function, as well as on digital still-image video cameras. While the United States won this trade dispute with the EU through a favorable WTO ruling in August 2010, the case was emblematic of countries' attempts to circumvent existing trade agreements to favor domestic production.[80]

Indeed, 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 information and communications technology (ICT) goods. For example, Indonesia applies 10 percent tariffs on video game consoles and video monitors and projectors. India continues to impose tariffs of 10 percent on solid-state, nonvolatile storage devices; semiconductor media used in recording; and television cameras, digital cameras, and video camera recorders. Malaysia imposes duties of 25 percent on ink cartridges, 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.[81] In Turkey, smartphones can cost as much as $1,000, due in large part to tariffs.

Countries that are not signatories to the ITA impose even higher tariffs. Argentina imposes 26 percent duties on optical media for sound recording and 20 percent for electronic calculators and telephone sets. Brazil imposes 20 percent tariffs on cordless handset telephones, electronic calculators, and cathode-ray tube monitors. All these measures are designed to unfairly disadvantage foreign IT producers to the advantage of domestic ones—but they hurt domestic IT consumers in the process. Moreover, because they fragment global production, they result in higher prices for consumers in other nations as well.

Though not nearly as overt as China, many nations also favor domestic producers in government procurement. For example, not only has Europe long provided massive WTO-illegal subsidies to Airbus, its regional champion, it also subsidizes Airbus through pressure on airlines to purchase Airbus instead of Boeing planes. Air France, which is partially owned by the French government, operates a fleet that's 71 percent Airbus, while 62 percent of Germany's Lufthansa fleet is Airbus. Seventy-one percent of active planes for Alitalia are Airbus, while 100 percent of Iberia's (Spain's major airline) planes are Airbus. In contrast, for the top six U.S. airlines (American, Continental, Delta, Southwest, US Airways, and United), just 15 percent of active planes are Airbus; the rest are largely Boeing. One might argue—wrongly, as it would turn out—that American airlines are biased toward Boeing, just as European carriers are biased toward Airbus. But we see similar market share in other parts of the world. Just 15 percent of All Nippon Airways (ANA) and Japan Airlines planes are Airbus. Korean Air, Malaysia Airlines, and Singapore Airlines buy 22 percent, 29 percent, and 13 percent, respectively, of their fleets from Airbus. That the overwhelming share of the European airline fleet is Airbus clearly suggests untoward government influence (designed to prevent imports) in the selection of aircraft by European carriers.

Nor is China the only country that manipulates standards to block or to limit foreign company access to their markets.[82] 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, where it has

twenty-seven votes and other countries only a single vote—to shape competition. (By that standard, the United States should have fifty votes, one for each state.) Because it's a more subtle method to gain innovation advantage than blunt-force methods like currency manipulation, standards manipulation has become an increasingly popular mercantilist tool. Yet the damage that standards manipulation does to global trade, innovation, and consumer welfare is real; the Organization for Economic Cooperation and Development (OECD) estimates that complying with country-specific technical standards can add as much as 10 percent to the cost of an imported product.[83]

A number of countries also seek to manipulate regulatory practices to gain innovation advantage by enacting discriminatory antitrust policies or by allowing anticompetitive activities on the part of their 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. For example, the EU appears to be favoring two European suppliers of enriched nuclear fuel by imposing strict limits on imports of nuclear fuel from the United States.[84] Meanwhile, in Japan, a government monopoly manages and strictly limits the import of U.S. rice into the country.

European antitrust officials (and EU courts) still adhere to a Populist approach to antitrust with a greater focus on defending the interests of producers (firms and workers), particularly those of European producers over non-European producers.[85] Europe's industrial policy approach to antitrust has been apparent since the late 1990s. In 2001, the European Commission blocked the merger of Honeywell and General Electric (GE), two U.S. technology companies, on antitrust grounds, despite the fact that the U.S. Department of Justice had already approved the deal. In the Microsoft antitrust 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 took action against Intel regarding its sales practices. It's 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.

Why Countries Pursue Innovation Mercantilism

Why have innovation mercantilist practices become so prevalent? Perhaps it's a bit like why Willie Sutton robbed banks, because that's where the money is (or at least that's where they think the money is). Countries engage in innovation mercantilism because they hold one or more of the following four beliefs: (1) that mercantilist policies work; (2) that goods, particularly exportable 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. Moreover, countries actually engage in innovation mercantilism because they know they can practice it with impunity because the global trading system as enforced by the WTO is largely toothless, akin to making bank robbers simply occasionally return only a share of their stolen money rather than pay a fine or go to jail.

First, for more than a generation, U.S. policy toward countries employing mercantilist practices has been predicated on the belief that these countries were only hurting themselves. As a consequence, the United States viewed its trade policy as benevolently trying to help these countries by explaining a bit more clearly how mercantilists only harm themselves, hoping they would see the error of their ways and abandon the practice.

But the reality is that while some mercantilist policies do not work, many do—particularly over the near term. China's mercantilist practices clearly were the principal reason the country racked up a current account (trade) surplus of an astounding $426 billion in 2008.[86] The United States' trade balance with China in 2010 was negative $273 billion; in 2011 it was negative $295 billion.[87] Had China paid for all the IP it stole or procured at a massive discount, its trade surplus would be considerably smaller.

Second, many nations believe that tradable goods constitute the only real part of the economy through which they can drive a growth multiplier and create jobs, largely discounting the crucial role boosting productivity in service sectors plays in fostering growth. Take Brazil, for example. Claudio

Nehme and Adriano Galvao, advisers to Brazil's Center for Strategic Management and Studies of Science, Technology, and Innovation, gave a presentation titled "Defining Long-Term Strategy Plans for Industry Sectors in Brazil" at the 2009 World Future Society annual conference. They identified six sectors that the Brazilian government has picked as targets of the country's national innovation strategy. Each of the sectors—such as airplanes, biotechnology, machine tools, and pharmaceuticals—involved export products, with no focus on any service sectors. When asked why there was no focus on services, they replied that services don't export as much. This is why a top official involved in Brazil's broadband plan told us that in contrast to the emphasis the government gives to these export sectors, the government pays scant attention to broadband and IT use because "they aren't export industries."

Building their economies around high-value-added, export-based sectors (such as IT or high-tech, capital-intensive manufacturing) appears to be the path that almost all developing nations—China, Brazil, India, Indonesia, Malaysia, Russia, and others—are following, right in the footsteps of Japan and the Asian tigers Hong Kong, Korea, Singapore, and Taiwan before them. Countries that systematically run large trade surpluses have bought into the perspective that exports are good (and imports bad).

Flowing from this second proposition is the third: mercantilist countries believe that the primary path to economic growth lies in replacing low-wage, low-value-added export industries with high-wage, high-value-added ones. For example, China's strategy seeks to shift from being a successful low- and middle-tech economy to a sophisticated high-tech one by cajoling, co-opting, and often coercing both Western and Chinese businesses.[88] Such countries are willing to take short-term losses in order to grow long-term, high-value-added production. In other words, these countries believe they can sacrifice short-term profits for long-term gains in international markets.

Consider the 1986 case filed by the U.S. company Zenith Radio Corp. against Japan's Matsushista Electric Industrial Co. American electronics firms alleged, accurately, 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, not only since firms in a true market economy would 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. Reflecting the received neoclassical economic wisdom that this type of alleged behavior was irrational and therefore simply could not exist, U.S. courts sided with the Japanese firms, 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 overseas. Because of this, they were able to eliminate all competitors in the United States and gain market share and potentially higher profits there as well. Japan's government encouraged such collusion because the country's leaders had decided that their society should pay a short-term societal tax (higher prices paid by Japanese consumers) to gain long-term benefits (a larger global market share for televisions made by Japanese companies). Moreover, Japanese firms faced many fewer short-term pressures from financial markets for quick profits, so they were able to endure short-term losses overseas. China and other mercantilist countries follow a similar strategy, subsidizing exports and lowering current standards of living of consumers to gain competitive advantage in a host of key industrial sectors.[89] By doing this, they hope to erode the production base of advanced industrial nations, with the goal of ultimately knocking industry after industry out of competition in order to reap long-term job and profit gains. Despite the fickle protestations of neoclassical economists that this is irrational or undesirable, this is a principal way that mercantilist countries compete. Yet, while mercantilist countries are prepared to incur short-term losses to gain long-term, high-value-added production, such an accomplishment, as we describe below, is not nearly as valuable to an economy as raising productivity levels across all industries.

Finally, some countries pursue mercantilist strategies out of a desire to realize national economic self-sufficiency. The intellectual foundation that

guides the global trading system goes back to the early nineteenth-century work of classical economist David Ricardo. In his famous theory of comparative advantage, Ricardo argued that when two nations trade, both can benefit, even if one is more productive in all industries, as long as each concentrates on the activities where it has a relative productivity advantage.

But trade theory based on conventional comparative advantage assumes that comparative advantage is a given and does not allow for policy to change it, that countries are stuck with what they have. But the "new trade theory" developed after the 1980s advances the notion of "competitive advantage" where nations can shape what they are good at in trade. In part, this can come from industries in which there are first-mover advantages (either from learning or scale economies). But even the theory of competitive advantage is supportive of trade and globalization, for according to it, countries should be exporting products and services in which they have (or want to have) competitive advantage and importing products and services in which they do not.

But the Chinese government in particular is not practicing a policy of comparative advantage or even competitive advantage; it is practicing a policy of absolute advantage. In other words, the Chinese strategy for globalization is to be dominant in virtually all industries. Autarky (a desire to become fully economically self-sufficient and free of the need to import goods or services), not trade, defines the Chinese goal. As hard as it may be for followers of Western neoclassical economics tradition to grasp, the Chinese don't want to make some things and buy others; they want to make virtually all of them (with perhaps the exception of raw material imports, like waste paper from the United States). As such, China's economic strategy consists of two main goals: (1) to develop and support all industries that can expand exports; and (2) to methodically and systemically identify imports and design strategies to reduce if not eliminate them. Chinese economic policy can be explained in terms of these two goals. Indeed, it appears that Chinese policy is to identify every single flow of money exiting the country (that is not a government-approved investment in Treasury bills or equities) to purchase foreign products or services, and shut off the spigot. This ambition is evident in China's effort to establish a domestic base of commercial, wide-body jet aircraft production and its desire to establish indigenous standards across a range of technologies so it need not make royalty payments on IP embedded in foreign technology standards. It's also clearly evident in China's cornering 97 percent of the world's production of rare earth minerals, and in cutting international exports of those minerals so that companies are pressured to produce more products requiring rare earth minerals in China.[90]

Such policies make it apparent that China fundamentally does not believe in the notion of global specialization and comparative advantage; it wants an absolute advantage in every single product category. As economic columnist Robert Samuelson explains, "The trouble is that China has never genuinely accepted the basic rules governing the world economy."[91] 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. But what China and other countries practicing innovation mercantilism must understand is that when they joined the WTO, they joined a trading system, not an exporting system.

Why Mercantilist Strategies Are Fundamentally Flawed

While some innovation mercantilist policies can benefit countries—at least for the short run—in general, they represent a fundamentally flawed strategy, hurting the overall global economy as well as the countries practicing them. Apologists for China and other innovation mercantilists contend that the best way for these countries to grow jobs and boost per capita incomes is through mercantilist policies predicated on running up massive trade surpluses. But, in fact, neither jobs nor income growth is dependent on mercantilist policies.

The need to create jobs is the number one excuse offered by China and its foreign apologists for the country's pernicious mercantilism. But while the logic that China must "keep Chinese-made products cheap, so Chinese factories will stay busy" is appealing, it is in fact flawed.[92] China (or any other mercantilist country) could achieve full employment just as readily by implementing a loose monetary policy and an aggressive fiscal policy and creating a better social safety net so citizens wouldn't feel compelled

to save most of their money. As one thorough review of the economic literature on trade and job creation explains, "In the long run, aggregate net employment largely is unaffected by international factors, whereas these factors have important allocative effects in the short and long run, both between and within detailed industries."[93] In other words, trade surpluses or deficits can change the industries and firms that jobs are located in, but they don't affect the overall number of jobs or rate of job growth over the medium term.

This is consistent with basic economics, which holds that a change in GDP equals the sum of changes in consumer spending, government spending, corporate investment, and net exports (exports minus imports): GDP = C + I + G + (Ex–Im). This is the classic formula for those who remember their macroeconomics. In other words, mercantilist countries could grow just as rapidly by pursuing a robust domestic expansionary economy that drives growth through increased domestic consumption and business investment or government spending. If countries have the right macroeconomic policies, they don't need trade surpluses to create jobs; expanded domestic activity can maintain full employment.

Even if Chinese officials were to acknowledge that they don't need mercantilist policies to create jobs, they would argue that mercantilist policies are needed for them to raise per capita incomes. The way they do this is to target "key" higher-value-added industries in which to run export surpluses. But far from generating increased incomes, export surpluses actually lower real incomes. China's $426 billion current account surplus in 2008 did not boost the nation's living standards because it represented $426 billion of value that China shipped outside its borders while getting nothing in return other than promissory notes. Consequently, China's residents are actually $426 billion poorer because if China instead had used those promissory notes to buy foreign goods and services, Chinese households would have seen on average a 17 percent increase in their disposable income.

But Chinese officials will argue that they are willing to impose a short-term diminution of income on their citizens in exchange for longer-term productivity growth. But even here, mercantilism is a flawed strategy be-

cause the lion's share of productivity growth in most nations—especially large- or medium-sized ones, like China—comes not from growing higher-productivity industries, but from all organizations and industries, even low-productivity ones, boosting their productivity. In fact, about 80 percent of an economy's productivity growth comes from organizations improving their own productivity and only about 20 percent comes from more productive organizations replacing those that are less productive.[94] This is exactly what the McKinsey Global Institute finds in its report *How to Compete and Grow: A Sector Guide to Policy*, concluding 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.[95] In other words, the productivity of a nation's sectors matters more than its mix of sectors.

We can see this when applied to China. Chinese government officials give as a major reason for their high-tech export strategy the supposed fact that they intend to get rich by shifting their industry mix toward higher-value-added, innovation-based sectors. But the amount of productivity growth generated from an industry-mix strategy is quite limited. Consider that the Chinese set a goal for the value-added of "strategic" emerging industries to reach 15 percent of overall GDP by 2020. Conservatively assuming that they are now around 4 percent of GDP and generously assuming that value-added per worker is twice as high in these industries as in the Chinese economy overall, this shift would yield a one-time productivity boost of just 1.4 percent. Assuming that the overall rate of Chinese economic growth will be 8 percent annually, this strategy of promoting strategic emerging industries, the centerpiece of Chinese economic policy, at best will generate the equivalent of fourteen months of Chinese economic growth.

But the net effect is likely to be even lower because this strategy distorts capital goods markets, which are vital to boosting productivity. We can see why by looking at the import substitution industrialization strategies that nations like India, Argentina, Brazil, and Paraguay have adopted. For example, in an attempt to create a domestic computer assembly industry, Argentina has imposed tariffs on assembled computers, though not on computer parts. But this has resulted in Argentina creating an inefficient

computer industry, with up to one-third of computers hand assembled in small shops. Likewise, Brazil's imposition of stiff tariffs on foreign computers and components in an effort to seed a domestic IT industry has only had the effect of raising the price Brazilian organizations and individuals pay for IT products and services and inhibiting the diffusion of IT throughout domestic service sectors such as financial services, retail, and transportation, causing productivity growth in these sectors to languish. India followed similar practices for many decades with similar deleterious effects.

These policies raise the price of capital investment goods, in this case, information technology goods and services, which economists classify as general purpose technologies (GPTs). GPTs are technology systems that produce spillover effects by enabling new products or services or by enhancing the productivity of downstream industries.[96] In this era, the fundamental GPT is information and communications technologies. Countries should want to acquire the best GPTs and more broadly the best capital goods they can, from wherever they are produced at the best possible price. Higher import prices, through tariffs or a manipulated currency, end up costing an economy more than it helps. For example, for every $1 of tariffs India imposed on imported IT products, it suffered an economic loss of $1.30. As Kaushik and Singh find in their study of IT adoption in India, "High tariffs did not create a competitive domestic [hardware] industry, and [they] limited adoption [of IT by Indian users] by keeping prices high."[97]

The crucial point missed by countries using mercantilist policies to build capital goods sectors, including IT industries, is that the vast majority of economic benefits from IT, as much as 80 percent, come from their widespread usage, while only 20 percent come from their production. Consider Israel, which has been held out as a poster child for high-tech development and a model for other nations of how to do it right. But Saul Lach, Gil Shiff, and Manuel Trajtenberg found that while Israel's IT 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 manufacturing and services sectors seemingly unable to benefit from the success of the IT sector, leading to the

emergence of a "dual economy." The authors conclude that "a fast-growing GPT-producing sector is not enough to guarantee sustained growth. 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."[98]

Thus, raising productivity in domestic, "less exciting" sectors of the economy such as retail trade can have outsized economic impacts. Yet many countries protect small-scale mom-and-pop stores through barriers to FDI and competitive entry, zoning laws, and restrictions on the size of stores.[99] For example, Argentina's grocery retail sector is one of the few in the world to have experienced declines in productivity growth since the early 1990s, primarily because its large, productive firms have lost market share due to extreme regulatory restrictions placed on them.[100] In this case, rather than creative destruction leading to the exit of less productive firms, Argentina sought uninspired preservation. Discriminatory policies against efficient (larger) firms coupled with the lack of enforcement of regulations on smaller and informal firms meant that less efficient firms 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 obtain 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. Furthermore, only in the larger stores does the government impose price controls on food and limit imports of certain items. Sunday work must be paid overtime in many large stores and some regions even require hardship pay increases for working in large stores.

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, carry 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. 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, Argentina has put lead weights on its efficient big-chain grocery store retailers. And by no means is Argentina alone; governments in France, India, Japan, Korea, and even some U.S. localities have likewise handicapped the most effective companies in their retail sectors. Of course, this is an example from just one industry sector. Scores of countries jealously guard many of their incumbent firms in nontraded 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.[101] Russian retail productivity more than doubled since 2000, from 15 percent to 31 percent of U.S. levels, because of the increasing market share won by more modern retailers. In Mexico, opening the food retail sector to international competition has lowered prices and increased choice. Mexico saw an explosion in the number of convenience stores (from one thousand to six thousand in five years). Mexican consumers are beneficiaries of this increased competitive intensity, as food prices have grown significantly less rapidly than other prices.

Indeed, raising the productivity of domestic nontraded sectors can have profound economic impacts. Overall productivity in India is but 8 percent of U.S. rates, in part because the productivity rates of its retail goods and retail banking sectors are just 6 percent and 9 percent of U.S. levels, respectively.[102] If India could raise productivity in these two sectors to just 30 percent of U.S. levels, it would raise its standard of living by more than 10 percent. Therefore, attracting more high-value-added export firms is not likely to be the major path to growth in the long run; countries should instead boost productivity across vast swaths of the economy, including in

sectors the are not traded internationally.[103] But it's often politically easier to turn a blind eye to IP theft, to subsidize traded industries, and to manipulate currency than it is to take on the hard political fight of supporting productivity and innovation-based transformation of domestic-serving sectors. Yet, as we explain in chapter 11, innovation mercantilism is fundamentally unsustainable if the world is to achieve a robust global innovation economy.