Techno-nationalism in China–US Relations:
Implications for Universities

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The deepening strategic rivalry between China and the United States has military, diplomatic, ideological, trade, financial and commercial dimensions. One is in the area of emerging and transformative technologies in the era of the Fourth Industrial Revolution that has spawned a techno-nationalist competition with global implications including for universities. This article outlines the American government's efforts in managing research and training interactions with China and their implications for other countries, Canada and Singapore in particular.

THE HOPE THAT the COVID-19 pandemic would bring something positive to the US–China relationship has evaporated. To the contrary, the level of enmity continues to rise and has tipped into Cold War territory. What might have been

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an opportunity for rapprochement and building trust in managing a common challenge has instead become another venue for competition.

As lives, economies, production networks and supply chains have been severely disrupted worldwide, China hawks in Washington are on the offensive, hardening their case for decoupling in manufacturing and technology, imposing new restrictions on US investment in Chinese companies, and applying new restrictions on US and foreign companies selling technologically advanced goods and services to China. In Beijing, there are indications of rapidly expanding efforts at self-sufficiency and reducing interdependence on the United States.

The deepening strategic rivalry between China and the United States encompasses military, diplomatic, ideological, trade, financial and commercial dimensions. The area of emerging and transformative technologies is one of the most important, driving a techno-nationalist rivalry that has global implications including for universities.

Techno-nationalism

Nation states have long been in the business of strengthening the economic advantages of their commercial enterprises and protecting themselves from efforts by others to develop military and technological capacities.

Techno-nationalism in the 21st century is something different. It is, as Robert Manning argues, "a set of industrial policies aimed at self-sufficiency, cultivating 'national champions' in tech sectors while curbing foreign competition just as a new era of advanced technology is unfolding". On the cusp of the Fourth Industrial Revolution, it is a domain at the intersection of Artificial Intelligence and Big Data, robotics, biotech and biomedicine, new materials, the Internet of Things and nano-engineering that "merge the digital with the physical economy".[1]

Techno-nationalism focuses not just on military or dual-use applications, but also a wider-gauged method of maximising national power. It blurs the distinctions between economic advantage, military capability, and technological and scientific capacity, all defined as matters of national security. This has parallels to the earlier Cold War era but differs in the nature of the technologies and their ubiquitous applications and economic interdependence of the prime contenders connected by deeply integrated supply chains.

The Chinese version of techno-nationalism is well understood. It has its historical roots in the calculation that China's century of humiliation was based on technological inferiority to the West and the more recent calculation in the Hu Jintao and Xi Jinping eras that science and technology are essential to China transcending its current place in the international division of labour and escaping a middle-income trap.

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[1]   Robert Manning, "Techno-Nationalism vs. the Fourth Industrial Revolution", *Global Asia*, March 2019, <https://www.globalasia.org/v14no1/cover/techno-nationalism-vs-the-fourth-industrial-revolution_robert a-manning> (accessed 22 April 2020).

Its main ingredients include centralised strategic planning through programmes like "Made in China 2025"; a civil–military fusion across a wide spectrum of enterprises; enormous state and private investment in research and development (R&D) that roughly equals that of the United States and the OECD (Organisation for Economic Co-operation and Development) average; the incubation and encouragement of state-owned and private companies; and integration in global supply chains while fencing off entire sectors from foreign involvement. Research is increasingly being pushed into areas of high value-added production and indigenous development of products and technologies which China no longer can source externally (e.g. some kinds of computer chips) or it wishes to dominate for commercial advantage (e.g. rare earths). They are integral parts of the Chinese state-led developmental system.

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At the recently concluded National People's Congress, Beijing announced it would spend US$1.4 trillion on digital infrastructure. One study frames this as part of "de-Americanization" of supply chains.[2] Another outlines the objectives and development of Xi Jinping's longer-term efforts to reduce the vulnerabilities produced by "interdependence" with the United States in an era of intensifying competition.[3]

The United States has its own variants of techno-nationalism. American industry, small businesses, universities and government departments are deeply connected through organisations like the Defence Advanced Research Projects Agency embedded in the Department of Defence. By official estimates, defence-related R&D in 2017 exceeded US$55 billion, four times greater than the rest of OECD countries combined.[4] In 2019 US investment in weapons procurement and R&D alone were larger than China's total defence budget.[5] There have been occasional ambitious projects like the Apollo space programme that fuse grand

2   Alex Capri, "Strategic US–China Decoupling in the Tech Sector", Hinrich Foundation, 4 June 2020, <https://www.hinrichfoundation.com/research/white-paper/trade-and-technology/us-china-decoupling-tech/?utm_medium=email&_hsmi=89253169&_hsenc=p2ANqtz-9ltiCzm5vlwie_IwZ9IDWRpnfliqVKnmzZbzoq3dZ2u3lS54vRKruVD2X_MUekh87ocHtcFQr-IUV2eWjqjpTP8zV4Lg&utm_content=89253169&utm_source=hs_email> (accessed 10 June 2020).

3   Julian Giwurtz, "The Chinese Reassessment of Interdependence", *China Leadership Monitor*, 1 June 2020, <https://www.prcleader.org/gewirtz> (accessed 10 June 2020).

4   Congressional Research Service, 28 January 2020, <https://fas.org/sgp/crs/natsec/R45441.pdf> (accessed 23 April 2020).

5   Lucie Bearaud-Sudreau, "Global Defense Spending: The United States Widens the Gap", Institute of International and Strategic Studies, Military Balance Blog, 14 February 2020, <https://www.iiss.org/blogs/military-balance/2020/02/global-defence-spending> (accessed 15 April 2020).

strategic thinking and governmental and private sector resources around a single objective. There is also private investment in R&D in sectors related to the non-military dimensions of emerging technologies.

The American arsenal for techno-nationalist competition is formidable and based on the underlying belief in free markets. What is changing is the diminution of self-confidence about its abilities to outcompete other nations on technological frontiers. China in particular poses a new kind of challenge.

The Trump administration has embraced a strident approach to framing and managing relations with China. The National Security Review of 2017 and the National Defence Review of 2018 defined the People's Republic of China as a strategic competitor and adversary. This approach is based on the belief that China's rise is coming at the expense of the United States and that it presents a whole-of-society and existential threat to the United States as a peer competitor.

There has been widespread anger in Congress and think tanks about a China that did not play fair in areas including intellectual property, trade balances and subsidies. Beneath it lies a fear not about a weak China that could only imitate, steal, or subsidise its way to success, but a China that can innovate, compete and lead in a variety of high value-added sectors. This has gone beyond the concern that Western technology can be used by China for military purposes and spilled over into a desire to contain China's technological rise more generally.[6]

With active Congressional support on a bicameral and bipartisan foundation, the Trump administration is building a whole-of-government legal and regulatory architecture for protecting national security in areas related to science and technology. Its elements include:

- limiting Chinese investment in tech companies in the United States via tighter restrictions enforced by the Committee of Foreign Investment in the United States;

- banning or restricting Chinese companies from participating in the US telecommunications industry;

- encouraging American companies via tax breaks, new rules and carefully structured subsidies to move operations of key components out of China;

> **The Trump administration has embraced a strident approach to framing and managing relations with China…This approach is based on the belief that China's rise is coming at the expense of the United States…**

6   Noah Barkin, "Export Controls and the US–China Tech War", *MERICS China Monitor*, 18 March 2020, <https://www.merics.org/en/china-monitor/export-controls-and-the-us-china-tech-war> (accessed 25 April 2020).

- strengthening export control restrictions unilaterally especially through the Commerce Department's Bureau of Industry and Security, and broadening the range of targeted Chinese firms associated with its "civil–military fusion", and blurring the distinction between commercial and military supply chains; as well as amplifying these restrictions through multinational coordinating agencies, chiefly the Wassenaar arrangement that includes 42 countries;

- laying down new restrictions on the sale of products based on American technology (e.g. chip-producing equipment) to China by foreign companies without the approval of the home government of the company as well as the US government;

- imposing trade tariffs on Chinese products and creating new tax breaks, rules and subsidies to encourage US companies to shift production out of China and "reshore" to the United States;

- reinforcing White House threats and pending legislation to limit or put new conditions on Chinese firms accessing US capital markets;

- pressuring other countries to restrict their high-tech interactions with China; and

- mobilising concerted opposition to Chinese influence in international organisations that set global technology standards including the International Organisation for Standardisation and the International Electrotechnical Commission.

The poster child of all that is considered threatening about China's rise is Huawei, which bears the full weight of American actions. However, the aforementioned provisions apply to multiple Chinese companies and in multiple sectors well beyond the information and communications technology. For example, in emerging technologies that require export licences, the current discussion of those that pose "national security risks" includes biotechnology; Artificial Intelligence; position, navigation and timing technology; microprocessor technology; advance computing; data visualisation; quantum information and sensing; logistics; additive manufacturing; robotics; brain–computer interfaces; hypersonics; and advanced materials. A second category includes "foundational" technologies, mainly related to semi-conductors.[7]

It remains to be seen if China will make sufficient changes to the structure of its economy and its own brand of techno-nationalism to satisfy the Trump administration. At the moment it is far more likely that China will double down

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[7]	See <https://www.federalregister.gov/documents/2018/11/19/2018-25221/review-of-controls-for-certain-emerging-technologies> (accessed 23 April 2020).

on its own forms of indigenous innovation and expand efforts to connect with Asian and other partners in sustaining technological supply chains that do not include the United States.

It also remains to be seen if this phase of American techno-nationalism and decoupling, along with the approach to China that informs it, as well as the current Washington consensus beneath it, will continue into the next administration. There is the possibility that the preferred instrument of strategic competition will shift from restricting and containing China to self-strengthening America's own technological and industrial innovation base along the lines that have been advocated in a number of recent think tank reports.[8] As is evident even in the Huawei case, Washington cannot count on continued support from its own corporations or all its friends and allies in a move towards deeper decoupling.

Universities

From a techno-nationalist perspective, universities are integral parts of the eco-systems for technological innovation and major contributors to national power, whatever their other functions. From a decoupling perspective, they are key players in the intellectual supply chains of ideas, research and talent. They are an asset but also a vulnerability in areas including intellectual property (IP) leakage, cyber intrusions and technology transfer, especially but not exclusively in the fields of science, technology, engineering and mathematics (STEM).

Western universities have long been active connectors with China in professorial exchanges, collaborative activities, student flows and joint research. For four decades since China's opening, these have been pursued on both sides with enthusiasm and optimism despite major structural and philosophical differences on matters such as academic freedom, censorship and relationship of academic institutions to the state.

In recent years, Western institutions have faced new obstacles and risks in their work on, in and with China. Some of these have been generated at home by increased media, public and alumni scrutiny of Chinese connections. Some members of faculty, including those with previously close involvement with China, are also voicing concerns.

The two countries that have gone furthest down the path of readjusting academic connections are Australia and the United States. In Australia, media, public and governmental attention has focused on perceived Chinese influence and interference activities on campus, over-reliance on revenue from Chinese international students (they make up 60% of all foreign student enrolments in the

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[8]   For example: James Manyika, William McRaven and Adam Segal, *Innovation and National Security: Keeping Our Edge* (Independent Task Force Report No. 77, Council on Foreign Relations, October 2019); see <https://www.cfr.org/report/keeping-our-edge/pdf/TFR_Innovation_Strategy.pdf> (accessed 23 April 2020); and "Weathering Tech Nationalism: A Security and Trustworthiness Framework to Manage Cyber Supply Chain Risk,", East West Institute, May 2020, <http://eastwest.ngo/technationalism> (accessed 8 June 2020).

top eight research universities, and nationally, they contribute about US$8 billion to the Australian economy in higher education sector; besides, about a quarter of postgraduate researchers in the STEM fields are Chinese citizens) and Chinese funding sources (the Torch Innovation Precinct at the University of New South Wales valued at more than US$70 million), cyber hacking and IP leakage. These have been framed as assaults on academic atmosphere, academic integrity and academic freedom with consequences for the quality of Australian higher education and national security.

The Australian government responded with legislation intended to combat foreign interference in general and the creation of a special task force to focus on the university sector. The November 2019 report of the task force was instructive. Led by the federal government and negotiated with university leaders. the universities were delegated to devise their own cybersecurity and IP protection mechanisms to safeguard academic principles, researchers and their data, in consultation with security and intelligence officials. They also agreed to set up a new reporting system and information network intended to increase awareness of risks and vigilance in identifying and responding to foreign interference.[9]

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Actions in the United States, led by the White House, Congress, federal agencies and national science funding organisations have been far more intrusive. The general approach has been top-down directive and with threat of immediate consequences for delinquent individuals and institutions, usually through cancellation of federal funding. The Office of Security Technology Policy in the White House has been working on guidelines for federal agencies and universities to manage foreign influence activities. The Department of Justice has also been active in investigations under the broad rubric of counter-espionage, leading to numerous charges against individuals associated with research institutes and universities. Several investigations had resulted in convictions for fraud and misrepresentation.

Various Congressional hearings focused on threats from China. Some examples of the hearings in 2019 include the Senate Finance Committee's review of "Foreign Threats to Taxpayer-funded Research" in June 2019, and the Senate Armed Services Committee's call for a list of Chinese institutions and companies with

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9   For *Guidelines to Counter Foreign Interference in the Australian University Sector. University Foreign Interference Taskforce*, November 2019, see the guidelines link on the Australian government, Department of Education, Skills and Employment website, <https://www.education.gov.au/ufit> (accessed 26 April 2020).

links to the Chinese military to be used in screening visa applications for students and researchers. The agendas of both the Senate Select Committee on Intelligence and most fulsomely, the hearings and roundtables sponsored by the Congressional Executive Commission on China have included China and technology research issues. A new bill intended was recently introduced to protect American research and IP from global competitors against the Chinese government's efforts to strategically and systematically acquire IP and cutting-edge research from US-based scientists, experts and research institutions.

A full slate of federal departments and agencies including Defence, Energy, Education and State and Commerce (including its Bureau of Industry and Security) have established regulations and requirements that, *inter alia*, affect American universities and colleges. The Department of Education completed in January 2020 an investigation into the connection of six universities with Huawei, contracts with the Central Committee of the Chinese Communist Party and involvement with "Thousand Talents programmes" hosted by China. The "Thousand Talents" programme established in 2008 to draw accomplished ethnic Chinese academics and others back to China via special incentives has emerged as a red flag in government scrutiny. The resulting report to Department of Homeland Security was severely critical and called for greater scrutiny in preventing foreign money from securing access to sensitive American research.

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Major funding agencies, including the National Science Foundation and National Institute of Health (NIH), are key instruments for disseminating and enforcing new compliance regulations. NIH has been especially active, issuing a letter in August 2018 to applicants raising concerns about foreign influences on research integrity, instituting compliance procedures that universities perceive as a variety of new disclosure and diligence requirements for projects, and conducting direct investigations of more than 60 institutions for breaches in disclosure of funding sources, diversion of IP and sharing of confidential information. In several instances these led to termination of scientists.

Specific examples of impacts on universities and academics in the past year include:

- public criticism of institutions by political authorities in Washington, e.g. a White House statement of disapproval centred on the University of

California at Berkeley's connections with Huawei and NIH's singling out for censure the failings of dozens of other universities;

- requirements mandated under the *National Defence Authorisation Act* for individual institutions to remove equipment provided by Huawei or risk loss of federal research grants and other government funding;

- reduction of the length of visas for Chinese master's and doctoral-level students in several sectors (including robotics, aviation and high-end manufacturing), rolling back the existing five-year multiple entry visa to one year;

- cancellation of multi-year visas for Chinese academics who refuse to answer questions at the border or provide detailed information including their travel history over the last 15 years;

- denial of visas for Chinese students applying for postgraduate studies in "sensitive fields" who have connections to institutions in China that implement or support China's military-fusion strategy;

- stricter controls over issuance of visas for Chinese scientists and engineers;

- requests from the Government Accountability Office to an initial list of 11 universities to discuss the response of granting agencies to foreign interference activities and to provide documentation of the universities' internal processes;

- FBI questioning of American academics and in some instances, students working on China, working with Chinese partners, or returning from visits to China;

- comments by the director of the FBI referring to China's whole-of-society effort to steal technology from the United States and labelling students across disciplines as "non-traditional intelligence gatherers";

- active investigations into the behaviour of ethnically Chinese scientists working in US universities and companies. Of special concern are connections to the Thousand Talents programme and United Front associated activities;

- major administrative burdens tied to large increase in obligations for due diligence, reporting and other compliance measures. These relate to current and proposed projects which in some instances are retroactive;

- heightened media coverage and scrutiny of China-related activities,

research contracts and funding, and philanthropic donations producing a chill on joint projects and new initiatives;

- new reporting requirements for individual professors who may be on the front line of research and teaching, and joint projects that are deemed to be illegal, unethical or involve technology transfer and leakage of IP;

- looming implications for foreign-affiliated offshore campuses or joint ventures with American universities and R&D centres in China already subject to tightening restrictions;

- researchers steering away from subjects related to restricted technologies because of administrative and reporting burdens, and new calculated risks involved in pursuing open research; and

- suspicion of Confucius Institutes (CIs) and new policies from government officials and agencies as well as media and public commentaries have led to the closing of CIs on more than 35 campuses in the past three years.

The focus centres on the STEM and biomedical fields but also bumps into the social sciences in areas including Big Data and instruments of social control.

Responses by individual universities are varied. Most have or are moving to undertake measures to insure the integrity of peer review processes, ensure full disclosure of partners and funding, secure compliance with regulatory requirements, protect IP and strengthen cybersecurity.

Associations including the Association of American Universities and the Association of Public and Land-grant Universities have responded with pushback, especially regarding excessive restrictions on research collaborations, diversion of talent from the United States, and dangers of racial profiling and xenophobia. The talent issue has been particularly important considering that until recently more than 90% of Chinese students who earned a doctoral degree in the United States remained in the United States after graduation.

A key argument academics and business leaders have emphasised is that the US innovation system largely depends on foreign researchers and partnerships with foreign research institutions, and China is central among foreign players. MIT President Rafael Reif argued, "If all we do in response to China's ambition is to try to double-lock all our doors, I believe we will lock ourselves into mediocrity." He and others have warned about the "toxic atmosphere" in research labs and the chilling effect on international collaborations including but not restricted to China.[10] Labs which not long ago were functioning as hotspots for international collaboration are reported to have turned into battlegrounds.

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[10]   As quoted in Stephanie Segal and Dylan Gerstel, *Research Collaboration in an Era of Strategic Competition*, Centre for International and Strategic Studies, September 2019, <https://csis-prod.s3.amazonaws.com/s3fs-public/publication/190925_Segal%26Gerstel_ResearchCollaboration. pdf> (accessed 22 April 2020).

Third-country Impact

Other countries including Japan, the United Kingdom, Canada and Singapore have not followed the United States in defining China as a strategic competitor or adversary or in adopting large-scale decoupling as a response. However, what is happening in the United States and in the US–China dynamic can be expected to have significant spillover effects for them.

According to statistics that Nature magazine provided in 2018 to track the international research collaborations by universities around the world in the physical sciences, life science, environment and chemistry, China was the top collaborator with both the United States and Singapore and ranked second for Canada (after the United States).[11]

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In Canada, there is rising concern about Chinese influence and interference activities, as is evident in a recent request by the Special Parliamentary Committee on Canada–China Relations for a further study on the role of universities. In addition, interactions between security and intelligence agencies and the universities are beginning to produce guidelines that, like Australia's, focus on risk awareness and vigilance, although a consensus has yet to be reached in the government or the universities on what constitutes a sensitive sector or technology beyond those with directly military application.

For the most part, no major changes have been made: The major granting councils have yet to adopt American-style requirements for extensive disclosure and independent monitoring of institutional agreements. Major research universities continue to accept funding from Chinese companies including Huawei, although this funding remains a small part of research budgets and is subject to careful institutional scrutiny and transparency provisions. Almost all Canadian universities continue to recruit large numbers of Chinese students without any government proscriptions on their fields of study.

In Singapore, there are extensive interactions between universities and Chinese partners, funders and collaborators. With the notable exception of the 2017 expulsion of a prominent academic based at the Lee Kuan Yew School of Public Policy for his Chinese connections, there is no public evidence of targeted scrutiny of individuals or institutions for their collaborations with Chinese institutions. No special screening mechanisms are in place for dealing with Chinese partners that go beyond normal university review processes.

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[11]   "Nature Index: Connected World", 1 December 2018 to 29 November 2019, <https://www.natureindex.com/country-outputs/collaboration-graph> (accessed 23 April 2020).

There are several areas of concern that have particular relevance for Canadian and Singaporean institutions.

(i)   American definitions of emerging and foundational technologies, sensitive sectors, designation of companies on the Commerce Department's entity list (e.g. Huawei) are all critical to multinational agreements on export controls and university-based research. This will have significant implications for countries that do not agree with or share America's position shift from defensive to offensive tools to restrict Chinese capabilities.[12]

(ii) The extraterritorial impact of regulations from American funding agencies stemming from new requirements that apply to all applicants regardless of nationality or location. For instance, Canadian universities risk losing funding from American agencies such as the NIH and NSF if they have collaborations with Chinese institutions and researchers that do not comply with American regulations and laws.

(iii) Increasing pressure domestically in both Canada and Singapore, and from the United States to increase awareness of heightened risks in working with Chinese counterparts and to exercise extensive due diligence on partner institutions and individuals including research collaborators, visitors and postdoctoral fellows and graduate students. Immediate issues arise pertaining to which party should conduct the detailed screening, and who should pay for it, and what level of information-sharing across organisations and with like-minded countries is considered acceptable. China's Thousand Talent programmes and connections to institutions associated with the Party and military will need careful analysis as will new American concerns about the end use of university-based research that go well beyond military or dual-use applications. The range of unacceptable partners was also quickly expanded to include Chinese institutions and individuals that might be complicit in human rights violations in situations like surveillance technology used in Xinjiang. American and Canadian academics are already heatedly debating the matter.

(iv) Deeper and wider discussion about balancing national security considerations with the commitment to open research and knowledge exchange. Very few academic leaders or professors in either Canada or Singapore are seized of the issue in the way that their US counterparts are.

(v) Adopting and developing codes of best practice for research hygiene related to safeguarding intellectual property, protecting against cyber incursions and strengthening the peer review system.

(vi) Assessing the implications of recent restrictions in China that academic papers on COVID-19 will have to be sent for review and vetting before they are

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[12]   Noah Barkin, "Export Controls and the US–China Tech War: Policy Choices for Europe", MERICS China Monitor, 18 March 2020, <https://www.merics.org/en/china-monitor/ export-controls-and-the-us-china-tech-war?utm_source=Newsletter&utm_medium=Email&utm_ campaign=Export%20Controls%20and%20the% 0US-China%20tech%20war> (accessed 23 April 2020).

submitted to academic journals for publication, thus affecting the free flow of data and research and collaborations with foreign universities.

Conclusion

Strategic rivalry between the United States and China is unlikely to diminish during or after the COVID-19 pandemic. Techno-nationalism and the push for decoupling may strengthen as countries attempt to rebuild their economies with a preference for domestic industries. The international system may become more autarchic and global value chains may well splinter.

For the moment most interactions with Chinese universities and students are frozen because of restrictions on travel, lockdowns and other uncertainties. Post-pandemic and amid Cold War tensions fuelled by techno-nationalist competition, universities will face even more obstacles in remaining focal institutions in building mutual understanding, addressing global issues and advancing scientific research.

For universities to keep their doors to China open, they will need to close some windows and install some new screens. To do this in the most effective way, expanded discussion between institutional leaders and professors in a range of countries will be essential. ▤