

Testimony of
Robert D. Atkinson
President
Information Technology and Innovation Foundation

Before the
House Committee on Foreign Affairs
Subcommittee on Terrorism, Nonproliferation and Trade

Hearing on China's Predatory Trade and Investment Strategy

July 11, 2018
Washington, DC

Good afternoon Chairman Poe, Ranking Member Keating, and members of the Committee; thank you for inviting me to share the views of the Information Technology and Innovation Foundation (ITIF) on the issue of Chinese predatory trade and investment policies and what the U.S. government should do in response.

The Information Technology and Innovation Foundation is a non-partisan think tank whose mission is to formulate and promote public policies to advance technological innovation and productivity internationally, in Washington, and in the states. Recognizing the vital role of technology in ensuring prosperity, ITIF focuses on innovation, productivity, and digital economy issues. ITF has long focused on the issue of how unfair foreign policies and practices, particularly Chinese, negatively impact the U.S. economy. I very much appreciate the opportunity to comment on these issues today.

The Existential Threat of Coerced and Purloined Chinese Technology Acquisition

Ever since the first industrial revolution advanced countries have worried about technology transfer to foreign nations. For example, it was against the law to transfer technology designs outside of Britain; something that Samuel Slater did when he memorized the plans for textile machines before immigrating to the United States and establishing the first U.S. textile mill in Rhode Island.

Today the United States leads in the so-called fifth industrial revolution (information technology) and hopes to lead in the 6th (artificial intelligence, robotics, etc.), but a major threat to our leadership is technology transfer to China. China is seeking global technology dominance in an array of advanced technology industries through an unprecedented array of predatory economic and trade policies and practices, including theft of U.S. technology and coerced transfer thereof. The world has never seen a country like China before, with its organized and strategic system of authoritarian state capitalism. It is not a market economy where firms largely dictate their own strategy and behavior. It is not a country governed by the rule of law. It is not a country constrained by global norms of acceptable economic and trade behavior. It is a country where the government is concerned with one and only one economic goal: winning in advanced technology industries by any means possible.

As ITIF has documented across a series of reports—including “False Promises: The Yawning Gap Between China’s WTO Commitments and Practices,” “Enough is Enough: Confronting Chinese Innovation Mercantilism,” and “Stopping China’s Mercantilism: A Doctrine of Constructive, Alliance-Backed Confrontation”—China has deployed a vast panoply of innovation mercantilist practices that seek to unfairly advantage Chinese advanced-industry producers over foreign competitors.¹ These practices have included forced technology transfer and forced local production as a condition of market access; theft of foreign intellectual property (IP); curtailment and even outright denial of access to Chinese markets in certain sectors; manipulation of technology standards; special benefits for state-owned enterprises; capricious cases to force foreign companies to license technology at a discount; government subsidies of Chinese companies, and government-subsidized acquisitions of foreign enterprises. U.S. and foreign enterprises across virtually every advanced technology sector—from aerospace and biotechnology to information and communications technology (ICT) products, Internet, clean energy, and digital media—have been harmed by China’s aggressive use of these types of innovation mercantilist policies and will continue to be harmed if China cannot be pressured to roll back its egregious predatory practices.

In the last few years, though, the focus of China's efforts has shifted. In 2015, Chinese President Xi Jinping unabashedly trumpeted a goal of making China the "master of its own technologies."² China's arrival at that point resulted from the evolution of Chinese economic policy over the past two decades. Up to the mid-2000s, China's economic development strategy sought principally to induce foreign multinationals to shift relatively low- and moderate-value production to China.³ It used an array of unfair tactics, including currency manipulation, massive subsidies, and limits on imports. That strategy changed in 2006 as China moved to a "China Inc." development model of indigenous innovation which focused on helping Chinese firms, especially those in advanced, innovation-based industries, often at the expense of foreign firms. Marking the shift was a seminal document called the "National Medium- and Long-term Program for Science and Technology Development (2006-2020)," the so-called "MLP," which called on China to master 402 core technologies, everything from intelligent automobiles to integrated circuits and high-performance computers.

The MLP announced that modern Chinese economic strategy sought absolute advantage across virtually all advanced technology industries. It rejected the notion of comparative advantage: which holds that nations should specialize in the production of products or services at which they are the most efficient and trade for the rest. Instead, China now wishes to dominate in the production of a wide array of advanced technology products including jet airplanes, semiconductors, computers, machine tools, robots, electric vehicles, artificial intelligence software, and pharmaceuticals. Essentially, Chinese policymakers wish to autarkically supply Chinese markets for advanced technology products with their own production while still benefiting from unfettered access to global markets for their technology exports and foreign direct investment (FDI).

In recent years President Xi has doubled down on this approach, through new promulgations such as the "Made in China 2025 Strategy," the "13th Five-Year Plan for Science and Technology," the "13th Five-Year Plan for National Informatization," and "The National Cybersecurity Strategy," among other policies. The "Made in China 2025 Strategy," for instance, calls for 70 percent local content in manufacturing components in China, while policies enumerated in documents such as the "13th Five-Year Plan for National Informatization" and "The National Cybersecurity Strategy" effectively deny access to U.S. enterprises seeking to compete in emerging ICT industries such as cloud computing in China. The "National Cybersecurity Strategy" further outlines a goal for China to become a strong cyber power by 2020, and that includes mastering core technologies, many of which the United States is currently the international leader in, such as operating systems, integrated circuits, big data, cloud computing, large-scale software services, the Internet of Things, 5G wireless systems, etc., as the country increasingly pursues a strategy of shutting out foreign competitors in the interest of advantaging domestic enterprises and industries. As the Mercator Institute for China Studies in Germany writes, "Made in China 2025 in its current form [means that] China's leadership systematically intervenes in domestic markets so as to benefit and facilitate the economic dominance of Chinese enterprises and to disadvantage foreign competitors."⁴ For instance, with regard to ICT-enabled manufacturing (i.e., "smart manufacturing") the strategy calls for 80 percent domestic market share of high-end computer numeric controlled machines by 2025; 70 percent for robots and robot core components; 60 percent for big data; 60 percent for IT for smart manufacturing; and 50 percent for industrial software.⁵

China's economic strategy can be summarized as follows: China seeks global competitive advantage in virtually all advanced industries. However, attaining that requires significant "learning" as the production "recipes" to make a jet aircraft, a computer chip, a genomics sequencer, a robot, or a biotech drug are incredibly complex and can't be obtained from scholarly journal articles or other widely available sources of scientific knowledge. The United States has gained competencies and leadership in these and a host of other industries the hard way: trillions of dollars of investment in R&D, production testing, workforce training, and other areas in order to master incredibly complex products and production systems. The Chinese government knows that if it proceeds the fair and "natural" way that it will take it many decades for Chinese firms to close the gap with global leaders. Most of their firms are too far behind to be able to catch up any time soon through organic and fair means. Hence, it has embraced a multifaceted set of policies and programs to obtain the knowledge and capabilities it needs from foreign producers; including through theft of intellectual property, forced joint ventures and technology transfer as a condition of market access; and state-subsidized purchases of or investments in foreign advanced industry firms. And once it obtains that know-how, it then proceeds to lavish subsidies and other benefits on its Chinese business champions so they can advance and scale up, while at the same time limiting foreign company market access in China. Once the Chinese champions have the protected "aircraft carrier" of a domestic market they provide subsidies and other incentives to enable their companies to launch attacks ("going out") to take market share from global leaders in non-Chinese markets.

Foreign Technology Acquisition Underpins "Made in China 2025"

At the heart of China's strategy is foreign technology acquisition. The Chinese leadership knows that if it just relies on market forces few if any foreign technology leaders will provide them with the technology Chinese firms need. Fewer would even establish factories in China, preferring instead to simply export products to China. As a result, China has deployed a panoply of tools to obtain needed foreign technology.

Intellectual property theft is one important tool in the Chinese arsenal. China has deployed industrial spies to obtain foreign secrets. As the *New York Times* documented, a leading Chinese computer chip maker allegedly paid employees of a Taiwanese chip company working with the U.S. company Micron to steal valuable chip designs.⁶ Another vector is cyber theft. Seven percent of U.S. firms operating in China listed cyber theft as a problem, a number that presumably would be higher if every firm that had faced an intrusion was aware of it.⁷ The *IP Commission Report on the Theft of U.S. Intellectual Property* found that China accounted for nearly 80 percent of all IP thefts from U.S.-headquartered organizations in 2013, amounting to an estimated \$300 billion in lost business annually.⁸ An updated 2017 Commission report put the figure at \$600 billion.⁹ Then NSA Director Keith Alexander has called Chinese IP theft, "the greatest transfer of wealth in history."¹⁰

Weak enforcement of IP law is another vector. Chinese firms can often copy and reengineer foreign technologies with impunity (what they call introducing, digesting, absorbing and re-innovating), even those technologies protected by patents. As a *MIT Sloan Management Review* article, "Protecting Intellectual Property in China," noted, "Intellectual property protection is the No. 1 challenge for multinational corporations operating in China."¹¹ According to the U.S. International Trade Commission, in 2009, U.S. IP-intensive enterprises conducting business in China reported losses of approximately \$48.2 billion in sales, royalties, or license fees due to Chinese IPR infringement.¹² In 2018, according to the American Chamber of

Commerce in China, one-quarter of surveyed U.S. companies cited “Insufficient protection offered by text of IP-related laws and regulations,” while 24 percent cited, “Difficulty prosecuting IP infringements in court or via administrative measures” as significant challenges.¹³

Another vector is to trick companies in the United States into thinking that a Chinese firm wants to invest in them. A seemingly independent Chinese investment fund will approach a small to mid-sized U.S. technology company and indicate a willingness to invest needed capital in the company. But before the Chinese company can do this, they must do due diligence and they send in employees, who turn out to work for a state-owned Chinese company) to obtain key information about the company, including trade secrets. The firm never hears back from the investment company again.

An increasingly important way for Chinese firms to gain access to needed technology is to simply buy up U.S. technology companies or invest in high-tech startups. Indeed, until recently, a not-insignificant share of Chinese foreign direct investment into the United States was in technology industries. According to Select USA, the top four industrial categories in terms of numbers of Chinese FDI projects from 2003 to 2015 were electronics, industrial machinery, software and information technology services, and communications.¹⁴ The Rhodium Group reports that over the last 16 years there has been roughly \$18 billion of Chinese FDI into ICT and electronics industries deals, with most of that in just the last few years. Of the \$4.9 billion invested in electronics, \$4.2 billion was invested in 2016, with 99.99 percent of that going to buy U.S. firms.¹⁵ Of the \$14.2 billion invested in ICT, 74 percent was made from 2014 to 2016, with more than 95 percent going to acquisitions.¹⁶ These numbers would have been considerably larger if the federal government had not informally or formally blocked some deals through the Committee on Foreign Investment in the United States (CFIUS).

The main purpose of most Chinese technology companies buying U.S. technology companies is not to make a profit, but to take U.S. technology to upgrade their own technology capabilities. The Rhodium Group notes that in the aviation sector, “The dominant player is aviation conglomerate AVIC, which is looking to the US market to upgrade its technology and other capabilities.”¹⁷ Likewise, in the electronics and electrical equipment sector, “Chinese investors are drawn to the US electronics and electrical equipment sector for building their brands, expanding their sales and distribution channels, and upgrading their innovative capacity and technology portfolios.”¹⁸ Investments in pharmaceuticals and biotechnology are “often driven by upgrading technology (such as Wuxi’s acquisition of AppTec, a laboratory services firm).”¹⁹ As one study of Chinese FDI estimated, 30 percent of the private firm deals and 46 percent of the SOE deals are motivated by technology acquisition.²⁰ The authors go on to state that Chinese acquisition of overseas firms “has become the most widely used methods [of investing overseas] for Chinese firms, largely because it provides rapid access to proprietary technology.”²¹

China has also ramped up its efforts to buy into early-stage U.S. technology start-ups. A recent report from DOD’s Defense Innovation Unit Experimental (DIUx) finds that “Chinese participation in venture-backed startups is at a record level of 10-16% of all [U.S.] venture deals (2015-2017) and has grown quite rapidly in the past seven years.”²² And some of this investment comes from venture firms that are backed by Chinese governments (federal or provincial). For example, the Zhongguancun Development Group, a state-owned

enterprise headquartered in Beijing has set up “Danhua capital” to promote the strategy of “Zhongguancun capital going global and bringing in overseas advanced technology and talents.”²³ Likewise, Shenzhen Capital Group, a purportedly private venture capital firm that has invested in at least one advanced U.S. technology company,²⁴ has actually received about 80 percent of its invested capital from the Chinese government,²⁵ and its investments are focused, not surprisingly, to match the central governments key targeted industries. The firm even boasts a chart that compares the technology allocation of its investments and how it compares to the governments priorities.²⁶

Forced Technology Transfer as a Key Weapon in the Chinese Arsenal

Dwarfing these tools is forced technology transfer. Although China’s World Trade Organization (WTO) accession agreement contains rules constraining it from tying foreign direct investment or market access to requirements to transfer technology to the country,²⁷ China routinely requires firms to transfer technology in exchange for being granted the ability to invest, operate, or sell in China.²⁸ As Harvard Business School professors Thomas Hout and Pankaj Ghemawat document in “China vs the World: Whose Technology Is It?,” Chinese technology transfer requirements as a condition of market access have affected scores of companies in industries as diverse as aviation, automotive, chemicals, renewable energy, and high-speed rail.²⁹ To be sure, because such conditions usually contravene China’s WTO commitments, officials are careful not to put such requirements in writing, usually resorting to oral communications to pressure foreign firms to transfer technology.³⁰ In 2011, then-U.S. Treasury Secretary Timothy Geithner laid such concerns about China’s technology transfer requirements, stating that “we’re seeing China continue to be very, very aggressive in a strategy they started several decades ago, which goes like this: you want to sell to our country, we want you to come produce here. If you want to come produce here, you need to transfer your technology to us.”³¹ In 2012, 23 percent of the value of all foreign direct investment projects were joint ventures.³² And the U.S.-China Business Council’s “2014 China Business Environment Survey” reports that 62 percent of companies had concerns about transferring technology to China, while 20 percent reported that they had been requested to transfer technology to China within the past three years.³³

Forced technology transfer is not new. A 1987 Congressional Office of Technology Assessment report states, “Although most U.S. firms approach the China market with the intent to sell products, many find they must include technology transfer if they wish to gain access to the China market.”³⁴ But what is new are two things. First, there are more foreign companies seeking to get in the Chinese market, such that the scale of forced technology transfer is much larger than it was two decades ago. In 2015 for example, 6,000 new international joint ventures, amounting to \$27.8 billion of FDI inflows, were established in China.³⁵

Second, the sophistication and value of the technology the Chinese government is now demanding is significantly higher than in decades past when U.S. companies could afford to give their Chinese “partners” older generations of technology, confident that the U.S. firms could innovate faster. Now for many foreign advanced industry companies, doing business in China requires transferring ever-more valuable technology to Chinese joint venture partners. In 2013, 35 percent of U.S. business respondents in China said that tech transfer requirements were a concern, and 42 percent in advanced technology industries voiced this concern.³⁶ Fifty-six percent of survey respondents who gave a response thought that tech transfer requirements were

increasing.³⁷ And as USTR points out in its 301 report on China, it is likely that these numbers are under-reported.³⁸

For example, the CEO of a large multinational telecommunications equipment company recently shared with ITIF that he opened up a large R&D facility in Beijing that employs over 500 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).

The Chinese government has employed the weapon of forced technology transfer to gain technological know-how in a variety of industries. A well-known case in point concerns high-speed rail. Over the past 15 years China built the largest high-speed rail network in the world. That massive purchase of rolling stock, signal systems, and related equipment was something no foreign rail producer could afford to ignore. As such, the Chinese government had enormous leverage to pressure foreign producers to give the Chinese state-owned enterprise competitors key technology and IP. The Chinese term for this is “exchanging market for technology.”³⁹ As Chen and Haynes document, in 2004 the State Council of China adopted a new railway development strategy that shifted from just subsidizing domestic producers in order to help them improve their technology to one where they “introduce advanced technology through joint design and manufacturing, [with an ultimate objective to] to build a Chinese brand.”⁴⁰ After that the state Ministry of Railways (MOR) launched three tenders for foreign high-speed electric trains and in each one MOR stipulated that foreign companies had to collaborate with domestic partners in the competition and had to transfer key technologies to achieve localization.¹⁶ The tender included two key conditions: to win, the bidder had to transfer technology to China and the final products had to be marketed under the Chinese state-owned enterprise rail car brand. This was all in support of the government’s “Action Plan for the Independent Innovation of Chinese High-Speed Trains.” As a result, multiple foreign train companies were pressured to transfer valuable technology to the Chinese companies (now principally one company due to the central government forcing the two main companies to merge into a powerful national champion, Chinese Railway Construction Corporation, now the largest rail producer in the world.) As Chen and Haynes write, “The result is a new HSR [high speed rail] industry in China has emerged which now serves the new vast HSR network and looks externally to export its new skill in HSR production and its new cutting-edge activity in HSR innovations.” Not only are CRCC and related Chinese companies virtually guaranteed all Chinese rail projects, but CRCC is now aggressively exporting trains and train systems containing advanced foreign technology to other nations, backed with generous export subsidies from the central government. For example, the China Export-Import Bank (a state agency) announced in 2017 the equivalent of \$30 billion in financing assistance for CRCC exports.⁴¹ (Surprisingly, the U.S. Department of Commerce International Trade Administration, in its document promoting U.S. rail export opportunities to China, makes no mention of the fact that the lion’s share of these opportunities come with forced technology transfer requirements.⁴²)

The Chinese have employed different tactics to the same end in the biopharmaceutical industry, where various policies enable Chinese firms to get access to U.S. technology. For example, the relatively short six-year term for data exclusivity, coupled with the lack of a formal definition of a “new chemical entity,” means

the Chinese government can pressure U.S. firms to turn over important data to Chinese generic drug firms. Similarly, the Chinese government requires that any drugs sold in China must go through Chinese clinical trials, even if they are approved in the United States. This extends the time for sales before a company can sell a drug by as much as 8 years, meaning that the company has only 12 years left of patent-protected sales in China before a Chinese generic company can copy the drug. Moreover, in China, unlike the United States and Europe, there is no extension of marketing exclusivity at the back end to take into account long clinical trial delays. Moreover, China also issues compulsory licenses for the intellectual property for particular drugs.⁴³ Finally, it presses foreign biopharmaceutical companies to form joint ventures if they want their drugs more easily put on the government list of drugs to qualify for reimbursement.⁴⁴

We also see this in cloud computing. China requires companies running cloud-computing operations to be locally controlled. This means that if a company like Amazon Web Services or Microsoft wants to serve the rapidly growing Chinese market it must partner with a Chinese company and sell their services under the Chinese company brand. And as part of this partnership the expectation is that the foreign cloud provider will provide the Chinese firm with technology and know-how.⁴⁵ Chinese cloud providers, like Aliyun, the cloud services unit of Alibaba, is able to establish its own data centers in the United States without any similar requirements.

The Chinese have long had policies in place requiring joint ventures with local firms in order for foreign companies to produce automobiles in China.⁴⁶ And many of those production JV requirements also include joint R&D facility requirements. The government is now doubling down on this approach in order to be the global leader in electric vehicles. For example, Renault-Nissan and Ford Motor have established joint electric-car ventures in China.⁴⁷ Indeed, the New Energy Vehicles program under Made in China 2025 strategy requires foreign companies wishing to sell in China to disclose and share valuable technology with their local joint venture partner.⁴⁸ We see this pattern in many other advanced technology industries, including wind turbines.⁴⁹

Tools to Force Technology Transfer

The Chinese have a host of tactics with which they use to pressure foreign companies to transfer technology. All involve “making them an offer they can’t refuse.” The first and most important is to set up industries that are off-limits to fully-owned foreign direct investment. China’s “Catalogue of Industries for Foreign Direct Investment” classifies industries based on categories: “encouraged,” “restricted,” “prohibited.” Other industries are considered to be “permitted.” It is in the restricted category, (which includes 35 sectors, such as automobiles, commercial aircraft, and high-value added telecommunications services) that foreign firms are legally required to partner with a domestic firm in a joint venture.

China wields a host of other weapons to help foreign firms understand that it is in their interest to share their technology. One is to bring bogus anti-trust charges against foreign advanced industry companies and then as part of the settlement make it clear that they must transfer technology to local Chinese partners.⁵⁰ And with Chinese courts largely rubber-stamping the government’s dictates, foreign companies have little choice but to comply. And, all too often, complying means changing their terms of business so that they sell to the Chinese

for less and/or transfer even more IP and technology to Chinese-owned companies, often after paying substantial fines to the government.⁵¹

Another tool is to force foreign companies operating in China to store data about Chinese users in China and turn over encryption keys and source code for inspection. Likewise, in some industries companies must disclose trade secrets as a precondition for receiving regulatory approvals for investments. Still another is to tie regulatory and licensing approvals needed for operation in China to technology transfer. Still another is to tie purchases by the state, including state-owned enterprises, to technology transfer. For example, the Commercial Aircraft Corporation of China (COMAC) requires foreign suppliers to enter into JVs with Chinese suppliers if they want to sell to COMAC.⁵²

Forced Technology Transfer is Effective

Some apologists for Chinese coercion argue that China is shooting itself in the foot with these practices and that if we are just patient the Chinese government will see the error of its ways. Their argument is that by making it so painful for foreign firms to do business in China, the foreign firms will decide to participate less in China and not transfer any technology. Clearly this is naïve at best. The Chinese government is masterful at understanding the maximum amount of pain they can impose without the foreign firm balking.

Moreover, forced technology transfer has been an extremely successful strategy for helping China catch up technologically. One recent study published by the National Bureau of Economic Research examined all international joint ventures (JV) in China from 1998 to 2007. Between 1998 and 2012, they counted 4,057 U.S. JV's in China. First, they found that the Chinese firms the government chose to be partners of foreign investors were on average the best Chinese firms in the particular industry; they were larger, more productive, and more subsidized than other Chinese firms. Second, the Chinese JV partner firm gained substantial technological capabilities from its participation in the JV, even though foreign partners usually took steps to limit the transfer of technology to the partner. Third, it was not just the joint venture firm that benefited; so did many other Chinese firms in the same industry. As the authors write, there is a high level of "technology leakage" to other Chinese firms. This should not be a surprise because the Chinese government sees JVs a tool to upgrade entire Chinese industries, not just the designated champions. Fourth, the tech transfer effect is larger if the foreign firm is a U.S. firm compared to a Japanese or Taiwanese firm. This should not be surprising as in general U.S. firms are more focused on short-term returns (something they can get if they are more accommodating to the Chinese government and Chinese industrial partners) and also because there is more domestic government pressure of firms in Japan and Taiwan to not transfer valuable technology to China.⁵³ Finally, in contrast to what promoters of China's accession to the WTO might have hoped for, the amount of technology spillovers to other Chinese firms was actually higher after the Chinese joined the WTO than before.⁵⁴

Other Steps to Gain Dominance

Once Chinese firms gain access to needed foreign technology, the next step of the Chinese strategy is to ensure that they have the capital needed to scale up. This involves direct and indirect subsidies and also designing markets protected from foreign competition, so the Chinese firms can accumulate capital. Once firms have the technology, competencies and scale to go global, the government often subsidizes global

market expansion, such as through the China Export-Import Bank (an entity the World Bank has funded) and China's Export and Credit Insurance Corporation (Sinosure).⁵⁵ Moreover, by leading to global overcapacity and selling below cost, China uses that overcapacity as a cudgel to disrupt the economics of innovation-based industries (i.e., subsidized competition prevents foreign competitors from earning reasonable profits from one generation of innovation to reinvest in future generations of innovation) and thus weaken foreign competitors, enabling Chinese firms to gain even more global market share.

The Chinese government also works to limit foreign competition for its budding national champions. For example, in the high-end equipment manufacturing sector, China maintains a program that conditions the receipt of a subsidy on an enterprise's use of at least 60 percent Chinese-made components when producing intelligent manufacturing equipment.⁵⁶ And despite the fact that China "clarified and underscored ... that it agreed that enterprises are free to base technology transfer decisions on business and market considerations" at a December 2014 meeting of the United States-China Joint Commission on Commerce and Trade (JCCT), USTR notes that China has "announced two measures relating to [local procurement of] information technology equipment used in the banking services sector and in providing Internet- or telecommunications-based services more generally."⁵⁷

China also lavishes Chinese firms that have obtained foreign technology with massive subsidies. As George and Usha Haley document in their book, *Subsidies to Chinese Industry: State Capitalism, Business Strategy, and Trade Policy*, China's game plan has long been to "aggressively subsidize targeted industries to dominate global markets." As they document, in the 2000s, China provided almost \$100 billion in subsidies to just three industries alone: \$33 billion for paper, \$28 billion for auto parts, and \$27 billion for steel.⁵⁸ China's share of global solar panel exports grew from just 5 percent in the mid-2000s to 67 percent today, with Chinese solar output turbocharged by at least \$42 billion of subsidies from 2010 to 2012 alone.⁵⁹ China now wants to replicate this strategy in other advanced-technology industries, such as semiconductors and electric batteries.⁶⁰ For instance, China's National Integrated Circuit (IC) Strategy calls for at least \$160 billion in subsidies to create a completely closed-loop semiconductor industry in China, including explicit plans to halve Chinese imports of U.S.-manufactured semiconductors by 2025 and eliminate them entirely by 2035. The "Made in China 2025 Strategy" is supported by some 800 state-guided funds to the tune of more than \$350 billion, including advanced-battery manufacturing, wide-body aircraft, and robotics.

China is Unique in Global Economic History

It is important understand how China differs from past Asian mercantilist nations. Japan and the four "Asian Tigers" (Hong Kong, Singapore, South Korea and Taiwan) all implemented mercantilist practices to leapfrog their industrialization process, including state subsidies, protected home markets, and other policies. But China is different in three fundamental ways.

First, these nations, especially Korea, Japan and Taiwan, largely closed their markets to U.S. firms, preferring to develop their own domestic champions. This reduced the leverage they had over U.S. firms to transfer their technology as a condition of market access. Moreover, it led U.S. companies to protest much more against these unfair practices since the competition was between "our companies" and "their companies." This explains why there was strong bipartisan support in Congress and the executive branch in the 1980s and early

1990s for tough action against these practices and for robust domestic competitiveness policies. U.S. businesses strongly pushed for these policies.

In contrast, China took a different tact, welcoming in (some might say seducing) U.S. companies, but holding out access to the largest market in the world in exchange for what China wanted: advanced technology. Moreover, because so many U.S. firms are now ensconced in China and would be significantly hurt if they walked away, or if the Chinese government retaliated against them for U.S. government enforcement action, most have been less than full-throated supporters of tougher enforcement action against China.

Second, Japan and the tigers were largely “rule of law” nations. While the Japanese government, for example, could exercise considerable discretion through so-called “administrative guidance,” it did have a Constitution, a legislature (the Diet), and laws that courts would enforce. This meant that not only were more of their mercantilist actions WTO-actionable, but there was a limit on how capricious and unfair the government could be. China knows no such bounds. For example, the Chinese government is too savvy and understanding of WTO legal arcana to ever put its rules on forced technology transfer in writing. It knows that if it did, this would be actionable under WTO rules. Rather, its rules are informal—known to all, but “hidden” behind face-to-face meetings and vague but ultimately clear informal messages. Moreover, when the Chinese government wants to send a message to a U.S. firm doing business in China—either to retaliate for some legitimate action the U.S. government has taken vis-à-vis China or simply to require a U.S. firm to toe the party line—it can pretty much do whatever it wants, including generating a trumped up anti-trust charge, denying permits and approvals, or otherwise making life difficult for a U.S. company.

Finally, Japan and the Tigers were not only allies of the United States, they benefited from and required the U.S. security umbrella. Without U.S. protection, these nations would have to cope with military and other security challenges from China, North Korea, and Russia on their own. As such, that gave the U.S. government some leverage to challenge their more egregious policies and practices. Moreover, the technological rise of these nations never posed a military and national security threat to the United States. In fact, an increase in their economic and technological strength benefited U.S. national security. The exact opposite is the case with China, which is working vigorously to upgrade its military capabilities to be on par, if not ahead, of the United States.

What is at Stake?

Given China’s Made in China 2025 plan, it is no exaggeration to suggest that, without aggressive action, the United States may face a world within two decades where U.S. jobs in industries as diverse as semiconductors, computers, biopharmaceuticals, aerospace, Internet, digital media, and automobiles are significantly reduced due to Chinese policies unabashedly targeting domestic and global market share in those industries.

It is important to understand that the challenge to America’s leadership in technology-based industries is much different than the process of losing more commodity-based, low-skilled industries to China in the 2000s. If, for example, the value of the dollar was to fall significantly related to the yuan (and other currencies), it is possible that America could regain at least some of the production lost to China in industries

like textiles and apparel, furniture, metal parts, and other similar low- and medium-value added products. Companies could simply buy machines, set up factories, and restart production domestically in a cost-effective way. But if America's technology companies were severely weakened or even put out business, no currency decline could bring them back because competitiveness in technology industries is based less on cost and more on a complex array of competencies at the firm- and ecosystem-level. For example, a firm cannot simply buy some semiconductor equipment and start producing chips. To do that would require not just machines but deep and complex tacit knowledge embedded in the firm in workers (from the shop floor to scientists to managers) coupled with an innovation ecosystem (universities training the right talent, a network of suppliers, etc.). Once those capabilities are lost, they are essentially gone, and are very difficult to resurrect absent massive government intervention.

There is an additional reason why losing advanced technology industries is problematic. Most technology-based industries have high barriers to entry. In contrast to the t-shirt industry where entry largely requires just capital to buy sewing machines, entry into innovation-based industries requires both physical and intellectual capital. In an industry like semiconductors, for example, firms spend hundreds of millions, if not billions, of dollars developing technical capabilities to enable production. Producing the first chip of a particular generation is incredibly expensive because of the amount of R&D involved. Producing the second chip is much cheaper because only the material and labor costs are involved. In this sense, fixed costs are extremely high, but marginal costs are low. In these innovation-based industries losing market share to unfairly competing firms supported by their innovation mercantilist governments means two things. First, sales fall. This is true because global sales are largely fixed (there is only so much demand for semiconductors, jet airplanes, and other similar advanced products), and if a mercantilist-supported competitor gains market share, the market-based competitor loses share. Second, because profits decline more than sales, it is now more difficult for the market-based innovator to reinvest revenues in the next generation of products or services, meaning that the mercantilist-supported entrant has an advantage in the next generation of products. This can lead to a death spiral whereby the market-based leader can lose complete market share.

A loss of advanced technology industries has two major negative impacts on the U.S. economy. The first is on prosperity, as the average wage in these industries is approximately 75 percent higher than average U.S. wages.⁶¹ The second is on national security and the defense industrial base. U.S. defense superiority is based in large part on technological superiority. Our service men and women go into any conflict with the advantage of fielding technologically superior weapons systems. But maintaining that advantage depends on the U.S. economy maintaining global technological superiority, not just in defense-specific technologies but in a wide array of dual-use technologies. To the extent the United States continues to lose technological capabilities to China, U.S. technological advantage in defense over China will diminish, if not evaporate, as U.S. capabilities whither and Chinese ones strengthen. It is certainly a highly risky proposition to assume that the United States can continue its weapons systems superiority over the Chinese if: 1) the Chinese continue to advance, largely through unfair, predatory practices at the pace they are; and 2) the United States loses a moderate to significant share of its advanced technology innovation and production capabilities. As ITIF wrote in 2014, "The United States defense system is still the most innovative in the world, but that leadership is not assured and is in danger of failing. This decline is not only impacting defense innovation and capabilities, but also overall commercial innovation and U.S. competitiveness."⁶²

Why Action is Needed

Some have invoked the “willing-buyer, willing-seller” defense to describe the relationship between U.S. companies and their Chinese company partners, especially with regard to joint ventures and technology transfer. For example, in interview in China’s *People’s Daily*, Liu Chuntian, Professor of Law School of Renmin University of China, argues, “the transfer of technology from American companies to China is a normal business practice. It is the result of two-way choice and independent decision-making by enterprises. It cannot be regarded as a mandatory behavior of government procurement.”⁶³

There are indeed some cases where the U.S. company is willing and engages in partnerships under no duress. But in most cases, foreign companies have little real choice between doing at least some of what the Chinese government wants and leaving the market. A survey of companies conducted by the EU found that only 12 percent of respondents would have chosen their current JV structure in the absence of JV requirements.⁶⁴ As Prud’homme writes, “Foreign firms are allowed some flexibility to decide whether or not they want to comply with China’s FTT [forced technology transfer] policies. Yet all are accompanied by consequences for non-compliance.”⁶⁵ And as Hout and Ghemawat note, “Executives working for multinational companies in China privately acknowledge that making official complaints or filing lawsuits usually does little good.”⁶⁶

There is another challenge that relates to market failures. One challenge is that for many U.S. firms the negative consequences from sharing technology won’t accrue to the firm for five or ten years, while the negative consequences of not sharing technology are immediate. Given that the median tenure for a CEO at a U.S. large cap company is just five years, the rational decision for a typical CEO is to avoid the short-term pain, even if it means longer-term damage to the company.⁶⁷ The CEO will likely be gone by the time the damage is done. In the short run they get to continue to participate in the Chinese market with minimal hassle from the government. They effectively get co-opted.

A second market failure relates to spillovers. Sometimes U.S. firms share technology with Chinese firms that is not very important to them but is important to its other U.S. competitors. If a U.S. company has only a small share of the U.S. market in a particular technology, it is often willing to share that technology with its Chinese partner, knowing that this will do little to hurt its core business, but might hurt its other U.S. competitors, all the while buying goodwill with the Chinese government. Often China is able to succeed at this by focusing on second-tier players in any particular industry segment which, as McKinsey notes, “have less to lose than global giants—and everything to gain.”⁶⁸ The problem, of course, is that the U.S. company’s actions harm other U.S. companies that are still competitive in that particular technology.

Why the U.S. Government Is Justified in Pushing Back Against Chinese Innovation Mercantilism Broadly, and Forced Technology Transfer Specifically

The Chinese government defends these predatory practices on the grounds that as a sovereign nation it has the right to build its own advanced industries. The state-run *Global Times* newspaper wrote that it’s “our sovereign right to develop high-tech industry and it is connected to the quality of rejuvenation of the Chinese nation. It will not be abandoned due to external pressure.”⁶⁹

It is China's sovereign right to do so the way they are doing it: as long as they are not members of the World Trade Organization. But when China joined the WTO it made a binding set of commitments to live by that at least in the spirit, if not the letter, of the law made these practices a violation of that commitment.⁷⁰ So if China insists on its right to practice predatory practices with impunity, it should withdraw from the WTO.

Others argue that China is justified in its practices because it faces pressures to modernize. As an article from Australia's Lowy Institute writes, "what is not negotiable for China is relinquishing the ambition of becoming a global leader in advanced technology industries. That is central to its economic progress as Chinese wages rise, the workforce begins to contract, and its labour-intensive manufacturing moves to other countries."⁷¹ Likewise, a Council on Foreign Relations blog states that China's "ambition makes sense within the context of China's development trajectory: countries typically aim to transition away from labor-intensive industries and climb the value-added chain as wages rise, lest they fall into the so-called 'middle-income trap.'"⁷²

But these views are wrong on two grounds. First, as the McKinsey Global Institute report *How to Compete and Grow: A Sector Guide to Policy* shows, per-capita income growth is overwhelmingly related to the ability to raise productivity in all industries, and not from changing an economy's industrial mix toward higher value-added industries.⁷³ Moreover, the so-called middle income trap is largely a myth.⁷⁴ Developing nations are not consigned to this trap; they can get out of it by raising productivity across the board in all industries.

Second, even if China wants to grow its technology economy, the key problem is the way in which they are going about it. The major problem with Made in China 2025 is the vast panoply of illegal, unethical, and unfair means China employs to reach its goals, which damage not only U.S. firms and workers, but the global innovation economy.

Limits of the WTO

One major barrier to getting China to roll back its predatory practices is that the World Trade Organization is not designed to deal with nations like China. The entire WTO framework, including its dispute settlement process, is premised on governments abiding by the rule of law and there being a fundamental separation between the state and the private sector. Neither is true in China. If something is in a law that is problematic, the WTO can rule against it. But that is not how China works and the Chinese are extremely canny on designing measures that can avoid triggering successful WTO challenges. As Harvard Law Professor Mark Wu notes, the lines between what is public and private in China blur, at least from a WTO perspective. He goes on to ask, "These scenarios remain complicated. Would SASAC's ability to remove the firm's top management or the NDRC's coordination on sector-specific policy suffice to render the firm a "public body?" For example, in China private banks often provide subsidies to an exporter because of informal demands from the government. As Wu writes, "At the heart of this challenge is the fact that China's economic structure is *sui generis*, having evolved in a manner largely unforeseen by those negotiating WTO treaty law."⁷⁵

Second, also another problem is that given the WTO's limited capacity, it can realistically handle only about two-dozen major trade dispute cases annually, meaning China can flood the zone with a gauntlet of unfair practices that could simply never get adequately adjudicated under WTO auspices.

Finally, the U.S. government relies on firms to provide specific evidence of the unfair policies and harms. But U.S. firms know that if they cooperate with the USTR in a case against China they will face retaliation. As one corporate counsel related to me, representatives from their company met with the minister of a Chinese agency to complain about an egregious and predatory action from the Chinese government and warned that if this did not stop that the firm would go to USTR to imitate a WTO case. The minister told the company representatives that they certainly had every right to do that, but that if they did that they would never sell another product in China again. Needless to say, the U.S. company “turned the other cheek” and did not initiate the case.

This is not to say that more cases could not be effectively brought before the WTO, but there should be no illusion that as an institution that WTO can do more than push back at the margin. As such USTR should develop WTO “non-violation nullification and impairment” claims that would assert the United States is being denied the benefits of reasonably expected market access. The claims can contend that China’s manifold mercantilist policies undercut and undermine the benefits and rights the United States thought it was getting when it assented to China joining the WTO. If that fails to produce satisfactory results, ultimately, the United States with its allies should consider establishing an alternative organization that can and will do the job. Nations that are governed by the rule of law and which do not put predatory practices at the center of their economic strategies would be welcomed to join. Others would be excluded, at least until they reformed enough to comply.

What the U.S. Federal Government Should Do

The main approach now being tried is tariffs under Section 301 authority. The Trump administration has announced placed tariffs on Chinese exports (including products ranging from aircraft to chicken incubators) and has announced his intention to add to that, But it is not clear what the administration’s strategic goal is. Is it to reduce the trade deficit with China? Is it to restore production in traditional sectors, such as steel and autos? Or is it to pressure China to roll back egregious “2025” practices that threaten America’s advanced industries? In our view, the goal should be the latter.

Regardless, any effective campaign to roll back Chinese innovation mercantilism will require a concerted joint campaign with our allies. The United States should be doing much more to develop such a coordinated agenda with like-minded allies.

In any case, the U.S. government can and should take a number of steps on its own. And there are steps Congress could take to help roll back Chinese innovation mercantilism. The first relates to boosting the institutional capacity of the federal government to understand and address these issues. The House should introduce and pass a companion to the National Economic Security Strategy Act of 2018 (S 2757). By requiring the administration to develop a national economic strategy to support the national security strategy, the legislation will not only help the administration make stronger connections between economic security and national security, it will help identify challenges and policy needs. By focusing attention not only on the strengths and weaknesses within American industry related to national security broadly defined, but also on the threats from other nations, policymakers will be better prepared to take the decisive steps that are required. ITIF has also published a list of proposals for legislative and administrative actions that would help

with trade enforcement.⁷⁶ Congress should also pass the Foreign Investment Risk Review Modernization Act (FIRRMA), to modernize CFIUS. It should instruct USTR to bring a WTO case against China over its ongoing failure to publish thousands of trade-related final measures, including subsidies, in a single official journal as it's required to do under WTO rules. One reason it's been difficult to bring subsidy cases against China at the WTO is that China fails to properly publish its subsidies. Getting the WTO to enforce China's publication requirements would make it possible to bring additional WTO cases for subsidy or other violations, such as forced IP or technology transfer.

The United States also needs a new regime to contest China's strict technology-licensing laws. Under Chinese contract law and technology import-export regulations (or TIER), a foreign licensor into China is obligated to offer an indemnity against third-party infringement to the Chinese licensee.⁷⁷ In other words, a foreign licensor licensing into China has to provide insurance that practicing the licensed technology does not infringe any IP held by a third party. But, under TIER, this legal obligation only attaches to "technology import contracts." That is, this obligation only attaches to a foreigner licensing technologies into China; the Chinese licensor has no such obligation. This discriminates against foreign licensors. The foreign licensor is legally bound to offer something that the Chinese licensee is not, making it difficult for small companies, companies which may experience high litigation risks in China's litigious environment, and companies engaged in collaborative research and development (such as cross-licensing, open-source licensing, and charitable activities) to arrive at mutually beneficial licensing agreements. TIER makes it almost impossible for small companies, such as start-ups, to license their breakthrough technologies in China, because no start-ups (due to their limited resources) would be able to conduct the complex analysis required by China's high-litigation environment and industrial policies that limit the value of foreign IP in order to offer insurance against third-party infringement disputes. While large multinational companies could avoid this issue by licensing technology (e.g., through their China-based subsidiaries), start-up companies cannot do so because they typically do not have subsidiaries in China. Consequently, the impact of the mandatory indemnification requirement on small- and medium-sized companies, and especially start-ups, is particularly acute.

Another provision in TIER mandates that in technology-import contracts, improvements belong to the party making the improvements, which typically is the Chinese licensee. Thus, foreign licensors, including U.S. firms, cannot negotiate to own any improvements or to share the improvements with Chinese licensees, even if both licensing parties desire for the improvements to be shared or owned by the foreign licensors. Moreover, TIER prohibits any technology-import contracts to "unreasonably restrict the export channels" of the Chinese licensee, thereby impeding the ability of the two licensing parties to allocate markets as they see mutually beneficial. Put simply, U.S. companies are obligated under TIER to let Chinese firms own the improvements and cannot freely negotiate with Chinese entities.

To address this discrimination, Congress should enact a regime whereby if Chinese entities seek licenses in the United States, then the Chinese enterprise must license on the same terms by which foreigners are required to license into China. Such legislation would specifically require the Chinese licensor to offer an indemnity against infringement by the U.S. licensee and to stipulate that the U.S. licensees are entitled to own the improvements they make and receive a reasonable market allocation under the licenses. Another possible approach would be for Congress to pass legislation requiring that the U.S. company whose original

technology was improved by the Chinese entity receives an automatic exclusive license to use that improved technology [in the United States], such that the full potential of the original technology owned by the U.S. companies is not encumbered by improvements owned by the Chinese entity. Although technology-licensing law is usually a matter of state contract law, the legislation would be enacted pursuant to Congress's power to legislate international commerce.

There are other ideas that are at least worth considering and developing further. The United States could limit Chinese student visas to the United States. It could limit ongoing science and technology cooperation with China. The administration could take a hard line on limiting most Chinese investment in the United States, including in Chinese-backed tech accelerators.⁷⁸ It could prohibit Chinese firms that are stealing IP from accessing the U.S. banking and financial system. It could deny Chinese-headquartered enterprises access to listing on U.S. stock exchanges if they fail to provide financial statements in line with generally accepted accounting principles. It could build an "inspection wall" against counterfeit and pirated Chinese goods, with the goal of stopping them all. China accounts for 87 percent of counterfeit goods seized each year, with costs estimated to be between \$30 and \$40 billion.⁷⁹ These kinds of steps could be employed to gain more leverage in negotiations to roll back some of China's most egregious innovation mercantilist actions, including forced technology transfer and massive subsidies.

The federal government should also work to establish a deeper North American supply chain, as at least somewhat of an alternative to the Chinese supply chain. This would entail maintaining (if not improving) NAFTA and expanding it to other Latin American nations.

It should also consider ramping up the use of anti-trust policies to discipline Chinese actions. Unfortunately, our antitrust regime is like the WTO: it is premised on the view that it is private companies that are in the driver's seat and call the shots, not sovereign nations. For example, China has abused the doctrine of "foreign sovereign compulsion" to justify anticompetitive behavior that has harmed U.S. interests, even though it initially passed muster in U.S. courts. In 2016 the U.S. Second Circuit of Federal Appeals threw out a case against Chinese vitamin C makers alleged to have conspired to fix prices and limit supplies in international markets, including in the United States, on grounds that the behavior was directed by the Chinese government and thus wasn't actionable under U.S. antitrust law because deference must be given to the official policies of foreign governments (i.e., the foreign sovereign compulsion defense). While this verdict was recently reversed by the U.S. Supreme Court, Congress should curb foreign governments' ability to abuse the foreign sovereign compulsion defense for these kinds of mercantilist ends.⁸⁰ One way to do so would be to require courts to give consideration to the implications for U.S. industries' global competitiveness in cases involving the foreign sovereign compulsion defense.⁸¹ Congress should also call on the administration to eliminate a regulation that exempts mergers involving Chinese state-owned enterprises from having to be announced in accordance with U.S. antitrust law.⁸²

Congress should also pass legislation that would allow firms to ask the Department of Justice for an exemption to coordinate actions regarding technology transfer and investment to other nations. One of the key levers China has is that it's a monopsonist: its market is so large it can pressure foreign companies to hand over technology in order to sell their products in China. But if companies in similar industries can jointly

agree that none of them will transfer technology to China to gain market access, then the Chinese government will have less leverage over them. The same would be true if companies agreed that they would not invest in China until China improved its IP protections. Such an amendment to antitrust law would be similar to the 1984 Cooperative R&D Act, which allowed firms to apply to form pre-competitive R&D consortia.

Congress should consider going even further to stand up a new arm of DOJ's antitrust division focused on foreign government-enabled and led antitrust violations. Currently, DOJ can bring actions against foreign firms if they are found to be acting in an anticompetitive manner. DOJ needs to not only be able to but be willing to bring actions against foreign firms if their actions are helped by their state in a way that leads to anticompetitive results. In the case of China, its subsidies, forced technology transfer, IP theft, and other unfair actions give Chinese firms unfair advantages that distort markets in an anticompetitive manner. DOJ should be able to investigate cases and if they found a violation, bring those to an administrative law judge who would adjudicate the case and the damages the U.S. government could impose on the Chinese companies that benefited from the anti-competitive Chinese government policies or practices. The challenge will be that not all Chinese companies likely to have cases brought against them are involved in the U.S. market. But some are, and for the ones that aren't such a ruling would effectively preclude them from entering the U.S. market.

In summary, taking firm and strategic action against Chinese predatory, mercantilist practices is long overdue. Whether such action can be successful is an open question, given the limits of the WTO, the unwillingness of the administration to engage our allies in the fight (and often their reluctance to be in the fight), and the fact that our leverage over China is much less than it was a decade ago. But one thing is clear: not taking action will make it much easier for the Chinese government to achieve their goal of dominating globally advanced technology industries.

References:

1. Stephen J. Ezell, and Robert D. Atkinson, “False Promises: The Yawning Gap Between China’s WTO Commitments and Practices” (Information Technology and Innovation Foundation, September 2015), <https://itif.org/publications/2015/09/17/false-promises-yawning-gap-between-china%E2%80%99s-wto-commitments-and-practices>; Robert D. Atkinson, Enough is Enough: Confronting Chinese Innovation Mercantilism (Information Technology and Innovation Foundation, February 2012), <http://www2.itif.org/2012-enough-enough-chinese-mercantilism.pdf>; Robert D. Atkinson, Nigel Cory, and Stephen J. Ezell, “Stopping China’s Mercantilism: A Doctrine of Constructive, Alliance-Backed Confrontation” (Information Technology and Innovation Foundation, March 2017), <https://itif.org/publications/2017/03/16/stopping-chinas-mercantilism-doctrine-constructive-alliance-backed>.
2. Robert D. Atkinson, “China’s Strategy For Global Technology Dominance By Any Means Necessary,” *Forbes*, November 12, 2015, <http://www.forbes.com/sites/realspin/2015/11/12/chinas-strategy-for-global-technology-dominance-by-any-means-necessary/#11b91b207242>.
3. Atkinson, “Enough is Enough.”
4. Jost Wübbke et al., “Made in China 2025: The Making of a High-Tech Superpower and Consequences for Industrial Countries” (Mercator Institute for China Studies, December 2016), https://www.merics.org/fileadmin/user_upload/downloads/MPOC/MPOC_Made_in_China_2025/MPOC_No.2_MadeinChina_2025.pdf.
5. Joseph Nahm, “China’s Specialization in Innovative Manufacturing” (power point, National Academies of Sciences Innovation Policy Forum, Washington, DC, May 23, 2017).
6. Paul Mozur, “Inside a Heist of American Chip Designs, as China Bids for Tech Power,” *The New York Times*, June 22, 2018, <https://www.nytimes.com/2018/06/22/technology/china-micron-chips-theft.html>.
7. The Intellectual Property Commission, *The Report of The Commission on the Theft of American Intellectual Property*, (United States: The National Bureau of Asian Research, 2017), 11, http://www.ipcommission.org/report/ip_commission_report_052213.pdf.
8. Ibid.
9. The Intellectual Property Commission, Update to the IP Commission Report, *The Theft of American Intellectual Property*, (United States: The National Bureau of Asian Research, May 2013), 11, http://ipcommission.org/report/IP_Commission_Report_Update_2017.pdf
10. Keith B. Alexander, “Cybersecurity and American Power” (conference presentation hosted by the American Enterprise Institute, Washington, D.C., July 9, 2012).
11. Andreas Schotter and Mary Teagarden, “Protecting Intellectual Property in China” *MIT Sloan Management Review*, June 17, 2014, <http://sloanreview.mit.edu/article/protecting-intellectual-property-in-china/>.
12. Katherine Linton, Alexander Hammer, and Jeremy Wise, China: Intellectual Property Infringement, Indigenous Innovation Policies, and Frameworks for Measuring the Effects on the U.S. Economy (U.S. International Trade Commission, November 2010), <http://www.usitc.gov/publications/332/pub4199.pdf>.
13. Ibid, 30.

-
14. Select USA, "Foreign Direct Investment (FDI) China," accessed July 3, 2018, http://selectusa.commerce.gov/country-fact-sheets/China_Fact_Sheet.pdf.
 15. Rhodium Group, "Chinese Investment Monitor," accessed July 4, 2018, <http://rhg.com/interactive/china-investment-monitor>.
 16. Ibid.
 17. Thilo Hanemann, Daniel H. Rosen, and Cassie Gao, "Two-Way Street: 25 Years of US-China Direct Investment" (report, US-China FDI Project, Rhodium Group and the National Committee on U.S.-China Relations, in partnership with the American Chamber of Commerce in Shanghai and the China General Chamber of Commerce, 2016), http://rhg.com/wp-content/uploads/2016/11/TwoWayStreet_FullReport_En.pdf.
 18. Bijun Wang and Huiyao Wang, "Chinese Manufacturing Firms' Overseas Direct Investment (ODI): Patterns, Motivations and Challenges" *Rising China: Global Challenges and Opportunities*, (August 2011), 99, <http://ssrn.com/abstract=1907170>.
 19. Ibid, 103.
 20. Ibid, 110.
 21. Ibid, 111.
 22. Michael Brown and Pavneet Singh, "China's Technology Transfer Strategy: How Chinese Investments in Emerging Technology Enable a Strategic Competitor to Access the Crown Jewels of U.S. Innovation, (Washington, DC: Defense Innovation Unit Experimental DIUx, January 2018), [https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_\(1\).pdf](https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_(1).pdf).
 23. "Zhongguancun Development Group," accessed July 3, 2018, http://www.zcggroup.com.cn/business/overseas_funds.html.
 24. "Shenzhen Capital Group Made 6 New Investments in March 2018," Shenzhen Capital Group Co, accessed July 7 2018, <http://www.szvc.com.cn/english/a/20180409/2388.shtml>.
 25. "Government Backed Funds," Shenzhen Capital Group Co, accessed July 7, 2018, <http://www.szvc.com.cn/english/OurBusiness/FundManagement/GovernmentBackedFunds/index.shtml>.
 26. "Investment Portfolio," Shenzhen Capital Group Co, accessed July 7, 2018, <http://www.szvc.com.cn/english/OurBusiness/Investment/InvestmentPortfolio/index.shtml>.
 27. These steps were clearly laid out in the protocol on the accession of the People's Republic of China.: China shall, upon accession, comply with the TRIMs Agreement, without recourse to the provisions of Article 5 of the TRIMs Agreement. China shall eliminate and cease to enforce trade and foreign exchange balancing requirements, local content and export or performance requirements made effective through laws, regulations or other measures. Moreover, China will not enforce provisions of contracts imposing such requirements. Without prejudice to the relevant provisions of this Protocol, China shall ensure that the distribution of import licenses, quotas, tariff-rate quotas, or any other means of approval for importation, the right of importation or investment by national and sub-national authorities, is not conditioned on: whether competing domestic suppliers of such products exist; or performance requirements of any kind, such as local content, offsets, the transfer of technology, export performance or the conduct of research and development in China."
 28. Congressional-Executive Commission on China, "China's Working Party Report," (November 2011), 49, <http://www.cecc.gov/pages/selectLaws/WTOimpact/wkptrptPRCWTO.php>; Atkinson, Enough is Enough, 13.

-
29. Thomas M. Hout and Pankaj Ghemawat, "China vs the World: Whose Technology Is It?," *Harvard Business Review*, December 2010, <http://hbr.org/2010/12/china-vs-the-world-whose-technology-is-it/ar/1>.
 30. Wayne M. Morrison, "China-U.S. Trade Issues" (Congressional Research Service, April 2018), 38, <https://fas.org/sgp/crs/row/RL33536.pdf>.
 31. Tim Mak, "Geithner: China 'Stealing' U.S. Ideas," *Politico*, September 23, 2011, <http://www.politico.com/news/stories/0911/64275.html>.
 32. Kun Jiang, Wolfgang Keller, Larry D. Qiu, William Ridley, "International Joint Ventures and Internal vs. External Technology Transfer: Evidence from China, (Working paper, the National Bureau of Economic Research, Cambridge, Massachusetts, 2018), <http://www.nber.org/papers/w24455>.
 33. The US-China Business Council (USCBC), "USCBC 2014 China Business Environment Survey Results: Growth Continues Amidst Rising Competition, Policy Uncertainty" (USCBC, 2014), https://www.uschina.org/sites/default/files/USCBC%202014%20China%20Business%20Environment%20Survey%20Results%20%28English%29_0.pdf.
 34. U.S. Congress, Office of Technology Assessment, "Technology Transfer to China," (Washington, DC: U.S. Government Printing Office, July 1987), 6, <https://www.princeton.edu/~ota/disk2/1987/8729/872901.PDF>.
 35. Kun Jiang, Wolfgang Keller, Larry D. Qiu, William Ridley, "International Joint Ventures and Internal vs. External Technology Transfer: Evidence from China, (Working paper, the National Bureau of Economic Research, Cambridge, Massachusetts, 2018), <http://www.nber.org/papers/w24455>.
 36. AmCham China, "China Business Climate Survey Report, 2013," <https://www.amchamchina.org/policy-advocacy/business-climate-survey/2013-business-climate-survey>.
 37. Thilo Hanemann, Daniel H. Rosen, and Cassie Gao, "Two-Way Street: 25 Years of US-China Direct Investment" (report, US-China FDI Project, Rhodium Group and the National Committee on U.S.-China Relations, in partnership with the American Chamber of Commerce in Shanghai and the China General Chamber of Commerce, 2016), 10, http://rhg.com/wp-content/uploads/2016/11/TwoWayStreet_FullReport_En.pdf.
 38. Office of the U.S. Trade Representative Executive Office of the President, *Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation Under Section 301 of the Trade Act of 1974*, (Washington DC: March 2018), 22, <https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>.
 39. Zhenhua Chen, Kingsley Haynes, "A Short History of Technology Transfer and Capture: High Speed Rail in China," (November 2016), 4, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2872527.
 40. Ibid, 8.
 41. "China's High-Speed Train Maker to Get \$30 Billion for Export Push," *The Economic times*, October 3, 2017, <https://economictimes.indiatimes.com/news/international/business/chinas-high-speed-train-maker-to-get-30-billion-for-export-push/articleshow/60924380.cms>.
 42. "China- Rail and Urban Rail," Export.gov, 2017, <https://www.export.gov/article?id=China-Rail-and-Urban-Rail>.
 43. Daniel C.K. Chow, "Three Major Problems Threatening Multi-National Pharmaceutical Companies Doing Business in China," (working paper, Ohio State Public Law and Legal Theory, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3029347.

-
44. Angus Liu, "Riding on Booming Drug Sales, AstraZeneca Forms \$133M China Joint Venture," *FierceBiotech*, November 27, 2017, <https://www.fiercebiotech.com/biotech/riding-booming-drug-sales-astrazeneca-forms-133m-china-joint-venture>.
 45. Cate Cadell, "Amazon Sells Off China Cloud Assets as Tough New Rules Bite," *Reuters*, November 13, 2017, <https://www.reuters.com/article/us-china-amazon-cloud/amazon-sells-off-china-cloud-assets-as-tough-new-rules-bite-idUSKBN1DE0CL>
 46. Michael Dunne, *American Wheels, Chinese Roads: The Story of General Motors in China*, (Singapore: John Wiley & Sons, 2011).
 47. Keith Bradsher, "China's Electric Car Push Lures Global Auto Giants, Despite Risks," *The New York Times*, September 10, 2017, <https://www.nytimes.com/2017/09/10/business/china-electric-cars.html>.
 48. U.S. Chamber of Commerce, *Made in China 2025: Global Ambitions Built on Local Protections*, (Washington, DC: U.S. Chamber of Commerce, 2017), https://www.uschamber.com/sites/default/files/final_made_in_china_2025_report_full.pdf.
 49. Keith Bradsher, "To Conquer Wind Power, China Writes the Rules," *The New York Times*, December 14, 2010, <https://www.nytimes.com/2010/12/15/business/global/15chinawind.html?mcubz=3>.
 50. David Barboza, "How This U.S. Tech Giant is Backing China's Tech Ambitions," *The New York Times*, August 4, 2017, <https://www.nytimes.com/2017/08/04/technology/qualcomm-china-trump-tech-trade.html>.
 51. Hearing on Foreign Investment Climate, Before the U.S.-China Economic and Security Review Commission (2015), 8, (statement of Robert D. Atkinson, Information Technology and Innovation Foundation).
 52. United States Trade Representative, *2017 Report to Congress On China's WTO Compliance* (Washington DC: Executive Office of the President of the United States, January 2018), 34, <https://ustr.gov/sites/default/files/files/Press/Reports/China%202017%20WTO%20Report.pdf>.
 53. Kun Jiang, Wolfgang Keller, Larry D. Qiu, William Ridley, "International Joint Ventures and Internal vs. External Technology Transfer: Evidence from China, (Working paper, the National Bureau of Economic Research, Cambridge, Massachusetts, 2018), <http://www.nber.org/papers/w24455>.
 54. Ibid. p. 39.
 55. The World Bank provided the Chinese Export-Import Bank (Eximbank) funding in 2006 to "formulate a medium-and-long-term development strategy . . . including the strategic guiding ideology, the choosing of the medium-and-long-term development strategy together with feasibility analysis, the guidelines, policies and measures for the implementation of the strategic goals." The project funded experts to consult with the Bank as well as the travel of Chinese Eximbank officials overseas to study best practices, "such as export credit, trade financing, ship financing, ODA [overseas development assistance] loan and financing for small and medium-sized enterprises." World Bank, "Implementation Project of Chinese Economic Reforms: Fifth Technique Aid: Purchase Plan for Sub-project Consultation Service," November 27, 2007, 52–58, http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2007/11/27/000020953_20071127145624/Rendered/PDF/41638.pdf.
 56. United States Trade Representative, *2017 Report to Congress On China's WTO Compliance* (Washington DC: Executive Office of the President of the United States, January 2018), 12, <https://ustr.gov/sites/default/files/files/Press/Reports/China%202017%20WTO%20Report.pdf>.

-
57. Michael B. G. Froman, *2015 National Trade Estimate Report on Foreign Trade Barriers* (United States Trade Representative's Office, April 2015), 72, <https://ustr.gov/sites/default/files/2015%20NTE%20Combined.pdf>.
 58. George Haley and Usha Haley, *Subsidies to Chinese Industry: State Capitalism, Business Strategy, and Trade Policy*, (New York: Oxford University Press, 2013).
 59. Sherisse Pham and Matt Rivers, "China is Crushing the U.S. in Renewable Energy," *CNN Tech*, July 18, 2017, <http://money.cnn.com/2017/07/18/technology/china-us-clean-energy-solar-farm/index.html>.
 60. David M. Hart, "To Build a battery Industry, New York Needs Help from Washington" (Information Technology and Innovation Foundation, February 2018), <https://itif.org/publications/2018/02/06/build-battery-industry-new-york-needs-help-washington>.
 61. Luke A. Stewart and Robert D. Atkinson, "Just the Facts: The Benefits of Information and Communications Technology" (Information Technology and Information Foundation, May 2013), <https://itif.org/publications/2013/05/13/just-facts-benefits-information-and-communications-technology>.
 62. Information Technology and Innovation Foundation, "Defense Innovation and the Future of American competitiveness" <https://itif.org/publications/2014/11/25/defense-innovation-and-future-american-competitiveness>.
 63. Wang Ke, "People's Daily: The United States Has No Right to Nickname China's Compulsory High-Technology," *People's Daily*, June 22, 2018, <http://westdollar.com/sbdm/finance/news/1344,20180622892994369.html>.
 64. European Commission, *Impact Assessment Report on the EU-China Investment Relations*, (Brussels, May 23, 2013, SWD Final) 185, http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2013/swd_2013_0185_en.pdf.
 65. Ibid, 8.
 66. Thomas M. Hout and Pankaj Ghemawat, "China vs the World Whose Technology Is It?" *The Harvard Business Review*, December 2010, 5, <https://hbr.org/2010/12/china-vs-the-world-whose-technology-is-it>.
 67. Dan Marce, "CEO Tenure Rates," *Harvard Law School Forum on Corporate Governance and Financial Regulation*, February 12, 2018, <https://corpgov.law.harvard.edu/2018/02/12/ceo-tenure-rates/>.
 68. Gordon Orr and Christopher Thomas, "Semiconductors in China: Brave new world or same old story?," (article, McKinsey & Company, High Tech, August 2014), <http://www.mckinsey.com/industries/high-tech/our-insights/semiconductors-in-china-brave-new-world-or-same-old-story>.
 69. Tory Newmyer, "The Finance 202: Trump Team Faces Long Odds for Trade Breakthrough in Beijing," *The Washington Post*, May 3, 2018, <https://www.washingtonpost.com/news/powerpost/paloma/the-finance-202/2018/05/03/the-finance-202-trump-team-faces-long-odds-for-trade-breakthrough-in-beijing/5aea396330fb042db57972b2/>.
 70. Stephen J. Ezell, and Robert D. Atkinson, "False Promises: The Yawning Gap Between China's WTO Commitments and Practices" (Information Technology and Innovation Foundation, September 2015), <https://itif.org/publications/2015/09/17/false-promises-yawning-gap-between-china%E2%80%99s-wto-commitments-and-practices>.
 71. John Edwards, "US-China Trade: Joke's Over," *The Interpreter*, July 10, 2018, <https://www.lowyinstitute.org/the-interpreter/us-china-trade-joke-over>.

-
72. Adam Segal, “Why Does Everyone Hate Made in China 2025?” *Council on Foreign Relations*, March 28, 2018, <https://www.cfr.org/blog/why-does-everyone-hate-made-china-2025>.
 73. McKinsey Global Institute, “How to compete and grow: A sector guide to policy,” (McKinsey & Company, March 2010), 26, http://www.mckinsey.com/mgi/reports/freepass_pdfs/competitiveness/Full_Report_Competitiveness.pdf.
 74. Gregory M. Larson, Norman V. Loayza, Michael Woolcock, “The Missile-Income Trap: Myth or Reality?” The World Bank, (March 2016), <http://documents.worldbank.org/curated/en/965511468194956837/The-middle-income-trap-myth-or-reality>.
 75. Mark Wu, “The “China, Inc.” Challenge to Global Trade Governance,” *Harvard International Law Journal* vol. 57 no. 2 (2016), http://www.harvardilj.org/wp-content/uploads/HLI210_crop.pdf.
 76. Information Technology and Innovation Foundation, “Tech Policy To-Do List” (Information Technology and Innovation Foundation, July 2018), <https://itif.org/tech-policy-to-do-list#trade>.
 77. Article 40 of the TRIPS Agreement (as an effort to control abusive licensing practices) holds that Members agree that some licensing practices or conditions pertaining to intellectual property rights which restrain competition may have adverse effects on trade and may impede the transfer and dissemination of technology.
 78. ZGC Innovation Center, accessed July 1, 2018, <http://zgccapital.com/>.
 79. Associated Press, “Counterfeit Goods Cost the U.S. \$600 Billion a Year,” *Inc.*, February 27, 2017, <https://www.inc.com/associated-press/counterfeiters-cost-600-billion-a-year.html>.
 80. Information Technology and Innovation Foundation, “ITIF Welcomes Supreme Court Ruling in Antitrust Case” news release, June 14, 2018, <https://itif.org/publications/2018/06/14/itif-welcomes-supreme-court-ruling-antitrust-case>.
 81. Robert Atkinson, Nigel Cory, and Stephen Ezell, “Stopping China’s Mercantilism: A Doctrine of Constructive, Alliance-Backed Confrontation” (Information Technology and Innovation Foundation, March 2017). <https://itif.org/publications/2017/03/16/stopping-chinas-mercantilism-doctrine-constructive-alliance-backed>.
 82. Frank L. Fine, “China Antitrust Law Journal,” *LexisNexis*, vol. 1, issue 1, 2017, <https://www.cooley.com/-/media/cooley/pdf/reprints/2017/2017-07-05-morse-regulatory-hurdles-facing-chinese-soes.ashx?la=en>.