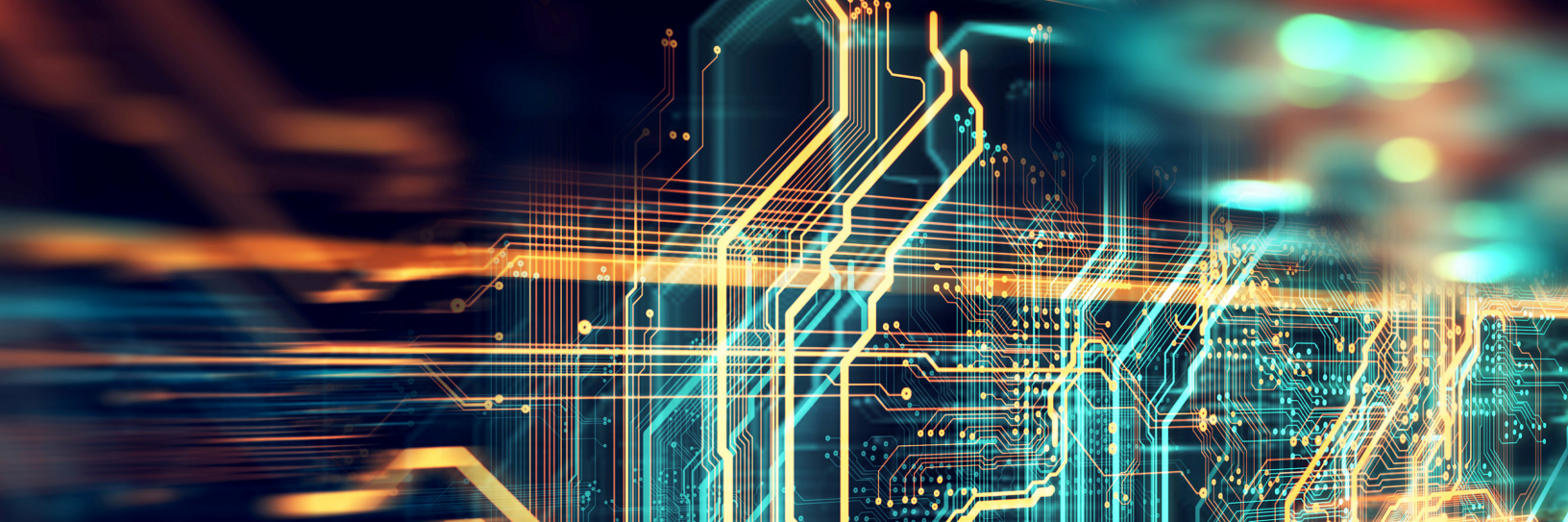




How China's Economic Aggression Threatens the Technologies and Intellectual Property of the United States and the World



White House Office of Trade and Manufacturing Policy
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I. China's Strategies of Economic Aggression

The Chinese government is implementing a comprehensive, long-term industrial strategy to ensure its global dominance.... Beijing's ultimate goal is for domestic companies to replace foreign companies as designers and manufacturers of key technology and products first at home, then abroad.

U.S.-China Economic and Security Review Commission¹

The People's Republic of China (China) has experienced rapid economic growth to become the world's second largest economy² while modernizing its industrial base and moving up the global value chain. However, much of this growth has been achieved in significant part through aggressive acts, policies, and practices that fall outside of global norms and rules (collectively, "economic aggression").³ Given the size of China's economy and the extent of its market-distorting policies, China's economic aggression⁴ now threatens not only the U.S. economy but also the global economy as a whole.

In some respects, China has been transparent about its aggressive acts, policies, and practices. They are revealed in Chinese government documents,⁵ through behaviors of Chinese State actors,⁶ and from reports produced by business organizations, think tanks, and government agencies.⁷ Four categories of such economic aggression which are outside the scope of this report include:

- ***Protect China's Home Market From Imports and Competition:*** This category features high tariffs, non-tariff barriers, and other regulatory hurdles.⁸
- ***Expand China's Share of Global Markets:*** Industrial policy tools include financial support to boost exports and the consolidation of State-Owned Enterprises into "national champions"⁹ that can compete with foreign companies in both the domestic and global markets. Chinese enterprises also benefit from preferential policies that lead to subsidized overcapacity in China's domestic market, which then depresses world prices and pushes foreign rivals out of the global market.¹⁰
- ***Secure and Control Core Natural Resources Globally:*** China uses a predatory "debt trap" model of economic development and finance that proffers substantial financing to developing countries in exchange for an encumbrance on their natural resources and access to markets. These resources range from bauxite, copper, and nickel to rarer commodities such as beryllium, titanium, and rare earth minerals.¹¹ This predatory model has been particularly effective in countries characterized by weak rule of law and authoritarian regimes.¹²
- ***Dominate Traditional Manufacturing Industries:*** China has already achieved a leading position in many traditional manufacturing industries. It has done so in part through preferential loans and below-market utility rates as well as lax and weakly enforced environmental and health and safety standards.¹³ As the European Chamber of Commerce has documented: "For a generation, China has been the factory of the world." By 2015, China already accounted for 28 percent of global auto production, 41 percent of global ship production, more than 50 percent of global refrigerator production, more than 60 percent

of global production of color TV sets, and more than 80 percent of global production of air conditioners and computers.¹⁴

In addition, China pursues two categories of economic aggression that are the focus of this report. These include:

- ***Acquire Key Technologies and Intellectual Property From Other Countries, Including the United States***
- ***Capture the Emerging High-Technology Industries That Will Drive Future Economic Growth¹⁵ and Many Advancements in the Defense Industry***

This report will document the major acts, policies, and practices of Chinese industrial policy used to implement these two strategies.¹⁶ Through such implementation, the Chinese State seeks to access the crown jewels of American technology and intellectual property. (A compendium of the acts, policies, and practices used to implement China's six strategies of economic aggression is presented in the Appendix.)

II. How China Seeks to Acquire Technologies and Intellectual Property and Capture Industries of the Future

Chinese industrial policy seeks to “introduce, digest, absorb, and re-innovate”¹⁷ technologies and intellectual property (IP) from around the world.¹⁸ This policy is carried out through: (A) State-sponsored IP theft¹⁹ through physical theft, cyber-enabled espionage and theft, evasion of U.S. export control laws, and counterfeiting and piracy; (B) coercive and intrusive regulatory gambits to force technology transfer from foreign companies, typically in exchange for limited access to the Chinese market; (C) economic coercion through export restraints on critical raw materials and monopsony purchasing power; (D) methods of information harvesting that include open source collection; placement of non-traditional information collectors at U.S. universities, national laboratories, and other centers of innovation; and talent recruitment of business, finance, science, and technology experts; and (E) State-backed, technology-seeking Chinese investment.

A. Physical Theft and Cyber-Enabled Theft of Technologies and IP

The Office of the Director of National Intelligence notes: “Chinese actors are the world’s most active and persistent perpetrators of economic espionage.”²⁰ Strategic sectors in emerging industries known to have been targeted include “electronics, telecommunications, robotics, data services, pharmaceuticals, mobile phone services, satellite communications and imagery, and business application software.”²¹

1. Physical Theft of Technologies and IP Through Economic Espionage

Physical theft through economic espionage by company insiders or others who have trusted access to trade secrets and confidential business information provides China with a significant means to acquire U.S. technologies and intellectual property. In describing China's use of economic espionage as part of a broader strategy to acquire U.S. technology companies, the U.S.-China Economic and Security Review Commission observes:

China appears to be conducting a campaign of commercial espionage against U.S. companies involving...human infiltration to systematically penetrate the information systems of U.S. companies to steal their intellectual property, devalue them, and acquire them at dramatically reduced prices.²²

A report from the Department of Defense's Defense Innovation Unit Experimental²³ (hereinafter the DIUx Pentagon Report) states that "the scale of the [Chinese economic] espionage ... continues to increase."²⁴ Law enforcement efforts alone cannot keep up with (or adequately deter) a state-sponsored campaign of theft. In part, this is because U.S. companies may be unaware of theft by an insider before it is too late. In part, this is because some U.S. companies are unwilling to report the theft for fear of the adverse consequences that such a disclosure could entail. Even when victims report, the Chinese government is typically unwilling to cooperate, making a successful cross-border investigation difficult.

Open source reporting indicates China's Ministry of State Security deploys no less than 40,000 intelligence officers abroad and maintains more than 50,000 intelligence officers in mainland China.²⁵ This force is bolstered by hundreds of thousands of People's Liberation Army (PLA) staff members and scientists.²⁶

2. Cyber-Enabled Espionage and Theft

Cyber tools have enhanced the economic espionage threat, and the IC [Intelligence Community] judges [that] the use of such tools is already a larger threat than more traditional espionage methods.

Report to Congress on Foreign Economic Collection and Industrial Espionage, Office of the National Counterintelligence Executive²⁷

China engages in widespread cyber-economic campaigns involving cyber-enabled espionage to infiltrate foreign companies for the purpose of stealing intellectual property, trade secrets, business processes, and technologies.²⁸ Estimates of the cost of trade secret theft alone range "between \$180 billion and \$540 billion annually."²⁹ As the U.S. Trade Representative (USTR) notes:

For over a decade, the Chinese government has conducted and supported cyber intrusions into U.S. commercial networks targeting confidential business information held by U.S. firms. Through these cyber intrusions, China's government has gained unauthorized access to a wide range of commercially valuable business information, including trade secrets, technical data, negotiating positions, and sensitive and proprietary internal communications. These acts, policies, or practices by the Chinese government are unreasonable or discriminatory and burden or restrict U.S. commerce.³⁰

In a 2012 study of cyber intrusions, Verizon, in cooperation with 19 contributing private organizations and government agencies, analyzed over 47,000 security incidents that resulted in 621 confirmed data disclosures and at least 44 million compromised records. Of the data disclosures that focused on economic espionage (as opposed to financially motivated incidents), 96% of the cases were attributable to "threat actors in China."³¹

In 2013, the cyber-security firm Mandiant described a People's Liberation Army cyber command "fully institutionalized" within the Chinese Communist Party and staffed by more than 100,000 personnel.³² In May of 2014, the U.S. Department of Justice (DOJ) unsealed criminal charges against five officers of the PLA for cyber-enabled economic espionage, among other hacking-related charges, related to the theft of intellectual property, trade secrets, and other sensitive business information from U.S. entities in the energy and steel industries.³³

In September of 2015, President Barack Obama and President Xi Jinping of China formally committed 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."³⁴ According to the U.S.-China Economic and Security Review Commission 2016 Annual Report to Congress:

*[A]lthough the number of incidents of Chinese cyber espionage detected by FireEye [a cybersecurity firm] has declined, this likely reflects a shift within China away from prolific amateur attacks toward more centralized, professionalized, and sophisticated attacks by a smaller number of actors, rather than a trend toward the cessation of Chinese cyber espionage.*³⁵

3. Evasion of U.S. Export Control Laws

Closely related to China's espionage campaigns are China's State-backed efforts to evade U.S. export control laws. These laws have been put in place for national security purposes under the Arms Export Control Act (AECA)³⁶ and the International Emergency Economic Powers Act (IEEPA);³⁷ they are designed to prevent the export of sensitive technologies with military applications.

A significant problem facing the U.S. departments and agencies implementing these export controls (principally the Departments of Commerce, Defense, and State)³⁸ is the growth in "dual-use" technologies, which have both military and civilian utility. For example, aero-engine technologies have an obvious commercial application. When acquired by a strategic economic and military competitor like China, commercial items can be exploited for military purposes.

As an example of China's evasion of U.S. export control laws, consider the case of Amin Yu, a Chinese national who became a lawful permanent U.S. resident. As described by Assistant U.S. Attorney Daniel Irick, "Yu was part of a conspiracy that involved shell companies, off-shore accounts and false documents" and "was involved in \$2.6 million in illegal transactions."³⁹

From 2002 to 2012, Yu admitted in a plea bargain that "at the direction of co-conspirators working for Harbin Engineering University (HEU), a state-owned entity in the People's Republic of China, Yu obtained systems and components for marine submersible vehicles from companies in the United States. She then illegally exported those items to the PRC for use by her co-conspirators in the development of marine submersible vehicles—unmanned underwater vehicles, remotely operated vehicles, and autonomous underwater vehicles—for HEU and other state-controlled entities."⁴⁰

4. Counterfeiting and Piracy

Counterfeiting entails the practice of producing unauthorized fake goods. Piracy is copyright infringement on a commercial scale and “consists in making an unauthorized exact copy—not a simple imitation—of an item covered by an intellectual property right.”⁴¹ China is the world’s largest source of counterfeit and pirated products.⁴²

Estimates of the cost of China’s counterfeiting and piracy run into the hundreds of billions of dollars per year. For example, the non-partisan and independent Commission on the Theft of Intellectual Property estimates “that the annual cost to the U.S. economy continues to exceed \$225 billion in counterfeit goods, pirated software, and theft of trade secrets and could be as high as \$600 billion,” “IP theft by thousands of Chinese actors continues to be rampant,” and China “remains the world’s principal IP infringer.”⁴³

5. Reverse Engineering

Reverse engineering in China is widespread and entails the process of disassembling and examining or analyzing a product or component for the purpose of cloning or producing something similar without authorization from the rights holder. Reverse engineering can be legal; it is illegal when the unauthorized production is of technology under patent or other IP protection.

Reverse engineering allows Chinese engineers and scientists to recreate the products of non-Chinese companies and thereby forego the time and cost of research and development. The practice of reverse engineering is consistent with China’s industrial policy goal to introduce, digest, and absorb a foreign technology and “re-innovate” that technology with improvements.⁴⁴

B. Coercive and Intrusive Regulatory Gambits to Force Technology and IP Transfer

[A] longstanding feature of China’s industrial policy is that foreign companies are often pushed to transfer technology as the price of market entry, which is in contravention of its commitments as a member of the World Trade Organisation (WTO). This situation is exacerbated by the fact that the Chinese authorities’ ultimate aim is to absorb these technologies...as domestic companies begin to catch up technologically, market access for foreign companies will become increasingly difficult.

*European Chamber of Commerce*⁴⁵

Chinese industrial policy features a wide range of coercive and intrusive regulatory gambits to force the transfer of foreign technologies and IP to Chinese competitors, often in exchange for access to the vast Chinese market. In its 2017 Member Survey, the U.S.-China Business Council reports that “tech transfer to gain market access is an acute issue for those who face it; nearly 20 percent of respondents to a U.S.-China Business Council 2017 Member Survey have been asked to transfer technology during the past three years” and that “ninety-four percent remain concerned about IP protection.”⁴⁶

China's instruments of coercion to force the transfer of foreign technologies and IP to Chinese competitors include: (1) foreign ownership restrictions such as forced joint ventures and partnerships that explicitly or tacitly require or facilitate technology transfers; (2) adverse administrative approvals and licensing processes; (3) discriminatory patent and other IP rights restrictions; (4) security reviews; (5) secure and controllable technology standards; (6) data localization; (7) burdensome and intrusive testing; (8) discriminatory catalogues and lists; (9) government procurement restrictions; (10) imposition of indigenous technology standards that deviate significantly from international norms and that may provide backdoor Chinese access to source codes; (11) forced research and development ("R&D localization"); (12) antimonopoly laws; (13) Expert Review Panels; (14) Chinese Communist Party Committees that influence corporate governance; and (15) placement of Chinese employees at foreign joint ventures.

1. Foreign Ownership Restrictions

China uses foreign ownership restrictions⁴⁷ to force or induce the transfer of technology and IP, often as a condition of access to the Chinese market.⁴⁸ Such investment restrictions may also serve both to deter entry of foreign producers into the Chinese market and to enhance indigenous innovation and import substitution.

For example, China requires foreign companies to enter into joint ventures or partnerships with minority stakes in exchange for access to the Chinese market in select sectors.⁴⁹ As noted by the USTR: "These requirements prohibit foreign investors from operating in certain industries unless they partner with a Chinese company, and in some cases, unless the Chinese partner is the controlling shareholder."⁵⁰

Once a U.S. or foreign company is coerced into entering a joint venture with a Chinese partner, it opens itself up to the transfer of technology and IP. This can happen through the joint manufacturing process. It can also happen when the Chinese partner engages in covert actions to steal the foreign IP or technology using its access and proximity to the foreign enterprise.

As foreign pressure mounts to end coercive foreign ownership restrictions, China increasingly relies on *tacit* coercion and minimizes written records of forced technology transfer requirements in particular deals.⁵¹ Despite repeated promises from top Chinese leaders to end this practice, it continues.⁵²

2. Adverse Administrative Approvals and Licensing Requirements

The Chinese government uses its administrative licensing and approvals processes to force technology transfer in exchange for the numerous administrative approvals needed to establish and operate a business in China.

U.S. Trade Representative⁵³

Foreign companies seeking to invest in China must obtain a variety of administrative approvals; these include investment approvals, project approvals, local approval for site-related conditions, and national security approvals, among others. At each stage, Chinese regulators may seek to extract concessions or force the transfer of technology or IP. In these ways, China's extensive,

burdensome, opaque, and discriminatory approvals process functions as a significant non-tariff barrier to entry and a coercive tool to force the transfer of technologies and IP.

China imposes licensing requirements on more than 100 different business activities, e.g. food and drug production, mining, and telecommunications services. In the course of an often vague, ambiguous, and discretionary licensing process, China can extract valuable intellectual property, acquire proprietary information about marketing channels, and press for more favorable, below-market commercial terms for the local partner(s). These licensing requirements also raise the costs of foreign competitors and can induce delays entering the Chinese market.

3. Discriminatory Patent and Other IP Rights Restrictions

China seeks to force foreign patent and technology holders to accept below-market royalty rates in licensing and other forms of below-market compensation for their technologies.⁵⁴ China also seeks to otherwise restrict the IP rights of foreigners in at least three ways.

First, China maintains special rules for foreign companies that license technologies to domestic companies. These rules mandate that all improvements to a technology belong to the party making the improvements and provide that the foreign licensor cannot stop the Chinese licensee from making improvements to the technology.⁵⁵ As noted by the USTR: “These provisions are particularly harmful to a U.S. licensor if the Chinese licensee makes an improvement severable from the original invention and then patents the severable improvement in China or elsewhere.”⁵⁶

Second, China seeks to limit the time that a foreign patent or rights holder has exclusive control over the technology or patent in licenses with domestic parties. For example, as part of its restrictions on foreign joint venture (JV) partners, the USTR notes: “[T]he term of the technology transfer agreement to the JV shall ‘generally not exceed ten years.’ The provision may result in U.S. companies only having control over their transferred technology for ten years, even though some forms of technology, such as patents and trade secrets, may be protectable for much longer than ten years.”⁵⁷

Third, China seeks to extend the right to use a foreign technology in perpetuity after the licensing or use term expires. As noted by the USTR in the joint venture context: “After the conclusion of the JV-related technology transfer agreement [under the relevant Chinese regulations,] the technology importing party shall have the right to continue using the technology... This means that under the JV Regulations, the Chinese joint venture licensee has the right to use the U.S. licensor’s technology in perpetuity.”⁵⁸

These market-distorting practices undermine the ability of U.S. firms to compete in China and continue investment in innovation. These practices also provide Chinese firms with an advantage in global markets over foreign competitors that must pay full royalty and other rates while depriving foreign technology owners of a fair return. In these ways, China’s discriminatory and restrictive policies on patent and other IP rights further China’s goal of indigenous innovation through re-innovation while truncating the intellectual property rights of foreigners.

4. Security Reviews Force Technology and IP Transfers

China uses security reviews to force foreign enterprises to disclose proprietary information.⁵⁹ At risk are source codes, encryption algorithms, and other sensitive IP.

Chinese use of security reviews dates back to older laws like China's 1999 "Commercial Encryption Regulation," which classified encryption as a state secret. In recent years, China has increased its use of security reviews to target emerging high-technology industries.

China's *Cybersecurity Law*,⁶⁰ which entered into force in June 2017, establishes security reviews for products and services, imposes restrictions on the cross-border flow of data, requires data localization, and authorizes the development of national cybersecurity standards that exceed the burden and scope of international standards.

The European Chamber of Commerce has expressed concern that as the *Cybersecurity Law* is implemented, it is likely that "companies will have to submit information on their products' design and source codes to government-affiliated review organisations."⁶¹ Similarly, the USTR has warned: "Companies may be forced to disclose critical technologies, including source code, complete design databases, behavior models, logic models, and even floor plans and physical layouts of central processing units."⁶²

5. Secure and Controllable Technology Standards

China continues to codify into law "secure and controllable" technology standards through laws such as the National Security Law, the Cyber Security Law, the National Cyber Security Standard, and the Technical Committee Standards. It "has more than 30 such measures in various industries."⁶³

Conformance with the secure and controllable technology standards (also known as "secure and trustworthy" and "indigenous and controllable") requires foreign firms to "surrender key technologies to Chinese authorities, such as source code and encryption algorithms"⁶⁴ and submit to "extensive IP disclosures."⁶⁵ The secure and controllable technology standards thereby act as a barrier to entry to firms reluctant to surrender their technologies and IP and as a coercive tool to force technology and IP transfer, thereby promoting indigenous innovation.

6. Data Localization Mandates

China is increasingly attempting to force foreign enterprises to localize valuable data or information within China, e.g., store their data and information on servers in China.⁶⁶ This practice of data localization can act as a barrier to entry for foreign companies unwilling to share their data because of the high risk such data localization poses in China. As the U.S. Chamber of Commerce notes:

*[I]f a foreign company is forced to localize a valuable set of data or information in China, whether for R&D purposes or simply to conduct their business, it will have to assume a significant amount of risk that its data or information may be misappropriated or misused, especially given the environment in China, where companies face significant legal and other uncertainties when they try to protect their data and information.*⁶⁷

7. Burdensome and Intrusive Testing

China imposes burdensome and intrusive testing requirements that extend beyond the need for public health and safety to force foreign companies to reveal trade secrets, source code, encryption algorithms, and other sensitive IP. For example, China's Compulsory Certification program requires foreign producers to undergo extensive and redundant in-country tests and factory inspections and to be certified before legally marketing certain products in China. Product types in the current catalogue⁶⁸ include agricultural machinery, electric tools, motor vehicles and parts, medical devices, and firefighting equipment.⁶⁹

Besides forcing technology transfer, burdensome and intrusive testing deters market entry and raises the costs of foreign competitors operating in the domestic market, thereby offering protection to domestic producers.

8. Discriminatory Catalogues and Lists

China's system of ministerial and provincial catalogues and lists can raise customs barriers, deter market entry, further expand licensing requirements, tighten foreign investment restrictions, and force technology transfer. For example, the *Catalogue of Telecommunications Services*⁷⁰ has expanded the scope of telecommunications services subject to licensing requirements. Only foreign companies participating in a joint venture with a Chinese company can hold a license. Absent a license, a foreign company cannot use its brand or trademark when selling or supplying services through its joint venture.⁷¹

Similarly, when a foreign company's products are excluded from an approved list in a Chinese government catalogue, the foreign company may be denied benefits available to domestic competitors such as preferential tax rates and low-interest loans from Chinese banks available to its Chinese competitors.

In these ways, China's catalogues and lists serve as significant non-tariff barriers to entry and as industrial policy tools to force the transfer of technologies and intellectual property while providing preferential treatment to domestic competitors.⁷²

9. Government Procurement Restrictions

China maintains an expansive set of government procurement restrictions to promote import substitution and indigenous innovation. As the European Chamber of Commerce notes: "China is not a party to the plurilateral Agreement on Government Procurement (GPA) under the WTO, and its public procurement market remains largely closed to foreign suppliers...government procurement has been observed to favour domestic producers."⁷³

Catalogues and lists often reinforce China's procurement restrictions. So, too, do discriminatory reimbursement schemes for foreign products, e.g., pharmaceuticals.

10. Indigenous Technology Standards That Deviate from International Norms

China sometimes formulates national standards in strategic industries that deliberately differ from international standards in order to impede market access for foreign technology and to favour Chinese technology on the domestic market. Examples of Chinese national standards are the FDD-LTE standard for 4G mobile networks, the WAPI standard for wireless networks and independent standards for electric vehicle charging stations. If such a national path of standardisation also manifests itself in smart manufacturing, market access for foreign tech suppliers could be considerably restricted.

Mercator Institute for China Studies⁷⁴

China imposes unique, indigenous technical standards that lack harmonization with, and deviate significantly from, international standards. Target industries include aviation, computer numerical control devices, machine tools, medical tools, and robotics.⁷⁵

These indigenous standards can serve as a tool to pressure foreign companies to reveal their source code, encryption codes, and other technologies and IP. These indigenous standards can be “confusing” and “unnecessarily duplicative” while creating trade barriers that restrict market entry and foreign imports.”⁷⁶ They help drive those companies implementing the standards towards Chinese technology suppliers rather than U.S. and foreign suppliers while protecting Chinese brands and promoting indigenous innovation. In addition, they may provide backdoor Chinese access to source codes.⁷⁷

China’s indigenous technology standards also potentially “serve to reduce the licensing fees that Chinese companies would have to pay to use foreign technologies in industries covered [by China 2025].”⁷⁸ China “aims to spread Chinese standards abroad, particularly in countries linked to its One-Belt One-Road—a Chinese initiative to connect Eurasian economies through infrastructure, trade, and investment.”⁷⁹

11. Forced Research & Development (“R&D Localization”)

The CEO of a large multinational telecommunications equipment company recently shared with ITIF [Information Technology & Innovation Foundation] 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’...

United States Trade Representative⁸⁰

China uses a variety of methods to force the placement of foreign research and development facilities in China as a condition of access to the Chinese market (“R&D localization”).⁸¹ For example, China issued new market access rules in 2017. The U.S. Trade Representative states: “These rules require that NEV manufacturers ‘master’ the development and manufacturing technology for a complete NEV, rather than just one of the three key technologies listed in the

2009 market access rules, and possess key R&D capacities.”⁸² China’s 2014 Integrated Circuits Guidelines also call for establishing R&D, along with manufacturing and operating centers in China.⁸³ One motive for China’s acquisition of U.S. companies is to capture their R&D facilities.⁸⁴

12. Antimonopoly Law Extortion

China uses the *Antimonopoly Law of the People’s Republic of China* not just to foster competition but also to force foreign companies to make concessions such as reduced prices and below-market royalty rates for licensed technology.⁸⁵ These concessions provide Chinese enterprises with a competitive advantage in the home market and global markets.

China’s ability to extort concessions lies in its authority to impose fines of between one and ten percent of a foreign company’s revenues for the previous year for alleged anti-competitive practices. As an example, San Diego-based Qualcomm agreed to a fine of \$975 million; it also was forced to accept below-market royalty rates on patents used by Chinese smartphone manufacturers.⁸⁶

13. Expert Review Panels Force Disclosure of Proprietary Information

Numerous Chinese administrative agencies empower Expert Review Panels composed of government, industry, and academic representatives as part of their review and approvals processes. These panels have broad powers to extract proprietary information from foreign companies under the guise of normal review⁸⁷ and thereby may help induce the transfer of technologies, IP, business processes, trade secrets, and other proprietary information. As an additional risk factor, members of these panels may have a competitive interest in the information that may be disclosed.⁸⁸

14. Chinese Communist Party Co-opts Corporate Governance

The *Company Law of the People’s Republic of China* authorizes the establishment of Communist Party committees in companies that are not State-owned “to carry out the activities of the party in accordance with the charter of the Communist Party of China.”⁸⁹ Following a dictate from President Xi Jinping,⁹⁰ both Chinese State-Owned Enterprises and the joint venture partners of foreign companies are now increasingly including Chinese Communist Party Committees in corporate charters and in their corporate governance decisions.⁹¹ In these ways, corporate governance has become a tool to advance China’s strategic goals, rather than simply, as is the custom of international rules, to advance the profit-maximizing goals of the enterprise.

Under the Xi revision, boards of directors may now receive guidance directly from the Chinese Communist Party.⁹² For example, China’s Internet national champion Baidu has a Party Committee that links Baidu’s corporate operations with Chinese industrial policy and China’s political goals.⁹³ Baidu has been particularly active in Silicon Valley and with its U.S. investments in artificial intelligence and autonomous driving technologies.⁹⁴

Most broadly, the number of Communist Party committees in private enterprises has increased in recent years.⁹⁵

15. Placement of Chinese Employees with Foreign Joint Ventures

After China successfully forces a foreign company to enter into a joint venture, it may recruit employees for the JV that work in the Chinese partner's facilities. As the USTR notes: "The risk of technology loss is exacerbated when the Chinese partner in the JV operation maintains other factories and workers that compete with the JV operation. The employees of the JV often are recruited from, or have ties to, the Chinese partner's existing operations. Under these conditions, there is a considerable likelihood that the JV's technology and knowhow will leak, either through 'unintentional osmosis or through intentional diversion.'"⁹⁶

C. Economic Coercion to Force Technology and IP Transfer

Chinese export restrictions offer a competitive advantage to Chinese industries that benefit from lower input prices. At times, non-Chinese buyers have been forced to buy their raw materials at a price that is more than twice as high as that paid by Chinese firms. In some cases, these raw materials can amount to a considerable share of the total production cost. Rare earths represent, for example, more than 50% of cost for wind turbine components and 50% to 60% for a LCD display. Therefore, the price difference can carry a decisive competitive disadvantage for components' makers outside China.

*European Commission*⁹⁷

1. Export Restraints Restrict Access to Raw Materials

China has a commanding share of a wide range of critical raw materials⁹⁸ essential to the global supply chain and production of high-technology and high value-added products. For example, China is the world's dominant producer of rare earths, tungsten, and molybdenum.⁹⁹

China has used export restraints, including export quotas and export duties, to restrict access to critical raw materials. As the USTR notes:

China's export restraints affect U.S. and other foreign producers of a wide range of downstream products, such as steel, chemicals, hybrid and electric cars, energy efficient light bulbs, wind turbines, hard-disk drives, magnets, lasers, ceramics, semiconductor chips, refrigerants, medical imagery, aircraft, refined petroleum products, fiber optic cables and catalytic converters. The export restraints can create serious disadvantages for these foreign producers by artificially increasing China's export prices for their raw material inputs, which also drives up world prices.... The export restraints can also create pressure on foreign downstream producers to move their operations, technologies and jobs to China.^{100, 101}

2. Monopsony Purchasing Power

China's State-Owned Enterprises have significant monopsony purchasing power in select markets, e.g., aviation.¹⁰² China seeks to use its significant purchasing power in select markets to extract concessions from foreign sellers. Concessions may include increased localized production and the forced transfer of foreign technology. Exercising this monopsony power can strengthen the Chinese manufacturing base and supply chain, particularly in the high-technology space.

D. Information Harvesting

China acquires U.S. technologies and IP from America's national security innovation base through three primary channels of information harvesting.

1. Open Source Collection of Science and Technology Information

Large cadres of Chinese State actors engage in systematic, large-scale, open-source collection operations. They exploit foreign science and technology information to acquire foreign technologies and intellectual property and thereby gain competitive advantage by circumventing the costs and risks of indigenous research.¹⁰³

Although many other countries and the citizens of countries leverage open sources to advance technology, particularly in the age of the Internet, what differentiates China is the historical scale and scope of the institutionalization of open source collection as a means of acquiring the world's technologies and IP. The DIUx Pentagon Report indicates that China makes "maximum use of diversified sources: scanning technical literature, analyzing patents, reverse engineering product samples and capturing conversations at scientific meetings."¹⁰⁴

In 1985, there were more than 400 major science and technology institutes in China employing more than 60,000 workers "investigating, collecting, analyzing, synthesizing, repackaging, benchmarking, and reverse engineering."¹⁰⁵ Today, the Institute of Scientific and Technical Information of China is one such institute, with a "mandate" to provide "comprehensive information services to industry, universities, research institutes, and research personnel," a staff team of over 500, and a record of collecting millions of doctoral theses and government reports and hundreds of thousands of reference books along with thousands of foreign journals, monographs, and conference proceedings.¹⁰⁶

In 1991, veteran Chinese spies published *Sources and Methods of Obtaining National Defense Science & Technology Intelligence*,¹⁰⁷ a textbook known as China's open source collection "Spy Guide."¹⁰⁸ It references how open source collection is a Chinese State activity designed to further strategic goals and notes how open source collection has evolved into a "profession within the broader field of S&T [Science and Technology]."¹⁰⁹ Excerpts from the guide include: "Information is documents." "Information is not intelligence. Information is the source of intelligence;" "Collection policy is determined according to the intentions of the higher authorities;" and "The first thing that must be known when setting collection policy is where the intelligence elements fit into the national intelligence system."¹¹⁰

The DIUx Pentagon Report describes this document as “a comprehensive account of China’s foreign military open-source collection...collecting all types of media (including verbal information prized for its timeliness over written information) and making them available in database form.”¹¹¹ Open source reporting credits the acquisition of foreign technological information through open source collection “with reducing research costs by 40 to 50 percent and time by 60 to 70 percent.”¹¹²

2. Chinese Nationals In the U.S. as Non-Traditional Information Collectors¹¹³

More than 300,000 Chinese nationals annually attend U.S. universities or find employment at U.S. national laboratories, innovation centers, incubators, and think tanks. Chinese nationals now account for approximately one third of foreign university and college students in the United States and about 25 percent of graduate students specializing in science, technology, engineering, or math (STEM).¹¹⁴

Non-military sectors and institutions increasingly and routinely generate scientific and technological advancements with dual-use applications. Aware that Chinese nationals attending U.S. universities or finding employment at U.S. national laboratories, innovation centers, incubators, and think tanks may have access to cutting-edge information and technologies, the Chinese State has put in place programs aimed at encouraging Chinese science and engineering students “to master technologies that may later become critical to key military systems.”¹¹⁵ The national and economic security risks are that the Chinese State may seek to manipulate or pressure even unwitting or unwilling Chinese nationals into becoming non-traditional information collectors that serve Beijing’s military and strategic ambitions.

During a February 2018 U.S. Senate Intelligence Committee hearing,¹¹⁶ Senator Marco Rubio (R-FL) asked FBI Director Christopher Wray what the “counterintelligence risk posed to U.S. national security” was from “Chinese students, particularly those in advanced programs in sciences and mathematics?” Wray responded that the FBI has observed “the use of nontraditional collectors, especially in the academic setting, whether it's professors, scientists, students...in almost every... field office that the FBI has around the country. It is not just in major cities, it's in small ones as well. It's across basically every discipline; and I think the level of naiveté on the part of the academic sector about this creates its own issues.”

In FBI Director Wray’s view, Chinese non-traditional collectors “are exploiting the very open research and development environment that we have, which we all revere. But they're taking advantage of it, so one of the things we're trying to do is view the China threat as not just the whole-of-government threat, but a whole-of-society threat on their end, and I think it's going to take a whole-of-society response by us.” As the DIUx Pentagon Report notes:

*Academia is an opportune environment for learning about science and technology since the cultural values of U.S. educational institutions reflect an open and free exchange of ideas. As a result, Chinese science and engineering students frequently master technologies that later become critical to key military systems, amounting over time to unintentional violations of U.S. export control laws.*¹¹⁷

State-backed Chinese enterprises increasingly finance joint research programs and the construction of new research facilities on U.S. campuses. For example, Huawei is a company founded by a former Chinese military officer that raises national security concerns.¹¹⁸ Section 1656 of the Fiscal Year 2018 National Defense Authorization Act prohibits the Department of Defense from procuring or obtaining “covered telecommunications or services” and names Huawei in the definition of covered transactions.¹¹⁹

Huawei has partnered with the University of California-Berkeley on research focusing on artificial intelligence and related areas such as “deep learning, reinforcement learning, machine learning, natural language processing and computer vision,”¹²⁰ areas which all have important future military applications.

Chinese State actors are strategically building research centers in innovation centers and hubs like Silicon Valley and Boston. For example, the Chinese Internet firm Baidu has “set up the Institute for Deep Learning in Silicon Valley so it could compete with Google, Apple, Facebook and others for talent in the artificial intelligence field.”¹²¹

At the national laboratory level where leading edge defense research takes place, open source reporting indicates Chinese nationals working at top laboratories such as Los Alamos in New Mexico and Livermore in California have returned to China with expertise and knowledge transferrable to the development of systems with military applications.¹²² Examples cited include hypersonic glide vehicles, which travel at speeds in excess of Mach 5 and “are specifically designed for increased survivability against modern ballistic missile defense systems.”¹²³

3. Recruitment of Science, Technology, Business, and Finance Talent

China State actors recruit scholars, researchers, technology experts, and scientists at the forefront of their respective fields across the world. Such talent recruitment also targets the top employees of companies that a Chinese enterprise may seek to acquire, partner with, or invest in.

China’s talent recruitment strategically complements China’s efforts to target emerging high-technology industries and involves well-established Chinese government programs and large, stable funding streams. It focuses on two main categories of recruitment—non-Chinese talent and Chinese talent.

Non-Chinese talent recruitment targets academic and industry leaders from research institutes, laboratories, and universities in other countries. Inducements include financial and material benefits such as favorable taxation policies, free housing, insurance, family settlement funds, research funding, prestigious appointments, and government awards.¹²⁴ In serving the Chinese State, this non-Chinese talent fills knowledge gaps for civilian, military, and dual-use technologies.

Chinese talent recruitment includes nationals studying or working abroad. Chinese recruiters appeal to national pride and urge a “return to China” to “serve the Motherland.”¹²⁵ Those who return are rewarded with financial incentives and career opportunities. Those staying abroad are afforded multiple avenues to “serve the country,”¹²⁶ often including short-term visits to China and drafting reports outlining their research abroad.¹²⁷

For example, the “Thousand Talents Plan,” a recruitment program launched in 2008 by the central government of China, targets scholars who are leaders in their respective fields with top-level research capabilities, and who may hold intellectual property rights, key technologies, or patents in technological fields desired by China. These recruits may receive lucrative and prestigious positions at premier Chinese research institutes, labs, or universities.¹²⁸

Chinese government sources claim over 44,000 highly skilled Chinese personnel have returned to China since 2009 through talent plans.¹²⁹ As noted by *China Daily*, which is owned by the Chinese Communist Party: “China has more than 300 entrepreneurial parks for students returned from overseas. More than 24,500 enterprises have been set up in the parks by over 67,000 overseas returnees.”¹³⁰

E. Technology-Seeking, State-Financed Foreign Direct Investment

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 and generate large-scale technology transfer in industries deemed important by state industrial plans.

*United States Trade Representative*¹³¹

The Chinese government has institutionalized the industrial policy of inducing investment in “encouraged” high-technology sectors¹³² using the financial resources and regulatory instruments of the State.¹³³ China’s government has a multi-billion dollar set of State-backed funds¹³⁴ that contribute to technology investment and uses an array of State actors to implement its strategies of acquiring foreign technologies and intellectual property.

From 2006 to 2014, much of China’s outbound foreign direct investment (FDI) focused on the acquisition of core natural resources. However, since 2015, China has increasingly directed capital to acquire high-technology areas of the U.S. economy in particular.

In policy documents such as *Made in China 2025*,¹³⁵ China has articulated the target list of technology sectors it seeks to dominate.¹³⁶ Much of recent Chinese investment behavior appears consistent with this target list.

For example, since 2012, CB Insights has catalogued more than 600 high-technology investments in the United States worth close to \$20 billion conducted by China-based investors, with artificial intelligence, augmented and virtual reality, and robotics receiving particular focus.¹³⁷ China’s biggest sovereign wealth fund, the China Investment Corporation, has used a significant fraction of the \$800 billion of assets under management¹³⁸ for a venture fund focusing on Silicon Valley.¹³⁹

1. Chinese State Actors Involved in Technology-Seeking FDI

Chinese State actors involved in technology-seeking FDI include: (a) State-Owned Enterprises (SOEs); (b) private Chinese companies with interlocking ties to the Chinese State; and (c) State-backed investment funds.

a. Chinese State-Owned Enterprises (SOEs)

President Xi Jinping stressed the Communist Party of China's (CCP) unswerving leadership over State-Owned Enterprises (SOEs) during a national meeting on building the role of the Party within SOEs.... Efforts should be made to strengthen and improve Party leadership, as well as to build the role of the Party in SOEs to make them the most trustworthy and reliable forces of the CCP and the state, said Xi.... SOEs should also become important forces to implement decisions of the CCP Central Committee.... Describing SOEs as an important material and political basis for socialism with Chinese characteristics and an important pillar and reliable force for the CCP's governance of the country, Xi said Party leadership and building the role of the Party are 'the root and soul' for SOEs.

*Xinhua*¹⁴⁰

President Xi Jinping's address to a national meeting underscores the important role SOEs play in Chinese industrial policy. SOEs are the most visible symbols of China's non-market economy.¹⁴¹ A significant share of China's non-financial outbound FDI is driven by SOEs.¹⁴² SOEs account for roughly a third of outbound non-financial FDI.¹⁴³

Besides the economic and national security risks associated with the strategic assets and military-capable technologies of the United States being acquired by the SOEs of a strategic competitor like China, the U.S.-China Economic and Security Review Commission notes an additional legal complication: "Some Chinese SOEs are evading [civil] legal action in the United States by invoking their status as a foreign government entity under the Foreign Sovereign Immunities Act."¹⁴⁴

b. Private Chinese Companies Guided By the Chinese State

The Chinese government maintains significant influence over private firms' investment decisions—including encouraging, modifying, or banning deals based on the specific industries, geographies, and technologies involved—by utilizing a mix of financial incentives, political arrangements, and agreements among company shareholders.

*U.S.-China Economic and Security Review Commission*¹⁴⁵

This observation is supported by four characteristics of Chinese enterprise. First, many enterprises in China depend on financing from the Chinese State, often at preferential rates.

Second, China can influence private enterprises through the aforementioned rules China has put in place with respect to the Chinese Communist Party's mandated role in corporate governance.

Third, China's executive ranks are populated with current or former members of the Chinese Communist Party or government. As Columbia Law School professors Wentong Zheng and Curtis Milhaupt found: "95 out of the top 100 private Chinese firms by revenue and eight out of the top ten Internet firms by revenue were founded or are controlled by a current or former member of a central or local political organization such as the People's Congresses and People's Political Consultative Conferences."¹⁴⁶

According to its 2017 Member Survey, the U.S.-China Business Council finds that the "challenges of competition with Chinese companies has been a top concern for USCBC members for many years" and that "competition concerns are not unique to having state-owned enterprise rivals. Most companies are competing with private, non-state-owned companies in China (and other foreign companies), in addition to SOEs."¹⁴⁷ As noted above, the Chinese government has significant influence over many of these putatively private companies.

Advantages that accrue to Chinese competitors cited by the 2017 Member Survey include preferential government financing (63 percent), preferential licensing and approvals (58 percent), preferential access to government contracts (53 percent), tax benefits (45 percent), and lower land costs (40 percent).¹⁴⁸

Fourth, sector-based restrictions on China's outbound foreign direct investment guide investment flows from private Chinese companies into strategic sectors. For example, as of April 2018, guidance published by the Chinese government divided outbound investment flows into the categories of encouraged, restricted, and prohibited. The encouraged category includes investments that promote the acquisition of advanced technology while the restricted category includes sectors like real estate that do not rely on technology.¹⁴⁹

These sector-based restrictions thereby strategically align the deployment of capital abroad by private Chinese companies with the priorities of the Chinese State rather than with the principles of economic efficiency and profit maximization that normally guide private sector investment in market economies and in the international system.

c. State-Backed, Technology-Seeking Investment Funds

China relies significantly on sovereign wealth funds (SWF) and other government-backed investment vehicles to finance its outbound foreign direct investment. This trend started in 2007 with the formation of the China Investment Corporation, which now has under management close to one trillion dollars.¹⁵⁰

Three of the world's ten largest SWFs are from China. According to the Mercator Institute, "while these funds and their management often present themselves as private enterprises, the state's active role is concealed behind an opaque network of ownership and funding structures."¹⁵¹

China's targeting of the integrated circuit industry illustrates how China's State-backed funds can rapidly deploy to acquire foreign assets. In June 2014, China's Ministry of Industry and Information Technology (MIIT) announced the National Guideline for the Development and Promotion of the Integrated Circuit Industry. This National Guideline detailed the Chinese government's goals for creating a self-sufficient integrated circuit sector that meets industrial and security requirements.¹⁵²

Ninety days after issuance of the National Guideline, MIIT announced the formation of its National IC Industry Investment Fund to mobilize capital.¹⁵³ This fund is staffed by former government officials, is backed by substantial government funding (approximately \$21 billion, and nearly 19 billion in a projected second round),¹⁵⁴ and has used its resources to support numerous technology-related outbound investments in the United States.¹⁵⁵

2. Chinese Investment Vehicles Used to Acquire and Transfer U.S. Technologies and IP

Chinese State actors implement China’s outbound FDI program through investment vehicles that include mergers and acquisitions, seed and venture capital financing, and greenfield investing, particularly in strategically targeted high-technology industries.

a. Mergers & Acquisitions

The most direct way to acquire U.S. or other foreign IP or technology is for a Chinese entity to buy or otherwise gain a controlling stake in U.S. companies. As the U.S.-China Economic and Security Review Commission notes, this is the most common form of investment in the United States:

*In 2016, acquisitions accounted for 96 percent of Chinese investment in the United States by value. Meanwhile, capital-intensive greenfield investments—including manufacturing plants, real estate developments, and R&D-intensive projects—accounted for only 4 percent of all U.S.-bound Chinese investments in 2016. This trend continued in the first half of 2017, with acquisitions comprising 97.6 percent of the total value of Chinese investment in the United States.*¹⁵⁶

Chinese industrial policy documents reference the use of overseas mergers and acquisitions as part of its “Going Out” strategy to acquire “key technology” in sectors ranging from “next-generation” artificial intelligence¹⁵⁷ and biotechnology¹⁵⁸ to telecommunications and Internet enterprises.¹⁵⁹

b. Greenfield Investments & Seed and Venture Funding

China’s participation in greenfield investments and U.S. seed and venture funding deals that finance early-stage technology companies and startup firms is a relatively new phenomenon. On greenfield investing, the DIUx Pentagon Report notes that: “In the past 10 years, China’s investments in U.S. technology firms were limited to joint ventures or acquisitions, but now there are an increasing number of greenfield investments in venture-backed startups (both as limited partners of U.S. venture firms and through Chinese venture firms) as well as investments through Chinese private equity firms.”¹⁶⁰

The China-based venture capital fund Sinovation illustrates the broader use of venture funding to acquire leading edge American technologies. Since its founding in 2009, Sinovation has accumulated \$1.2 billion in total capital and “has invested in almost 300 startups – including 25 in artificial intelligence.”¹⁶¹ The DIUx Pentagon Report warns of the risks associated with Chinese venture funding:

*The technologies China is investing in are the same ones that we expect will be foundational to future innovation in the U.S.: artificial intelligence, autonomous vehicles, augmented/virtual reality, robotics and block chain technology. Moreover, these are some of the same technologies of interest to the US Defense Department to build on the technological superiority of the U.S. military today.*¹⁶²

The DIUx Pentagon Report further notes that: “Chinese participation in venture-backed startups is at a record level of 7-10% of all venture deals done and has grown quite rapidly in the past five years.”¹⁶³ Venture funding allows China to accomplish its objective of gaining access to leading companies in targeted technology sectors while drawing less scrutiny from governments wary of technology transfer risks.

III. Conclusion

This report has documented the two major strategies and various acts, policies, and practices Chinese industrial policy uses in seeking to acquire the intellectual property and technologies of the world and to capture the emerging high-technology industries that will drive future economic growth. The vectors of China’s economic aggression in the technology and IP spaces that have been documented in this report are summarized in Table One on the next page.

Given the size of China’s economy, the demonstrable extent of its market-distorting policies, and China’s stated intent to dominate the industries of the future, China’s acts, policies, and practices of economic aggression now targeting the technologies and IP of the world threaten not only the U.S. economy but also the global innovation system as a whole.

The Appendix to this report provides a compendium of the more than 50 acts, policies, and practices China uses to implement the six categories of Chinese economic aggression presented in the introduction to this report.

SEE TABLE ONE NEXT PAGE

Table One: Vectors of China's Economic Aggression in the Technology and IP Space

1. Physical Theft and Cyber-Enabled Theft of Technologies and IP
 - Physical Theft of Technologies and IP Through Economic Espionage
 - Cyber-Enabled Espionage and Theft
 - Evasion of U.S. Export Control Laws
 - Counterfeiting and Piracy
 - Reverse Engineering
2. Coercive and Intrusive Regulatory Gambits
 - Foreign Ownership Restrictions
 - Adverse Administrative Approvals and Licensing Requirements
 - Discriminatory Patent and Other IP Rights Restrictions
 - Security Reviews Force Technology and IP Transfers
 - Secure and Controllable Technology Standards
 - Data Localization Mandates
 - Burdensome and Intrusive Testing
 - Discriminatory Catalogues and Lists
 - Government Procurement Restrictions
 - Indigenous Technology Standards That Deviate From International Norms
 - Forced Research and Development
 - Antimonopoly Law Extortion
 - Expert Review Panels Force Disclosure of Proprietary Information
 - Chinese Communist Party Co-opts Corporate Governance
 - Placement of Chinese Employees with Foreign Joint Ventures
3. Economic Coercion
 - Export Restraints Restrict Access to Raw Materials
 - Monopsony Purchasing Power
4. Information Harvesting
 - Open Source Collection of Science and Technology Information
 - Chinese Nationals in U.S. as Non-Traditional Information Collectors
 - Recruitment of Science, Technology, Business, and Finance Talent
5. State-Sponsored, Technology-Seeking Investment
 - Chinese State Actors Involved in Technology-Seeking FDI
 - Chinese Investment Vehicles Used to Acquire and Transfer U.S. Technologies and IP
 - Mergers and Acquisitions
 - Greenfield Investments
 - Seed and Venture Funding

ENDNOTES

¹ “2017 Annual Report,” US-China Economic and Security Commission, November 15, 2017, p. 24.

https://www.uscc.gov/sites/default/files/annual_reports/2017_Annual_Report_to_Congress.pdf

² The World Bank, “The World Bank in China,” March 28, 2017.

<http://www.worldbank.org/en/country/china/overview>

According to the International Monetary Fund, China is the world’s largest economy based on purchasing power parity, share of the world. IMF DataMapper. October, 2017.

<https://www.imf.org/external/datamapper/PPPSH@WEO/OEMDC/ADVEC/WEOWORLD>

³ See United States Trade Representative, 2017 Report to Congress on China’s WTO Compliance, January 2018.

<https://ustr.gov/sites/default/files/files/Press/Reports/China%202017%20WTO%20Report.pdf>.

See also United States Trade Representative, “Section 301 Investigation of China’s Acts, Practices, and Policies Related to Technology Transfer, Intellectual Property, and Innovation,” March, 2018. <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/march/section-301-report-chinas-acts>

⁴ The designation of China as a “strategic competitor” engaged in “economic aggression” was formalized in United States government policy with the December 2017 release of the White House National Security Strategy.

<https://www.whitehouse.gov/articles/new-national-security-strategy-new-era/>

⁵ Key documents range from the five-year plans that articulate Chinese goals and industrial policies and the landmark 2006 *National Medium and Long Term Plan for Science and Technology*, which extends to 2020, to the more recent *Made in China 2025* and government reports on China’s One-Belt, One-Road Initiative, a Chinese strategy to dominate much of the infrastructure, resources, and trading routes of the world. (See citations in endnotes that follow). See also the “The Belt and Road Initiative,” National Development and Reform Commission, Ministry of Foreign Affairs, and Ministry of Commerce, People’s Republic of China, March 28, 2015. And: “Made in China 2025,” Gov.cn, Jan 8, 2018,

<http://english.gov.cn/2016special/madeinchina2025/>

⁶ Actors include State-Owned Enterprises like China Mobile and Sinopec; sovereign wealth funds like China Investment Corp (CIC) and SAFE Investment Company; bureaucrats that control industrial policy agencies like the Ministry of Industry and Information Technology; Chinese military personnel in the People’s Liberation Army that execute China’s state-sponsored cyber espionage, and Chinese nationals that travel the world as students, scientists, engineers, venture capitalists, and business people.

⁷ Some of those, on which this document has relied, include reports on China’s trade practices produced by Chambers of Commerce in America and Europe; thousands of pages of hearings and reports generated by the bi-partisan U.S.-China Economic and Security Commission; documentation of China’s behaviors at agencies like the Department of Commerce, the Department of Justice, and the U.S. Trade Representative; and the threat assessments of cyber security firms like Mandiant. Each of these sources will be referenced in the course of this report.

⁸ For a review of Chinese protectionism, see, for example, *Chapter 1: U.S.-China Economic and Trade Relations* p. 35-140 of “2017 Annual Report,” US-China Economic and Security Commission, November 15, 2017,

https://www.uscc.gov/Annual_Reports/2017-annual-report.

See also “American Business in China,” AmCham China, 2017. <https://www.amchamchina.org/policy-advocacy/white-paper/>

⁹ As the U.S.-China Economic and Security Review Commission notes in its 2012 Report regarding China’s use of national champions in its industrial policy: “China’s indigenous innovation policies and additional attention to certain strategic sectors identified in its 12th Five-Year Plan ensure that it will continue to provide support to national champions. For the foreseeable future, such companies will continue to be favored over foreign firms for government and state-owned enterprise procurement contracts and will continue to benefit from a range of subsidies, tax breaks, special development funds, increased credit support, and other assistance not enjoyed by their foreign competitors. These advantages continue to make Chinese national champions formidable competitors in China and in other markets globally, undermining U.S. industry innovation and success.” p. 5. The report also notes: “The 12th Five-Year Plan (2011–2015) also created “strategic emerging industries” such as green energy, biotechnology and nanotechnology, which will be advanced by “national champions” selected from among state-controlled companies and nurtured with government subsidies and preferences.” p. 57. https://www.uscc.gov/sites/default/files/annual_reports/2012-Report-to-Congress.pdf

¹⁰ It is unclear whether China deliberately uses overcapacity to gain control of industries. A competing view is that such overcapacity is the result of factors within China beyond the central government’s control, e.g., the entrepreneurial efforts of local and provincial governments to stimulate growth in their jurisdictions.

¹¹ China controls over 95 percent of the world’s rare earth minerals; see “Rare Earths: Battling China’s Monopoly After Molycorp’s demise,” *Mining.com*, September 10, 2016. <http://www.mining.com/rare-earths-battling-chinas-monopoly-after-molycorps-debacle/>

¹² China’s mercantilist approach to securing global resources is documented, for example, in Peter Navarro and Greg Autry, *Death By China*, Pearson FT Press, May 2011, Chapter 7. See also “2017 Annual Report,” U.S.-China Economic and Security Commission, November 15, 2017. https://www.uscc.gov/Annual_Reports/2017-annual-report

¹³ For additional documentation of China’s efforts to dominate global manufacturing, see Peter Navarro and Greg Autry, *Death By China*, Pearson FT Press, May 2011.

¹⁴ European Chamber of Commerce in China, “China Manufacturing 2025,” February, 2017. p. 2. http://docs.dpaq.de/12007-european_chamber_cm2025-en.pdf

¹⁵ According to the European Chamber of Commerce in China, “China Manufacturing 2025,” February, 2017, one of the reasons China is turning its attention to capturing industries of the future is that today’s manufacturing industries tend to be low value-added, energy-intensive, and highly polluting. p. 3.

http://docs.dpaq.de/12007-european_chamber_cm2025-en.pdf

Other reasons cited by the European Chamber include the need to raise income levels and reduce China’s dependence on foreign technologies. This is a key goal of President Xi Jinping. See “Xi Jinping: Speech at the 17th Conference of the Chinese Academy of Sciences and 12th Conference

of the Chinese Academy of Engineering,” Chinese Communist Party News, June 9, 2014. <http://cpc.people.com.cn/n/2014/0610/c64094-25125594.html>

¹⁶ By construction, this report is not intended as a comprehensive, whole-of-government assessment of Chinese industrial policy. Nor does it assess every threat vector.

¹⁷ *Notice on Issuing the National Medium- and Long-Term Science and Technology Development Plan Outline (2006-2020)*, State Council, Guo Fa, 2005 No. 44, issued Dec. 26, 2005).

¹⁸ As noted by the U.S. International Trade Commission in its November 2010 Report: The goal of promoting Chinese intellectual property was reinforced in China’s 2008 National Intellectual Property Strategy (NIPS).

<https://www.usitc.gov/publications/332/pub4199.pdf>

¹⁹ For an overview of Chinese industrial espionage, see William C. Hannas, James Mulvenon, and Anna B. Puglisi, *Chinese Industrial Espionage: Technology Acquisition and Military Modernization*, (London: Routledge, 2013), 219-220.

²⁰ Cited in U.S. Trade Representative, 2013 *Special 301 Report*, p. 13. <https://ustr.gov/sites/default/files/05012013%202013%20Special%20301%20Report.pdf> For main source, see Office of the National Counterintelligence Executive, “Foreign Spies Stealing U.S. Economic Secrets in Cyberspace,” Report to Congress on Foreign Economic Collection and Industrial Espionage, 2009-2011, October, 2011.

[http://www.ncix.gov/publications/reports/fecie_all/%20Foreign Economic Collection 2011.pdf](http://www.ncix.gov/publications/reports/fecie_all/%20Foreign%20Economic%20Collection%202011.pdf).

²¹ Testimony by Ms. Jen Weedon on June 15, 2015 before the U.S.-China Economic and Security Review Commission, p. 3. <https://www.uscc.gov/sites/default/files/Weedon%20Testimony.pdf>

²² U.S.-China Economic and Security Review Commission 2016 Annual Report to Congress, p. 3. https://www.uscc.gov/sites/default/files/annual_reports/2016%20Annual%20Report%20to%20Congress.pdf

²³ DIUx was formed by the Department of Defense in April 2015. A DoD website describes DIUx as a “fast-moving government entity that provides non-dilutive capital to companies to solve national defense problems.” <https://www.diux.mil/> The DIUx Pentagon Report was commissioned to assess the impacts of “China’s participation in venture deals financing early-stage technology companies.” p. 1. It was officially released in March 2018. [https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_\(1\).pdf](https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_(1).pdf)

²⁴ Brown, Michael, and Singh, Pavneet, “China’s Technology Transfer Strategy,” Defense Innovation Unit Experimental (DIUX), January, 2018. p. 15. (Hereinafter DIUx Pentagon Report) [https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_\(1\).pdf](https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_(1).pdf)

²⁵ “Revealing CCP’s Special Politics: Guoan Yuli Aliens,” *NTDTV.com*, June 6, 2015. <http://www.ntdtv.com/xtr/gb/2015/06/02/a1200737.html>

²⁶ Kania, Elsa, “China’s Strategic Support Force: A Force for Innovation?” *The Diplomat*, February 18, 2017.

<https://thediplomat.com/2017/02/chinas-strategic-support-force-a-force-for-innovation/>

²⁷ “Annual Report to Congress on Foreign Economic Collection and Industrial Espionage,” Office of the National Counterintelligence Executive, October 2011. <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB424/docs/Cyber-055.pdf>, p. i.

²⁸ According to the testimony of Jeffrey Johnson before the U.S.-China Economic and Security Review Commission, cyber-economic campaigns “consist of state-sponsored and supported criminal cartels focused on leveraging cyber-enabled espionage and sabotage to execute industry-wide fraud, market manipulation and anti-trust schemes designed to accelerate

China's entry and domination of each key global industry." Hearing on "Chinese Investment in the United States." January 26, 2017. Hearing on "Chinese Investment in the United States." January 26, 2017.

https://www.uscc.gov/sites/default/files/Johnson_USCC%20Hearing%20Testimony012617.pdf

²⁹ According to the IP Commission, the cost of trade secret theft alone "is between 1% and 3% of GDP, meaning that the cost to the \$18 trillion U.S. economy is between \$180 billion and \$540 billion," and China "remains the world's principal IP infringer." "The Theft of American Intellectual Property," IP Commission, February 2017, p. 2.

http://www.ipcommission.org/report/IP_Commission_Report_Update_2017.pdf.

³⁰ USTR Section 301 Investigation, p. 153.

³¹ Verizon, "2013 Data Breach Investigations Report," p. 21.

http://www.verizonenterprise.com/resources/reports/rp_data-breach-investigations-report-2013_en_xg.pdf

³² Mandiant, "APT1: Exposing One of China's Cyber Espionage Units," February 19, 2013.

<https://www.fireeye.com/content/dam/fireeye-www/services/pdfs/mandiant-apt1-report.pdf>

³³ U.S. Department of Justice, "U.S. Charges Five Chinese Military Hackers for Cyber Espionage Against U.S. Corporations and a Labor Organization for Commercial Advantage," May 19, 2014.

<https://www.justice.gov/opa/pr/us-charges-five-chinese-military-hackers-cyber-espionage-against-us-corporations-and-labor>

³⁴ 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>

³⁵ U.S.-China Economic and Security Review Commission 2016 Annual Report to Congress, pp. 56-57.

https://www.uscc.gov/sites/default/files/annual_reports/2016%20Annual%20Report%20to%20Congress.pdf

³⁶ The Arms Export Control Act of 1976, 22 U.S.C. 2778.

https://www.pmddtc.state.gov/regulations_laws/aeca.html

³⁷ The AECA governs the export of defense articles and services, and the International Traffic in Arms Regulations (ITAR) is the implementation arm of AECA. The International Economic Emergency Powers Act (IEEPA), Title II of Public Law 95-223, 91 Statute 1626, enacted October 28, 1977, governs the export of military and dual use items through the Export Administration Regulations (EAR). The Export Administration Act (EAA) of 1979 (P.L. 96-72) was put in place to provide legal authority to the President to control U.S. exports for reasons of national security, foreign policy, or short supply; this authority was continued by executive and legal authority under IEEPA when the EAA expired in 1994. For IEEPA, see:

<https://www.gpo.gov/fdsys/pkg/STATUTE-91/pdf/STATUTE-91-Pg1625.pdf>

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³⁹ Stutzman, Rene, "Orlando Smuggler Sentenced to 21 Months in Federal Prison," *Orlando Sentinel*, September 26, 2016. <http://www.orlandosentinel.com/news/breaking-news/os-chinese-submarine-parts-smuggler-sentence-20160926-story.html>

⁴⁰ U.S. Department of Justice, Summary Of Major U.S. Export Enforcement, Economic Espionage, Trade Secret And Embargo-Related Criminal Cases (January 2010 to the present: updated June 27, 2016)

<https://www.pmddtc.state.gov/compliance/documents/OngoingExportCaseFactSheet.pdf>

⁴¹ According to the European Commission: “A counterfeit good is an unauthorised imitation of a branded good; and “pirated copyright goods shall mean any goods which are copies made without the consent of the right holder or person duly authorised by the right holder in the country of production and which are made directly or indirectly from an article where the making of that copy would have constituted an infringement of a copyright or a related right under the law of the country of importation.” [http://europa.eu/rapid/press-release MEMO-10-272 en.htm](http://europa.eu/rapid/press-release_MEMO-10-272_en.htm)

⁴² 2017 Situation Report on Counterfeiting and Piracy in the European Union. p. 7.

<https://www.europol.europa.eu/publications-documents/2017-situation-report-counterfeiting-and-piracy-in-european-union>

⁴³ “The Theft of American Intellectual Property,” IP Commission Report Update, February 2017 p. 2. http://www.ipcommission.org/report/IP_Commission_Report_Update_2017.pdf

⁴⁴ *Notice on Issuing the National Medium- and Long-Term Science and Technology Development Plan Outline (2006-2020)*, State Council, Guo Fa, 2005 No. 44, issued Dec. 26, 2005).

⁴⁵ European Chamber, “China Manufacturing 2025: Putting Industrial Policy ahead of Market Forces,” p. 15. http://docs.dpaq.de/12007-european_chamber_cm2025-en.pdf

⁴⁶ US-China Business Council, “2017 Member Survey.” p. 9.

https://www.uschina.org/sites/default/files/2017_uscbc_member_survey.pdf

⁴⁷ As noted by the U.S. Department of State: “China maintains a more restrictive foreign investment regime than its major trading partners, including the United State ... broad sectors of the economy remain closed to foreign investors.”

<https://www.state.gov/e/eb/rls/othr/ics/2015/241518.htm>

According to the U.S. Chamber of Commerce: “China has the most restrictive investment regime among G20 countries.” U.S. Chamber of Commerce, “Made in China 2025: Global Ambitions Built on Local Protections,” March 16, 2017. p. 8. (Hereinafter U.S. Chamber Made in China 2025 Report)

https://www.uschamber.com/sites/default/files/final_made_in_china_2025_report_full.pdf

⁴⁸ For example, China requires all foreign electronic vehicle (EV) companies wishing to manufacture automobiles in China to form joint ventures with Chinese companies with minority stakes. The foreign company must transfer EV technology to Chinese enterprises as they are building up their Chinese brands. In 2009, the Chinese Ministry of Industry and Information Technology (MIIT) hastened the pace of this forced technology transfer by requiring that one of the three key technologies essential to EVs (battery system, driving system, and electronic control system) have to be controlled by the Chinese company in joint ventures.

<https://www.uscc.gov/sites/default/files/Research/Planning%20for%20Innovation-Understanding%20China%27s%20Plans%20for%20Tech%20Energy%20Industrial%20and%20Defense%20Development072816.pdf>

In January, 2017, MIIT issued updated regulations that “require NEV [New Energy Vehicle] manufacturers to master the development and manufacturing technology for the complete NEV, not just one of three core technologies.”

https://www.uschamber.com/sites/default/files/final_made_in_china_2025_report_full.pdf

⁴⁹ “2017 Special 301 Report,” *Office of the United States Trade Representative*, 2017. In placing China at the top of its Priority Watch List, the report notes that China “imposes requirements that US firms develop their IP in China or transfer their IP to Chinese entities as a condition to accessing the Chinese market.” p. 1.

<https://ustr.gov/sites/default/files/301/2017%20Special%20301%20Report%20FINAL.PDF>

⁵⁰ USTR Section 301 Investigation, p. 19

⁵¹ As the U.S. Trade Representative notes, in referencing the written submission of the Information Technology and Innovation Foundation in the course of the USTR's Section 301 Investigation of China: "Chinese officials are careful not to put such requirements in writing, often resorting to oral communications and informal 'administrative guidance' to pressure foreign firms to transfer technology." USTR Section 301 Investigation, p. 19.

⁵² Bradsher, Keith, and Mozar, Paul "As Washington Tries to Protect Tech, China Could Fight Back," *The New York Times*, August 2, 2017.

<https://www.nytimes.com/2017/08/02/business/china-trade-trump-technology.html>

⁵³ USTR Section 301 Investigation, p. 19.

⁵⁴ See, for example, China's draft Administrative Measures for the Formulation and Revision of National Standards Involving Patents released in December, 2012. According to the U.S.-China Business Council, this regulation "force[s] foreign companies to accept royalty rates lower than their ordinary worth." Specifically, Article 9 of the draft measures would require patent holders to license technology at a reasonable and nondiscriminatory rate that is "significantly lower than the normal licensing fee." U.S.-China Business Council, "The US-China Business Council Comments on Provisional Administrative Measures for the Formulation and Revision of National Standards Involving Patents (Draft)," Undated.

https://www.uschina.org/sites/default/files/patents_standards_comments_eng.pdf

Notes the *China Business Review* on such discriminatory royalty rights restrictions: "At least three features of China's royalties system appear to restrict royalty rates. First, China's tax authorities may limit the rates Second, late last year the standardization administration of China released draft Administrative Measures for the Formulation and Revision of National Standards Involving Patents, which may force foreign companies to accept royalty rates lower than their ordinary commercial worth. Specifically, Article 9 of the draft measures would require patent holders to license technology at a reasonable and nondiscriminatory rate that is 'significantly lower than the normal licensing fee'.... Third, in some cases, domestic companies may accept royalty arrangements only if the royalties are below standard market rates. This is driven, in part, by the belief among some Chinese companies that foreign industries are 'extracting' huge, seemingly disproportionate profits by their royalty demands." Moga, Thomas, "Tech Transfer Turning Point," September 1, 2010. *China Business Review*. <https://www.chinabusinessreview.com/tech-transfer-turning-point/>

⁵⁵ USTR Section 301 Investigation, p. 49.

⁵⁶ *Ibid.*

⁵⁷ USTR Section 301 Investigation, p. 54.

⁵⁸ *Ibid.*

⁵⁹ For a history, see, for example, Segal, Adam, "China, Encryption Policy, and International Influence," *Hoover Institution Series Paper No. 1610*. As Segal notes: "Encryption regulations have also been deployed as part of a larger effort to use standards policy to bolster the competitiveness of Chinese technology firms." November 28, 2016.

https://www.hoover.org/sites/default/files/research/docs/segal_webreadypdf_updatedfinal.pdf

⁶⁰ *Cybersecurity Law of People's Republic of China*, National People's Congress of the People's Republic of China, 7th November, 2016. http://www.npc.gov.cn/npc/xinwen/2016-11/07/content_2001605.htm

⁶¹ European Chamber, “China Manufacturing 2025: Putting Industrial Policy ahead of Market Forces,” p. 24. http://docs.dpaq.de/12007-european_chamber_cm2025-en.pdf

⁶² USTR Section 301 Investigation, p. 43.

⁶³ U.S. Chamber Made in China 2025 Report, p. 31. China has taken an expansive view of the application of this standard. At risk are sectors that include aviation, big data, banking, finance, cyber products, internet-related activities, industrial manufacturing, medical treatment and devices, and telecommunications.

⁶⁴ *Ibid*, p. 30.

⁶⁵ *Ibid*, p. 32.

⁶⁶ See, for example, China’s recent comprehensive restrictions on all cross-border flow of data in China’s June 2017 Cybersecurity Law. It established sweeping security reviews for products and services; imposes restrictions on the cross-border flow of data; requires data localization; and authorizes the development of national security standards that exceed the burden and scope of international standards. U.S. Chamber, *Submission, Section 301 Hearing 33-34* (Oct. 3, 2017). <http://www.theglobalepicenter.com/wp-content/uploads/2013/01/USCC-2017-Special-301-Submission-Final.pdf>

⁶⁷ U.S. Chamber, *Submission, Section 301 Hearing 33-34* (Oct. 3, 2017).

<http://www.theglobalipcenter.com/wp-content/uploads/2013/01/USCC-2017-Special-301-Submission-Final.pdf>.

⁶⁸ InCompliance, “New CCC Regulations in China,” January 30, 2015.

<https://incompliancemag.com/article/new-ccc-regulations-in-china/>

⁶⁹ TUV Rheinland of North America, “China Compulsory Certification,” Undated.

<http://wll.com/us/wp-content/uploads/China%20Compulsory%20Certification%2009.04.pdf>

⁷⁰ Practical Law, “MIIT Releases 2015 Telecoms Catalogue,” January 22, 2016.

[https://content.next.westlaw.com/Document/I41aed0b7c08b11e598dc8b09b4f043e0/View/FullText.html?contextData=\(sc.Default\)&transitionType=Default&firstPage=true&bhcp=1](https://content.next.westlaw.com/Document/I41aed0b7c08b11e598dc8b09b4f043e0/View/FullText.html?contextData=(sc.Default)&transitionType=Default&firstPage=true&bhcp=1)

⁷¹ U.S. Chamber Made in China 2025 Report, p. 28.

⁷² *Ibid*.

⁷³ European Chamber Report, p. 16.

⁷⁴ Josh Wübbeke, Mirjam Meissner, Max J. Zenglein, Jaqueline Ives, and Björn Conrad, *Made in China 2025: The Making of a High-Tech Superpower and Consequences For Industrial Countries*, Mercator Institute for China Studies, December 2016. p. 56.

https://www.merics.org/sites/default/files/2017-09/MPOC_No.2_MadeinChina2025.pdf

⁷⁵ U.S. Chamber Made in China 2025 Report, p. 35.

⁷⁶ “American Business in China,” AmCham China, 2017, p. 110.

<https://www.amchamchina.org/policy-advocacy/white-paper/>

⁷⁷ China plans to “set or revise over 500 standards in smart manufacturing.” U.S. Chamber Made in China 2025 Report. p. 34.

⁷⁸ European Chamber, p. 16.

⁷⁹ U.S. Chamber Made in China 2025 Report, p. 35.

⁸⁰ USTR Section 301 Investigation, p. 39,

⁸¹ Official Chinese government documents identify “establishing foreign R&D centers” as an important method of acquiring foreign technology. USTR Section 301 Investigation, p. 12.

⁸² USTR Section 301 Investigation, p. 32. See also U.S. CHAMBER, *Submission, Section 301 Hearing 16* (Oct. 3, 2017).

⁸³ Ministry of Industry and Information Technology, Formal Announcement of Guidelines for the Development and Promotion of the Integrated Circuit Industry § 4(8), June 24, 2014.

⁸⁴ As the USTR Section 301 Investigation notes: “U.S. companies acquired by AVIC [Aviation Industry Corporation of China] now provide ongoing R&D and fill critical nodes in China’s GA aircraft and piston engine manufacturing industry.” USTR Section 301 Investigation, p. 109. See also USTR Section 301 Investigation, pp. 180-181.

⁸⁵ In a letter to Secretary of State John Kerry and Treasury Secretary Jacob Lew, the U.S. Chamber of Commerce wrote: “It has become increasingly clear that the Chinese government has seized on using the AML to promote Chinese producer welfare and to advance industrial policies that nurture domestic enterprises, rather than the internationally accepted norm of using competition law to protect consumer welfare and competition.” See also Miller, Mathew. “China’s Latest Anti-Trust Probes Revive Protectionist Concerns.” *Reuters*. August 7, 2014. <https://www.reuters.com/article/us-china-antitrust/chinas-latest-anti-trust-probes-revive-protectionism-concerns-idUSKBN0G70VA20140807>

⁸⁶ Randewich, Noel and Miller, Matthew, “Qualcomm to Pay \$975 Million to Resolve China Antitrust Dispute, *Business New*, February 9, 2015. <https://www.reuters.com/article/us-china-qualcomm/qualcomm-to-pay-975-million-to-resolve-china-antitrust-dispute-idUSKBN0LD2EL20150209>

⁸⁷ For example, an Expert Review Panel may “assess the safety, environmental impact, and energy conservation of a proposed investment.” USTR Section 301 Investigation, p. 42.

⁸⁸ USTR Section 301 Investigation, p. 42. As an example offered by the U.S. Chamber of Commerce: “One company that submitted its safety assessment to an approval agency was required to provide specific temperature and pressure range information for its process equipment...that would make it easier for a competitor to learn about a production process the company considered to be a trade secret.” In USTR Section 301 Investigation, p. 42.

⁸⁹ “Company Law of the People’s Republic of China (Revised in 2013): Article 19,” Standing Committee of the National People’s Congress, December 28, 2013. www.fdi.gov.cn/1800000121_39_4814_0_7.html

⁹⁰ Notes the *New York Times*, in a November 2017 speech, “Mr. Xi called on officials to strengthen the party in ‘government, the military, society and schools, north, south, east and west.’ The message was quick to reach party members lower down in the ranks. Soon after Mr. Xi’s speech, party officials in the central province of Hunan issued a notice to members instructing them to write the party into legal documents for private and state-owned companies alike. The document was accidentally made public when a local state-owned newspaper published it, but it was quickly taken down.” Stevenson, Alexandra. “China’s Communists Rewrite the Rules for Foreign Business.” *New York Times*, April 13, 2018.

<https://www.nytimes.com/2018/04/13/business/china-communist-party-foreign-businesses.html>

⁹¹ The extension of this strategy to joint venture partners represents an escalation of the policy. Open source reporting indicates that foreign companies have had decisions overruled by the Chinese Communist Party, e.g., a joint venture by Cummins of Indiana was prohibited from hiring a manager. Stevenson, Alexandra. “China’s Communists Rewrite the Rules for Foreign Business.” *New York Times*, April 13, 2018.

<https://www.nytimes.com/2018/04/13/business/china-communist-party-foreign-businesses.html>

⁹² As an example noted in open source reporting: “the amended article of association of Beijing-based engineering contractor [China Machinery Engineering Corp](#)” specifies that “when making decisions on significant matters, the Board shall seek advice from the Party committee of the

Company.” Hunter, Gregor, and Russolillo, Steven. “Now Advising China’s State Firms: The Communist Party.” *Wall Street Journal*, August 17, 2017. <https://www.wsj.com/articles/now-advising-chinas-state-firms-the-communist-party-1502703005>

⁹³ Feng, Emily. “Chinese Tech Giants Like Baidu and Sina Set Up Communist Party Committees. October 11, 2017.

<http://www.afr.com/news/world/asia/chinese-tech-giants-like-baidu-and-sina-set-up-communist-party-committees-20171011-gyyh5u>

⁹⁴ Jing, Meng, “China’s First ‘Deep Learning Lab’ Intensifies Challenge to US in Artificial Intelligence Race,” *South China Morning Post*, February 21, 2017.

<http://www.scmp.com/tech/china-tech/article/2072692/chinas-first-deep-learning-lab-intensifies-challenge-us-artificial>

⁹⁵ Martina, Michael, “Exclusive: In China, The Party’s Push for Influence Inside Foreign Firms Stirs Fears, Reuters, Aug. 24, 2017. <https://www.reuters.com/article/us-china-congress-companies/exclusive-in-china-the-partys-push-for-influence-inside-foreign-firms-stirs-fears-idUSKCN1B40JU>

⁹⁶ USTR Section 301 Investigation, p. 28.

<https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>

⁹⁷ European Commission, “WTO Appellate Body Confirms: China’s Export Restrictions on Rare Earths and Other Raw Materials Illegal,” August 7, 2014.

<http://trade.ec.europa.eu/doclib/press/index.cfm?id=1050>

⁹⁸ European Commission, “Critical Raw Materials,” https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en

⁹⁹ European Commission, “WTO Appellate Body Confirms: China’s Export Restrictions on Rare Earths and Other Raw Materials Illegal,” August 7, 2014.

<http://trade.ec.europa.eu/doclib/press/index.cfm?id=1050>

¹⁰⁰ 2017 USTR Report to Congress on China’s WTO Compliance. pp. 44-45.

<https://ustr.gov/sites/default/files/files/Press/Reports/China%202017%20WTO%20Report.pdf>

¹⁰¹ As an example, the USTR notes: “China’s treatment of coke, a key steel input, provided a clear example of the trade distortions engineered by China’s export restraints. In 2008, China produced 336 million MT of coke, but it limited exports of coke to 12 million MT and additionally imposed 40 percent duties on coke exports. The effects of the export restraints on pricing were dramatic. In August 2008, the world price for coke reached \$740.” 2017 USTR Report to Congress on China’s WTO Compliance. pp. 44-45.

<https://ustr.gov/sites/default/files/files/Press/Reports/China%202017%20WTO%20Report.pdf>

¹⁰² For example, as the USTR Section 301 Investigation notes: “The fact that China’s three largest airlines – Air China, China Eastern, and China Southern – are all state-owned and account for the vast majority of aircraft purchases provides the Chinese government with a significant degree of leverage over foreign aircraft makers.” p. 33.

¹⁰³ DIUx Pentagon Report, pp. 19.

¹⁰⁴ *Ibid.*

¹⁰⁵ *Ibid.* The quotation within the quotation is attributed to Hannas, et. al, *China Industrial Espionage*, p. 22.

¹⁰⁶ As noted on its website, the Institute of Scientific and Technical Information of China as of 2010 had “collected 1.5 million domestic theses or dissertations, 220,000 overseas theses or dissertations, 100,000 conference proceedings in foreign languages, and 60,000 domestic conference proceedings. It has also collected 1.23 million copies of four major U.S. government

reports published since 1958, and more than 4,000 titles/year of foreign journals. It has possessed some 300,000 reference books published abroad, and opened up 18 electronic platforms for reference search, including Web of Knowledge, CA, NSI, NTIS, EI, INSPEC, among others. ISTIC has created 33 full text data bases, covering more than 7,500 titles of full-text digitized journals and 1,000 titles of proceedings, and made them available to the public access. Meanwhile, the Institute enjoys the collection of some 4,000 monographs or papers authored and donated by more than 1,000 academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering. Of the digital collections possessed by the Institute, the abstracts, published either at home or abroad, reached 45.23 million entries, with an annual addition up to 3.3 million entries. Chinese and foreign citations have risen to 82.86 million entries, with an annual addition of 15.5 million entries.” <http://www.istic.ac.cn/English/>

¹⁰⁷ Huo Zhongwen and Wang Zongxiao, *Sources and Methods of Obtaining National Defense Science & Technology Intelligence*, Kexue Jishu Wenxuan Publishing Co., Beijing, 1991. https://fas.org/irp/world/china/docs/sources_chap7.html

¹⁰⁸ For this descriptor, see, for example, Roper, Carl, *Trade Secret Theft, Industrial Espionage, and the China Threat*, CRC Press, December 2013.

<https://www.taylorfrancis.com/books/9781439899397>

¹⁰⁹ *Ibid*, see Chapter 2.

¹¹⁰ Huo Zhongwen and Wang Zongxiao, *Sources and Methods of Obtaining National Defense Science & Technology Intelligence*, Kexue Jishu Wenxuan Publishing Co., Beijing, 1991. <https://fas.org/irp/world/china/docs/sources.html>

¹¹¹ DIUx Pentagon Report, p. 17.

¹¹² Mattis, Peter, “A Guide to Chinese Intelligence Operations,” *War on the Rocks*, August 18, 2015. <https://warontherocks.com/2015/08/a-guide-to-chinese-intelligence-operations/>

¹¹³ The term “non-traditional collector” is commonly used in the Intelligence Community to differentiate between traditional collectors such as spies. For an example of its use in discussing the threats associated with “non-traditional collectors such as post-graduate and graduate students applying for positions in cleared U.S. industry,” see Defense Security Service, Department of Defense, “Targeting U.S. Technologies: A Trend Analysis of Reporting from Defense Industry.” <http://www.dss.mil/counterintel/regionalTrends/eastAsiaPacific.html?sub5>

¹¹⁴ DIUx Pentagon Report, p. 17-18.

¹¹⁵ *Ibid*, p. 19.

¹¹⁶ CNN Transcript, Intelligence Chiefs Take Questions From Senate Intelligence Committee,” February 13, 2018. <http://transcripts.cnn.com/TRANSCRIPTS/1802/13/cnr.04.html>

¹¹⁷ *Ibid*.

¹¹⁸ U.S. House of Representatives, “Investigative Report on the U.S. National Security Issues Posed by Telecommunications Companies Huawei and ZTE, October 8, 2012. [https://intelligence.house.gov/sites/intelligence.house.gov/files/documents/huawei-zte%20investigative%20report%20\(final\).pdf](https://intelligence.house.gov/sites/intelligence.house.gov/files/documents/huawei-zte%20investigative%20report%20(final).pdf)

¹¹⁹ U.S. House of Representatives, National Defense Authorization Act For Fiscal Year 2018, p. 1224. <https://docs.house.gov/billsthisweek/20171113/HRPT-115-HR2810.pdf> For an analysis, see Wiley Rein, “Update on NDAA FY18 Cyber Provisions,” February 2018. <https://www.wileyrein.com/newsroom-newsletters-item-Update-on-NDAA-FY18-Cyber-Provisions.html>

¹²⁰ “Huawei Puts \$1M into a New AI Research Partnership with UC Berkeley,” Ingrid Lunden, *Tech Crunch*, October 11, 2016,

<https://techcrunch.com/2016/10/11/huawei-puts-1m-into-a-new-ai-research-partnership-with-uc-berkeley/>

¹²¹ “DIUx Pentagon Report, p. 20. See also Yuan, Li, “China Races to Tap Artificial Intelligence,” *Wall Street Journal*, August 24, 2016.

<https://www.wsj.com/articles/china-gears-up-in-artificial-intelligence-race-1472054254>

¹²² Stephen Chen, “America’s Hidden Role in Chinese Weapons Research,” *South China Morning Post*, March 29, 2017

<http://www.scmp.com/news/china/diplomacy-defence/article/2082738/americas-hidden-role-chinese-weapons-research>

¹²³ Berger, Zach. “Hypersonic Missiles,” Missile Defense Advocacy Alliance. March 2016.

<http://missiledefenseadvocacy.org/missile-threat-and-proliferation/future-ballistic-missile-technology/hypersonic-missiles/>

¹²⁴ “China’s Program For Recruiting Foreign Scientists Comes Under Scrutiny,” *South China Morning Post*, November 3, 2014.

<http://www.scmp.com/news/china/article/1631317/chinas-programme-recruiting-foreign-scientists-comes-under-scrutiny>

¹²⁵ “Xinhua,” “Chinese Students Overseas Inspired by Patriotism of Late Geophysicist,” *China Daily*, July 13, 2017. http://www.chinadaily.com.cn/china/2017-07/13/content_30101355.htm

¹²⁶ President Xi Jinping is quoted as saying, “You are warmly welcome if you return to China. If you stay abroad, we support you in serving the country in various ways.” See http://usa.chinadaily.com.cn/epaper/2013-10/22/content_17050714.htm.

¹²⁷ Programs include the Chinese Academy of Sciences’ Hundred Talents Plan, the High-level Visiting Scholar Plan Special Fund for Overseas Scholars to Return to China for Short Periods to Work and Lecture and the Young Overseas Scholars Cooperative Research Fund. See, for example, “China Launches 12 Programs to Attract Talent,” *China Daily*, November 11, 2011. http://www.chinadaily.com.cn/china/2011-11/11/content_14081037.htm

¹²⁸ Jia, Hepeng. “China’s Plan to Recruit Talented Researchers,” January 17, 2019. <https://www.nature.com/articles/d41586-018-00538-z>

¹²⁹ “Returnees Finding Big Opportunities,” Su Zhou, *China Daily*, February 25, 2017, http://www.chinadaily.com.cn/china/2017-02/25/content_28345785.htm

¹³⁰ *Ibid.*

¹³¹ USTR Section 301 Investigation, p. 65.

¹³² As the USTR Section 301 Investigation documents: “Investments that are ‘encouraged’ receive several forms of government support, including: (1) subsidies for fees incurred, and bank loans at government-subsidized interest rates; (2) policy bank loan support; (3) priority administrative approval; (4) priority support for the use of foreign exchange; (5) export tax rebates on exports of equipment and other materials relating to the overseas investment project; (6) priority access to services relating to overseas financing, investment consultation, risk evaluation, risk control, and investment insurance; and (7) coordinated support from several government departments with respect to information exchange, diplomatic protections, the travel of personnel abroad, and registration of import and export rights.” p. 78.

¹³³ *Overseas Investment Industrial Guiding Policy*, July 5, 2006.

¹³⁴ Three of the world’s ten largest sovereign wealth funds are from China and handle more than \$1.5 trillion in assets. These three funds, according to the Sovereign Wealth Fund Institute, include: CIC (third-ranked, \$813.8 billion in assets); SAFE Investment Company (seventh-ranked,

\$441 billion in assets); and the National Social Security Fund (“NSSF”) (tenth-ranked, \$295 billion in assets). “Sovereign Wealth Fund Rankings – Largest Sovereign Wealth Funds Under Management,” Sovereign Wealth Fund Institute. <https://www.swfinstitute.org/sovereign-wealth-fund-rankings/>

¹³⁵ State Council of the People’s Republic of China, *Made in China 2025*, May 8, 2015, staff translation.

¹³⁶ For an analysis of the protectionist and mercantilist implications of *Made in China 2025*, see, for example, Josh Wübbeke, Mirjam Meissner, Max J. Zenglein, Jaqueline Ives, and Björn Conrad, *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/sites/default/files/2017-09/MPOC_No.2_MadeinChina2025.pdf and U.S. Chamber Made In China 2025 Report.

<https://www.uschamber.com/report/made-china-2025-global-ambitions-built-local-protections-0>

¹³⁷ “From China with Love: AI, Robotics, AR/VR Are Hot Areas For Chinese Investment In US,” *CB Insights*, August 1, 2017.

<https://www.cbinsights.com/research/chinese-investment-us-tech-expert-research/>

¹³⁸ Wee, Sui-Lee, “China’s \$800 Billion Sovereign Wealth Fund Seeks More U.S. Access,” *New York Times*, July 11, 2017.

<https://www.nytimes.com/2017/07/11/business/china-investment-infrastructure.html>.

¹³⁹ Schleifer, Theodore, “Chinese Investors Are Making Moves to Increase Their Spending in Silicon Valley,” *Recode*, October 29, 2017.

<https://www.recode.net/2017/10/29/16568412/chinese-investors-silicon-valley-spending-china-investment-corporation>

¹⁴⁰ “Xi Stresses CPC Leadership of State-Owned Enterprises,” *Xinhua*, November 10, 2016. http://news.xinhuanet.com/english/2016-10/11/c_135746608.htm

¹⁴¹ Scissors, Derek, “China’s SOE Sector is Bigger Than Some Would Have Us Think,” *American Enterprise Institute*, May 17, 2016.

<http://www.aei.org/publication/chinas-soe-sector-is-bigger-than-some-would-have-us-think/>

¹⁴² See, for example, Tiezzi, Shannon, “China Invests in the World,” *The Diplomat*, June 24, 2015. <https://thediplomat.com/2015/06/china-invests-in-the-world/>

¹⁴³ See, for example, “The Rise of Private Firms in China Outbound Direct Investment,” *China Chamber of Commerce in the Netherlands*, <https://www.dcccchina.org/2016/09/the-rise-of-private-firms-in-china-outbound-direct-investment/>

¹⁴⁴ “2017 Annual Report,” US-China Economic and Security Commission, November 15, 2017, p. 71.

https://www.uscc.gov/sites/default/files/annual_reports/2017_Annual_Report_to_Congress.pdf

As noted by Reuters: the “legal argument concerns whether companies controlled by the Chinese government can be protected under the U.S. Foreign Sovereign Immunities Act (FSIA), which was passed by Congress in 1976, even when their U.S. subsidiaries are involved in commercial disputes.” Miller, Matthew, and Michael Martina, “Chinese State Entities Argue They Have ‘Sovereign Immunity’ in U.S. Courts,” *Reuters*, May 11, 2016.

<https://www.reuters.com/article/us-china-usa-companies-lawsuits/chinese-state-entities-argue-they-have-sovereign-immunity-in-u-s-courts-idUSKCN0Y2131>.

For example, in March of 2016, a U.S. District Court Judge in Louisiana dismissed a defective drywall suit against the China New Building Materials Group on the grounds that it was “immune

under the Foreign Sovereign Immunities Act from claims in U.S. litigation since it is owned by a foreign government” and its alleged conduct was not subject to the commercial activity or tortious activity exceptions to immunity under the Act. China’s global champion in the aviation sector, the Aviation Industry Corporation of China (AVIC), has sought similar protection in two other suits. This type of legal gambit conforms to an aggressive Chinese industrial policy that seeks to benefit from the rules of the free market when it is convenient but flaunts those rules when it is not. For more, see Sundar, Sindhu, “Chinese Co. Ducks MDL Claims Over Defective Drywall,” *Law360*, March 15, 2016. <https://www.law360.com/articles/771877/chinese-co-ducks-mdl-claims-over-defective-drywall>

¹⁴⁵ “2017 Annual Report,” U.S.-China Economic and Security Commission, November 15, 2017, p. 80.

https://www.uscc.gov/sites/default/files/annual_reports/2017_Annual_Report_to_Congress.pdf

For more on the role of SOEs in China’s economy, see U.S.-China Economic and Security Review Commission, Chapter 1, Section 2, “State-Owned Enterprises, Overcapacity, and China’s Market Economy Status,” in 2016 Annual Report to Congress, November 2016, 92–103 https://www.uscc.gov/sites/default/files/annual_reports/2016%20Annual%20Report%20to%20Congress.pdf

and Walsh, Dustin, “Gateway ’17 Looks to Connect Michigan Business to China,” *Crain’s Detroit Business*, June 18, 2017.

<http://www.craigslist.com/article/20170618/NEWS/170619891/gateway-17-looks-to-connect-michigan-business-to-china>

¹⁴⁶ “2016 Annual Report,” U.S.-China Economic and Security Commission, 2016, p. 102. https://www.uscc.gov/sites/default/files/annual_reports/2016%20Annual%20Report%20to%20Congress.pdf The report bases the information on State Council of the People’s Republic of China, *Made in China 2025*, May 8, 2015, Staff translation; U.S.-China Economic and Security Review Commission, *Hearing on China’s Five-Year Plan, Indigenous Innovation and Technology Transfers, and Outsourcing*, written testimony of Willy C. Shih, June 15, 2011; U.S.-China Economic and Security Review Commission, *Hearing on the Extent of the Government’s Control of China’s Economy, and Implications for the United States*, written testimony of George T. Haley, May 24–25, 2007; and U.S.-China Economic and Security Review Commission, Chapter 1, Section 1, “The Relationship’s Current Status and Significant Changes during 2007,” in 2007 Annual Report to Congress, November 2007, 38–39.

¹⁴⁷ US-China Business Council, “2017 Member Survey.” p. 3.

https://www.uschina.org/sites/default/files/2017_uscbc_member_survey.pdf

¹⁴⁸ *Ibid.*

¹⁴⁹ “Rising Tension: Assessing China’s FDI Drop in Europe and North America,” Baker McKenzie and Rhodium Group, April 2018, p.7. https://www.bakermckenzie.com/-/media/files/insight/publications/2018/04/rising_tension_china_fdi.pdf?la=en

¹⁵⁰ Sovereign Investor Institute’s Sovereign Wealth Center, January 2018. <http://www.sovereignwealthcenter.com/fund/6/china-investment-corporation.html#.Wq1yNujwb-g>

¹⁵¹ Wübbeke, Jost, Mirjam Meissner, Max J. Zenglein, Jaqueline Ives, and Björn Conrad, “Made in China 2025: The Making of a High-Tech Superpower and Consequences for Industrial Countries,” Mercator Institute for China Studies, December 2016, p. 53. https://www.merics.org/sites/default/files/2017-09/MPOC_No.2_MadeinChina2025.pdf

¹⁵²“National Integrated Circuit Industry Development Outline,” Chinese Ministry of Industry & Information Technology, June 24, 2014.

<http://www.miit.gov.cn/n1146295/n1652858/n1652930/n3757021/c3758335/content.html>

¹⁵³ State Council, *Guideline for the Development and Promotion of the Integrated Circuit Industry*, Section 4(2). <https://members.wto.org/CRNAttachments/2014/SCMQ2/law47.pdf>

¹⁵⁴ USTR Section 301 Investigation, p. 92; Wu, Kane; Zhu, Julie; and Cadell, Cate, “Exclusive: Chip Wars – China Closing In On Second \$19 Billion Semiconductor Fund: Sources,” *Reuters*, April 26, 2018. <https://www.reuters.com/article/us-china-trade-fund-exclusive/exclusive-chip-wars-china-closing-in-on-second-19-billion-semiconductor-fund-sources-idUSKBN1HX191..>

¹⁵⁵ Ye, Tianchun, “Guidelines to Promote National IC Industry Development,” U.S. Information Technology Office.

[https://www.semiconductors.org/clientuploads/China%20IC%20docs/B/YeTianchun%20Analysis%20\(2\).pdf](https://www.semiconductors.org/clientuploads/China%20IC%20docs/B/YeTianchun%20Analysis%20(2).pdf)

¹⁵⁶ “2017 Annual Report,” U.S.-China Economic and Security Commission, November 15, 2017, p. 78.

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See also written testimony of Timothy R. Heath before the U.S.-China Economic and Security Review Commission, Hearing on Hotspots along China’s Maritime Periphery, April 13, 2017; <https://www.uscc.gov/sites/default/files/transcripts/April%20Hearing%20Transcript.pdf>;

China’s State Council Information Office, *The Diversified Employment of China’s Armed Forces*, April 16, 2013; http://www.nti.org/media/pdfs/China_Defense_White_Paper_2013.pdf; and Ryan Martinson, “The Militarization of China’s Coast Guard,” *The Diplomat*, November 21, 2014. <https://thediplomat.com/2014/11/the-militarization-of-chinas-coast-guard/>

¹⁵⁷ *State Council Notice on Issuing the Next-Generation of Artificial Intelligence Development Plan*, July 8, 2017. p. 24. <https://flia.org/wp-content/uploads/2017/07/A-New-Generation-of-Artificial-Intelligence-Development-Plan-1.pdf>

¹⁵⁸ *MOST Notice on Issuing the “13th Five-year” Biotechnology Innovation Special Plan* Apr. 24, 2017.

¹⁵⁹ *International Cooperation Opinion § 3(15). Guiding Opinion on Promoting International Industrial Capacity and Equipment Manufacturing Cooperation (International Cooperation Opinion)*, May 2015. http://www.gov.cn/zhengce/content/2015-05/16/content_9771.htm

¹⁶⁰ DIUx Pentagon Report, p. 9.

¹⁶¹ *Ibid*, p. 8.

¹⁶² *Ibid*, p. 1

¹⁶³ *Ibid*, p. 2