

CROSSED WIRES: **CHINA'S INVESTMENTS IN THE** **CANADIAN TECHNOLOGY SECTOR**

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INTRODUCTION

In December 2018, Meng Wanzhou, the chief financial officer of Chinese telecommunications giant Huawei Technologies, was detained in Vancouver, Canada, on an extradition request from the United States for allegedly violating U.S. sanctions on Iran. The move angered Chinese authorities, who shortly afterward blocked key Canadian agricultural exports and arrested two Canadian citizens, Michael Spavor and Michael Kovrig, on suspicion of “stealing state secrets.”¹ Tensions escalated in June 2020, when Chinese prosecutors formally brought espionage charges against the two men only three weeks after a Canadian judge ruled that Meng’s extradition could proceed.²

Such retaliatory tactics contributed to the Trump administration’s decision to declare China a “revisionist power” in the 2017 National Security Strategy.³ U.S. officials have also expressed concerns that China’s recent innovation-driven development policies are promoting unfair trade practices and incentivizing Chinese firms to acquire foreign dual-use technologies (those that have both commercial and defense applications) through legitimate and illegitimate means. Huawei in particular has come under intense scrutiny by the United States due to the rapid global adoption of the company’s 5G internet technology and its perceived close ties with the Chinese government.⁴

The Biden administration has adopted a similar stance on China in the March 2021 Interim National Security Strategy and upheld the Trump administration’s ban on Huawei through a June 2021 executive order.⁵

Immediate neighbors with a shared history and culture, Canada and the United States have a mutual interest in promoting bilateral cooperation in areas such as trade and defense. In particular, as members of the Five Eyes intelligence-sharing alliance, Canada and the United

States have developed cybersecurity interdependencies based on shared hardware and software capabilities. Canada has also developed a reputation as a research leader in emerging technologies, such as artificial intelligence, which has made it an appealing investment destination for U.S. and Chinese technology firms alike.⁶

China’s interest in Canada’s rapidly growing technology sector takes many forms, but this brief will focus on three areas that closely align with the structure of Canada’s technology industry. These areas are **direct investments, technology incubators and accelerators, and research partnerships.**

China’s interest in Canada’s rapidly growing technology sector takes many forms, but this brief will focus on three areas that closely align with the structure of Canada’s technology industry. These areas are direct investments, technology incubators and accelerators, and research partnerships. China’s involvement in all three of these areas has implications for U.S. and Canadian national security based on how the technologies under development could be transferred to the Chinese military or used as platforms for the Chinese government’s political influence activities. This risk is compounded by the fact that unlike other U.S. allies, Canada does not have a comprehensive or clear international cybersecurity strategy or strong guidelines for government oversight of public-private research partnerships. The future of Chinese-Canadian diplomatic relations and its impact on technology investments is still uncertain due to the Meng Wanzhou case and other factors. However, understanding



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the current relationship can help both U.S. and Canadian officials identify the most

critical areas for collaboration in the short and long term.

CHINA'S TECHNOLOGICAL AMBITIONS

When Xi Jinping became the general secretary of the Chinese Communist Party (CCP) in 2012, he set out two goals: to make China a “moderately prosperous society” by 2021 and to “achieve the great rejuvenation of the Chinese nation” by 2049, the centennial of the founding of the People’s Republic of China (PRC).⁷ China is well on its way to achieving this first goal, as the country has had the most rapid, sustained economic growth of any country since opening up its economy in 1979.⁸ However, as GDP growth has slowed, China now runs the risk of falling into the so-called “middle-income trap,” a phenomenon in which a middle-income country loses its comparative advantage against low-income countries due to increasing wages, but is also unable to compete with high-income countries in terms of innovation and productivity, leading to economic stagnation.⁹

To escape this trap, the Chinese government has adopted a number of policies geared towards “moving up the value chain” of high technology manufacturing to decrease the country’s reliance on foreign technological imports and improve firm competitiveness at the international level.¹⁰ For example, the Thirteenth Five Year Plan (2016–20)^{*} has an entire section devoted to innovation-driven development. The plan’s major targets include deepening the “contribution of science and technological advances to economic growth” and increasing spending on research and development.¹¹ The plan provides support for both the “Made in China 2025” industrial policy and the “Internet Plus” initiative, a plan to integrate technologies such as cloud computing and big data with traditional industries to create an information-based development model.¹²

“Made in China 2025,” announced by Premier Li Keqiang in May 2015, forms the backbone of China’s innovation-driven development strategy. The plan lays out a



comprehensive framework to boost high tech manufacturing in ten strategically important sectors by 2025. These sectors include new advanced information technologies and materials; biopharma and advanced medical products; robotics; new-energy vehicles; and modernized equipment for the aerospace, maritime, rail, power, and agricultural industries. In addition to providing subsidies and other financial incentives for domestic investment in these sectors, “Made in China 2025” encourages firms such as Huawei and ZTE to seek out investments in related areas abroad.¹³ A spike in foreign direct investment overseas in 2016 forced China to institute capital controls in some sectors, including real estate, a year later, but the

* China’s Five Year Plans define the country’s domestic and international economic policy priorities. Beginning with the Eleventh Five Year Plan (2006–10), the focus of these plans has shifted from hard production targets to broader principles such as long-term economic growth and sustainable development.

updated government guidelines continue to encourage companies to “cooperate with foreign new and high technological and advanced manufacturing companies and to establish offshore research and development centers.”¹⁴

The release of “Made in China 2025” sparked debates among the policy community in the United States and elsewhere regarding the long-term impacts of China’s technological ambitions. In particular, U.S. policymakers argue that China’s substantial subsidies to state-owned enterprises that invest overseas in the very same sectors where China often restricts foreign investment domestically create an unfair competitive advantage for Chinese firms.¹⁵ When foreign

investors are allowed into a certain sector in China, they are often required to transfer technological assets to their Chinese counterparts as part of their investment agreement.¹⁶ Researchers have also highlighted how “Made in China 2025” may incentivize Chinese firms to acquire foreign technology through other means in order to jumpstart domestic innovation. These technology transfers can be legal (such as direct investments and school enrollments), illegal (such as hacking and intellectual property theft), or extralegal (activities of unknown legality, such as professional associations based in foreign countries targeting ethnic Chinese experts).¹⁷ Examples of technology transfer vectors in these categories are provided in Table 1.

Table 1. Chinese Technology Transfer Strategies

Legal	Illegal	Extralegal
Conferences, competitions, and enrollments in foreign universities.	Breaches of contract or non-disclosure agreements.	Document acquisition and overseas scholar returnee facilities.
Investments and acquisitions of foreign companies.	Computer network exploitations.	PRC ministry offices and front organizations.
Direct technology purchases and patent mining and exploitation.	Insider operations.	Sino-foreign professional and student/alumni associations.
Overseas-based labs and representative offices.	Traditional espionage activities.	Technology transfer centers, forums, and incentive programs.
Venture capital funds and startup accelerators/incubators.	Copyright infringement.	University-linked “innovation parks.”
State-backed investments in overseas research and joint research agreements.	Willful patent infringement.	Professional and technical facilitators, such as transfer facility staff, scientists, and entrepreneurs.
Loopholes in trade agreements, tech exchanges, and trade-for-tech agreements.	Reverse engineering activities.	S&T intelligence workers, such as talent spotters and members of “business intelligence” groups.

Source: Hannas and Chang, *China’s Access to Foreign AI Technology*, 4-6.

These issues are also tied to broader concerns around China’s growing military strength and risks to U.S. national security. Many of the priority sectors listed in “Made in China 2025” are closely linked to the development of dual-use technologies and, as a result, can be difficult to regulate through export controls.¹⁸ The creation of the CCP Central Military-Civil Fusion Development Committee in 2017, which aims to improve cooperation and promote joint investments and research between the People’s Liberation Army (PLA) and civilian authorities in areas covered by “Made

in China 2025,” further underlined these concerns.¹⁹ China’s plan to localize high tech value chains could also lead to the capture of supply chains for U.S. military equipment and services, and close the gap between the two countries’ military capabilities.²⁰

In response to the backlash, China has quietly removed any reference to “Made in China 2025” and military-civil fusion from its public statements. Experts note, however, that the change in public rhetoric does not mean China will abandon the core aspects of these strategies.²¹ In addition, China’s

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updated Foreign Investment Law, which went into effect on January 1, 2020, now prohibits forced technology transfers “by administrative means.” Lawyers in China

have noted that the provisions of the new law are vague, so it is unclear what this will change in practice until the implementation rules are released.²²

CANADA'S RELATIONSHIPS WITH THE UNITED STATES AND CHINA

Canada has a special relationship with the United States based on a shared history, culture, and standard of living. The depth of Canadian-American economic integration and security cooperation is reflected in the number of trade and defense partnerships between the two countries, such as the following:

- » **United States-Mexico-Canada Agreement (USMCA):** The United States is Canada's largest trading partner and foreign investor by a wide margin.²³ Like its predecessor, the North American Free Trade Agreement, the USMCA supports this economic partnership through tariff-free trade and supply chain integration, particularly in the automotive and aerospace sectors.²⁴
- » **North American Aerospace Defense Command (NORAD):** Under this program, American and Canadian defense and law enforcement personnel conduct joint exercises and monitor aerospace and maritime threats to both countries.²⁵
- » **Defence Production Sharing Agreement and Defence Development Sharing Agreement (DDSA):** These agreements allow Canadian companies to compete for U.S. defense contracts on the same terms as U.S. firms. The DDSA, in particular, focuses on joint R&D projects.²⁶
- » **National Technology and Industrial Base (NTIB):** The NTIB promotes cross-border cooperation on national security and dual-use technology R&D and production between the United States, Canada, Australia, and the United Kingdom.²⁷ In February 2020, NTIB member states were granted

Canada has a special relationship with the United States that is based, in part, on centuries of shared history.

“excepted” status under the U.S. Foreign Investment Risk Review Modernization Act of 2018.²⁸

- » **Multilateral Institutions:** Canada is a key U.S. ally in organizations such as the World Trade Organization, the G7, and NATO.²⁹
- » **Five Eyes:** Five Eyes is an intelligence-sharing network between the United States, Canada, Australia, New Zealand, and the United Kingdom that grew out of the intelligence exchanges between Allied Forces during World War II. An important aspect of the alliance is the high degree of interoperability between the intelligence agencies of each member country, such as a shared intelligence database.³⁰ However, as researchers from the Fraser Institute note, this high level of cybersecurity integration can potentially put all of the Five Eyes members at risk. For instance, between 2003 and 2005, a series of coordinated cyberattacks from China dubbed *Titan Rain* compromised U.S. Department of Defense systems before spreading to the systems of the other Five Eyes members.³¹ While all alliance members have adopted national strategies to address the growing risk of sophisticated cyberattacks, Canada is the only Five Eyes member that has not developed a holistic international cyber strategy.³²

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Despite this close relationship, successive Canadian government leaders have been wary of becoming economically dependent on the United States. Canada's relationship with China is in some ways an attempt to diversify its trade partnerships.³³ For example, Canada was one of the first Western countries to recognize the PRC in the 1970s under then prime minister Pierre Trudeau (father of current prime minister Justin Trudeau).³⁴ China is now Canada's second-largest trading partner and an important source of foreign investment. Canadian exports to China have been historically dominated by mining and agricultural products, but there are signs that Chinese firms are increasingly diversifying their Canadian portfolios to include services such as finance and technology.³⁵

Due to these trade relationships, Canada is vulnerable to shifts in the U.S.-China dynamic.³⁶ This is clearly visible in the controversy surrounding Huawei's global investments in 5G internet technology. The U.S. government has prevented U.S.-based corporations from collaborating with Huawei and its subsidiaries on and off since 2012, with a related order signed by then president Donald J. Trump in May 2019.³⁷ The Biden administration issued an executive order on June 3, 2021 that upheld and expanded upon the Trump-era ban.³⁸

These bans have been issued over concerns that Huawei and other Chinese technology companies could be compelled to spy on and collect data from U.S. citizens and allied nations for the Chinese government under China's 2017 National Intelligence Law.³⁹ Article 14 of the law states that Chinese national intelligence agencies may "request relevant organs [government bodies], organizations, and citizens provide necessary support, assistance, and cooperation," which analysts of the *Lawfare* blog argue could potentially be used to justify pressure on staff working at companies such as Huawei to cooperate with authorities.⁴⁰

As of this writing, Canada is the only Five Eyes member that has not yet made a firm decision on Huawei and 5G. However, in June 2020, Canada's Big Three telecommunications companies—Bell Canada, Rogers Communications Canada, and Telus Communications—announced that they had signed contracts with Ericsson and Nokia to build out their 5G networks, effectively locking Huawei out of the domestic market while the federal government determines next steps.⁴¹ The government's decision has been complicated by a cooling relationship with China, mostly due to the latter's actions surrounding Meng Wanzhou's extradition case.⁴²

INVESTING IN CANADA'S TECHNOLOGY SECTOR

Canada's history of technological innovation is typically overshadowed by that of the United States, despite Canada being the home of several globally recognized brands, such as BlackBerry and Shopify. However, Canada is quickly developing a reputation as a hotspot—rivaling Silicon Valley—for technology start-ups and cutting-edge research hubs.⁴³

Canada is particularly well known for its leading artificial intelligence research center in the Toronto-Waterloo corridor, which has attracted corporations including Facebook, Google, Amazon, and Uber.⁴⁴ According to the Canadian government, growth in the information and communications technology (ICT) sector outpaced the

overall economy's average annual growth by 0.5 percent between 2012 and 2018, with companies employing fewer than ten people making up over 85 percent of all ICT companies.⁴⁵

Much of this growth is spurred by a series of government incentives adopted over the last few years to attract domestic and foreign investment. In 2018, the Canadian government announced the \$700 million (CAD 950 million) Innovation Supercluster Initiative, which finances collaborations between industry and research institutions across five different superclusters. These superclusters focus on R&D in ocean sciences; artificial intelligence; advanced manufacturing tools, such as machine

learning; agricultural sciences; and digital technology, such as quantum computing.⁴⁶

Other financial incentives include the Scientific Research and Experimental Development tax incentive program, the Accelerated Investment Initiative, and the Strategic Innovation Fund for large R&D projects.⁴⁷ Canada has also developed a robust immigration program to retain and attract skilled workers through the Express Entry and Start-Up visa schemes, encouraging many foreign technology entrepreneurs to come to Canada instead of the United States due to changes in the latter's H-1B visa program.⁴⁸ Coupled with lower labor costs relative to the United States and Western Europe, these incentives mean that Canada's ICT sector has been flagged as an appealing investment opportunity for Chinese investors.⁴⁹

The Canadian government recognizes that some foreign investments may come with economic or national security risks. In Canada, such activity includes investments in cultural industries, extractive industries, and emerging technologies that may have defense applications.⁵⁰ Like the United States, Canada employs a variety of policy tools to manage these investments and prevent unwanted technology transfers. The two main tools used by both countries are export controls and investment reviews.⁵¹

» **Export Controls:** Canada's export controls are governed by the Export and Import Permits Act, which requires companies exporting items on the Export Control List (ECL) or to a country on the Area Control List to apply for an export permit. All re-exports of goods of U.S. origin also require a permit to comply with U.S. export controls. The ECL includes weapons, nuclear goods, dual-use technologies, many chemical goods, lumber, and certain agricultural products.⁵² The ECL is supplemented by the Controlled Goods Program (CGP), which requires those who "examine, possess, or transfer" military equipment or technologies (as defined by the Defence Production Act) to register with the Department of Public Works and Government Services.

The CGP was adopted in 2001 as a requirement for continued exemptions under ITAR, the U.S. International Traffic in Arms Regulations.⁵³

» **Investment Reviews:** The 1985 Investment Canada Act gives the Canadian government the authority to monitor and screen foreign investments, which include new businesses founded by non-Canadians, as well as takeovers of existing Canadian firms by non-Canadians. In 2009, the act was amended to establish a national security review screening process similar to the Committee on Foreign Investment in the United States.⁵⁴ However, the government has been criticized for not applying the act consistently; even though the number of reviews conducted annually increased from 2012 to 2019, the majority of recent investments reviewed have been cleared with no conditions attached.⁵⁵ In one controversial case, the Canadian government approved the sale of satellite company Norsat International, a U.S. defense contractor, to Chinese radio manufacturer Hytera Communications without conducting a formal national security review.⁵⁶ The U.S. government added Hytera to a list of banned suppliers in July 2020, but the Canadian government has not followed suit.⁵⁷ More recently, in December 2020, BlackBerry sold 90 of its mobile technology patents to Huawei, including several with security-related features. While experts, such as Canadian patent lawyer Jim Hinton, have highlighted the potential cybersecurity risks of selling such patents to a company outside of Canada, the government has not explicitly committed to conducting a national security review of the transaction.⁵⁸ In March 2021, the Canadian government updated the Guidelines on the National Security Review of Investments to include a provision on evaluating the "potential effects of the investment on the transfer of sensitive technology or know-how outside of Canada."⁵⁹

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This includes technologies that are explicitly designed for military and intelligence purposes as well as dual-use technologies. As of the time of

writing, there have been no reports of this provision being invoked during an investment review, so the long-term impact of this change remains unclear.

CHINESE OVERSEAS INVESTMENTS

China began actively encouraging overseas investments under its “Going Out” strategy in 2001, and by 2016, it had become the world’s second-largest source of outward foreign direct investment (OFDI) flows. The majority of China’s overseas investments remains concentrated in



low-income countries, but from 2009 to 2016, the proportion of OFDI stocks in high-income countries increased from 7.4 percent to 14.1 percent.⁶⁰ Researchers have found that this shift in investment destinations is mostly driven by economic considerations, with policy objectives playing either a constraining or risk-reducing role.⁶¹ As China’s domestic economy grows, Chinese firms are using OFDI to access new and larger markets and to acquire strategic business assets in order to be globally competitive.⁶² Technology-seeking investments, in particular, give Chinese firms access to the tacit knowledge of Western R&D personnel, which cannot be exported and has been shown to have positive reverse spillover effects on domestic innovation in China.⁶³

Chinese investments in Canada grew at a steady pace following the signature of a Foreign Investment Partnership Agreement between the two countries in 2014.⁶⁴ By 2016, Canada was the tenth-highest recipient of Chinese OFDI stock globally.⁶⁵ However, total Chinese OFDI dropped significantly in 2018 and 2019, partly due to

the implementation of Chinese capital outflow restrictions and ongoing political tensions.⁶⁶ According to the Investment Monitor of the Asia Pacific Foundation of Canada, between 2003 and 2020, the technology sector was the third-largest destination of Chinese capital investment

by value (3.5 percent) behind energy (63.7 percent) and mining and chemicals (22.4 percent).⁶⁷ Yet this data only covers greenfield projects** and mergers and acquisitions, though venture capital funding is becoming more popular among Chinese firms. For instance, venture capital deals in Canada involving Chinese investors grew from four deals worth \$50 million in 2016 to nine deals worth \$180 million in 2017.⁶⁸

The size and scope of Chinese investments in Canada’s technology sector vary widely. Some companies focus on joint ventures, such as the 2016 Memorandum of Understanding between Shenzhen-based BYD and the provincial government of Alberta to develop and commercialize autonomous vehicle technologies, valued at \$4.4 million (CAD 6 million).⁶⁹ Huawei has also undertaken a number of joint projects since starting operations in Canada in 2008, such as an Internet of Things pilot project with Bell Canada and BeWhere Technologies for an Ontario-based winery in 2015.⁷⁰ Other firms are interested in emerging technologies, such as Beijing-based Tsing Capital’s 2015 venture capital

** A common investment term, “greenfield projects” refers to activities by a company in a foreign country where it begins a venture from scratch, building new production facilities, distribution centers, and other accommodations their staff need. This contrasts with “brownfield projects,” which is where a foreign entity purchases or leases an existing facility to minimize costs (Troy Segal, “Greenfield vs. Brownfield Investments: What’s the Difference?,” Investopedia, updated July 9, 2019, <https://www.investopedia.com/ask/answers/043015/what-difference-between-green-field-and-brown-field-investment.asp>).

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investment in GaN Systems, a leading developer of gallium nitride (GaN) transistors and semiconductors.⁷¹ GaN has become the semiconductor material of choice for military technologies—including radar, satellite communications, and electronic warfare tools, such as IED jammers—because of its ability to efficiently amplify high-power radio frequencies over long distances while maximizing bandwidth and thermal performance compared to traditional silicon semiconductors.⁷²

Tencent Holdings, the company behind the popular WeChat messaging app, has

also been quite active in Canada. In 2015, Tencent launched its first North American cloud data server in Toronto.⁷³ It has invested in a variety of companies, including popular tech venture capital firm Real Venture, messaging app Kik Interactive, storytelling platform Wattpad, and intelligent robotics company Kindred.⁷⁴ The company also participated in the groundbreaking \$102 million Series A financing round for Montreal-based Element AI in 2017, the largest investment for any artificial intelligence company at the time.⁷⁵ Table 2 lists more examples of Chinese technology investments in Canada.

Table 2. Sample of Chinese Technology Investments in Canada

Target Company	Investor	Technology	Year	\$M
March Networks (Ottawa)	Infinova Canada (subsidiary of Shenzhen Infinova)	Video Surveillance	2012	\$88.6
Hemisphere GPS (Calgary)	1718784 Alberta (subsidiary of Beijing UniStrong Science and Technology)	Satellite Positioning and Navigation	2013	\$14.9
Rx Networks (Vancouver)	Beijing BDStar Navigation	Mobile Positioning and GPS	2017	\$23.2
Kindred (Vancouver)	Tencent Holdings	AI and Robotics	2017	\$28
Norsat International (Vancouver)	Hytera Communications	Satellite Communications	2017	\$67.3
Solantro Semiconductor (Ottawa)	Huada Semiconductor (subsidiary of China Electronics)	Semiconductor Manufacturing	2018	Undisclosed
Lorex Technology (Markham)	Zhejiang Dahua Technology	Video Surveillance	2018	\$29

Sources: Norsat Int'l, "Norsat Completes Plan of Arrangement with Hytera Communications Co., Ltd.," *PR Newswire*, July 20, 2017, <https://www.prnewswire.com/news-releases/norsat-completes-plan-of-arrangement-with-hytera-communications-co-ltd-635592413.html>; Douglas Soltys, "Kindred Closes \$35.4M Series B from Tencent, Launches Pilot Program with Major Retailers," *Betakit*, October 24, 2017, <https://betakit.com/kindred-closes-35-4m-series-b-from-tencent-launches-pilot-program-with-major-retailers>.

Chinese OFDI is beneficial for the Canadian technology sector because of its infusion of much-needed capital, but there are potential implications for U.S. technology development and national security as well. These implications include:

- » **Knowledge spillovers from U.S. companies working on dual-use technologies** (such as autonomous vehicles) that are based in the same clusters as Chinese-backed companies.⁷⁶

- » **Acquisitions of mature dual-use technologies currently in use** in the United States and Canada that could be transferred to the PLA. For instance, Hytera Communications was able to acquire satellite technology that was previously sold to the U.S. Department of Defense and NATO through its purchase of Norsat in 2017.⁷⁷

- » **Diversions of U.S. defense supply chains** by disqualifying a number of Canadian firms from trade and contracting exemptions due to foreign ownership.⁷⁸

» **Potential evasions of Canadian export controls.** While there are restrictions on “intangible” exports of technology, such as emails or face-to-face meetings, it is unclear whether or how this applies to intra-company technology transfers.⁷⁹

In addition, the small dollar values of Chinese technology investments up to now mean they are likely to fall under the Investment Canada Act review threshold, even if the technologies involved are important to U.S. and Canadian interests. For example, all of the investments outlined

in Table 2 are well below the act’s review thresholds for investments by World Trade Organization members, which have been set at \$822 million (CAD 1 billion) for private sector companies and \$327 million (CAD 415 million) for state-owned enterprises.⁸⁰ And though the minister of innovation, science, and economic development may trigger a national security review of any transaction of any size, as of this writing, the majority of the reviews conducted by the Canadian government have focused on mergers and acquisitions, not venture capital investments.⁸¹

TECHNOLOGY INCUBATORS AND ACCELERATORS

Technology incubators and accelerators have been adopted by some countries, including China and Canada, to help smaller start-ups mitigate the risks of market failure that traditional financing cannot appropriately address. These incubators provide a variety of services to small businesses, such as mentoring, training, funding, networking, and shared office space.⁸² There does not appear to be a comprehensive list of tech incubators in Canada, though different sources suggest the number ranges somewhere between 100 and 200 organizations.⁸³ Of these, only 30 incubators have been approved by the government to act as sponsors for foreign entrepreneurs under the Start-Up Visa program.⁸⁴

In China, local and national government agencies have pursued a strategy of building overseas technology incubators as sources for driving domestic innovation.⁸⁵ For example, the Zhongguancun Development Group (ZDG), founded by the Beijing municipal government, has been actively involved in financing cross-border incubators and technology transfer centers, including in the United States, Finland, Israel, and Japan.⁸⁶ In 2014, ZDG and Invest Ottawa formally opened the International Incubation Centre in Ottawa, the first of its kind in Canada. The first four start-ups selected for the incubator were Viscore, which provides high-speed software and hardware solutions for enterprise networks; CanShielding, a radiation-shielding fabric manufacturer; GREnergyTEC, a renewable

energy company; and iNano Medical, a medical device services company.⁸⁷

Incubators and accelerators backed by Chinese venture capital funds have also sprung up around the world, particularly in the United States and Europe, as newly wealthy Chinese investors seek to take advantage of more stable Western markets. One prominent program in Canada is the China Angels Mentorship Program (CAMP), an initiative launched by the Toronto-based China Canada Angels Alliance (CCAA). The CCAA is a network of Chinese angel investors founded in 2014 by Zhishuo (Peter) Liu, the co-founder of the Beijing-based River Capital fund and a member of the Chinese Economists 50 Forum, a Chinese government advisory group.⁸⁸

Through 2018, CAMP was co-hosted by the CCAA and the Ontario Centres of Excellence (OCE). Each year, the program provided mentorship and \$75,000–\$380,000 (CAD 100,000–500,000) in seed funding to ten early-stage technology start-ups to prepare them to enter the Chinese market. CAMP also included a two-and-a-half-week trip to China to meet with local investors and mentors.⁸⁹ After a brief hiatus, the program relaunched in 2021, this time without the support of the OCE. While the number of eligible companies for the program has expanded to 20, CAMP no longer provides seed funding, instead encouraging participants to apply for up to \$59,000 (CAD 75,000) in funding from the Canadian government under the CanExport program.⁹⁰

Start-ups selected for past programs include Cyclica, an AI-driven biotechnology company, and Cryptiv, a blockchain management platform.⁹¹ As one example of the success of the program, in March 2020, Cyclica entered into a partnership with China's Institute of Materia Medica to develop antiviral drug treatments for COVID-19 that were based on Cyclica's deep-learning engine; the two parties were introduced through the CCAA.⁹² The alliance has also provided seed funding outside the CAMP framework to companies such as Motion Gestures, a Kitchener, Ontario, firm that develops machine-learning gesture recognition software.⁹³

Private sector companies and trade associations have also been involved in setting up incubators in Canada. For example, Tencent signed an agreement with the OTT Financial Group in 2017 to open the Tencent Cloud Business Accelerator Centre in Toronto, which focuses on start-ups working on financial technology, cloud computing, and big data.⁹⁴ In 2018, the Tsinghua University-affiliated incubator TusStar opened a joint accelerator exchange

program with TEC Edmonton in Alberta. The six-month program provides strategic support and training to Canadian and Chinese technology start-ups on how to do business in each country.⁹⁵ Unfortunately, no public information is available about the companies that may have participated in these incubators, so it is difficult to assess their impact.

The explicit goal of these international incubators and accelerators is to facilitate technology transfers between Canada and China, both in terms of a start-up's products as well as the tacit innovation "know-how" of the founders.⁹⁶ As such, these programs pose similar risks to U.S. technology development and national security as traditional OFDI. However, the values of seed funding for start-ups provided by some incubators is too small to trigger an investment review. In addition, it is difficult to apply export controls to broad and emerging technologies that do not yet have specific defense applications, such as those that are typically the focus of early-stage technology start-ups.⁹⁷

RESEARCH PARTNERSHIPS

Universities and other research centers play a key role in the production and diffusion of knowledge that drives technological innovation and economic growth. In recognition of this, China has prioritized spending on domestic R&D over the last two decades. These investments appear to have paid off. In the 2019 Global Innovation Index, China was the highest-ranking middle-income country and fifteenth highest-ranking country globally on the quality of innovation metric, which is based on the quality of local universities, internationalization of patents, and quality of research publications. Canada has also seen significant improvement in the quality of innovation metric since 2016, ranking just above China at tenth highest globally in 2019.⁹⁸

China's ability to close the innovation gap with high-income countries, such as the United States and Canada, is driven in part by the expansion and intensification

of its international research network. One controversial element of this expansion is China's overseas talent recruitment programs. The most notable of these is the Thousand Talents Plan, which offers generous stipends and other incentives, such as cutting-edge labs, to attract foreign scientists. China stopped publicly reporting the names of Thousand Talents recruits in 2018 following U.S. government scrutiny, but as of September 2017, the program has recruited 7,000 people.⁹⁹ Other well-known programs include the Chinese Academy of Science's 100 Plan, the Ministry of Education's Spring Light Plan, and the Changjiang Scholars Award Program.¹⁰⁰ China has also encouraged companies, universities, and government ministries to finance joint research partnerships with foreign universities and establish overseas research facilities.¹⁰¹ These programs have allowed Chinese firms and researchers "to buy expertise off the shelf" and speed up the domestic innovation process.¹⁰²

Canada and China first codified their bilateral research relationship in 2007, when the two countries signed the Agreement on Science and Technology Cooperation. This agreement sets the framework for promoting joint R&D initiatives and information sharing between Canadian and Chinese government entities, private sector firms, and academic institutions. In 2016, two additional agreements under this framework were signed to establish the Joint Working Group on Clean Technology and the Canada-China Innovation Dialogue mechanism.¹⁰³ These agreements are complemented by the Canadian International Innovation Program, which provides seed funding to small- and medium-sized enterprises to support R&D collaborations with partners in China and six other participating countries.¹⁰⁴ Other local and regional research partnerships include:

- » **Ontario-China Research and Innovation Fund (OCRIF):** The fund is sponsored by the Ontario Ministry of Economic Development, Job Creation, and Trade and China's Ministry of Science and Technology. OCRIF provides up to \$367,000 (CAD 500,000) in grant funding to support "scientific, technological and industrial research, and commercialization cooperation" between academic institutions and technology companies. The project teams must include at least one Ontario-based private sector partner and two principal investigators, one each from Ontario and China. The program is not currently active, though it is unclear if it was temporarily or permanently suspended.¹⁰⁵
- » **University of Alberta Global Partnerships:** The University of Alberta has an extensive collaboration program with several Chinese universities. For example, it has established the Joint Research Center for Future Energy and Environment with Tsinghua University and the Joint Institute of Advanced Science and Technology with East China Normal University. The university's China Institute is also well known for promoting Chinese scholarship and

advising the Canadian government on China-related affairs.¹⁰⁶

Huawei, which opened its first Canadian 5G research center in Ottawa in 2010, is one of the biggest China-based funders of academic research in Canada.¹⁰⁷ Since 2010, Huawei has committed over \$367 million (CAD 500 million) to R&D in Canada and employs around 960 people in its offices across the country.¹⁰⁸ An estimated \$41 million (CAD 56 million) of this total has been linked to projects with 13 leading Canadian universities.¹⁰⁹

Since 2010, Huawei has committed nearly \$50 million (CAD 68 million) to research projects and partnerships with several leading Canadian universities.

The University of Toronto, for instance, received nearly \$2.6 million (CAD 3.5 million) in 2016 as part of a five-year research partnership. The University of British Columbia received \$2.2 million (CAD 3 million) for a research collaboration project on advanced communications and 5G in 2017. In addition, in 2019, Huawei pledged to invest \$2.2 million (CAD 3 million) as part of its strategic research partnership with the University of Waterloo, where the company is also currently a sponsor of the Waterloo Artificial Intelligence Institute.¹¹⁰

Huawei has even partnered with the Natural Sciences and Engineering Research Council of Canada (NSERC) to establish joint research chairs at the University of Laval in Quebec City and Polytechnique Montréal. For example, a joint research venture on future wireless technologies at Polytechnique Montréal was matched by a five-year, \$1.8 million (CAD 2.5 million) investment from Huawei.¹¹¹ There are also rumors that Huawei started researching next-generation 6G technologies in its Ottawa lab in 2019 and has been in talks with university researchers on further collaboration.¹¹²

Huawei's research investments illustrate

how these types of partnerships can facilitate potentially unwanted technology transfers. For instance, some intellectual property rights experts argue that the depth and breadth of Huawei's university partnerships undermine Canada's domestic competitiveness since Huawei shares the rights to patent the technologies developed by the hundreds of researchers that have worked on its projects. Huawei applies for about 30–35 export licenses a year to transfer this research to China, and as of 2018, the last date for which there is publicly available data, the Canadian government has never rejected a permit application.¹¹³ Under China's military-civil fusion strategy, Huawei and other Chinese companies with similar overseas research partnerships could be compelled to share this technology with the PLA.¹¹⁴

There is also evidence to suggest the Chinese government is using research partnerships as a front for its political influence and military research activities. For example, funding from China-backed entities, such as the Confucius Institutes, has been used to pressure foreign universities to promote pro-China policies and adopt Chinese censorship rules on topics such as the human rights situations in Tibet and Xinjiang.¹¹⁵ Moreover, the Australian Strategic Policy Institute has documented several cases where PLA-affiliated researchers participated in overseas

research exchanges on critical technologies, such as artificial intelligence and hypersonic missiles, using false credentials.¹¹⁶ In the United States, there were three cases in January 2020 alone where academics were indicted for failing to disclose their ties to China, such as Boston University student Ye Yanqing, who did not report that she was a PLA lieutenant while studying at the university's Department of Physics, Chemistry, and Biomedical Engineering.¹¹⁷

While there have not been any reported arrests of Canadian academics with ties to China, documents by researchers, Chinese-Canadian activists, and government agencies, such as the Canadian Security Intelligence Service, have indicated that these political influence campaigns may be common in Canada as well, though to what extent is unknown.¹¹⁸ In one recent instance, when setting up the advisory board for the NSERC/Huawei University of Laval Industrial Research Chair in 2019, NSERC explicitly stated that it would be screening out candidates with "strong political opinions" on Huawei, which had never been included as selection criteria before.¹¹⁹ Still, the Canadian government does not currently have guidelines in place for universities on how to manage or disclose the details of private sector investments, so it is likely impossible to know the full scope and potential risks of these partnerships.¹²⁰

LOOKING AHEAD

It is important to note that many of the Chinese firms investing in Canada's technology sector are not acting on behalf of the Chinese government. However, this does not preclude the Chinese government from taking advantage of the access granted by these investments to the emerging and dual-use technologies being developed. Though the Canadian government has tools in place to manage such unwanted technology transfers—such as export controls and foreign investment reviews—the inconsistent application of these policy tools and weak guidelines for government oversight means that some Chinese actors may be able to

surreptitiously acquire potentially sensitive technologies. These weaknesses could have serious negative implications for U.S. national security because of the integration of Canadian and U.S. defense supply chains.

Researchers from Georgetown University's Center for Security and Emerging Technology suggest that one way to address this is for the United States, Canada, and other allies to standardize the data collection and monitoring of China's technology transfers.¹²¹ This is especially relevant for Canada's academic sector as it may encourage the Canadian government to set down clear guidelines

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for universities to report the details of their financing agreements with private sector companies. One avenue for this kind of collaboration may be the newly established Inter-Parliamentary Alliance on China, which was launched in June 2020 and, as of this writing, includes cross-party legislative representatives from the United States, Canada, Australia, New Zealand, the United Kingdom, Japan, Uganda, and several European countries.¹²²

In April 2020, Canada temporarily tightened its foreign investment oversight to cover all investments made by state-owned enterprises to protect Canadian companies from foreign takeovers during the COVID-19 pandemic. Critics argued that it might not be sustainable to maintain such strict protectionist measures in the long term since Canada's domestic financial market is not as large as those of the United States or China.¹²² However, the March 2021 update to the Guidelines on the National Security Review of Investments indicates that the Canadian government is committed to permanently adopting this enhanced scrutiny of state-owned enterprises, though it is currently too early to tell what, if any, effect this change will have.¹²³

It is also difficult to predict what the landscape of China's investments in Canada will look like in the future. Diplomatic relations between the two countries continued to deteriorate in late June 2020, as Prime Minister Justin Trudeau announced Canada would be the first country to suspend its extradition treaty with Hong Kong after China's new security

law was adopted. He also refused to comply with China's demands to exchange Meng Wanzhou for the two detained Canadian citizens, indicating that a prisoner swap would set a negative precedent for Canada-China relations.¹²⁴ China, in return, warned its citizens not to travel to Canada and threatened to take more actions if Canada continued to "meddle in China's internal affairs."¹²⁵

Tensions are expected to remain high until Meng's potential extradition to the United States is resolved. The final hearings of the case concluded in August 2021, but the ruling may take several months to be announced. The judge is expected to provide a timeline for delivering the verdict during the next scheduled court appearance in late October 2021.¹²⁶ Compounding these factors is the ongoing COVID-19 pandemic, as the rise in the number of new variants and accompanying spikes in infection rates could slow the pace of global economic recovery.¹²⁷

Despite these challenges, it is unlikely that China will abandon its lofty innovation-driven development goals or the technology transfer strategies that support them. Understanding the patterns of China's technology investments in a particular context, such as in Canada, can help the United States and its allies identify potential weaknesses that should be resolved now to protect sensitive technology assets from being exposed in the future. In an interconnected world, collaboration may be the best solution.



REFERENCES

- 1 Brian Job, "Canada's Middle Power Dilemma," East Asia Forum, October 17, 2019, <https://www.eastasiaforum.org/2019/10/17/canadas-middle-power-dilemma/>.
- 2 Gerry Shih, "Escalating Huawei Feud, China Indicts Two Canadians in Spying Case," *Washington Post*, June 19, 2020, https://www.washingtonpost.com/world/asia_pacific/china-indicts-two-canadians-for-spying-escalating-dispute-over-huawei-case/2020/06/19/3923cea2-b1e4-11ea-98b5-279a6479a1e4_story.html.
- 3 White House, *National Security Strategy of the United States of America* (Washington, DC: White House, 2017), 25, <https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>.
- 4 U.S.-China Economic and Security Review Commission (USCC), *2019 Annual Report to Congress* (Washington, DC: U.S. Government Printing Office, 2019), 2, 46, <https://www.uscc.gov/annual-report/2019-annual-report>.
- 5 Joseph R. Biden, Jr., *Interim National Security Strategic Guidance* (Washington, DC: White House, March 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/03/interim-national-security-strategic-guidance/>; David E. Sanger and David McCabe, "Biden Expands Trump-Era Ban on Investment in Chinese Firms Linked to Military," *New York Times*, June 3, 2021, <https://www.nytimes.com/2021/06/03/us/politics/biden-ban-chinese-firms-trump.html>.
- 6 Emma Graney, "Small but Mighty Canada Fights for Space in Highly Competitive Artificial Intelligence World," *Edmonton Journal*, December 5, 2018, <https://edmontonjournal.com/technology/tech-biz/small-but-mighty-canada-fights-for-space-in-highly-competitive-artificial-intelligence-world/>.
- 7 Ran Li and Kee Cheok Cheong, *China's State Enterprises: Changing Role in a Rapidly Transforming Economy* (Singapore: Palgrave Macmillan, 2018), 177, doi: 10.1007/978-981-13-0176-6.
- 8 Wayne M. Morrison, *China's Economic Rise: History, Trends, Challenges, and Implications for the United States*, CRS Report for Congress RL33534 (Washington, DC: Library of Congress, Congressional Research Service [CRS], updated June 25, 2019), 1, <https://fas.org/sgp/crs/row/RL33534.pdf>.
- 9 Max J. Zenglein and Anna Holzmänn, *Evolving Made in China 2025: China's Industrial Policy in the Quest for Global Tech Leadership* (Berlin: Mercator Institute for China Studies, 2019), 19, <https://www.merics.org/en/papers-on-china/evolving-made-in-china-2025>.
- 10 Tobias ten Brink, "Chinese Firms 'Going Global': Recent OFDI Trends, Policy Support, and International Implications," *International Politics* 52, no. 6 (2015): 674, doi: 10.1057/ip.2015.19.
- 11 Katherine Koleski, *The 13th Five-Year Plan* (Washington, DC: USCC, 2017), 7-8, <https://www.uscc.gov/research/13th-five-year-plan>.
- 12 "Internet Plus," People's Republic of China, State Council, accessed June 17, 2020, <http://english.www.gov.cn/2016special/internetplus/>.
- 13 Scott Kennedy, "Critical Questions: Made in China 2025," Center for Strategic and International Studies, June 1, 2015, <https://www.csis.org/analysis/made-china-2025>.
- 14 Laney Zhang, "China: New Rules on Overseas Investment Released," *Global Legal Monitor* (Law Library of Congress blog), September 7, 2017, <https://www.loc.gov/law/foreign-news/article/china-new-rules-on-overseas-investment-released/>.
- 15 USCC, *2019 Annual Report to Congress*, 171.
- 16 White House, Office of Trade and Manufacturing Policy (OTMP), *How China's Economic Aggression Threatens the Technologies and Intellectual Property of the United States and the World* (Washington, DC: White House, OTMP, 2018), 2, <https://trumpwhitehouse.archives.gov/wp-content/uploads/2018/06/FINAL-China-Technology-Report-6.18.18-PDF.pdf>.
- 17 William C. Hannas and Huey-Meei Chang, *China's Access to Foreign AI Technology: An Assessment* (Washington, DC: Georgetown University, Center for Security and Emerging Technology, 2019), 3-4, https://cset.georgetown.edu/wp-content/uploads/CSET_China_Access_To_Foreign_AI_Technology.pdf.
- 18 White House, OTMP, *How China's Economic Aggression Threatens*, 4.
- 19 Greg Levesque, "Military-Civil Fusion: Beijing's 'Guns AND Butter' Strategy to Become a Technological Superpower," *China Brief* (Jamestown Foundation) 19, no. 18 (2019), <https://jamestown.org/program/military-civil-fusion-beijings-guns-and-butter-strategy-to-become-a-technological-superpower/>.
- 20 Michael Brown and Pavneet Singh, *China's Technology Transfer Strategy: How Chinese Investments in Emerging Technology Enable a Strategic Competitor to Access the Crown Jewels of U.S. Innovation* (Mountain View, CA: Defense Innovation Unit Experimental, 2018), 4, [https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_\(1\).pdf](https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_(1).pdf).
- 21 Matt Ho, "Has China Gone into Stealth Mode with its Military-Civil Fusion Plans?," *South China Morning Post*, June 5, 2020, <https://www.scmp.com/news/china/military/article/3087785/has-china-gone-stealth-mode-its-military-civil-fusion-plans>.
- 22 Laney Zhang, "China: Foreign Investment Law Passed," *Global Legal Monitor*, May 30, 2019, <https://www.loc.gov/law/foreign-news/article/china-foreign-investment-law-passed/>.
- 23 "Canada and the World Statistics Hub—United States," Statistics Canada, last modified November 23, 2020, <https://www150.statcan.gc.ca/n1/pub/13-609-x/13-609-x2017001-eng.htm>.
- 24 "United States-Mexico-Canada Agreement," U.S. Department of Commerce, International Trade Administration, accessed June 24, 2020, <https://www.trade.gov/usmca>.
- 25 "North American Aerospace Defense Command/NORAD Missions," North American Aerospace Defense Command, accessed April 28, 2021, <https://www.norad.mil/>.

REFERENCES

- 26 "Canadian Access to the United States Defence Market," Government of Canada, accessed April 28, 2021, <http://web.archive.org/web/20210302153332/https://www.ic.gc.ca/eic/site/ad-ad.nsf/eng/ad00271.html>.
- 27 Heidi M. Peters, *Defense Primer: The National Technology and Industrial Base*, "In Focus" Report IF11311 (Washington, DC: Library of Congress, CRS, updated February 3, 2021), <https://fas.org/sgp/crs/natsec/IF11311.pdf>.
- 28 "CFIUS [Committee on Foreign Investment in the United States] Excepted Foreign States," U.S. Department of the Treasury, accessed June 24, 2020, <https://home.treasury.gov/policy-issues/international/the-committee-on-foreign-investment-in-the-united-states-cfius/cfius-excepted-foreign-states>.
- 29 "U.S. Relations with Canada," U.S. Department of State, Bureau of Western Hemisphere Affairs, July 16, 2020, <https://www.state.gov/u-s-relations-with-canada/>.
- 30 Sylvain Rouleau, "The Value of Intelligence Sharing for Canada: The 'Five Eyes' Case," *Canadian Military Journal* 21, no. 1 (2020): 35, <http://www.journal.forces.gc.ca/vol21/no1/page29-eng.asp>.
- 31 Alexander Moens, Seychelle Cushing, and Alan W. Dowd, *Cybersecurity Challenges for Canada and the United States* (Vancouver: Fraser Institute, 2015), 21-22, <https://www.fraserinstitute.org/sites/default/files/cybersecurity-challenges-for-canada-and-the-united-states.pdf>.
- 32 Josh Gold, Christopher Parsons, and Irene Poetranto, "Canada's Scattered and Uncoordinated Cyber Foreign Policy: A Call for Clarity," *Just Security*, August 4, 2020, <https://www.justsecurity.org/71817/canadas-scattered-and-uncoordinated-cyber-foreign-policy-a-call-for-clarity/>; Michael Schmitt, "New Zealand Pushes the Dialogue on International Cyber Law Forward," *Just Security*, December 8, 2020, <https://www.justsecurity.org/73742/new-zealand-pushes-the-dialogue-on-international-cyber-law-forward/>.
- 33 Lauren Gardner and Alexander Panetta, "Canada Decides: Trudeau Faces Heat over Handling of China and Trade War," *Politico*, September 16, 2019, <https://www.politico.com/story/2019/09/16/canada-china-trade-war-1704947>.
- 34 "China's Relationship with Canada" [中国同加拿大的关系], People's Republic of China, Ministry of Foreign Affairs, last updated March 2021, http://www.fmprc.gov.cn/web/gjhdq_676201/gj_676203/bmz_679954/1206_680426/sbgx_680430/.
- 35 Duanjie Chen, *Moving Beyond Rhetoric: Understanding the Practical Consequences of a Canada-China Free Trade Agreement* (Ottawa: Macdonald-Laurier Institute, 2019), 12, 18, 22, [http://macdonaldlaurier.ca/files/pdf/20190315_MLI_CanadaChina_Free_Trade_%28Chen%29_PAPER_FWeb.pdf?mc_cid=897146283f&mc_eid=\[UNIQID\]](http://macdonaldlaurier.ca/files/pdf/20190315_MLI_CanadaChina_Free_Trade_%28Chen%29_PAPER_FWeb.pdf?mc_cid=897146283f&mc_eid=[UNIQID]).
- 36 Job, "Canada's Middle Power Dilemma."
- 37 Sean Keane, "Huawei Ban Timeline: Follow the Saga of the Chinese Telecommunications Giant," *CNET*, accessed February 9, 2021, <https://www.cnet.com/news/huawei-ban-full-timeline-us-sanctions-china-trump-biden-5g/>.
- 38 Sanger and McCabe, "Biden Expands Trump-Era Ban."
- 39 USCC, *2019 Annual Report to Congress*, 416.
- 40 "China's Intelligence Law and the Country's Future Intelligence Competitions," Government of Canada, modified May 17, 2018, <https://www.canada.ca/en/security-intelligence-service/corporate/publications/china-and-the-age-of-strategic-rivalry/chinas-intelligence-law-and-the-countrys-future-intelligence-competitions.html>; Murray Scot Tanner, "Beijing's New National Intelligence Law: From Defense to Offense," *Lawfare* (blog), July 20, 2017, <https://www.lawfareblog.com/beijings-new-national-intelligence-law-defense-offense>.
- 41 Bevin Fletcher, "Bell Canada Doesn't Rule Out Huawei for 5G," *Fierce Wireless*, June 3, 2020, <https://www.fiercewireless.com/5g/canadian-operators-bypass-huawei-for-5g-pick-ericsson-and-nokia>.
- 42 Nathan Vanderklippe and Steven Chase, "China is Alienating Foreign Countries, Damaging its Global 'Soft Power,' Canadian Ambassador to Beijing Says," *Globe and Mail*, May 12, 2020, <https://www.theglobeandmail.com/world/article-china-is-alienating-foreign-countries-damaging-its-global-soft-power/>.
- 43 Elaine Pofeldt, "Why Canada is Becoming a Start-Up Mecca Rivaling Silicon Valley," *CNBC*, November 12, 2019, updated November 14, 2019, <https://www.cnbc.com/2019/11/12/why-canada-is-becoming-a-start-up-mecca-rivaling-silicon-valley.html>.
- 44 David George-Cosh, "Canadian Tech Sector Thrives, but Struggles to Keep its Talent," *Wall Street Journal*, updated February 8, 2018, <https://www.wsj.com/articles/canadian-tech-sector-thrives-but-struggles-to-keep-its-talent-1518091201>.
- 45 "Canadian ICT Sector Profile 2019," Innovation, Science, and Economic Development Canada (ISED), modified June 26, 2020, https://www.ic.gc.ca/eic/site/ict-tic.nsf/eng/h_it07229.html.
- 46 "Innovation Superclusters Initiative," ISED, modified April 1, 2021, <https://www.ic.gc.ca/eic/site/093.nsf/eng/home>.
- 47 "Programs and Incentives," Invest in Canada, accessed on June 19, 2020, <https://www.investcanada.ca/programs-incentives>.
- 48 Joel Rose, "Canada Wins, U.S. Loses in Global Fight for High-Tech Workers," *NPR*, January 27, 2020, <https://www.npr.org/2020/01/27/799402801/canada-wins-u-s-loses-in-global-fight-for-high-tech-workers>.
- 49 Han Liang [韩良], "Embrace Investment Opportunities for Canadian Science and Technology Companies" [拥抱加拿大科技企业投资机遇], *China Foreign Exchange* [中国外汇] no. 21 (2016): 63-64, doi: 10.13539/j.cnki.11-5475/f.2016.21.021.
- 50 "Investment Canada Act: Guidelines," Government of Canada, modified December 19, 2016, https://www.ic.gc.ca/eic/site/ica-lic.nsf/eng/h_lk00066.html.
- 51 Brown and Singh, *China's Technology Transfer Strategy*, 23-24. This report identifies policy tools available to the United States comparable to the Canadian regulations discussed in Dentons's *Guide to Doing Business in Canada*.
- 52 "Export Controls: Export Controls and Canada,"

REFERENCES

- Government of Canada, Trade Commissioner Service, modified February 21, 2020, <https://www.tradecommissioner.gc.ca/sell2usgov-vendreaugouvusa/procurement-marches/export-cont-export.aspx?lang=eng>.
- 53 “Guide to Doing Business in Canada: International Trade,” Gowling WLG, October 1, 2020, <https://gowlingwlg.com/en/insights-resources/guides/2019/doing-business-in-canada-international-trade/>.
- 54 Dentons Canada, *A Guide to Doing Business in Canada* (Toronto: Dentons Canada, 2019), 13–15, <http://www.doingbusinessincanada.com/>.
- 55 Christine Dobby, “Ottawa Steps Up Reviews of Merger Deals on National Security Grounds,” *Globe and Mail*, March 1, 2020, <https://www.theglobeandmail.com/business/article-ottawa-steps-up-reviews-of-merger-deals-on-national-security-grounds>.
- 56 Canadian Press, “Trudeau Says No Security Risks in Chinese Takeover of Canadian Satellite Firm,” *Financial Post*, June 27, 2017, <https://business.financialpost.com/technology/trudeau-says-no-security-risks-in-chinese-takeover-of-canadian-satellite-firm-2>.
- 57 Federal Acquisition Regulation: Prohibition on Contracting With Entities Using Certain Telecommunications and Video Surveillance Services or Equipment, 85 Fed. Reg. 42,665 (July 14, 2020), <https://www.federalregister.gov/documents/2020/07/14/2020-15293/federal-acquisition-regulation-prohibition-on-contracting-with-entities-using-certain>.
- 58 Sean Silcoff, “BlackBerry Sells 90 Patents to Huawei, Covering Key Smartphone Technology Advances,” *Globe and Mail*, January 12, 2021, <https://www.theglobeandmail.com/business/article-blackberry-sells-90-patents-to-huawei-covering-key-smartphone/>.
- 59 “Investment Canada Act: Guidelines on the National Security Review of Investments,” Government of Canada, March 24, 2021, <https://www.ic.gc.ca/eic/site/ica-lic.nsf/eng/lk81190.html>.
- 60 Bijun Wang and Kailin Gao, “Outward Direct Investment: Restricted, Relaxed, and Regulated Stages of Development,” in *China’s 40 Years of Reform and Development: 1978–2018*, eds. Ross Garnaut, Ligang Song, and Cai Fang (Acton, Australia: ANU Press, 2018), 623–27, <https://www.jstor.org/stable/j.ctv5cgbnk.38>.
- 61 Li and Cheong, *China’s State Enterprises*, 165.
- 62 Jan Knoerich, “Has Outward Foreign Direct Investment Contributed to the Development of the Chinese Economy?,” *Transnational Corporations* 23, no. 2 (2017): 9, doi: 10.18356/898d556e-en.
- 63 Jin Hong et al., “Technology Gap, Reverse Technology Spillover, and Domestic Innovation Performance in Outward Foreign Direct Investment: Evidence from China,” *China and World Economy* 27, no. 2 (2019): 3, 20, doi: 10.1111/cwe.12272.
- 64 University of Alberta, China Institute, “China-Canada Investment Tracker: Year End Review 2018; Chinese Investment in Canada,” 2019, 1, <https://www.ualberta.ca/china-institute/media-library/media-gallery/research/tracker/2-year-end-review-2018.pdf>.
- 65 Wang and Gao, “Outward Direct Investment,” 626.
- 66 Kai Valdez Bettcher, “Investments Drop One Year into the Canada-China Dispute—But There’s a Catch,” Asia Pacific Foundation of Canada, November 29, 2019, <https://www.asiapacific.ca/publication/investments-drop-one-year-canada-china-dispute-theres-catch>.
- 67 “Investment Monitor,” Asia Pacific Foundation of Canada, accessed March 5, 2021, <https://investmentmonitor.ca/>.
- 68 Georgina Lee, “Canada’s Tech Firms Drawing Increasing Interest from Chinese Venture Capital Firms,” *South China Morning Post*, January 25, 2018, <https://www.scmp.com/business/article/2130409/canadas-tech-firms-drawing-increasing-interest-chinese-venture-capital>.
- 69 Justin Trudeau, “Strengthening of Canada-China Commercial Relationship,” Office of the Prime Minister of Canada, September 1, 2016, <https://pm.gc.ca/en/news/backgrounders/2016/09/01/strengthening-canada-china-commercial-relationship>.
- 70 Bell Canada, “Bell, Huawei, and BeWhere Bring New Internet of Things Solution to Ontario Winery,” CNW Telbec, November 9, 2017, <https://www.bce.ca/news-and-media/releases/show/bell-huawei-and-bewhere-bring-new-internet-of-things-solution-to-ontario-winery-1>.
- 71 GaN Systems, “GaN Systems Raises USD\$20 Million in Series C Financing,” *Business Wire*, May 7, 2015, <https://www.businesswire.com/news/home/20150507005393/en/GaN-Systems-raises-USD20-Million-Series-Financing>.
- 72 Jeffrey B. Shealy et al., “Optimization of Gallium Nitride High Power Technology for Commercial and Military Applications,” in *2009 IEEE Bipolar/BiCMOS Circuits and Technology Meeting* (New York: Institute of Electrical and Electronics Engineers [IEEE], 2009), 146–53, doi: 10.1109/BIPOL.2009.5314127.
- 73 Laura Luo, “China’s Tencent Launches Cloud Center in Toronto,” *Data Center Dynamics*, April 1, 2015, <https://www.datacenterdynamics.com/en/news/chinas-tencent-launches-cloud-center-in-toronto/>.
- 74 Sean Silcoff, “The Real Deal: Startups Draw Foreign Cash; Tencent, Temasek among Global Investors to Back Two New Real Ventures VC Funds Totalling \$180 Million,” *Globe and Mail*, December 1, 2017, ProQuest (1970541008).
- 75 Sean Silcoff, “AI Firm Nets Watershed Investment,” *Globe and Mail*, June 14, 2017, ProQuest (1909102846).
- 76 Cinzia Colapinto, “A Way to Foster Innovation: A Venture Capital District from Silicon Valley and Route 128 to Waterloo Region,” *International Review of Economics* 54, no. 3 (2007): 321, doi: 10.1007/s12232-007-0018-1.
- 77 Marie-Danielle Smith, “No Buzz from Chinese over Tech Takeover Concerns, but ‘Stars Aligned’ to Build Relationship: Ambassador,” *National Post*, June 14, 2017, <https://nationalpost.com/news/politics/no-buzz-from-chinese-over-tech-takeover-concerns-but-stars-aligned-to-build-relationship-ambassador>.
- 78 Brown and Singh, *China’s Technology Transfer Strategy*, 15.
- 79 “Export and Brokering Controls Handbook,” Government of Canada, Global Affairs Canada, Export Control Division, amended August 2019, modified

REFERENCES

- October 29, 2020, https://www.international.gc.ca/trade-commerce/controls-controles/reports-rapports/ebc_handbook-cce_manuel.aspx?lang=eng.
- 80 "Investment Canada Act: Thresholds," Government of Canada, modified March 30, 2021, https://www.ic.gc.ca/eic/site/ica-lic.nsf/eng/h_1k00050.html.
- 81 Dobby, "Ottawa Steps Up Reviews of Merger Deals."
- 82 "How Do I Find Accelerators and Incubators?," MaRS Startup Toolkit, accessed July 7, 2020, <https://learn.marsdd.com/article/accelerators-incubators/>.
- 83 Margaret McCuaig-Johnston and Moxi Zhang, *China's Innovation Incubators: Platforms for Partnerships* (Vancouver: Asia Pacific Foundation of Canada, 2015), 9, https://www.asiapacific.ca/sites/default/files/filefield/apfc_report_incubators-pd05.pdf.
- 84 "List of Designated Organizations—Start Up Visa," Government of Canada, modified January 22, 2021, <https://www.canada.ca/en/immigration-refugees-citizenship/services/immigrate-canada/start-visa/designated-organizations.html>.
- 85 Jun Li, "Overseas Technology Incubators for International Entrepreneurship: A Chinese Experiment," *International Journal of Entrepreneurship and Innovation* 10, no. 3 (2009): 182, doi: 10.5367/000000009789067851.
- 86 "Zhongguancun Development Group and Japan's Mizuho Bank Sign Strategic Cooperation Agreement," *China Daily*, January 21, 2019, updated January 25, 2019, http://www.chinadaily.com.cn/m/beijing/zhongguancun/2019-01/25/content_37432459.htm.
- 87 Joseph Czikk, "Chinese Incubator Partners Up with InvestOttawa, Names Initial Four Startups," *Betakit*, April 17, 2014, <https://betakit.com/chinese-incubator-partners-up-with-investottawa-names-initial-four-startups/>.
- 88 Josh Dehaas, "Flush with Cash, Chinese Investors are Wooing Canadian Startups," *Globe and Mail*, December 19, 2016, <https://www.theglobeandmail.com/report-on-business/small-business/startups/flush-with-cash-chinese-investors-are-wooing-canadian-startups/article33360714/>.
- 89 "China Angels Mentorship Program (CAMP)," Ontario Centres of Excellence, last updated December 7, 2018, <https://www.oce-ontario.org/programs/archived-programs/china-angels-mentorship-program>.
- 90 "Apply to CAMP," CAMP, accessed February 18, 2021, <http://ccaa-camp.com/apply/>.
- 91 Ontario Centres of Excellence, "China-Ontario Incubator Proves to be Successful," *Canada NewsWire*, September 29, 2016, <https://www.newswire.ca/news-releases/china-ontario-incubator-proves-to-be-successful-595294011.html>.
- 92 Cyclica, "China's Institute of Materia Medica Partners with Cyclica on Innovative Drug Repurposing for COVID-19," *Business Wire*, March 5, 2020, <https://www.businesswire.com/news/home/20200305005764/en>.
- 93 Brent Davis, "Symbolic Gesture: Kitchener Startup's Technology Allows People to Interact with Technology Using Gestures," *Waterloo Regional Record* (Canada), June 9, 2018, <https://www.therecord.com/business/2018/06/09/symbolic-gesture-kitchener-startup-s-technology-allows-people-to-interact-with-technology-using-gestures.html>.
- 94 OTT Pay, "Tencent Cloud and OTT Pay to Build Tencent Cloud Business Accelerator Centre in Canada," *Markets Insider*, November 27, 2017, <https://markets.businessinsider.com/news/stocks/tencent-cloud-and-ott-pay-to-build-tencent-cloud-business-accelerator-centre-in-canada-1009681694>.
- 95 "TusStar Opens First Incubator in Canada, Focusing on AI Industry," *Tsinghua Holdings*, June 28, 2018, http://en.thholding.com.cn/2018-06/28/c_247260.htm.
- 96 Yunming Shao and Lei Shi, "Cross-Border Open Innovation of Early Stage Tech Incubation: A Case Study of FORGE, the First UK-China Accelerator Program," *Journal of Open Innovation: Technology, Market, and Complexity* 4, no. 3 (2018): 4, doi: 10.3390/joitmc4030037.
- 97 Brown and Singh, *China's Technology Transfer Strategy*, 24.
- 98 Soumitra Dutta, Bruno Lanvin, and Sacha Wunsch-Vincent, eds., *Global Innovation Index 2019: Creating Healthy Lives—The Future of Medical Innovation* (Ithaca, NY; Fontainebleau, France; and Geneva, Switzerland: Cornell University, INSEAD, and World Intellectual Property Organization, 2019), 25-27, <https://acc.coj.go.th/th/file/get/file/20200103890deb97b903274f989daf0940426160150419.pdf>.
- 99 USCC, *2019 Annual Report to Congress*, 211-12; Robert Fife and Steven Chase, "CSIS Warns about China's Efforts to Recruit Canadian Scientists," *Globe and Mail*, August 6, 2020, <https://www.theglobeandmail.com/politics/article-csis-warns-about-chinas-efforts-to-recruit-canadian-scientists>.
- 100 Hannas and Chang, *China's Access to Foreign AI Technology*, 12.
- 101 White House, OTMP, *How China's Economic Aggression Threatens*, 15.
- 102 Yojana Sharma, "China Seeks To Build More Strategic Research Partnerships Overseas," *Chronicle of Higher Education*, October 30, 2013, <https://www.chronicle.com/article/China-Seeks-To-Build-More/142703>.
- 103 "China's Relationship with Canada" [中国同加拿大的关系], People's Republic of China, Ministry of Foreign Affairs, last updated April 2020, https://www.fmprc.gov.cn/web/gjhdq_676201/gj_676203/bmz_679954/1206_680426/sbgx_680430/.
- 104 "Canadian International Innovation Program," Government of Canada, Trade Commissioner Service, modified December 15, 2020, <https://www.tradecommissioner.gc.ca/funding-financement/ciip-pcii/index.aspx>.
- 105 "Ontario-China Research and Innovation Fund: How it Works," Ontario Centres of Excellence, accessed July 10, 2020, [https://www.oce-ontario.org/programs/archived-programs/ontario-china-research-and-innovation-fund-\(ocrif\)/how-it-works](https://www.oce-ontario.org/programs/archived-programs/ontario-china-research-and-innovation-fund-(ocrif)/how-it-works).
- 106 "Global Partnerships: Asia; China," University of Alberta, Research & Innovation, accessed May 6, 2021, <https://www.ualberta.ca/research/partnerships/global-partnerships/asia.html>.
- 107 Huawei, "Huawei Announces its Investment in Ottawa Ahead of Schedule during Mayor Jim Watson's Visit to Shanghai Operations," *PR Newswire*, October 21, 2013, ProQuest (1443441092).

REFERENCES

- 108 Nouredin Zaamout, Tom Alton, and Gordon Houlden, *Examining Huawei's Growth & Global Reach: Key Implications, Issues, and the Canadian Connection* (Edmonton: University of Alberta, China Institute, 2019), 22, 25, doi: 10.7939/r3-x8tw-rp58.
- 109 Peter Armstrong, "Huawei Funds \$56M in Academic Research in Canada. That Has Some Experts Concerned," *CBC News*, November 29, 2019, <https://www.cbc.ca/news/business/huawei-academic-funding-in-canada-1.5372310>.
- 110 Zaamout, Alton and Houlden, *Examining Huawei's Growth & Global Reach*, 26.
- 111 Zaamout, Alton and Houlden, *Examining Huawei's Growth & Global Reach*, 27.
- 112 Alan Weedon, "Huawei is Beginning 6G Research—A Mobile Network that May Move Far beyond Smartphones," *ABC News (Australia)*, August 21, 2019, <https://www.abc.net.au/news/2019-08-22/huawei-reportedly-entering-into-6g-research/11427056>.
- 113 Sean Silcoff et al., "How Canada is Helping a Chinese Tech Giant Become a Superpower," *Globe and Mail*, May 26, 2018, ProQuest (2044095587).
- 114 USCC, *2019 Annual Report to Congress*, 290.
- 115 Anne-Marie Brady, "Magic Weapons: China's Political Influence Activities under Xi Jinping," *Wilson Center*, September 18, 2017, 9-10, https://www.wilsoncenter.org/sites/default/files/media/documents/article/magic_weapons.pdf.
- 116 USCC, *2019 Annual Report to Congress*, 212.
- 117 U.S. Department of Justice, U.S. Attorney's Office, District of Massachusetts, "Harvard University Professor and Two Chinese Nationals Charged in Three Separate China Related Cases," January 28, 2020, <https://www.justice.gov/usao-ma/pr/harvard-university-professor-and-two-chinese-nationals-charged-three-separate-china>.
- 118 Graeme Wood, "Chinese-Canadians Mount Case against Chinese Communist Party Tactics, Abuses," *Business in Vancouver*, May 13, 2020, <https://biv.com/article/2020/05/chinese-canadians-mount-case-against-chinese-communist-party-tactics-abuses>; Fife and Chase, "CSIS Warns about China's Efforts to Recruit Canadian Scientists."
- 119 Tom Blackwell, "Canadian Governments Give Huawei Millions in Funding While Debate Rages over Its 5G Role," *National Post*, February 3, 2020, <https://nationalpost.com/news/canadian-governments-give-huawei-millions-in-funding-while-debate-rages-over-its-5g-role>.
- 120 Armstrong, "Huawei Funds \$56M in Academic Research in Canada."
- 121 Andrew Imbrie and Ryan Fedasiuk, *Untangling the Web: Why the U.S. Needs Allies to Defend against Chinese Technology Transfer* (Washington, DC: Brookings Institution, 2020), 10, <https://www.brookings.edu/research/untangling-the-web-why-the-us-needs-allies-to-defend-against-chinese-technology-transfer/>.
- 122 "Home Page," *Inter-Parliamentary Alliance on China*, accessed July 10, 2020, <https://www.ipac.global/>.
- 123 "Investment Canada Act: Guidelines."
- 124 Kait Bolongaro and Natalie Obiko Pearson, "A Bid for Hostage Diplomacy with China Backfires in Canada," *Bloomberg*, July 10, 2020, <https://www.bloomberg.com/news/articles/2020-07-10/a-shot-at-hostage-diplomacy-with-china-backfires-in-canada>.
- 125 "China Says Could Take More Action against Canada, Says Ottawa and Allies 'Kicking against the Pricks,'" *Reuters*, July 6, 2020, <https://www.reuters.com/article/us-china-hongkong-canada-mofa/china-says-could-take-more-action-against-canada-says-ottawa-and-allies-kicking-against-the-pricks-idUSKBN2470SQ>.
- 126 Leyland Cecco, "Meng Wanzhou Extradition Case Wraps Up but Verdict Will Take Months," *Guardian*, August 18, 2021, <https://www.theguardian.com/world/2021/aug/18/meng-wanzhou-extradition-case-canada>.
- 127 James K. Jackson et al., *Global Economic Effects of COVID-19*, CRS Report for Congress R46270 (Washington, DC: Library of Congress, CRS, updated July 9, 2021), 1, <https://crsreports.congress.gov/product/pdf/R/R46270/76>.



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