

# U.S.-China Economic and Security Review Commission

Staff Research Report



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## **How Chinese Companies Facilitate Technology Transfer from the United States**

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## Executive Summary

Chinese companies—in many cases with the backing of the Chinese government—use a variety of methods to acquire valuable technology, intellectual property (IP), and knowhow from U.S. firms. Some of these tactics are legal, while others involve coercive or covert means. Although Chinese companies are not the only foreign firms seeking to acquire U.S. technology, the Chinese case is unique because the Chinese Communist Party (CCP) has prioritized technology transfer as a matter of policy and provides direct and indirect support to companies engaging in these anticompetitive activities. Chinese acquisition attempts frequently target advanced technologies such as artificial intelligence (AI), biotechnology, and virtual reality, which are still in the early stages of development but could provide dual military and civilian capabilities in the future.

**Table 1: How Chinese Companies Facilitate Technology Transfer from the United States**

	Description
<b>Foreign Direct Investment (FDI)</b>	The Chinese government directs Chinese firms to invest in and acquire U.S. companies and assets in order to obtain cutting-edge technologies and IP, fostering technology transfer in strategic industries.
<b>Venture Capital (VC) Investments</b>	Chinese VC investments in the United States have increased in recent years, in particular targeting U.S. technology startups. Although the trends and implications of Chinese VC investment in the United States are new and still underexamined, they may allow Chinese firms to access valuable U.S. technology and IP, including technologies with potential dual-use applications.
<b>Joint Ventures (JVs)</b>	In many industries, foreign firms must enter into JVs to invest or operate in China. JVs are often the source of Chinese companies' most technologically advanced and innovative procedures and products, acquired through technology transfer from their foreign JV partner.
<b>Licensing Agreements</b>	Licensing approval processes in China are often unclear and arduous, requiring companies to disclose sensitive information typically not required in other markets. Chinese government agencies often do not have to agree to destroy company information submitted in the licensing process, so companies' IP can be shared or exposed even after the license is adjudicated.
<b>Cyber Espionage</b>	Through covert cyber intrusions, Chinese actors gain unauthorized access to a wide range of commercially valuable U.S. business information—including IP, trade secrets, technical data, negotiating positions, and sensitive and proprietary internal communications—which are then provided to and utilized by select Chinese firms.
<b>Talent Acquisitions</b>	The Chinese government maintains government programs aimed at recruiting overseas Chinese and foreign experts and entrepreneurs in strategic sectors to teach and work in China. Moreover, Beijing utilizes intergovernmental and academic partnerships and collaborations in the United States, establishes Chinese research facilities in the United States, and sends experts abroad to gain access to cutting-edge research and equipment without disclosing the organization's or individual's connections to the Chinese government.

To date, U.S. regulations governing Chinese economic activities abroad—including U.S. foreign investor disclosure requirements, the operations of the Committee on Foreign Investment in the United States (CFIUS), and U.S. export controls—have been unable to adequately assess and address the risks of increased technology transfers to China. These regulatory shortcomings, along with intelligence and law enforcement limitations, allow Chinese firms to pursue investments in critical U.S. technologies that could jeopardize U.S. technological innovation and national security.

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## Chinese Companies' Methods for Facilitating Tech Transfer

As some of the world's leading producers of high-tech products, U.S. companies are a natural target of Chinese and other global companies' efforts to acquire technology and IP. Unlike other global firms, however, Chinese firms often acquire U.S. technology and IP at the direction of and with assistance from the Chinese government. As detailed in the U.S. Trade Representative's (USTR) March 2018 Section 301 report, the Chinese government uses an array of directives and incentives for Chinese companies to facilitate technology transfers of U.S. products and IP. These government policies are part of Beijing's larger effort to develop its domestic market and become a global leader in a wide range of technologies, particularly advanced technologies, as well as aid its military capabilities.\*

According to the USTR's Section 301 report, the Chinese government uses "joint venture requirements, foreign investment restrictions, and administrative review and licensing processes to force or pressure technology transfers from American companies."<sup>1</sup> Taken together, these technology transfer methods have led to the loss of billions of dollars in U.S. research and development, IP, and technology products. According to the Commission on the Theft of American Intellectual Property, the annual cost of IP theft (globally, not just from China) to the U.S. economy could be as much as \$600 billion.<sup>2</sup> The report goes on to name China as "the world's principal IP infringer," stating:

*China continues to obtain American IP from U.S. companies operating inside China, from entities elsewhere in the world, and of course from the United States directly through conventional as well as cyber means. These include coercive activities by the state designed to force outright IP transfer or give Chinese entities a better position from which to acquire or steal American IP.*<sup>3</sup>

To support its technological development, the Chinese government relies on several different means by which to acquire U.S. technology, including (1) pursuing FDI in foreign technology firms, (2) making VC investments in foreign technology firms and startups, (3) establishing JVs between foreign and Chinese companies, (4) requiring licensing agreements for foreign firms to operate in China, (5) conducting cyber espionage to steal IP, and (6) attracting U.S. experts and researchers to work for or partner with Chinese companies. The following sections will explore how Chinese companies apply each of these six methods to acquire U.S. technology and IP.

### Foreign Direct Investment

Chinese FDI in the United States remains an important tool for acquiring U.S. technology, although its significance has waned amid increased regulatory constraints in both the United States and China. According to the USTR's Section 301 investigation, Chinese FDI transactions seek to enable technology transfer back to China:

*The Chinese government directs and unfairly facilitates the systematic investment in, and acquisition of, U.S. companies and assets by Chinese companies, to obtain cutting-edge technologies and intellectual property (IP) and generate large-scale technology transfer in industries deemed important by state industrial plans.*<sup>4</sup>

The Chinese government encourages state-owned and private firms to acquire U.S. technology companies in line with the government's strategic interests in industries like telecommunications and biotechnology.<sup>†</sup> From 2011 to the first half of 2018, information and communications technology (\$14.4 billion) and energy (\$10.4 billion) were the third- and fourth-largest targets of Chinese FDI in the United States, respectively, behind only real estate (\$40.3 billion) and transportation and infrastructure (\$16.9 billion).<sup>5</sup>

Increased uncertainty surrounding U.S. investment review procedures, along with Beijing's recent efforts to tighten controls on capital outflows, has led Chinese FDI flows to the United States to decline in recent years.<sup>6</sup> In 2017, the private economic consultancy Rhodium Group estimated Chinese FDI flows to the United States totaled \$29.4 billion, down from \$45.6 billion in 2016 (see Figure 1).<sup>7</sup> In 2018, Chinese FDI in the United States fell to \$4.8

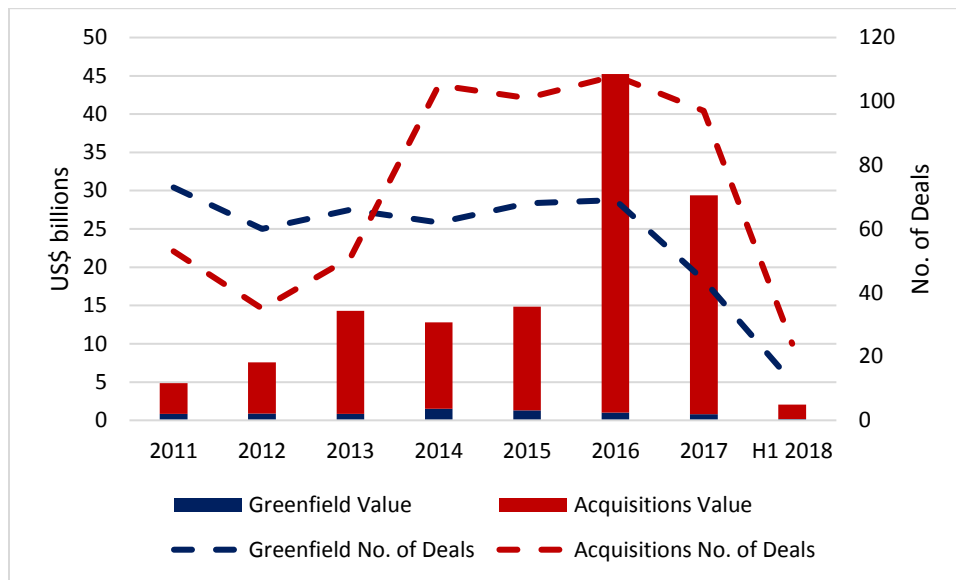
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\* For more, see Office of the U.S. Trade Representative, *Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974*, March 22, 2018. <https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>.

† For more on trends and implications of Chinese investment in the United States, see U.S.-China Economic and Security Review Commission, Chapter 1, Section 4, "Chinese Investment in the United States," in *2017 Annual Report to Congress*, November 2017, 71–91.

billion, the lowest level since 2010.<sup>8</sup> Mergers and acquisitions (M&As) account for the vast majority (97 percent in 2017) of the total value of Chinese FDI, with the rest comprising capital-intensive greenfield investments.<sup>9</sup>

**Figure 1: Chinese FDI in the United States, 2011–H1 2018**



Source: Rhodium Group, “China Investment Monitor.” <http://rhg.com/interactive/china-investment-monitor>.

Despite the recent decline in FDI flows, it is notable that Chinese firms’ attempts to directly acquire and invest in foreign firms focus on companies that have or are developing technology, IP, facilities, and talent in high-tech industries.<sup>10</sup> In the semiconductor industry, for example, the Chinese central and local governments have established at least \$107 billion of national and regional integrated circuit investment funds to finance increases in domestic capacity and Chinese firms’ acquisitions abroad.<sup>\*</sup> Between 2013 and 2016 alone, China-based firms leveraged this state funding to attempt to acquire or invest in at least 27 U.S. semiconductor firms totaling more than \$37 billion.<sup>11</sup> In the AI industry, Chinese firms invested in at least 51 U.S. AI startups and firms from 2010 to 2016.<sup>12</sup>

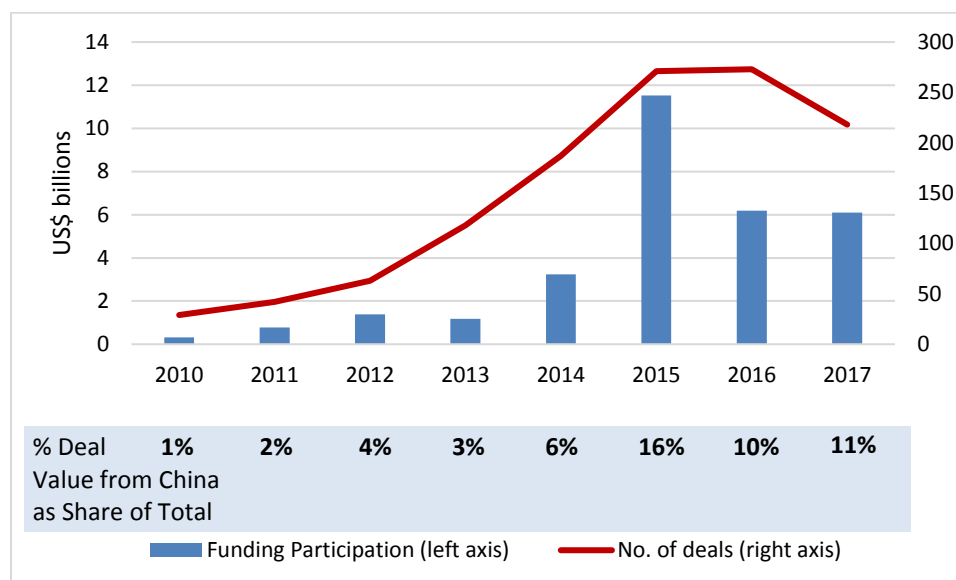
Private and official government estimates of Chinese investment in the United States only capture transactions—namely M&A and greenfield deals—resulting in foreign ownership of 10 percent or more of the voting securities of an incorporated U.S. firm.<sup>13</sup> Other forms of minority investment that do not meet this definition, including VC investments and business dealings such as JVs and licensing requirements, are not included in these statistics. As a result, analysis of Chinese investment in the United States generally underestimates the real level of Chinese economic activity in the United States.<sup>14</sup>

## Venture Capital Investments

Although flows of Chinese VC investments are not captured in most government and private estimates of FDI flows to the United States, they represent an increasingly significant share of total investment in U.S. companies. According to research by the Defense Innovation Unit (DIU), a U.S. Department of Defense initiative, Chinese participation in U.S. venture-backed startups accounted for between 10 and 16 percent of global venture deals in the United States between 2015 and 2017 and has increased rapidly since 2010 (see Figure 2).<sup>15</sup> Between 2015 and 2017, China was the largest foreign source of equity investments in U.S. companies, investing a combined \$24 billion in U.S. venture-backed companies, or 13 percent of worldwide investment in the United States.<sup>16</sup> For comparison, during the same period, all European countries were the source of \$36 billion worth of investments in U.S. venture-backed companies.<sup>17</sup> However, the DIU study found that—like M&A investments—Chinese equity investments in the United States declined between 2015 and 2017 after the Chinese government imposed strict limits to curb capital outflows.<sup>18</sup>

<sup>\*</sup> For analysis on China’s efforts to build its semiconductor capabilities, see U.S.-China Economic and Security Review Commission, Chapter 1, Section 3, “China’s 13th Five-Year Plan,” in *2016 Annual Report to Congress*, November 2016, 151–161.

**Figure 2: Chinese VC Investments in the United States, 2010–2017**



*Note:* Data through October 2017. Percent of total deal value refers to Chinese VC in the United States as a share of total equity investments each year.

*Source:* 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,” *Defense Innovation Unit*, January 2018, 6.

Separately, a Rhodium Group report found that in 2018, Chinese VC investment in the United States reached a record \$3.3 billion, up from \$2.1 billion in 2017.<sup>19</sup> Rhodium estimates that from 2000 to May 2018, Chinese VC capital contributions in the United States totaled \$11 billion, 88 percent of which came from private Chinese investors.<sup>20</sup> Alibaba, for example, was the lead investor in a \$793 million financing round for the U.S. virtual reality startup Magic Leap, \$200 million in the social media firm Snap, and \$250 million in ride-sharing app Lyft.<sup>21</sup> The Chinese social networking service Renren, meanwhile, was the lead company for million-dollar VC fund investments in U.S. fintech startups like Fundrise and Motif.<sup>22</sup> Baidu, Alibaba, and Tencent have all established offices in California for research and development and for corporate venture investing.<sup>23</sup>

Although there is not a clear link between Chinese VC investment decisions and CCP policies or incentive programs, Chinese VC investments still typically target firms in industries the government has prioritized as strategic, such as AI, autonomous vehicles, virtual reality, robotics, and blockchain technology.<sup>24</sup> The Rhodium Group study found that between 2000 and May 2018 Chinese investors targeted strategic technologies in 78 percent of all U.S. VC funding rounds involving a Chinese investor (out of a total of more than 1,200 funding rounds with Chinese participation).<sup>25</sup> These investments are not just lucrative business opportunities; they could also enable Chinese firms to acquire valuable U.S. technology and IP.<sup>26</sup>

Until CFIUS reforms were signed into law in August 2018, Chinese investments facilitated through U.S. VC funds allowed Chinese firms to acquire U.S. technology assets without being subjected to the same rigorous regulations and disclosure requirements that are applied to traditional FDI transactions.<sup>27</sup> VC funds are not typically\* required to publicly report their investments—neither the source of investments they received nor the target of investments they made. Similarly, startups can choose whether to publicly disclose information from funding rounds, which may include the amount of capital raised and participating investors, but they generally do not share the amount each investor contributed. For these reasons, it is difficult to quantify the total dollar amount of annual Chinese VC investments into U.S. startups.<sup>28</sup>

In August 2018, reforms were signed into law expanding CFIUS’ jurisdiction for foreign investment screening to include certain nonpassive foreign minority equity stakes such as venture transactions (for more on the impact of

\* Some public pension funds and other VC partners are legally mandated to disclose the source and value of their investments. U.S. Senate Committee on Banking, Housing, and Urban Affairs, *Hearing on CFIUS Reform: Examining the Essential Elements*, written testimony of Scott Kupor, January 18, 2018.



CFIUS reforms, see section on “U.S. Regulations Governing Tech Transfer”). These reforms have had a chilling effect on partnerships between some Chinese investors and U.S. startups, which fear lengthy CFIUS reviews that could drain resources and slow business activity. In an interview with Reuters, one unnamed U.S. venture capitalist indicated at least ten deals had fallen apart due to CFIUS concerns.<sup>29</sup> One example is U.S. AI startup Volley Labs, Inc. After accepting Chinese capital in 2017, it declined offers from Chinese investors in 2018 due to CFIUS concerns. “We decided for optical reasons it just wouldn’t make sense to expose ourselves further to investors coming from a country where there is now so much by way of trade tensions and IP tensions,” said Carson Kahn, Volley’s CEO.<sup>30</sup>

## Joint Ventures

Because the Chinese government enforces stringent restrictions on FDI inflows, U.S. and other foreign businesses have few options other than to acquiesce to Chinese firms’ JV requirements and sign over their IP and technology to access the Chinese market. A JV is a business arrangement in which two or more parties pool their resources to pursue a specific project or business opportunity. Under a typical JV arrangement, each JV participant shares responsibility for profits, losses, and costs of the venture, yet the arrangement itself is regarded as its own entity separate from the participants’ other business interests.<sup>31</sup> The Chinese government, however, has historically required foreign JV partners to provide both their IP and technology as part of the arrangement.<sup>32</sup>

A March 2018 study from the National Bureau of Economic Research found that JVs often generate Chinese companies’ most technologically advanced and innovative procedures and products, acquired through technology transfer from their foreign JV partner.<sup>33</sup> The study also found that the Chinese firms directly involved in the JV—meaning they are the direct beneficiaries of advanced foreign technology and knowhow—generate positive externalities to other domestic firms operating in the same industry. Thus, these technology transfers make all Chinese firms more productive and competitive, putting U.S. economic competitiveness and—potentially—national security interests at risk.<sup>34</sup>

According to data from China’s Investment Promotion Agency, which operates under China’s Ministry of Commerce, over 6,000 new China-based JVs with foreign partners were established in 2015 alone, accounting for around \$27.8 billion of FDI flows to China.<sup>35</sup> In several industries, foreign firms must form a JV with a Chinese partner in order to invest or operate in China (see Table 1).<sup>36</sup> Frequently, the Chinese partner in a JV will require that its foreign partner share technology and knowhow, leading to technology transfer to China.<sup>37</sup> Although Chinese regulations on foreign investment have been liberalized in recent years, China’s foreign investment policy still mandates that foreign firms partner with a local firm to conduct business in restricted industries, while in some industries (typically those dealing with national security or other critical infrastructure sectors) foreign investment remains strictly off limits.<sup>38</sup>

**Table 1: Chinese Industries with JV Requirements for Foreign Investors**

<b>JV with Chinese Company Required</b>	<b>JV Required with Foreign Share Limited to Minority</b>
<ul style="list-style-type: none"> <li>• Exploration and exploitation of oil and natural gas</li> <li>• Medical institutions</li> <li>• Production of radio and television programs and movies</li> <li>• Insurance companies</li> </ul>	<ul style="list-style-type: none"> <li>• Auto manufacturing (allows for 50-50 stake)</li> <li>• General aviation companies</li> <li>• Market surveys (such as radio and television ratings surveys)</li> <li>• Educational institutions (excluding compulsory education and religious education institutions)</li> </ul>

*Note:* The list of industries with JV requirements does not include all industries with ownership restrictions.

*Source:* China’s National Development and Reform Commission and Ministry of Commerce, *Catalogue of Industries for Guiding Foreign Investment (Revision 2017)*, June 28, 2017. [http://www.fdi.gov.cn/1800000121\\_39\\_4851\\_0\\_7.html](http://www.fdi.gov.cn/1800000121_39_4851_0_7.html); China’s National Development and Reform Commission and Ministry of Commerce, *Special Administrative Measures (Negative List) for the Access of Foreign Investment (2018)*, July 28, 2018. <http://english.mofcom.gov.cn/article/pressconferencehomepage/foreigninvestment/201807/20180702767650.shtml>.

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In March 2019, the Chinese government passed a new Foreign Investment Law, which seeks to promote inbound FDI to China and protect “the legitimate rights and interests of foreign investors.”<sup>39</sup> Although the law requires government officials to protect foreign firms’ IP rights and bans technology transfer requirements, the law only provides general assurances that, if enacted, will still take years to implement. According to Jingzhou Tao, a managing partner in Beijing at the law firm Dechert LLP, “It will take many [Chinese] administrations, both central and local, [and] a lot of time to amend or abolish [the] existing regulatory and approval processes” for foreign investors in China.<sup>40</sup>

## Licensing Requirements

The Chinese government utilizes an extensive and complex licensing system that discriminates against foreign investors, resulting in significant delays and added costs for foreign companies while also leading to the transfer of valuable IP and technology to Chinese competitors.<sup>41</sup> Licensing requirements are laws that demand companies—foreign or domestic—receive government approval for different types of economic activities (everything from selling products to building new manufacturing facilities). This includes obtaining licenses, permits, and certifications to operate legally in the market.<sup>42</sup> China imposes licensing requirements on more than 100 different business activities, such as food and drug production, mining, and telecommunications services.<sup>43</sup>

The licensing processes allow Chinese regulators to discriminate against foreign investors while keeping protectionist practices from being documented and used against China at the World Trade Organization.<sup>44</sup> According to the U.S. Chamber of Commerce, “The relatively opaque nature of the inbound FDI approval processes enables China’s investment approval authorities to favor domestic competitors over foreign investors, should they so desire, without leaving a paper trail of discriminatory written regulations that could clearly offend [World Trade Organization] obligations.”<sup>45</sup> This problem is illustrated by the Organization for Economic Cooperation and Development’s FDI Restrictiveness Index, which in 2017 ranked China as the third most restrictive market in the world for foreign investors (ahead of only Saudi Arabia and the Philippines).<sup>46</sup>

As part of China’s licensing documentation procedures, commercial firms are required to provide detailed product and process information to Chinese government agencies at the local and central levels. Because licensing approval processes in China are unclear and arduous, companies tend to disclose sensitive information that is typically not required in other markets.<sup>47</sup> Prior to the recent Foreign Investment Law, Chinese government agencies did not typically have to agree to destroy company information submitted in the licensing process, so companies’ IP could be shared or exposed even after the approval was secured. The Foreign Investment Law includes provisions that suggest these practices will be eliminated, but the wording of the law remains vague.<sup>48</sup> Beijing also revised provisions of its Administration of Technology Import/Export Regulations effective March 2019, but it remains unclear how the changes will impact foreign companies.<sup>49</sup>

According to the American Chamber of Commerce in China’s 2019 business survey, 35 percent of survey respondents cited licensing requirements as a top challenge of operating in China.<sup>50</sup> Similarly, the U.S.-China Business Council has found that more than half of U.S. companies experience licensing challenges even during renewal processes in China, and report facing challenges obtaining licenses that their domestic competitors do not.<sup>51</sup>

Chinese data protection and security laws also allow the CCP to acquire U.S. IP and technology through localization requirements for foreign technology firms. For example, China’s new Cybersecurity Law, which entered into force in June 2017, requires data to be stored locally in China, forcing foreign companies to either invest in new China-based data servers subject to government spot checks, or hire a local server provider such as Huawei, Tencent, or Alibaba.<sup>52</sup>

## Cyber Espionage

Cyber intrusions allow Chinese businesses—in some cases acting at the CCP’s direction or with government assistance—to access information about U.S. firms’ proprietary operations and project-financing information, as well as steal IP and technology. The Chinese government has utilized coordinated, government-backed cyber espionage campaigns to steal information from a variety of U.S.-based commercial firms, including those in the oil and energy, steel, and aviation industries.<sup>53</sup> According to James Lewis, a senior vice president at the Center for



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Strategic and International Studies, over the past two decades Chinese cyber espionage has likely cost the U.S. economy between \$20 billion and \$30 billion annually.<sup>54</sup>

The 2018 USTR Section 301 report found that government actors in Beijing and executives at Chinese companies alike use covert cyber intrusions to gain “unauthorized access to a wide range” of commercially valuable U.S. business information, including “trade secrets, technical data, negotiating positions, and sensitive and proprietary internal communications.”<sup>55</sup> For example, in October 2018 the U.S. Department of Justice indicted an official from China’s Ministry of State Security for economic espionage and attempting to steal trade secrets from GE Aviation, a subsidiary of General Electric, and other U.S. aviation and aerospace companies. According to Assistant Attorney General for National Security John C. Demers, “This case [was] not an isolated incident. It is part of an overall economic policy of developing China at American expense.”<sup>56</sup>

From a U.S. perspective, these espionage campaigns represent a violation of the 2015 deal between then President Barack Obama and Chinese President and General Secretary of the CCP Xi Jinping, when both leaders agreed that “neither country’s government will conduct or knowingly support cyber-enabled theft of intellectual property, including trade secrets or other confidential business information, with the intent of providing competitive advantages to companies or commercial sectors.”<sup>57</sup>

## Talent Acquisition

The Chinese government maintains official programs aimed at recruiting overseas Chinese and foreign experts and entrepreneurs in strategic sectors to come teach and work in China. These programs seek to acquire U.S. technology by blurring the line between informal technology transfer and IP theft, using methods such as utilizing open source intelligence, recruiting leading U.S. experts in high-tech fields, and promoting academic exchanges.<sup>58</sup>

Project 111, for example, was launched by the Chinese government in 2006 to recruit 1,000 foreign experts in strategic sectors from the world’s top 100 universities and research institutes.<sup>59</sup> By 2009, it had recruited 39 Nobel Prize winners and 591 academics.<sup>60</sup> Similarly, the Thousand Talents Program was launched in December 2008 and by mid-2014 had brought more than 4,000 foreigners to China’s scientific laboratories, companies, and research centers.<sup>61</sup> Research and startup funding provided under these and similar programs are used to incentivize foreign experts and entrepreneurs to either split time between positions overseas and in China or base their work entirely in China.<sup>62</sup>

The Chinese government also utilizes intergovernmental and academic partnerships and exchanges to gain access to cutting-edge U.S. research and equipment. By opening research centers and laboratories in the United States, Chinese companies and researchers develop the knowhow to create and run advanced research and development facilities such as the U.S. Department of Energy’s national laboratories.<sup>63</sup> Exchange programs for Chinese students in science and technology fields, meanwhile, allow Chinese firms to access overseas expertise, research, and training. According to a 2018 report from the Australian Strategic Policy Institute, since 2008 the Chinese military sponsored more than 2,500 Chinese military scientists and engineers to travel to universities in the United States and elsewhere as students or visiting scholars. These exchanges, the report alleges, directly allowed China to develop better military technology by leveraging U.S. and other countries’ experience, facilities, and resources in high-tech industries.<sup>64</sup>

## U.S. Regulations Governing Tech Transfer

U.S. regulations governing the preservation of technologies critical for U.S. national security fall into three main categories: (1) disclosure requirements, (2) export controls, and (3) CFIUS. The sections below explore how each of these regulations is applied in the context of Chinese technology transfer practices.

### Disclosure Requirements

VC investors are required to disclose little information to the U.S. government provided they are passive investors, such as investments facilitated through VC funds. Venture capitalists—both in the United States and abroad—are typically exempt from the Investment Company Act of 1940, which set the guidelines for other forms of corporate

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activities like mutual fund investments.<sup>65</sup> Although the U.S. Securities and Exchange Commission (SEC) maintains filings of private financings, these documents only provide information on the amount of funding, not the names or home countries of the investors.<sup>66</sup> As a result, there is a shortage of reliable industry data on foreign investment facilitated through VC funds in the United States, making it difficult to fully assess the implications of non-M&A foreign investments and business arrangements involving U.S. persons or companies.<sup>67</sup>

## Export Controls

The current U.S. export control regime is designed to prevent foreign ownership of sensitive technology, companies, and infrastructure, with an emphasis on the protection of dual-use technologies. However, export controls have become more difficult to apply as regulators must attempt to predict whether early-stage technologies developed for commercial purposes could be used for military purposes in the future.<sup>68</sup>

In August 2018, President Donald Trump signed the Export Control Reform Act of 2018 (ECRA) into law as part of the 2018 John S. McCain National Defense Authorization Act, establishing permanent export controls on certain commercial, dual-use, and military items. Under the law, the U.S. Department of Commerce’s Bureau of Industry and Security will lead an interagency, regularly scheduled process to identify and appropriately control “emerging” and “foundational” technologies deemed “essential to the national security of the United States.”<sup>69</sup>

## Committee on Foreign Investment in the United States

CFIUS is the primary government entity tasked with reviewing FDI into the United States.\* In August 2018, President Trump signed into law the Foreign Investment Risk Review Modernization Act (FIRRMA), which, among other things, expanded the definition of “covered transactions” under CFIUS (i.e., transactions subject to a CFIUS review) to include transactions that provide foreign investors access to critical technology, critical infrastructure, and sensitive information, as well as certain types of investment fund transactions.

With FIRRMA signed into law, CFIUS must now consider whether a transaction involves a country of “special concern” that has the “strategic goal of acquiring a type of critical technology or critical infrastructure that would affect” U.S. leadership in those areas.† FIRRMA also provides that any noncontrolling investment (such as through a VC fund) by a foreign person is subject to CFIUS scrutiny if such an investment grants a foreign person control over a U.S. business that (1) owns, operates, manufactures, supplies, or services critical infrastructure; (2) produces, designs, tests, manufactures, fabricates, or develops one or more critical technologies; or (3) maintains or collects sensitive personal data of United States citizens that may be exploited in a manner that threatens national security.<sup>70</sup>

FIRRMA also broadens the definition of “critical technology” beyond traditional export-controlled articles to include “emerging and foundational technologies” as defined in ECRA. Moreover, FIRRMA establishes a regular, ongoing interagency process to identify emerging and foundational technologies that should be covered under FIRRMA and ECRA.<sup>71</sup>

These reforms add to a broader effort by the Trump Administration to ramp up CFIUS scrutiny of foreign investments in U.S. technology companies. In 2019, two Chinese tech investments in the United States—Kunlun’s 2016 investment in the dating app Grindr and iCarbonX’s 2017 investment in U.S. health firm PatientsLikeMe—were unwound following pressure from CFIUS.<sup>72</sup>

Although FIRRMA expanded CFIUS’s ability to review deals with national security implications, some methods of Chinese technology transfer remain unaddressed, most notably investments in U.S. critical technologies based outside the United States. Companies based outside the United States that rely on U.S. IP and technology—or investments in U.S. technology industries facilitated through shell companies to obscure ownership—may not be detected, and thus could avoid CFIUS’s scrutiny. Moreover, it remains uncertain how FIRRMA will be

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\* For more on the CFIUS review process, see U.S.-China Economic and Security Review Commission, Chapter 1, Section 2, “Chinese Investment in the United States,” in *2017 Annual Report to Congress*, November 2017, 81–82.

† For more on the implications of FIRRMA, see “Committee on Foreign Investment in the United States Reform Becomes Law,” in U.S.-China Economic and Security Review Commission, *Economics and Trade Bulletin*, September 5, 2018, 2–4. [https://www.uscc.gov/sites/default/files/trade\\_bulletins/September%202018%20Trade%20Bulletin.pdf](https://www.uscc.gov/sites/default/files/trade_bulletins/September%202018%20Trade%20Bulletin.pdf).

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implemented; effective November 2018, the U.S. Department of the Treasury began the first pilot programs and issued temporary (ending in March 2020) CFIUS regulations since FIRRMA was signed into law.<sup>73</sup>

## Conclusions and Considerations for Congress

Chinese government efforts to encourage and direct firms to acquire technology from the United States are likely to continue as Beijing seeks to further develop its domestic high-tech industries. Aside from M&A investments, Chinese firms invest in and partner with U.S. businesses through VC investments and business arrangements that are poorly regulated and lack sufficient disclosure requirements in the United States. Chinese companies also benefit from cyber espionage and talent acquisition campaigns, allowing them to replicate the technologies and processes that make U.S. businesses competitive in markets around the world. In response to these tactics, the United States concluded a Section 301 investigation in 2018 and implemented tariffs—along with other trade tools—to pressure the Chinese government to adjust its policies. However, Beijing has repeatedly indicated it will continue to promote its national interests, with state policies designed to further the country’s technological development that leverage the resources and powers of the Chinese government against U.S. companies.

Chinese firms are also acquiring U.S. IP and technology overseas through JV and licensing requirements, as well as through localization requirements for foreign technology firms. U.S. companies based outside both the United States and China (such as firms based in Europe, Canada, or Japan) are also subject to Chinese efforts to acquire or steal their technology, necessitating a multilateral approach to confronting Chinese technology transfer practices.

Technology transfers and IP theft threaten to undermine U.S. technological development and capabilities both now and in the future. High-tech industries like AI and virtual reality are expected to produce foundational technologies upon which future innovations will be built. Much like semiconductors were crucial for the creation of later electronic and telecommunication products, today’s high-tech fields are expected to serve as the platforms for development and innovation in the decades to come. Consequently, foreign investments that enable technology transfers could directly support more advanced Chinese military capabilities.<sup>74</sup> According to Adam Segal, fellow at the Council on Foreign Relations, the Chinese government is well aware of these long-term implications and is “increasingly thinking about how to ensure they are competitive in the next wave of technologies.”<sup>75</sup>

While the United States has long maintained a free and open foreign investment environment, Chinese government-led efforts to acquire U.S. technology raise questions about whether current U.S. disclosure, investment review, and export control laws are sufficient for preserving U.S. economic and national security interests. To ensure these interests remain effectively guarded against the risks of foreign influence and technology transfers, Congress should consider the following questions:

- Do current U.S. disclosure requirements provide sufficient information on foreign investments in U.S. early-stage technology companies and joint research partnerships?
- Does the U.S. government’s ability to review foreign investment transactions in the United States extend to all investments or business arrangements that could grant a foreign entity effective control over U.S. assets?
- How are current export controls applied to technologies developed by U.S. startups or developing companies?
- How can the United States work with its allies and economic partners to address the risks posed by Chinese technology transfer practices?
- What are the implications of Chinese talent recruitment programs? Should any restrictions be imposed to limit technology transfer risks resulting from these programs?
- Are there sufficient U.S. government assessments of CCP efforts to leverage the development of strategic dual-use industries to aid in China’s competition with the United States (a strategy commonly referred to as military-civil fusion)? What additional steps, if any, should be taken to ensure a proper evaluation of these Chinese activities vis-à-vis U.S. interests?

## Endnotes

- <sup>1</sup> Office of the U.S. Trade Representative, *Section 301 Fact Sheet*, March 2018. <https://ustr.gov/sites/default/files/USTR%20301%20Fact%20Sheet.pdf>.
- <sup>2</sup> Commission on the Theft of American Intellectual Property, *Update to the IP Commission Report*, 2017, 1. [http://www.ipcommission.org/report/IP\\_Commission\\_Report\\_Update\\_2017.pdf](http://www.ipcommission.org/report/IP_Commission_Report_Update_2017.pdf).
- <sup>3</sup> Commission on the Theft of American Intellectual Property, *Update to the IP Commission Report*, 2017, 2–3. [http://www.ipcommission.org/report/IP\\_Commission\\_Report\\_Update\\_2017.pdf](http://www.ipcommission.org/report/IP_Commission_Report_Update_2017.pdf).
- <sup>4</sup> Office of the U.S. Trade Representative, *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*, March 22, 2018, 65. <https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>.
- <sup>5</sup> Rhodium Group, “China Investment Monitor.” <http://rhg.com/interactive/china-investment-monitor>.
- <sup>6</sup> Thilo Hanemann, “Arrested Development: Chinese FDI in the U.S. in 1H 2018,” *Rhodium Group*, June 19, 2018. <https://rhg.com/research/arrested-development-chinese-fdi-in-the-us-in-1h-2018/>.
- <sup>7</sup> Rhodium Group, “China Investment Monitor.” <http://rhg.com/interactive/china-investment-monitor>.
- <sup>8</sup> Thilo Hanemann, Cassie Gao, and Adam Lysenko, “Net Negative: Chinese Investment in the U.S. in 2018,” *Rhodium Group*, January 13, 2019. <https://rhg.com/research/chinese-investment-in-the-us-2018-recap/>; Rhodium Group, “China Investment Monitor.” <http://rhg.com/interactive/china-investment-monitor>.
- <sup>9</sup> Rhodium Group, “China Investment Monitor.” <http://rhg.com/interactive/china-investment-monitor>.
- <sup>10</sup> Jonathan Ray et al., “China’s Industrial and Military Robotics Development,” *Defense Group, Inc.* (prepared for the U.S.-China Economic and Security Review Commission), October 25, 2016, 12.
- <sup>11</sup> Thilo Hanemann and Daniel H. Rosen, “Chinese Investment in the United States: Recent Trends and the Policy Agenda,” *Rhodium Group* (prepared for the U.S.-China Economic and Security Review Commission), December 8, 2016, 79–81.
- <sup>12</sup> Paul Mozur and John Markoff, “Is China Outsmarting America in A.I.?” *New York Times*, May 27, 2017.
- <sup>13</sup> Thilo Hanemann, “China Investment Monitor: Methodology Update,” *Rhodium Group*, July 21, 2015. <https://rhg.com/research/china-investment-monitor-methodology-update/>; Alicia M. Quijano, “A Guide to BEA Statistics on Foreign Direct Investment in the United States,” *U.S. Bureau of Economic Analysis*, February 1990, 29. <https://www.bea.gov/scb/pdf/internat/fdiinvest/1990/0290iid.pdf>.
- <sup>14</sup> 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,” *Defense Innovation Unit*, January 2018, 10.
- <sup>15</sup> 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,” *Defense Innovation Unit*, January 2018, 6.
- <sup>16</sup> 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,” *Defense Innovation Unit*, January 2018, 28.
- <sup>17</sup> 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,” *Defense Innovation Unit*, January 2018, 28.
- <sup>18</sup> Matt Sheehan, “The Rise, Fall, and Future of Chinese Money in Silicon Valley,” *MacroPolo*, July 31, 2017. <https://macropolo.org/rise-fall-future-chinese-money-silicon-valley/>.
- <sup>19</sup> Thilo Hanemann, Cassie Gao, and Adam Lysenko, “Net Negative: Chinese Investment in the U.S. in 2018,” *Rhodium Group*, January 13, 2019. <https://rhg.com/research/chinese-investment-in-the-us-2018-recap/>; Adam Lysenko and Thilo Hanemann, “Chinese Venture Investment in the U.S.: A First FIRRMA Impact Assessment,” *Rhodium Group*, March 8, 2019, 1.
- <sup>20</sup> Thilo Hanemann, Adam Lysenko, and Daniel H. Rosen, “Chinese Venture Capital in the U.S.: Recent Trends and FIRRMA Impacts,” *Rhodium Group*, July 11, 2018, 1.
- <sup>21</sup> Rebecca Fannin, “China’s Tech Giants Are Pouring Billions into US Start-Ups,” *CNBC*, March 9, 2017. <https://www.cnn.com/2017/03/08/chinas-tech-giants-are-pouring-billions-into-us-start-ups.html>.
- <sup>22</sup> Rebecca Fannin, “China’s Tech Giants Are Pouring Billions into US Start-Ups,” *CNBC*, March 9, 2017. <https://www.cnn.com/2017/03/08/chinas-tech-giants-are-pouring-billions-into-us-start-ups.html>.
- <sup>23</sup> Rebecca Fannin, “China’s Tech Giants Are Pouring Billions into US Start-Ups,” *CNBC*, March 9, 2017. <https://www.cnn.com/2017/03/08/chinas-tech-giants-are-pouring-billions-into-us-start-ups.html>.
- <sup>24</sup> 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,” *Defense Innovation Unit*, January 2018, 2.
- <sup>25</sup> Thilo Hanemann, Adam Lysenko and Daniel H. Rosen, “Chinese Venture Capital in the U.S.: Recent Trends and FIRRMA Impacts,” July 11, 2018, 8.
- <sup>26</sup> Cory Bennett and Bryan Bender, “How China Acquires ‘The Crown Jewels’ of U.S. Technology,” *Politico*, May 22, 2018. <https://www.politico.eu/article/china-investment-uber-apple-us-tech-how-china-acquires-the-crown-jewels/>.
- <sup>27</sup> 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,” *Defense Innovation Unit*, January 2018, 24.
- <sup>28</sup> U.S. Senate Committee on Banking, Housing, and Urban Affairs, *Hearing on CFIUS Reform: Examining the Essential Elements*, written testimony of Scott Kupor, January 18, 2018.
- <sup>29</sup> Heather Somerville, “Chinese Tech Investors Flee Silicon Valley as Trump Tightens Scrutiny,” *Reuters*, January 7, 2019. <https://www.reuters.com/article/us-venture-china-regulation-insight-idUSKCN1P10CB>.
- <sup>30</sup> Heather Somerville, “Chinese Tech Investors Flee Silicon Valley as Trump Tightens Scrutiny,” *Reuters*, January 7, 2019. <https://www.reuters.com/article/us-venture-china-regulation-insight-idUSKCN1P10CB>.



- <sup>31</sup> *Financial Times*, “Definition of Joint Venture.” <http://lexicon.ft.com/Term?term=joint-venture>; Kun Jiang et al., “International Joint Ventures and Internal vs. External Technology Transfer: Evidence from China (Working Paper),” *National Bureau of Economic Research*, March 2018, 1.
- <sup>32</sup> Lingling Wei and Bob Davis, “How China Systematically Pries Technology from U.S. Companies,” *Wall Street Journal*, September 26, 2018. <https://www.wsj.com/articles/how-china-systematically-pries-technology-from-u-s-companies-1537972066>.
- <sup>33</sup> Kun Jiang et al., “International Joint Ventures and Internal vs. External Technology Transfer: Evidence from China (Working Paper),” *National Bureau of Economic Research*, March 2018, 26.
- <sup>34</sup> Kun Jiang et al., “International Joint Ventures and Internal vs. External Technology Transfer: Evidence from China (Working Paper),” *National Bureau of Economic Research*, March 2018, 20–21, 33.
- <sup>35</sup> Kun Jiang et al., “International Joint Ventures and Internal vs. External Technology Transfer: Evidence from China (Working Paper),” *National Bureau of Economic Research*, March 2018, 1.
- <sup>36</sup> China’s National Development and Reform Commission and Ministry of Commerce, *Catalogue of Industries for Guiding Foreign Investment (Revision 2017)*, June 28, 2017. [http://www.fdi.gov.cn/1800000121\\_39\\_4851\\_0\\_7.html](http://www.fdi.gov.cn/1800000121_39_4851_0_7.html); China’s National Development and Reform Commission and Ministry of Commerce, *Special Administrative Measures (Negative List) for the Access of Foreign Investment (2018)*, July 28, 2018. <http://english.mofcom.gov.cn/article/pressconferencehomepage/foreigninvestment/201807/20180702767650.shtml>.
- <sup>37</sup> Morgan Lewis, Chapter 34, “Doing Business in China,” in *Emerging Life Sciences Companies Deskbook* (2<sup>nd</sup> Edition), 2017. [https://www.morganlewis.com/topics/entrepreneurresources/~media/files/special-topics/erh\\_pubs/erh\\_doingbusinessinchina\\_elscdeskbook](https://www.morganlewis.com/topics/entrepreneurresources/~media/files/special-topics/erh_pubs/erh_doingbusinessinchina_elscdeskbook).
- <sup>38</sup> China’s National Development and Reform Commission and Ministry of Commerce, *Catalogue of Industries for Guiding Foreign Investment (Revision 2017)*, June 28, 2017. [http://www.fdi.gov.cn/1800000121\\_39\\_4851\\_0\\_7.html](http://www.fdi.gov.cn/1800000121_39_4851_0_7.html); ; China’s National Development and Reform Commission and Ministry of Commerce, *Special Administrative Measures (Negative List) for the Access of Foreign Investment (2018)*, July 28, 2018. <http://english.mofcom.gov.cn/article/pressconferencehomepage/foreigninvestment/201807/20180702767650.shtml>.
- <sup>39</sup> Jones Day, “English Translation of the Draft Foreign Investment Law.” [https://www.uschina.org/sites/default/files/2015%20Draft%20Foreign%20Investment%20Law%20of%20the%20People%27s%20Republic%20of%20China\\_JonesDay\\_0.pdf](https://www.uschina.org/sites/default/files/2015%20Draft%20Foreign%20Investment%20Law%20of%20the%20People%27s%20Republic%20of%20China_JonesDay_0.pdf).
- <sup>40</sup> Chao Deng, “China Pushes Ahead with New Foreign-Investment Law,” *Wall Street Journal*, March 8, 2019. <https://www.wsj.com/articles/china-pushes-ahead-with-new-foreign-investment-law-11552053228>.
- <sup>41</sup> Christina Nelson, “Licensing in China: Challenges and Best Practices,” *China Business Review*, January 14, 2014. <https://www.chinabusinessreview.com/licensing-in-china-challenges-and-best-practices/>.
- <sup>42</sup> Christina Nelson, “Licensing in China: Challenges and Best Practices,” *China Business Review*, January 14, 2014. <https://www.chinabusinessreview.com/licensing-in-china-challenges-and-best-practices/>.
- <sup>43</sup> White House Office of Trade and Manufacturing Policy, *How China’s Economic Aggression Threatens the Technologies and Intellectual Property of the United States and the World*, June 18, 2018, 7. <https://www.whitehouse.gov/wp-content/uploads/2018/06/FINAL-China-Technology-Report-6.18.18-PDF.pdf>.
- <sup>44</sup> Office of the U.S. Trade Representative, *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*, March 22, 2018, 37. <https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>.
- <sup>45</sup> U.S. Chamber of Commerce, *China’s Approval Process for Inbound Foreign Direct Investment: Impact of Market Access, National Treatment and Transparency*, 2012, 35–36. [https://www.uschamber.com/sites/default/files/documents/files/020021\\_China\\_InboundInvestment\\_Cvr.pdf](https://www.uschamber.com/sites/default/files/documents/files/020021_China_InboundInvestment_Cvr.pdf).
- <sup>46</sup> Organization for Economic Cooperation and Development, “FDI Restrictiveness,” 2017. <https://data.oecd.org/fdi/fdi-restrictiveness.htm>.
- <sup>47</sup> Christina Nelson, “Licensing in China: Challenges and Best Practices,” *China Business Review*, January 14, 2014. <https://www.chinabusinessreview.com/licensing-in-china-challenges-and-best-practices/>.
- <sup>48</sup> Austin Lowe, “China’s Foreign Investment Law Fails to Address U.S. Concerns,” *Lawfare*, March 7, 2019. <https://www.lawfareblog.com/chinas-foreign-investment-law-fails-address-us-concerns>.
- <sup>49</sup> Mark Cohen, “The TIER Is Revised,” *China IPR* (Blog), March 18, 2019. <https://chinaipr.com/2019/03/18/the-tier-is-revised/>.
- <sup>50</sup> American Chamber of Commerce in the People’s Republic of China, “2019 China Business Climate Survey Report,” February 2019, 51.
- <sup>51</sup> U.S.-China Business Council, *Hearing on China’s Implementation of its World Trade Organization Commitments*, written testimony to the Office of the U.S. Trade Representative, September 21, 2016, 4. <https://www.uschina.org/sites/default/files/USCBC%202016%20TPSC%20Testimony%20Final.pdf>.
- <sup>52</sup> Jack Wagner, “China’s Cybersecurity Law: What You Need to Know,” *Diplomat*, June 1, 2017. <https://thediplomat.com/2017/06/chinas-cybersecurity-law-what-you-need-to-know/>.
- <sup>53</sup> Office of the U.S. Trade Representative, *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*, March 22, 2018, 153–164. <https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>.
- <sup>54</sup> James Andrew Lewis, “How Much Have the Chinese Actually Taken?” *Center for Strategic and International Studies*, March 22, 2018. <https://www.csis.org/analysis/how-much-have-chinese-actually-taken>.
- <sup>55</sup> Office of the U.S. Trade Representative, *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*, March 22, 2018, 153. <https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>.

- <sup>56</sup> U.S. Department of Justice, *Chinese Intelligence Officer Charged with Economic Espionage Involving Theft of Trade Secrets from Leading U.S. Aviation Companies*, October 10, 2018. <https://www.justice.gov/opa/pr/chinese-intelligence-officer-charged-economic-espionage-involving-theft-trade-secrets-leading>.
- <sup>57</sup> White House, *Fact Sheet: President Xi Jinping's State Visit to the United States*, September 25, 2015. <https://obamawhitehouse.archives.gov/the-press-office/2015/09/25/fact-sheet-president-xi-jinpings-state-visit-united-states>.
- <sup>58</sup> Jonathan Ray et al., "China's Industrial and Military Robotics Development," *Defense Group Inc.* (prepared for the U.S.-China Economic and Security Review Commission), October 2016, 98. [https://www.uscc.gov/sites/default/files/Research/DGI\\_China%27s%20Industrial%20and%20Military%20Robotics%20Development.pdf](https://www.uscc.gov/sites/default/files/Research/DGI_China%27s%20Industrial%20and%20Military%20Robotics%20Development.pdf).
- <sup>59</sup> Li Xiaohua, "China to Undergo Brain Gain through Plan 111," *China Internet Information Center*, September 14, 2006.
- <sup>60</sup> Ka-Ho Mok and Kar Ming Yu, eds., *Internationalization of Higher Education in East Asia: Trends of Student Mobility and Impact on Education Governance*, Routledge Critical Studies in Asia Education: New York, NY (2014): 19, 101–102.
- <sup>61</sup> Jonathan Ray et al., "China's Industry and Military Robotics Development," *Defense Group, Inc.* (prepared for the U.S.-China Economic and Security Review Commission), October 25, 2016, 101–102; Joseph Jimenez, "There's a Research Revolution Going on in China—and One Day It Could Save Your Life," *World Economic Forum*, July 21, 2016. <https://www.weforum.org/agenda/2016/07/theres-a-research-revolution-going-on-in-china-and-one-day-it-could-save-your-life>.
- <sup>62</sup> Jonathan Ray et al., "China's Industry and Military Robotics Development," *Defense Group, Inc.* (prepared for the U.S.-China Economic and Security Review Commission), October 25, 2016, 101–102; Joseph Jimenez, "There's a Research Revolution Going on in China—and One Day It Could Save Your Life," *World Economic Forum*, July 21, 2016. <https://www.weforum.org/agenda/2016/07/theres-a-research-revolution-going-on-in-china-and-one-day-it-could-save-your-life>.
- <sup>63</sup> U.S. Office of the Director of National Intelligence, National Counterintelligence and Security Center, *Foreign Economic Espionage in Cyberspace 2018*, July 26, 2018, 6. <https://www.dni.gov/index.php/ncsc-newsroom/item/1889-2018-foreign-economic-espionage-in-cyberspace>; Tate Nurkin et al., "China's Advanced Weapons Systems," *Jane's by IHS Markit* (prepared for the U.S.-China Economic and Security Review Commission) May 10, 2018, 124. [https://www.uscc.gov/sites/default/files/Research/Jane%27s%20by%20IHS%20Markit\\_China%27s%20Advanced%20Weapons%20Systems.pdf](https://www.uscc.gov/sites/default/files/Research/Jane%27s%20by%20IHS%20Markit_China%27s%20Advanced%20Weapons%20Systems.pdf).
- <sup>64</sup> Alex Joske, "Picking Flowers, Making Honey," *Australian Strategic Policy Institute*, October 30, 2018. <https://www.aspi.org.au/report/picking-flowers-making-honey>.
- <sup>65</sup> U.S. Securities and Exchange Commission, *Guidance on the Exemption for Advisers to Venture Capital Funds*, December 2013. <https://www.sec.gov/divisions/investment/guidance/im-guidance-2013-13.pdf>.
- <sup>66</sup> Steven N. Kaplan and Josh Lerner, "Venture Capital Data: Opportunities and Challenges," *Harvard Business School* (Working Paper), August 2016, 9. [http://www.hbs.edu/faculty/Publication%20Files/17-012\\_10de1f93-30e4-4a98-858c-4137556ec037.pdf](http://www.hbs.edu/faculty/Publication%20Files/17-012_10de1f93-30e4-4a98-858c-4137556ec037.pdf).
- <sup>67</sup> Steven N. Kaplan and Josh Lerner, "Venture Capital Data: Opportunities and Challenges," *Harvard Business School* (Working Paper), August 2016, 4–5. [http://www.hbs.edu/faculty/Publication%20Files/17-012\\_10de1f93-30e4-4a98-858c-4137556ec037.pdf](http://www.hbs.edu/faculty/Publication%20Files/17-012_10de1f93-30e4-4a98-858c-4137556ec037.pdf).
- <sup>68</sup> 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," *Defense Innovation Unit*, January 2018, 2.
- <sup>69</sup> John S. McCain National Defense Authorization Act for Fiscal Year 2019, Public Law No. 115-232, 2018, Sec. 1758.
- <sup>70</sup> John S. McCain National Defense Authorization Act for Fiscal Year 2019, Public Law No. 115-232, 2018, Sec. 1703.
- <sup>71</sup> John S. McCain National Defense Authorization Act for Fiscal Year 2019, Public Law No. 115-232, 2018, Sec. 1703.
- <sup>72</sup> Carl O'Donnell, Liana B. Baker, and Echo Wang, "Exclusive: Told U.S. Security at Risk, Chinese Firm Seeks to Sell Grindr Dating App," *Reuters*, March 27, 2019. <https://www.reuters.com/article/us-grindr-m-a-exclusive/exclusive-us-pushes-chinese-owner-of-grindr-to-divest-the-dating-app-sources-idUSKCN1R809L>; Christina Farr and Ari Levy, "The Trump Administration Is Forcing This Health Start-up That Took Chinese Money into a Fire Sale," *CNBC*, April 4, 2019. <https://www.cnn.com/2019/04/04/cfius-forces-patientslikeme-into-fire-sale-booting-chinese-investor.html>.
- <sup>73</sup> U.S. Department of the Treasury, *Treasury Releases Interim Regulations for FIRRMA Pilot Program*, October 10, 2018. <https://home.treasury.gov/news/press-releases/sm506>; U.S. Department of the Treasury, *FAQS on FIRRMA Critical Technology Pilot Program*, November 2018. <https://home.treasury.gov/system/files/291/-Pilot-Program-FAQs.pdf>.
- <sup>74</sup> 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," *Defense Innovation Unit*, January 2018, 8.
- <sup>75</sup> John Markoff and Matthew Rosenberg, "China's Intelligent Weaponry Gets Smarter," *New York Times*, February 3, 2017. <https://www.nytimes.com/2017/02/03/technology/artificial-intelligence-china-united-states.html>.