

Section 301 Investigation:

CHINA'S ACTS, POLICIES AND PRACTICES RELATED TO TECHNOLOGY TRANSFER, INTELLECTUAL PROPERTY, AND INNOVATION

James Lewis, Center for Strategic and International Studies, Sept. 2017

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China is now the world's second largest economy. The reforms begun by Deng Xiaoping in the 1980s have transformed the Chinese economy. Much of this is driven by rapidly growing demand from the Chinese domestic market, but it also reflects strategic decisions by China's leaders. They hope to see China take a dominant position in advanced technologies for both economic and security reasons and to advance the position of Chinese firms in the global market. The principle techniques they have used in pursuit of this objective include:

- Heavy, sustained government investment in human capital, infrastructure, and research;
- Generous subsidies along with non-tariff barriers to build national champions
- Weak regulatory barriers to business activity;
- The acquisition of foreign technology, either licitly or illicitly.

China's leaders want to move away from a dependence on foreign technology, so that China moves up the production value chain and is no longer just the assembler of other nations' intellectual property. They want China to become a leader in innovation. Since the 1980s, China has sought to build a strong technology base and has made repeated efforts to achieve this. The primary motivation is to enhance China's security and national power. Previous efforts to achieve this have not been as successful as Beijing may have hoped, but with each effort China has improved.

China's quest for technological leadership is not new. What is new is that unfair trade, security and industrial policies, tolerable in a smaller developing economy, are now combined with China's immense, government-directed investment and regulatory policies to put foreign firms at a disadvantage. With the development of human capital (after decades of spending on STEM education) for both in entrepreneurship and innovation, China is a much more formidable competitor and policies that put foreign firms at a disadvantage can no longer be justified on ground of poverty, development, repayment for 100 years of humiliation or other excuses. China now has the wealth, commercial sophistication and technical expertise to make its pursuit of technological leadership work. The fundamental issue for the U.S. and other Western nations, and the IT sector is how to respond to a managed economy with a well-financed strategy to create a domestic industry intended to displace foreign suppliers.

China is a strategic competitor and its managed economy and centrally directed industrial policies undercut market economies. In addition to ending its dependence on foreign technology, China's goal is to overtake the U.S. economically and technologically. This is not a military conflict, but it has deep implications for American security and for the future of an international system based on the rule of law and democratic norms.

If China followed international business practices, its decisions to invest in domestic industries would be unobjectionable. There would be powerful effects on the global economy, but competition is good for the market and China's economic growth is in many ways a welcome development. But China has not hesitated to use unfair practices and policies to advance its own firms, extract concessions, or block competition by foreign companies in China.

China's Five Year Plans lay out the strategic economic and technological goals that China will pursue and fund. These have had mixed success, but a steady, well-funded pursuit of its economic and technological goals is a hallmark of Chinese policy. China has a strategy to build a high-tech economy and is willing to spend heavily and consistently to achieve this. China will commit to support research and investment programs for decades. A centrally directed economy can be remarkably inefficient in making investment decisions, but China has compensated for this with heavy and sustained government spending to build industrial and innovation capacity.

Although it is a member of the World Trade Organization (WTO), China routinely ignores WTO rules. Its public justification for this is that China is still developing and should not be held strictly accountable, but this is nonsense for the world's second largest economy. Compare the treatment of U.S. companies in China to Chinese companies in the United States. When Alibaba built a data center in Seattle, it was not forced to do this as a junior partner in a joint venture, nor was it forced to provide source code to the government for review, but U.S. companies seeking to operate in China face these requirements.

China uses various tactics to achieve its technological and economic goals, such as non-tariff barriers to trade, security regulations, procurement mandates, acquisitions (both licit and illicit) of foreign technology, and strategic investments in or acquisition of foreign firms. Companies from the U.S. and other Western nations find themselves under pressure to make long-term concessions in technology transfer in exchange for market access. Chinese policy is to extract technologies from Western companies; use subsidies and nontariff barriers to competition to build national champions; and then create a protected domestic market for these champions to give them an advantage as they compete globally. Huawei is the best example of a now globally dominant Chinese company built along these lines, but there are others. A senior Chinese official once remarked that if China had not blocked Google from the China market, there would be no Baidu.

China's announcement of an indigenously produced commercial airliner illustrates Beijing's intent to move up the "value chain," build industries, and displace Western firms. In the past, China's Soviet-supplied aircraft factories made shoddy aircraft. When China opened its market, Western firms rushed to sell aircraft. Part of the requirement imposed on them for market access was coproduction, where Chinese aviation companies worked with Western aircraft firms to make parts for Western commercial aircraft or help assemble them. Coproduction, over 20 years, taught Chinese companies essential production know-how, and the quality of Chinese aircraft has improved markedly.

Much of this transfer did not involve IP theft. While IP theft, particularly as a result of hacking, attracts much attention, Foreign Direct Investment (FDI) has been the largest source of technology transfer for China. When Western aircraft companies created coproduction facilities in China, they taught Chinese workers how to build planes to Western standards. This included machining tolerances, quality of welds, and the general care taken in producing components and assembling them into an aircraft. Compare the Y-12 of the 1980s to the current Y-12F, or to China's new ARJ21 to see how production has improved. Foreign Direct Investment helped to teach Chinese companies to build to global standards.

It would be easy to attack this investment, but it is hard to see what a realistic alternative would have been for the U.S. and other nations. First, FDI has generated immense revenue for western countries. China's rise makes the world wealthier. Second, even if the U.S. had blocked FDI, other nations with advanced aircraft manufacturers would not. Finally, FDI was predicated on a very different bilateral relationship in the 1980s and 1990s, one that assumed China would become less hostile and would play by the rules of world trade as it was integrated into the global economy. Other Asian countries have used similar strategies to build industrial capacity, but they usually brought their policies into line with global norms within a few decades. China shows no sign of doing this, for reasons of both domestic politics and international strategy.

Now that China has an entry in the global airliner market, the Chinese government will be tempted to subsidize sales, to pressure domestic airlines to buy the new Chinese plane, and create barriers to foreign companies selling in China. These domestic practices, which we have seen in other industries, create a protected space for Chinese firms, giving them an edge in China and in the global market.

Semiconductors are another key industry for China and a major concern for the U.S. Since the 1960s, the United States has been the leader in semiconductor manufacturing. A strong semiconductor sector is crucial for growth in key high-tech industries and for defense, and will grow more important as more devices are connected to the internet—all will require an embedded semiconductor. Semiconductors enable a broad range of industries and serves a foundational role for critical civilian and military digital technologies.

China's national policies emphasize the creation of a domestic semiconductor industry. The emphasis appeared as early as the 'Four Modernizations' development program of the 1970s. Prior to the 1990s, China had a microelectronics industry before it opened its economy to foreign investment, but it was based on Soviet technology and was inefficient and lagged several generations behind Western firms in the products it churned out. This is no longer the case. Persistent Chinese efforts to acquire semiconductor technology, combined with non-competitive practices, could create risks for U.S. and for American companies.

In the last few years, there have been a number of efforts by Chinese companies linked in some way to the government to buy Western semiconductor firms, using a multi-billion-dollar acquisition fund created by the Chinese government. While the CFIUS process has been successful in blocking most of these efforts, China's policy to end its reliance on foreign semiconductor manufacturers by creating its own companies

has not changed and there will be continued attempts to acquire capacity. One sign of this continuing effort is the increasing Chinese investment and presence in Silicon Valley

China is still heavily dependent on foreign expertise and investment for semiconductor production, particularly from Taiwan and the U.S., but the effect of China's government-subsidized expansion in both semiconductor manufacturing and design will be to squeeze semiconductor producers in other countries. The political goal is Beijing's effort to end 'foreign dependency' for semiconductors. Without this political intent, China (or semiconductor companies with a presence in China) would become part of an interdependent semiconductor production network centered on the Pacific Rim, but Beijing is determined to make China independent of foreign manufacturers and to displace foreign producers. While semiconductors and aviation are salient examples, this pattern can be seen in other key areas, including robots, artificial intelligence, internet services, and green energy.

Concern over technology transfer has been an element of the U.S.-China relationship for decades, but China's growing wealth and sophistication poses a new kind of challenge U.S. regulation and policy. Moreover, China's strategies for acquiring technology by circumventing FINSA protections or export controls are relatively agile. The long-term viability of China's managed economy model is an open question, but in the near term, it creates new risks for U.S. companies and for national security.

Technology transfers as a result of FDI have been reinforced by an energetic espionage program that began with China's economic opening to the West in the early 1980s and moved into cyberspace two decades ago. The Chinese discovered that the internet gave them unparalleled access to poorly secured Western networks. Cyber espionage is accompanied by collection efforts by human agents, both in China and in other countries, but the most rewarding collection programs have shifted from human agents targeting Western facilities located in China to cyber espionage.

Cyber-espionage has given China an invaluable intelligence resource. The value of the products of cyber espionage will increase as China acquired the know-how through co-production and education, creating the human capital that can understand and take advantage of stolen data. There appears to be a limited correlation between goals set in the Five-Year plans and espionage targets. Under President Xi, the collection tasking process are much more centralized and formal, fitting in with both the PLA professionalization and anti-corruption efforts.

While China's policy has been to acquire Western IP from the start of the opening of its market, and the high point of IP theft came from cyber espionage between 2000 and 2015 (more a reflection of our lax defenses than of Chinese skill). We do not want to overstate the damage caused by commercial espionage. Most of the estimates of loss from Chinese hacking are unreliable. China is not using "economic warfare" or "death by 1000 cuts"—there is absolutely no evidence that these are Chinese policies and they mischaracterize Chinese intent. What is telling is that China does not feel constrained by international practice or law when it comes to using illicit or questionable techniques to gain advantage in business competition.

IP theft and cyber espionage are of concern because they are part of a larger Chinese industrial strategy, but China could steal "\$600 billion" in IP and not gain \$600 billion in value if it is unable to turn the stolen IP into commercially viable products. It does little good to steal IP if you do not have the expertise to use it, and until recently, this was true for much of China's espionage in advanced technology. What has changed in the last decades is that China has realized that acquiring "know-how" is more important than acquiring IP. In many cases, China now has the money and the skill to use much of the IP it has acquired licitly or illicitly.

Stolen IP does not guarantee success for the acquirer (or loss for the victim) but in China, this new competitor may have access to government subsidies or it may benefit from a protected domestic market built with nontariff barriers to hobble foreign competition. Subsidized Chinese companies have an immense advantage operating from a closed domestic market and selling to an open international market. If nothing else, this distorts the global market by creating overcapacity and putting unsubsidized foreign firms at a disadvantage.

China appears to be living up to its commitments under the Obama-Xi agreement. The language of this agreement was drafted by the U.S. to allow continued espionage. It is not an agreement to end cyber espionage. The agreement supports PLA modernization and reorganization by ending PLA units' cyber espionage moonlighting to augment their incomes. It advances Xi's goal of centralizing control of intelligence collection and assets under his control. The outcome of the agreement is likely to be a more effective and focused Chinese intelligence effort, an unexpected consequence, but so far, Chinese commercial espionage against U.S. companies appears to have decreased.

The Obama-Xi agreement showed that China's behavior can still be changed through sustained engagement at senior levels, through realistic proposals for change, and with threats, implicit or otherwise, of trade penalties, but it is far more difficult to do this than in the past. U.S. policies need to adjust to a more assertive and independent China and identify where there is room for mutual understanding and where it will be necessary to build coalitions with like-minded nations to oppose further encroachments. China is much more responsive when U.S. requests for change are accompanied by similar requests from Germany, Japan and the European Commission.

No one can object to a country trying to increase its innovative capabilities or research productivity, but it is the methods China uses that are a problem. In addition to investment in science and engineering, China aggressively pursues illicit technology transfer and intervenes to support Chinese firms against foreign competitors. Illicit acquisition of foreign technology has been promoted by the government policy since China opened its economy. The greater concern is that long standing Chinese practices on technology acquisition are now married to an aggressive, well-funded industrial policy.

Confronting China over these practices is long overdue, but the central issue is not IP theft. The central issue is the unfair treatment of U.S. companies in China. The word that Chinese policy makers dislike is reciprocity—that they should be treated in the United States the way American companies are treated in China. U.S. efforts to get China to follow global norms on technology, trade, and investment is long overdue, but it will not work without a complementary America strategy to improve competitiveness and reignite leadership in technology and innovation, which is largely coasting on investments made in the Cold War. The United States has innate advantages, with the strongest scientific base in the world, leading technology companies, and an innovative culture that others find difficult to match. Strengthening and revitalizing the partnership among companies, universities, and government can reignite U.S. innovation, but it will require a willingness to invest seriously in growth. The recommendations of the International Monetary Fund for the U.S. economy include tax reform, less regulation, increased infrastructure spending, deficit reduction, educational improvements, and improved trade agreements. These can be contentious issues, but a decision to match China should not face the same debate.

One reason that China not been called to account for its trade and industrial practices is that many companies have been ambivalent about pushing back. They fear retribution from China—a reasonable concern, since China is not shy about retaliating against critics—and many do not believe the United States will take action to support them against such retribution—also a reasonable concern. China is a huge market that

companies are reluctant to risk, but as the consequences of China's industrial policies become clearer, company attitudes have changed and there is growing concern about unfair competition from the Chinese state.

A purely defensive response to China would be inadequate. While we should change Chinese behavior in the treatment of foreign firms, we should also seek to strengthen the ability of the U.S. to innovate and compete. Innovation is a complex, interconnected, and global process, and investment in science plays a crucial role in it. China has allocated billions of dollars for investment for research in and acquisitions of advanced technologies that are key to future economic growth, including semiconductors, 5G telephony, artificial intelligence, and super computers. The United States allocates millions for the same efforts, meaning we are being outspent a thousand to one. We do not want to take media hyperbole about a war over AI or supercomputing seriously, but we also do not want to watch as others pass us.

It is important not to exaggerate China's strength. It faces immense problems in government debt, life-threatening pollution, mismanagement, and corruption, but under its current leaders, it intends to displace the United States and building globally dominant high-tech industries is a part of this strategy. But the Chinese economy has reached a turning point that makes its nationalistic industrial policies far more dangerous. Because of past technology transfers through joint ventures and coproduction, and in part because of heavy, sustained government investment in science and research, China has developed its own innovation capabilities. In some technology areas, China may even be the world leader. This is a good thing for the global market and competition, and it should help spur a rethinking of America's relaxed approach when it comes to technology and innovation. What is not good is the Chinese government's policy of using unfair business practices to give Chinese companies an edge in marketing their products.

The policies and agreements that worked in the past may no longer be adequate to manage the challenge American firms face from China's managed economy. Moreover, China's industrial strategy are relatively agile and able to take advantage of outdated American policies. The long-term viability of the managed economy model is an open issue, but in the near or mid-term, it creates new risks for U.S. companies and for national security.

The issue is complicated by the tensions in the larger bilateral relationship. Chinese leaders are ambivalent about their relation with the U.S. and some, in particular the PLA, are antagonistic. If we just had to deal with Chinese industry and economic policy-makers, the primary issue would be winning greater compliance with WTO commitments and ensuring fair conditions for foreign companies, but they are not the drivers of Chinese policy as much as national security and the survival of one-party rule.

U.S. policy has been to encourage competition in global markets, and China could be a welcome addition to the international economy. Where our policies erred was in assuming that China would follow international practice in trade, that it would play by our rules, and that the bilateral relationship would be more collaborative and less competitive (including military competition). China can choose to be independent, rich and powerful without being antagonistic, but this would require significant change in the Party's thinking about international affairs. This should not be a trade war. A renewed economic partnership with China remains possible, but will require energetic and assertive diplomacy. We can reshape Chinese behavior if we adopt new, active policies.

China's legitimate desire for economic development is complicated by powerful commercial motives. China uses government investment produce globally dominant national champions in many different industry sectors. However, China's leaders are practical and its behavior can be changed. China companies enjoy the benefits they get from economic nationalism but also realize that this can create disadvantages in a

global market. China is will accommodate American concerns if it persuaded it is best for China to do so, and steady pressure can achieve this. The U.S. and its allies have a strong hand to play in this contest, since the Party's rule is fragile, and China's economy, despite its size, needs access to and partnership with the West. A good first step, one where the U.S. might be able to persuade Europe and Japan to join us, is to insist on reciprocity in the treatment of foreign and Chinese companies.

James Andrew Lewis is a senior vice president and director of the Technology Policy Program at the Center for Strategic and International Studies in Washington, D.C.

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