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US–China Strategic Competition

The Quest for Global Technological Leadership

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Contents

Summary

- The underlying driver of the ongoing US–China trade war is a race for global technological dominance. President Trump has raised a number of issues regarding trade with China – including the US's trade deficit with China and the naming of China as a currency manipulator. But at the heart of the ongoing tariff escalation are China's policies and practices regarding forced technology transfer, intellectual property theft and non-market distortions.
- From a US perspective, a solution to the US–China trade war and quest for technological supremacy should include avoiding self-harming actions (such as decoupling), focusing on America's competitiveness, finding solutions that allow both the US and China to claim victory or at least save face, working with like-minded partners around the globe and strengthening the international trading system.
- As China's international influence has expanded it has always been unlikely that Beijing would continue to accept existing global standards and institutions established and widely practised by developed countries based on 'the Washington Consensus'.
- China's desire to be an alternative champion of technology standard-setting remains unfulfilled. Its ample innovation talent is a solid foundation in its quest for global technology supremacy but tightening controls over personal freedoms could undermine it and deter potential global partners.
- It is unclear if Chinese government interventions will achieve the technological self-sufficiency Beijing has long desired. China's approach to macroeconomic management diverges significantly from that of the US and other real market economies, particularly in its policy towards nurturing innovation.
- Chinese actors are engaged in the globalization of technological innovation through exports and imports of high-tech goods and services; cross-border investments in technology companies and research and development (R&D) activities; cross-border R&D collaboration; and international techno-scientific research collaboration.
- While the Chinese state effectively pushes domestic companies and research institutes to engage in the globalization of technological innovation, its interventions in the high-tech sector have caused uneasiness in the West.
- A technically sound screening mechanism of foreign investment can prevent normal cross-border collaboration in technological innovation from being misused by geopolitical rival superpowers.

1. Introduction

The US and China are engaged in an economic battle that has so far shown little prospect of a positive resolution. But the current dispute between the world's two largest economies goes far beyond trade tariffs and tit-for-tat reprisals: the underlying driver of this clash is a race for global technological supremacy.

Under President Trump, the US has publicly criticized China's trade surplus as well as Chinese practices and policies regarding forced technology transfers, intellectual property (IP) theft and cyber espionage. Underlying this rhetoric and recent actions is a deeper concern that the trade playing field is not level. Moreover, among US political elites and leaders from the so-called Five Eyes countries there is suspicion that China's 'Made in China 2025' industrial upgrade strategy, introduced by Beijing in 2015, poses a serious threat to US and Western competitiveness in high-tech sectors.

In the eyes of the current Chinese leadership, technological prowess is one of the accoutrements of power. With a strong sense of self-reliance, the focus now is on surpassing the US in a broad range of technologies while asserting that China can afford to decouple from the US in terms of pursuing an independent technological development path.

In today's highly integrated global economy, it is difficult for governments to restrict technological integration on the basis of nationality. Instead of building a coalition against China, President Trump's rhetoric and actions against long-standing allies around the world have raised questions about the reliability of the US as a partner and ally. While the EU and other allies share some of the US's concerns regarding China, they also want to maintain good relations with both countries – and avoid having to pick sides. Thus, US allies are not necessarily willing to go along with the more aggressive aspects of the US approach.

China's technological capability, together with its distinctive political system at home, is now reshaping the global technological and economic order. Beijing's ambition is not only to adopt cutting-edge technologies, but also to set international technology standards. These issues create the basis for a longer-term economic and technological confrontation between the US and China.

The purpose of this research paper is threefold: firstly, it examines the impact of the US and China's domestic politics on the trade war and technological competition, and the measures taken by both countries to gain a technological advantage. Secondly, it assesses China's ability to shape global technology governance and standard-setting. Thirdly, it looks at the longer-term implications of the US–China trade war (and the US–China tech race more generally) on trade and investment flows in the Asia-Pacific region.

The paper examines the risks associated with greater strategic competition – and the instability this brings for countries that wish to preserve relations with both the US and China – as well as the broader implications and potential solutions for mitigating the impacts of the US–China economic confrontation.

2. Behind the US–China Trade War: The Race for Global Technological Leadership

Marianne Schneider-Petsinger

Even if the US and China agree on a deal that would end their on-again, off-again trade war, the economic and trade relationship between these two countries will be fraught for years to come. This is because the current dispute is not so much about trade, but rather about larger structural issues. The US and China are locked in a race for economic and technological dominance in the long-term. Resolving this new rivalry will require both sides to find a mutually acceptable middle ground. This chapter focuses on the US demands in the current US–China trade war and 'tech race' as a starting point and outlines some solutions from the US perspective.

US concerns in the trade war with China

The Trump administration has raised various concerns regarding trade with China. While some are legitimate, others are less valid.

US trade deficit with China

The one area that President Trump has often lamented is the large and persistent US trade deficit in goods with China. Standing at $419 billion in 2018, it accounted for approximately 48 per cent of the US's global goods trade deficit.[1] However, the Trump administration's focus on this metric is misplaced for two reasons: first, it only takes into account the trade deficit in goods, while ignoring that the US had a $40 billion surplus in trade in services with China in 2018.[2] Second, while overall global trade imbalances matter (with China's structural trade surplus being a case in point), most economists believe that trade deficits are largely the result of macroeconomic forces (i.e. savings and investment) and not due to trade policy.

As US–China trade tensions intensified over the course of 2018, the US trade deficit in goods widened to the highest level ever recorded. Because of President Trump's fixation on the trade balance, the US and China have announced steps to adjust it – for instance in January 2019, when Beijing pledged to 'purchase a substantial amount of agricultural, energy, manufactured goods, and other products and services from the United States'.[3]

[1] US Census Bureau (2019), 'Top Trading Partners – December 2018', https://www.census.gov/foreign-trade/statistics/highlights/top/top1812yr.html (accessed 8 Mar. 2019).
[2] US Bureau of Economic Analysis (2018), 'U.S. Trade in Goods and Services by Selected Countries and Areas, 1999-present', https://www.bea.gov/system/files/2018-12/trad-geo-time-series-1018.xlsx (accessed 8 Mar. 2019).
[3] Office of the United States Trade Representative (2019), 'Statement on the United States Trade Delegation's Meetings in Beijing', 9 January 2019, https://ustr.gov/about-us/policy-offices/press-office/pressreleases/2019/january/statement-united-states-trade (accessed 8 Mar. 2019).

Currency manipulation

On the 2016 US presidential election campaign trail, Trump vowed to label China a currency manipulator. Until recently, the Treasury Department kept China on the 'Monitoring List' of economies that 'merit close attention to their currency practices'.[4] But while most pundits still believe that China does not meet the criteria set for determining currency manipulation,[5] Treasury Secretary Mnuchin, under the auspices of President Trump, named China a currency manipulator in August 2019.[6]

China has manipulated the renminbi in the past, but direct interventions by the People's Bank of China have been limited in recent years. While the latest depreciation of the renminbi vis-à-vis the dollar helps China's exports, and thus widens the country's trade surplus with the US, the real driver is the strength of the US dollar as a result of President Trump's fiscal and trade policies.

In short, the issue of currencies has now become another front in the US–China trade war. But the currency feud is more a sideshow reflecting the reality that the trade war has economic consequences. Nonetheless, China's lack of currency transparency requires further scrutiny.

Market-distorting forces and overcapacity in the steel sector

The Trump administration has repeatedly criticized China for flooding global markets with cheap steel and aluminium. To tackle this trend, President Trump – at the recommendation of the US Department of Commerce – introduced near-blanket tariffs of 25 per cent on steel and 10 per cent on aluminium in March 2018, citing national security reasons. The recent US tariffs on steel and aluminium have affected $2.8 billion of Chinese products (based on 2017 export values), and the retaliatory tariffs that China introduced in response, in April 2018, hit $2.4 billion of US products (based on 2017 export values).[7]

However, while the current metal tariffs are aimed at China, they have little impact on the country and primarily hit US allies.[8] While South Korea received a permanent exemption from the tariffs in May 2018 in exchange for quotas, Canada and Mexico only saw tariffs lifted in May 2019 to pave the way for ratification of the United States–Mexico–Canada Agreement. Steel and aluminium exports from the EU and Japan to the US are currently still subject to the tariffs.

The tariffs do little to address the real problem of China's market-distorting practices and policies such as subsidies and state-owned enterprises that fuel severe excess capacity in the steel sector.

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[4] US Department of the Treasury, Office of International Affairs (2019), *Report to Congress: Macroeconomic and Foreign Exchange Policies of Major Trading Partners of the United States*, 28 May 2019, https://home.treasury.gov/system/files/206/2019-05-28-May-2019-FX-Report.pdf (accessed 29 May 2019).

[5] Horsley, S. (2019), 'U.S.-China Trade War Spreads From Tariffs To A Battle Over Currencies', NPR, 6 August 2019, https://www.npr.org/2019/08/06/748775639/u-s-china-trade-war-spreads-from-tariffs-to-a-battle-over-currencies (accessed 29 Aug. 2019).

[6] US Department of the Treasury (2019), 'Treasury Designates China a Currency Manipulator', 5 August 2019, https://home.treasury.gov/news/press-releases/sm751 (accessed 29 Aug. 2019).

[7] Lu, Z. and Schott, J. (2018), 'How Is China Retaliating for US National Security Tariffs on Steel and Aluminum?', Peterson Institute for International Economics, 9 April 2018, https://piie.com/research/piie-charts/how-china-retaliating-us-national-security-tariffs-steel-and-aluminum (accessed 8 Mar. 2019).

[8] US steel imports come primarily from Canada, Brazil and South Korea – whereas China is not among the top 10 supplier countries (mostly because of the prior imposition of US antidumping and countervailing duties). See US Department of Commerce, Bureau of Industry and Security (2018), *The Effect of Imports of Steel on the National Security*, Washington, DC: US Department of Commerce, https://www.commerce.gov/sites/default/files/the_effect_of_imports_of_steel_on_the_national_security_-_with_redactions_-_20180111.pdf (accessed 8 Mar. 2019).

Practices regarding technology transfer, intellectual property and innovation

China's policies and practices related to technology transfer, IP and innovation are at the heart of the ongoing tariff escalation, which overshadowed the US and Chinese – and indeed global – economies in 2018 and 2019. Following a Section 301 investigation and report by the Office of the US Trade Representative,[9] the US subsequently imposed tariffs on approximately $250 billion of Chinese imports over the course of three rounds in 2018. China retaliated by increasing tariffs on $110 billion worth of imports from the US. In June 2019, the Trump administration raised tariffs from 10 per cent to 25 per cent on $200 billion of imports from China that were previously targeted; and China in retaliation raised the tariff rate on $60 billion of imports from the US that it had previously targeted.[10] In August 2019, the tit-for-tat tariff trade dispute escalated further – with both sides announcing more tariffs.[11] The Trump administration is also preparing to raise duties on an additional $300 billion worth of goods, which would cover all remaining imports from China.[12] The US and China are pursuing dispute settlements at the World Trade Organization (WTO) over those tariff measures imposed.

The US has raised four primary concerns regarding China's practices and policies – most prominently laid out in the Section 301 report:[13]

a) Foreign ownership restrictions

China's restrictions on foreign ownership, such as joint-venture stipulations and foreign equity limitations, are seen by the US as requiring – or at least pressuring – technology transfer from American to Chinese companies.

b) Regime of technology regulations

The US alleges that American companies that seek to license technologies often are forced to do so on terms that favour the Chinese recipient.

c) Cybertheft

According to the US Trade Representative, cyber intrusions into, and theft from, computer networks of US companies provide the Chinese government with unauthorized access to US trade secrets and sensitive commercial information.

d) Outbound investment

China's strategic investment in and acquisitions of US companies and assets in order to obtain cutting-edge technologies and IP is viewed with great concern in the US.

[9] Office of the United States Trade Representative (2018), *Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974*, 22 March 2018, https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF (accessed 8 Mar. 2019).
[10] Bown, C. and Kolb, M. (2019), 'Trump's Trade War Timeline: An Up-to-Date Guide', The Peterson Institute for International Economics, https://piie.com/blogs/trade-investment-policy-watch/trump-trade-war-china-date-guide (accessed 29 May 2019).
[11] Ibid.
[12] Reuters (2019), 'Factbox: Tariff wars – duties imposed by Trump and U.S. trading partners', 13 May 2019, https://www.reuters.com/article/us-usa-trade-tariffs-factbox/factbox-tariff-wars-duties-imposed-by-trump-and-us-trading-partners-idUSKCN1SJ1ZJ (accessed 29 May 2019).
[13] Office of the United States Trade Representative (2018), *Update Concerning China's Acts, Policies and Practices Related to Technology Transfer, Intellectual Property, and Innovation*, 20 November 2018, https://ustr.gov/sites/default/files/enforcement/301Investigations/301%20Report%20Update.pdf (accessed 8 Mar. 2019).

The current US administration believes that these four categories of policies and practices undermine the value of US investments and technology, and thus weaken US firms' global and long-term competitiveness.[14] The administration also contends that the Chinese government seeks to obtain cutting-edge US technologies and IP in order to advance its industrial policy goals.

While lawmakers – including leading Republicans in Congress – and American businesses agree with the concerns that the current administration has raised, they largely think that tariffs are not the best approach to address China's trade and technology policies and practices.[15] Instead, they believe that the US tariffs are counterproductive because they are effectively a tax on US businesses and consumers. Nonetheless, it should be acknowledged that President Trump's pressure tactics have proven effective in terms of getting the Chinese to the negotiating table.

While lawmakers and American businesses agree with the concerns that the current administration has raised, they largely think that tariffs are not the best approach to address China's trade and technology policies and practices.

China is adamant that it is taking steps to address these concerns, for instance by abiding to the terms of a 2015 agreement between US President Obama and Chinese President Xi Jinping that 'neither country's government will conduct or knowingly support cyber-enabled theft of intellectual property'.[16]

The tech race and strategic competition – issues and US actions

Many of the US–China tensions in the area of technology transfer, IP and innovation arise because of American concerns over China's ambition to become a global leader in a wide range of technologies. In particular, the industrial policy 'Made in China 2025' – which is aimed at expanding the high-tech sector in such fields as aerospace, robotics, and information and communications technology – is seen as a threat to US technological leadership. The Trump administration has described such Chinese policies as 'economic aggression'.[17]

Another reason for the Trump administration's increasingly confrontational approach to China is that many of the next generation technologies have both civilian and military applications. Thus, US apprehensions go beyond purely commercial issues.

In order to address concerns of Chinese outbound investment, the US has taken steps in recent years involving the Committee on Foreign Investment in the United States (CFIUS). This interagency committee reviews certain transactions involving foreign investment in the US that raise potential national security concerns.

[14] Ibid.
[15] See, for example, US Chamber of Commerce (2018), 'U.S. Chamber's Donohue Statement on New Tariffs against China', 15 June 2018, https://www.uschamber.com/press-release/us-chamber-s-donohue-statement-new-tariffs-against-china (accessed 8 Mar. 2019); Johnson, K. (2018), 'Trump's Trade Wars Prompt Congressional Pushback', 19 June 2018, Foreign Policy, https://foreignpolicy.com/2018/06/19/trumps-trade-wars-prompt-congressional-pushback/ (accessed 8 Mar. 2019).
[16] The White House – Office of the Press Secretary (2015), 'Fact Sheet: President Xi Jinping's State Visit to the United States', 25 September 2015, https://obamawhitehouse.archives.gov/the-press-office/2015/09/25/fact-sheet-president-xi-jinpings-state-visit-united-states (accessed 8 Mar. 2019).
[17] White House Office of Trade and Manufacturing Policy (2018), *How China's Economic Aggression Threatens the Technologies and Intellectual Property of the United States and the World*, June 2018, https://www.whitehouse.gov/wp-content/uploads/2018/06/FINAL-China-Technology-Report-6.18.18-PDF.pdf (accessed 8 Mar. 2019).

For instance, based on the recommendation by CFIUS in 2017, President Trump prevented a Chinese purchaser with alleged links to the Chinese government from acquiring the US firm Lattice Semiconductor.[18] In 2018, President Trump blocked Singapore-based Broadcom Limited from purchasing the US chipmaker Qualcomm in a hostile takeover, citing CFIUS concerns that the acquisition would weaken Qualcomm's technological leadership and give an edge to Chinese competitors.[19]

Moreover, President Trump signed the Foreign Investment Risk Review Modernization Act of 2018 (FIRRMA) into law, which expands the jurisdiction of CFIUS. Although this recent legislation did not mention China directly as a target of the measures, it was driven by concerns over the risks to US technological leadership stemming from foreign investment by primarily Chinese firms in American high-tech companies.[20] One of FIRRMA's objectives is to allow for greater scrutiny of 'transactions that involve a country of special concern that has a demonstrated or declared strategic goal of acquiring a type of critical technology or critical infrastructure that would affect United States leadership in areas related to national security'.[21] Without express reference, this nonetheless signals China is a focus of concern.

In May 2018, President Trump intervened to overturn a ban imposed by the US Department of Commerce that barred the Chinese telecommunications giant ZTE from buying American technology for seven years.[22] This came after ZTE was found not to abide by the rules of a previous settlement agreement over violations of US sanctions on Iran and North Korea.

In the case of Huawei, another Chinese multinational technology company, the US Department of Justice filed a number of criminal charges against the company and its chief financial officer in January 2019, including for the alleged evasion of sanctions on Iran and the alleged theft of robotic technology.[23] Moreover, the Trump administration has asked US allies – including Germany, Italy, and Japan – not to use the company's 5G network equipment, citing espionage concerns.[24] In May 2019, President Trump declared a national emergency and signed an Executive Order that prohibits US companies from using any information and communications technology and services from 'foreign adversaries' that are considered to pose 'an unacceptable risk to the national security of the United States'.[25] Though the Executive Order does not name any company, it has been widely seen as targeting

[18] US Department of the Treasury (2017), 'Statement On The President's Decision Regarding Lattice Semiconductor Corporation', 13 September 2017, https://www.treasury.gov/press-center/press-releases/Pages/sm0157.aspx (accessed 8 Mar. 2019).
[19] See US Department of the Treasury (2018), 'Statement by Secretary Mnuchin on the President's Decision Regarding Broadcom's Takeover Attempt of Qualcomm', 12 March 2018, https://home.treasury.gov/news/press-releases/sm0309 (accessed 8 Mar. 2019); Rappeport, A. and Kang, C. (2018), 'U.S. Calls Broadcom's Bid for Qualcomm a National Security Risk', *New York Times*, 6 March 2018, https://www.nytimes.com/2018/03/06/business/qualcomm-broadcom-cfius.html (accessed 8 Mar. 2019).
[20] Jackson, J. and Cimino-Isaacs, C. (2018), 'CFIUS Reform: Foreign Investment National Security Reviews, Congressional Research Service', https://fas.org/sgp/crs/natsec/IF10952.pdf (accessed 8 Mar. 2019).
[21] Foreign Investment Risk Review Modernization Act (FIRRMA) of 2018 (Title XVII, P.L. 115-232).
[22] Ballentine, C. (2018), 'U.S. Lifts Ban That Kept ZTE From Doing Business With American Suppliers', *New York Times*, 13 July 2018, https://www.nytimes.com/2018/07/13/business/zte-ban-trump.html (accessed 8 Mar. 2019); US Department of Commerce (2018), 'Commerce Department Lifts Ban After ZTE Deposits Final Tranche of $1.4 Billion Penalty', 13 July 2018, https://www.commerce.gov/news/press-releases/2018/07/commerce-department-lifts-ban-after-zte-deposits-final-tranche-14 (accessed 8 Mar. 2019).
[23] US Department of Justice – Office of Public Affairs (2019), 'Chinese Telecommunications Conglomerate Huawei and Huawei CFO Wanzhou Meng Charged With Financial Fraud', 28 January 2019, https://www.justice.gov/opa/pr/chinese-telecommunications-conglomerate-huawei-and-huawei-cfo-wanzhou-meng-charged-financial (accessed 8 Mar. 2019); US Department of Justice – Office of Public Affairs (2019), 'Chinese Telecommunications Device Manufacturer and its U.S. Affiliate Indicted for Theft of Trade Secrets, Wire Fraud, and Obstruction Of Justice', 28 January 2019, https://www.justice.gov/opa/pr/chinese-telecommunications-device-manufacturer-and-its-us-affiliate-indicted-theft-trade (accessed 8 Mar. 2019).
[24] Woo, S. and O'Keeffe, K. (2018), 'Washington Asks Allies to Drop Huawei', *Wall Street Journal*, 23 November 2018, https://www.wsj.com/articles/washington-asks-allies-to-drop-huawei-1542965105?tesla=y (accessed 8 Mar. 2019).
[25] The White House (2019), 'Executive Order on Securing the Information and Communications Technology and Services Supply Chain', 15 May 2019, https://www.whitehouse.gov/presidential-actions/executive-order-securing-information-communications-technology-services-supply-chain/ (accessed 29 May 2019).

Huawei.[26] At the same time, the US Department of Commerce put Huawei and its affiliates on the so-called 'Entity List' – which forbids US individuals and companies from exporting goods, technology or services to the listed entities without a licence from the US government.[27] Despite the recent crackdown, the Commerce Department has extended a temporary reprieve for US companies to do business with Huawei.[28] President Trump has also raised the possibility of easing restrictions on Huawei as a bargaining chip in ongoing US–China trade talks.[29]

President Trump's willingness to use Huawei as leverage in the trade talks with China has blurred the lines between US legal processes, the US–China trade war, and the quest for technological leadership. Nonetheless, the export blacklisting of Huawei shows that the US's aim is not simply about reducing the trade deficit, but about decoupling from China.

The concerns of the Trump administration make reaching an agreement between the US and China difficult, particularly regarding strategic and long-term considerations related to tech supremacy.

President Trump's willingness to use Huawei as leverage in the trade talks with China has blurred the lines between US legal processes, the US–China trade war, and the quest for technological leadership.

To complicate matters, infighting between two broad factions on Trump's trade team makes any progress with China even more difficult. On the one side are National Economic Council Director Larry Kudlow and Secretary of the Treasury Steven Mnuchin. They are (seen in relative terms) the voices most in favour of free trade – even though both have shifted away from their internationalist outlook held prior to joining the Trump administration.[30] In order to calm financial markets, Mnuchin has reportedly been a proponent of easing up on tariffs on China.[31] Most importantly, the individuals in this camp want to stop China's unfair trade practices and policies – in particular the theft of IP and forced technology transfers.

On the other side are President Trump's trade adviser Peter Navarro and US trade representative Robert Lighthizer, and – to some extent – the Secretary of the Commerce Department Wilbur Ross. Though Lighthizer is focused on structural changes and enforcement when it comes to trade with China, he is also interested in managing and enforcing the rules of the global trading system more broadly. Navarro (who currently is assistant to the president and director of the Office of Trade and Manufacturing Policy) is best known for his book *Death by China* and is particularly hawkish on China. He believes that it is in the US's long-term interest to 'decouple' from China.[32] According

[26] Stewart, E. (2019), 'The US government's battle with Chinese telecom giant Huawei, explained', Vox, 21 May 2019, https://www.vox.com/technology/2018/12/11/18134440/huawei-executive-order-entity-list-china-trump (accessed 29 May 2019).
[27] US Office of the Federal Register (2019), Addition of Entities to the Entity List, 16 May 2019, https://www.federalregister.gov/documents/2019/05/21/2019-10616/addition-of-entities-to-the-entity-list (accessed 29 May 2019).
[28] Sonmez, F. (2019), 'Commerce Department will extend Huawei reprieve, Ross says', *Washington Post*, 19 August 2019, https://www.washingtonpost.com/politics/commerce-department-will-extend-huawei-reprieve-ross-says/2019/08/19/82a11436-c275-11e9-9986-1fb3e4397be4_story.html (accessed 29 Aug. 2019).
[29] Pham, S. and Phillip, A. (2019), 'Trump suggests using Huawei as a bargaining chip in US-China trade deal', CNN, 24 May 2019, https://edition.cnn.com/2019/05/24/tech/donald-trump-huawei-ban/index.html (accessed 29 May 2019).
[30] Schneider-Petsinger, M. (2019), *US–EU Trade Relations in the Trump Era: Which Way Forward?,* Research Paper, London: Royal Institute of International Affairs, https://www.chathamhouse.org/sites/default/files/publications/research/2019-03-08US-EUTradeRelations2.pdf (accessed 8 Mar. 2019).
[31] Davis, B. and Wei, L. (2019), 'U.S. Debates Lifting China Tariffs to Hasten Trade Deal, Calm Markets', *Wall Street Journal*, 17 January 2019, https://www.wsj.com/articles/u-s-weighs-lifting-china-tariffs-to-hasten-trade-deal-calm-markets-11547754006 (accessed 8 Mar. 2019).
[32] Without directly referring to it as 'decoupling', Peter Navarro laid out his vision of 'Economic Security as National Security' in a recent speech. Center for Strategic and International Studies (2018), 'Economic Security as National Security: A Discussion with Dr. Peter Navarro', 13 November 2018, https://www.csis.org/analysis/economic-security-national-security-discussion-dr-peter-navarro (accessed 8 Mar. 2019).

to this line of thought, ceasing trade, capital and technology flows with China would make US IP and technology less vulnerable to theft and forced transfer. This, in turn, is thought to help limit China's challenge to the US's global technological leadership. However, as explored in the next section, the consequences of decoupling would be severe.

Due to this perceived long-term strategic rivalry between the US and China, the Trump administration designated China a 'strategic competitor' and 'revisionist power' in the 2017 National Security Strategy.[33]

Solutions from the US perspective

Many of the Trump administration's concerns regarding China reflect long-standing worries that are widely shared by both political parties and business groups. Thus, even future administrations are likely to pursue similar objectives and push for a hard line on China.

Avoid self-inflicted wounds

Many of the recent actions by the Trump administration have caused self-inflicted damage to the US economy and the country's technological leadership.

The imposition of tariffs comes with costs to the US economy – US tariffs raise the price of inputs for its own firms (making their products costlier and thus less competitive internationally) and prices for American consumers. China's retaliatory tariffs (particularly targeted at US agricultural goods) hurt the competitiveness of US products in China.

The US's withdrawal from the Trans-Pacific Partnership (TPP) under President Trump also left a self-inflicted wound. The agreement was an opportunity for the US to strengthen its influence on setting the rules relevant for 21st century trade – and to address issues presented by China's policies and practices that currently are not dealt with under WTO rules.

In particular, TPP would have included new rules in areas such as state-owned enterprises, IP and digital trade. Most of those rules now live on in the trade deal's reconstituted successor that does not include the US – the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). Because the CPTPP could play an important role in addressing concerns raised by China's practices and policies, the US should reconsider joining. Although this is very unlikely under the current administration, President Trump has not ruled it out entirely.[34] Should the Trump administration or its successor choose to rejoin the agreement, the US would want to address about 20 provisions (many of which its negotiators pushed in the original TPP) that have been suspended under CPTPP. While reinstating the suspended provisions is technically possible, it would be hard to get all CPTPP members to agree to the reinstatement and even more difficult for the US to extract further concessions.

[33] The White House (2017), *National Security Strategy of the United States*, December 2017, https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf (accessed 8 Mar. 2019).
[34] Trump, D. (@realDonaldTrump) (2018), 'Would only join TPP if the deal were substantially better than the deal offered to Pres. Obama. We already have BILATERAL deals with six of the eleven nations in TPP, and are working to make a deal with the biggest of those nations, Japan, who has hit us hard on trade for years!', tweet, 12 April 2018, https://twitter.com/realdonaldtrump/status/984631073865953280?lang=en (accessed 8 Mar. 2019).

Decoupling from China's economy would amount to the US inflicting economic self-harm. The US technology sector is deeply intertwined with China's. A fencing off would have adverse consequences for the innovation and competitiveness of US firms and raise costs for American consumers.[35] Thus, a balance must be struck between protecting important US technology sectors for national security reasons, protecting FDI in the US, and protecting US innovation.

Focus on own competitiveness

China's technological rise cannot be attributed solely to 'unfair practices'. It is also a result of China's market size and large amounts of private and public venture capital. Against this background, the US should invest more in those areas that underpin its own innovative strength. For instance, it should advance efforts to strengthen its education system and boost STEM learning, promote research and development in future industries, invest in infrastructure, reform the immigration rules and processes to make it easier for entrepreneurs and innovators to come to the US, and develop policies that will retain and attract new investment. But one hurdle will be to find consensus and provide the necessary funding for these initiatives at a time of partisan politics.

Washington should also move forward with regulatory reform to promote 5G deployments.[36] To accelerate progress on artificial intelligence (AI), dedicated resources are needed for research and development and to promote collaboration between academia, industry and government labs. In this regard, it is noteworthy that President Trump signed an Executive Order launching an American AI Initiative – arguing that continued leadership in AI is critical for maintaining the economic and national security of the US.[37] This Executive Order from February 2018 came almost one year after China unveiled plans to become a world leader in AI by the year 2030.[38]

Finding middle ground with China

The US and China should identify solutions that allow both sides to claim victory and save face. In the short term, part of the solution could include persuading China to lower its trade barriers and open the Chinese market to majority-owned foreign investment. In order to advance the latter goal, the Trump administration could renew efforts for a US–China bilateral investment treaty, which has been under negotiation since 2008.[39]

But this additional opening of China's market (for instance in the finance, energy and agricultural sectors) cannot stand alone. It should be combined with increased efforts by China to enforce the protection of IP and technology. China has in the past vowed to do better under various memorandums of understanding (MoUs), but not always complied.[40] In recent months, China has reportedly made

[35] Laskai, L. and Sacks, S. (2018), 'The Right Way to Protect America's Innovation Advantage', Foreign Affairs, 23 October 2018, https://www.foreignaffairs.com/articles/2018-10-23/right-way-protect-americas-innovation-advantage (accessed 8 Mar. 2019).
[36] Federal Communications Commission (n.d.), 'The FCC's 5G FAST Plan', https://www.fcc.gov/5G (accessed 8 Mar. 2019).
[37] The White House (2019), 'Executive Order on Maintaining American Leadership in Artificial Intelligence', 11 February 2019, https://www.whitehouse.gov/presidential-actions/executive-order-maintaining-american-leadership-artificial-intelligence/ (accessed 8 Mar. 2019).
[38] Metz, C. (2018), 'As China Marches Forward on A.I., the White House Is Silent', *New York Times*, 12 February 2018, https://www.nytimes.com/2018/02/12/technology/china-trump-artificial-intelligence.html?module=inline (accessed 8 Mar. 2019).
[39] Lawrence, R. (2018), 'US-China Trade Frictions and the Global Trading System', in Jiming, H. and Posen, A. (eds) (2018), *US-China Economic Relations: From Conflict to Solutions – Part 1*, PIIE Briefing 18-1, https://piie.com/system/files/documents/piieb18-1.pdf (accessed 8 Mar. 2019).
[40] See, for instance, the MoUs from 1992 and 1995 concerning intellectual property rights, which China has failed to implement. Rogin, J. (2019), 'Trump is headed for a bad trade deal that China won't honor', *Washington Post*, 27 February 2019, https://www.washingtonpost.com/opinions/2019/02/27/trump-is-headed-bad-trade-deal-that-china-wont-honor/?noredirect=on&utm_term=.1d0bd5dda5dd (accessed 8 Mar. 2019).

proposals that would go further than past offers, including on forced technology transfer, but then allegedly backtracked.[41] Going forward, the key will be to agree a deal that is binding, verifiable and enforceable.

Beijing is very unlikely to give up on its 'Made in China 2025' strategy as it is at the heart of its industrial development agenda. Hence, the US should not ask China to part with this strategy, but demand that China open up the sectors central to the 'Made in China 2025' policy to increased foreign participation.[42] Reports that China is rewriting its strategy to allow for more international competition are a positive step,[43] but it remains to be seen whether real change will follow.

> The US should also be willing to offer some concessions so that Chinese negotiators, with their strong sense of national dignity, can claim a more balanced deal.

The fact that Beijing is willing to (at least notionally) consider structural reforms can be presented as a win-win for both the US and China. They should not be framed by the Trump administration as a concession by the Chinese to US pressure, but as actions in line with years of official rhetoric from Chinese officials about domestic reform and opening up.[44] At the same time, the US should also be willing to offer some concessions so that Chinese negotiators, with their strong sense of national dignity, can claim a more balanced deal. In this regard, the Trump administration is reportedly considering agreeing to a Chinese proposal, which would reduce the data protection for certain US pharmaceutical products – though this move would be opposed by US industry.[45]

Work with like-minded partners

Many of the Trump administration's concerns regarding China's policies and practices related to technology transfer, IP and innovation are shared by other countries. To some extent, the Trump administration has recognized this: the US has issued a number of joint statements with the EU and Japan since 2017 to tackle 'unfair market distorting and protectionist practices' by China (though without naming the country directly).[46] But while there are many areas of shared concern, the trilateral meetings have not yet produced a set of common solutions to tackle China's unfair trade practices.

International cooperation regarding China's behaviour is fragile. The EU and Japan (and other trading partners) oppose Trump's use of unilateral tariffs as a negotiating tactic to force Beijing to change its practices as they are at risk of becoming collateral damage in the US–China 'trade war' and have great concerns about the implications of the US's actions for the rules-based international trading order. The economic and political fallout resulting from President Trump's pursuit of trade wars on multiple

[41] Lawder, D., Mason, J. and Martina, M. (2019), 'Exclusive: China backtracked on almost all aspects of U.S. trade deal – sources', Reuters, 8 May 2019, https://in.reuters.com/article/us-usa-trade-china-backtracking-exclusiv/exclusive-china-backtracked-on-nearly-all-aspects-of-u-s-trade-deal-sources-idINKCN1SE0WJ (accessed 29 May 2019).
[42] Lawrence (2018), 'US-China Trade Frictions and the Global Trading System'.
[43] Wei, L. and Davis, B. (2018), 'China Prepares Policy to Increase Access for Foreign Companies', *Wall Street Journal*, 12 December 2018, https://www.wsj.com/articles/china-is-preparing-to-increase-access-for-foreign-companies-11544622331?mod=hp_lead_pos4 (accessed 8 Mar. 2019).
[44] Williams, R. (2019), 'Is Huawei a Pawn in the Trade War?', Foreign Affairs, 30 January 2019, https://www.foreignaffairs.com/articles/china/2019-01-30/huawei-pawn-trade-war (accessed 8 Mar. 2019).
[45] Leonard, J. (2019), 'U.S. Considers Concessions on Drug Protections in China Talks, Sources Say', Bloomberg, 25 April 2019, https://www.bloomberg.com/news/articles/2019-04-25/u-s-said-to-mull-concessions-on-drug-protections-in-china-talks (accessed 29 May 2019).
[46] Office of the United States Trade Representative (2017), 'Joint Statement by the United States, European Union and Japan at MC11', 12 December 2017, https://ustr.gov/about-us/policy-offices/press-office/press-releases/2017/december/joint-statement-united-states (accessed 8 Mar. 2019).

fronts – with the current US unilateral metal tariffs hitting US allies and the threat of car tariffs still looming – risks undermining the willingness of international leaders to work together with the current US administration regarding China.

Another area where increased international cooperation would be useful concerns foreign investment screening. For the implementation of FIRRMA to be effective, allied countries should exchange information with the US, coordinate action and adopt similar investment screening provisions for national security risks – otherwise the recent US reforms will hurt US competitiveness.[47] Notably, a new framework for screening FDI in the EU entered into force in April 2019, building on national review mechanisms in some member states.[48]

Strengthen international trading system

As part of a strategy that aims at getting China to adhere to a rules-based international trading system, the architecture and rules of the system need to be updated in the first place.

The WTO is currently not fit for purpose to deal with the challenges posed by China's economic system and its policies and practices. New rules are needed to keep up with technological advancements – including in such areas as digital trade and e-commerce. But the current crisis at the WTO make achieving reform more difficult. The Trump administration's actions (in particular the blocking of appointments to the WTO's Appellate Body) threaten the functionality of the institution that is at the heart of the international trading system.

The WTO is currently not fit for purpose to deal with the challenges posed by China's economic system and its policies and practices. New rules are needed to keep up with technological advancements.

In order to bring about reform, the trilateral cooperation between the US, EU and Japan should be strengthened. The three parties are among China's most important trading partners, and hence joint efforts could put necessary pressure on Beijing to change its policies and practices. The trilateral cooperation could be the basis for a 'big, bold, comprehensive case at the WTO filed by a broad coalition of countries that share the United States' substantive concerns about China'.[49]

At the centre of this case should be China's technology transfer and IP policies and practices. A specific ruling – but also a broader discussion about how to reform the WTO rules – has the potential to restore confidence in the organization and its ability to update the rules of the international trading system.[50]

But despite the benefits of this approach, the odds for launching a case against China in which the EU, Japan and others would join the US as co-complainants are slim because it would require a US approach that emphasizes cooperating with allies on trade matters instead of alienating them.

[47] Meltzer, J. and Shenai, N. (2019), 'The US-China economic relationship: A comprehensive approach', The Brookings Institution and American Enterprise Institute, Policy Brief, February 2019, https://www.brookings.edu/wp-content/uploads/2019/02/us_china_economic_relationship.pdf (accessed 8 Mar. 2019).
[48] European Commission (2019), 'EU foreign investment screening regulation enters into force', 10 April 2019, http://europa.eu/rapid/press-release_IP-19-2088_en.htm (accessed 29 May 2019).
[49] Hillman, J. (2018), 'Testimony before the U.S.-China Economic and Review Security Commission', 8 June 2018, https://www.uscc.gov/sites/default/files/Hillman%20Testimony%20US%20China%20Comm%20w%20Appendix%20A.pdf (accessed 8 Mar. 2019).
[50] Ibid.

Conclusion

The headlines regarding the US–China trade war have focused on the tit-for-tat tariffs and President Trump's fixation with the US trade deficit. But the so-called trade war between the world's two economic superpowers is not really a fight about trade – in fact, the primary source of the current commercial tensions between the US and China is technology competition.

The US and other countries have legitimate concerns about China's IP and technology practices. The development of new transformative technologies such as 5G and AI will remain a critical source of tension between the US and China. But as the relationship is simultaneously based on competition and interdependence, the US and China should seek a compromise in order to move forward. Instead of a temporary resolution to the current trade conflict that only masks the underlying structural issues, the US–China relationship should be set on firmer foundations. Otherwise, a prolonged period of confrontation would likely lead to decreased trade and investment in the US and China – a lose-lose result for both sides and indeed the rest of the world.

3. The Implication of Global Technological Innovation on US–China Strategic Competition

Jue Wang

China's high-technology sector (HTS) is increasingly integrated in the global economy. With the exception of technologies that have a military and intelligence application, which are generally off limits to foreign investment and partnership, the globalization of technological innovation is set to continue. A wide range of actors, including private and public companies, governments, universities and research institutes have played a significant role in the innovation of these technologies.

For late entrants in the HTS, such as China, the global technology market is vital as it enables the Chinese government and companies to buy advanced technologies that cannot be developed and produced at home. It also helps domestic developers advance their skills and techniques in technological innovation to meet international standards. Chinese actors have taken pro-active measures to engage in the globalization of technological innovation, including:

1. Exports and imports of high-tech goods and services;
2. Cross-border investments in technology companies and research and development (R&D) activities;
3. Cross-border R&D collaboration; and
4. International techno-scientific research collaboration.[51]

Each of these actions has generated technology gains for Chinese actors. China is now home to several world-leading tech conglomerates and is the largest global high-tech products exporter. Nevertheless, certain features and practices of China's outward technology expansion have caused controversy, which has been exacerbated by the ongoing US–China trade war.

This chapter examines China's four pro-active measures to engage in the globalization of technological innovation, assessing the pros and cons of each approach.

[51] Scholars categorize these activities in different ways, but they all include some format of cross-border R&D investment and research collaboration involving multiple state and non-state actors. Archibugi, D. and Michie, J. (1995), 'The globalization of technology: a new taxonomy', *Cambridge Journal of Economics*, 19(1), pp. 121–140; Archibugi, D. and Iammarina, S. (2002), 'The globalization of technological innovation: definition and evidence', *Review of International Political Economy*, 9(1), pp. 98–122; Kennedy, A. (2017), *The Conflicted Superpower: America's Collaboration with China and India in Global Innovation,* Columbia University Press.

Export and import of high-tech goods and services

Technological innovation is key to the international trade of high-tech goods and services. By its nature technological innovation is extremely costly, consequently developers are keen to commercialize their technology through international markets as soon as possible. There is a 'two-way' relationship between technology and international trade: domestic technology competence determines exports and international competitiveness, while international trade stimulates technological innovation.[52]

China's National Bureau of Statistics (NBS) data show that China has had a trade surplus of high-tech products since 2000.[53] And, according to the World Bank, since 2004 it has been the largest exporter of high-tech products globally.[54] As of 2017, the total value of China's high-tech exports was $654 billion, more than triple that of the second largest exporter, Germany.[55] This clear increase in China's economic competitiveness has pressured traditional high-tech leaders like Germany, the US and Japan. However, the vast majority of China's high-tech exports are only assembled in China and most of the profits in these industries go to companies in the US, Europe and developed Asian economies. Moreover, China still relies on developed economies for the most advanced high-tech products with higher values.

> The Chinese market accommodates a considerable amount of high-tech innovation products originating from developed economies (with presumably higher value); meanwhile, Chinese innovations (with comparatively lower value) are diffused to emerging and developing economies.

The number of patents registered abroad is a useful measure of an exporting economy's will to engage in foreign market technological innovations.[56] China's patent applications have grown rapidly each year and continue to rise. The number of patent applications made by Chinese innovators abroad and that of patent applications made by foreign innovators in China have both grown in the past decade to differing degrees. In 2017, overseas applications by Chinese innovators reached 59,282, while foreign innovators in China made 161,512 applications (see Table 1). Figure 1 shows that innovators from Belgium, France, Germany, Italy, Japan, Netherlands, South Korea, Switzerland, the UK and US applied for a larger number of patents in China than applications in the other direction. The opposite trend is true in countries like Brazil, India, Indonesia, Mexico, South Africa, Russia and Vietnam. This indicates that the Chinese market accommodates a considerable amount of high-tech innovation products originating from developed economies (with presumably higher value); meanwhile, Chinese innovations (with comparatively lower value) are diffused to emerging and developing economies.

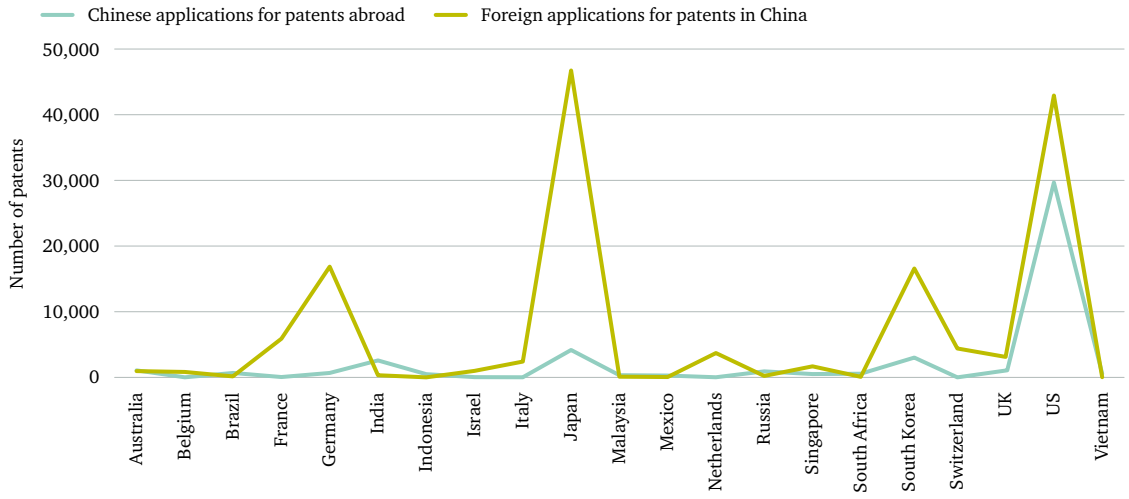
[52] Pietrobelli, C. and Samper, J. (1997), 'Measurement of Europe-Asia technology exchanges: asymmetry and distance', *Science and Public Policy*, 24(4), p. 257.
[53] The data divided total exports into manufactured goods and primary goods, and high-tech products are a part of manufactured goods. For more detail, see NBS (2018), 'Imports and exports of high-tech products, manufactured goods and primary goods', http://www.stats.gov.cn/tjsj/ndsj/2018/html/EN2020.jpg (accessed 15 Oct. 2019).
[54] Defined by the World Bank, 'high-technology exports are products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery'.
[55] World Bank data (n.d.), 'High Technology Exports', https://data.worldbank.org/indicator/TX.VAL.TECH.CD?locations=CN-JP-DE-US-SG (accessed 15 Oct. 2019).
[56] Archibugi and Iammarina (2002), 'The globalization of technological innovation: definition and evidence', p. 106.

Table 1: Number of foreign patent applications, by country (2017)

Countries	Patent application made by Chinese actors abroad	Patent application made by foreign actors in China
Australia	1,067	958
Belgium	24	828
Brazil	676	154
France	109	5,890
Germany	646	16,860
India	2,582	330
Indonesia	492	12
Israel	78	992
Italy	35	2,408
Japan	4,172	46,734
Malaysia	335	107
Mexico	281	54
Netherlands	41	3,708
Russia	917	221
Singapore	508	1,683
South Africa	558	86
South Korea	3,015	16,581
Switzerland	11	4,402
UK	1,078	3,121
US	29,674	42,922
Vietnam	535	30
World Total	**59,282**	**161,512**

Source: National Intellectual Property Administration, PRC (n.d.) *Annual Report of Patents Statistics 2017* and *Annual Report of Patents Statistics 2018*, http://www.sipo.gov.cn/tjxx/.

Figure 1: Foreign patent applications in 2017



Source: National Intellectual Property Administration, PRC (n.d.) *Annual Report of Patents Statistics 2017* and *Annual Report of Patents Statistics 2018*, http://www.sipo.gov.cn/tjxx/.

China has a total trade deficit in services, mostly in the travel industry (including tourism and transportation). However, it has a trade surplus in several service sectors that utilize advanced technologies, the largest of which is the telecommunications, computer and information (TC&I) services sector. In 2017, the total values of China's TC&I services exported and imported were $27.8 billion and $19.2 billion, respectively; most of the transactions were in the computer and information services sectors.[57]

Despite the growing trend in both exports and imports, China's own trade sectors for TC&I services are highly contentious. Many foreign tech companies have encountered strict political restrictions in China. For example, the Chinese government required foreign tech companies to submit to extensive audits and share key information; some of the largest internet service companies are banned in China, including Google, Facebook, Twitter, Instagram and YouTube.[58] Those companies that managed to enter the Chinese market often face strong competition from local companies. There are three likely reasons for such restrictions: (1) to prevent the circulation of information that threatens the Chinese government's authority and social stability; (2) to avoid foreign companies from controlling sensitive and/or crucial data on the Chinese economy and society; (3) to protect domestic companies.

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Chinese TC&I service providers have mixed experiences of overseas engagement. A rising number of Chinese tech companies have gained access to foreign markets in the past decade. China's two homegrown tech giants, Alibaba and Tencent, although still mostly relying on domestic customers, have grown their businesses in Southeast Asia, India and the Middle East, including advanced cloud computing infrastructure, financial facilities and social media platforms.[59] In addition, a few Chinese tech start-ups, including Musical.ly, Bytedance and CashCash, are actively pursuing foreign markets since the domestic one is dominated by a handful of tech giants.[60]

Chinese telecommunication infrastructure providers have been successful in Africa, however, they face rising obstacles in the West. The US government has listed Chinese telecommunication companies ZTE and Huawei as threats to US national security and imposed unilateral punishments on both. In particular, as the 'trade war' escalated, the US government banned Huawei from accessing parts of Google's Android system after placing the company on a trade blacklist, an extremely strong punishment regarded as a potential 'death sentence' for the company.[61] The US has also made huge efforts in trying to persuade its allies to exclude Huawei from their 5G development plans.

[57] Chinese National Bureau of Statistics (n.d.), '11-12 Total Value of Imports and Exports of Services by Sector', *China Statistical Yearbook 2018*, http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm (accessed 15 Oct. 2019).
[58] Alba, D. (2015), 'China's new rules for selling tech to banks have US companies spooked', *Wired Business*, 29 January 2015, https://www.wired.com/2015/01/chinas-new-rules-selling-tech-banks-us-companies-spooked/ (accessed 15 Oct. 2019).
[59] He, W. (2018), 'Domestic tech giants are venturing overseas', *China Daily*, 7 June 2018, http://www.chinadaily.com.cn/a/201806/07/WS5b18714ca31001b82571e8e0.html (accessed 15 Oct. 2019).
[60] Lucas, L. (2019), 'New wave of Chinese tech start-ups focus on overseas markets', *Financial Times*, 4 February 2019, https://www.ft.com/content/b93434d8-285b-11e9-88a4-c32129756dd8 (accessed 15 Oct. 2019); Hancock, T. (2018), 'How a Chinese tech company conquered markets overseas', *Financial Times*, 31 July 2018, https://www.ft.com/content/923eef5a-90dd-11e8-bb8f-a6a2f7bca546 (accessed 15 Oct. 2019).
[61] Villas-Boas, A. (2019), 'Huawei has been blacklisted by the US government. Here's what happened to the last Chinese tech company that got the "death penalty"', Business Insider, 20 May 2019, https://www.businessinsider.com/huawei-us-ban-similar-to-zte-us-ban-2019-5 (accessed 15 Oct. 2019).

US advocacy efforts have received different responses: Japan, Australia and New Zealand have decided to ban Huawei, in contrast with the actions of the UK, Germany, France and South Korea, whereas countries like the Netherlands and Sweden are still on the fence.[62]

Cross-border investment in tech-companies and R&D activities

Firms with a long-term vision and adequate financial capacity are the main driving force of technological innovation. They invest in and perform R&D activities – including basic research, applied research and development – in order to create leading technologies.[63] In the era of globalization, firms increasingly engage in cross-border R&D activities. They invest in foreign R&D centres and seek to acquire shares of foreign companies with advanced technology. They also commit to cross-border R&D collaboration that engages various institutions, as covered in the next sub-section.

China welcomes foreign investment in R&D, because it allows Chinese workers and companies to access advanced foreign technology and grow into an integral part of the global technological innovation network. The establishment of foreign-run R&D centres in China has received support from the Chinese government, and in return, overseas enterprises gain access to the Chinese market.

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Despite the central Chinese government's endorsement[64] and a number of successful cases,[65] foreign investment in R&D has been hindered by issues such as inadequate IP protection in China and domestic suspicions of foreign companies engaging in cyber espionage.[66] In addition, western companies often complain about the Chinese government forcing them to transfer technology to their Chinese partners as a condition for a business licence. This is also one of the main issues fuelling the US–China trade war. The frequent complaints eventually led Chinese lawmakers to pass a new Foreign Investment Law that bans mandatory technology transfer,[67] but it does not apply to the deals signed before the new law comes into force. Moreover, the new law only prohibits forced technology transfer being imposed by 'administrative bodies', which leaves non-administrative bodies, such as companies, enough leeway to compel technology transfer.[68]

[62] Neate, R. (2019), 'How other countries are responding to Trump's Huawei threat', *Guardian*, 16 May 2019, https://www.theguardian.com/business/2019/may/16/how-other-countries-are-responding-to-trump-huawei-threat (accessed 15 Oct. 2019).
[63] National Science Foundation (2012), *Science and Engineering Indicators 2012,* Chapter 4, Arlington, VA: National Science Foundation.
[64] The '13th Five-Year National Plan for the Development of Strategic Emerging Industries' explicitly endorsed foreign direct investment in R&D.
[65] For example, Microsoft's research centre in Beijing, GE's China Technological Centre in Shanghai, and Intel's China Research Centre, Sony China Research Lab and Toshiba China R&D Centre.
[66] Ren, D. (2018), 'Why American companies refuse to make China their main innovation hub', *South China Morning Post*, https://www.scmp.com/business/companies/article/2142473/why-american-companies-refuse-make-china-their-main-innovation (accessed 15 Oct. 2019); Miller, M. (2013), 'Spy scandal weighs on U.S. tech firms in China, Cisco takes hit', *Reuters*, https://www.reuters.com/article/us-china-cisco-idUSBRE9AD0J420131114 (accessed 15 Oct. 2019); Kennedy, A. (2017), *The Conflicted Superpower: America's Collaboration with China and India in Global Innovation,* Columbia University Press.
[67] National Development and Reform Commission (2019), *'Foreign Investment Law of the People's Republic of China',* http://wzs.ndrc.gov.cn/zcfg/201903/t20190329_931972.html (accessed 15 Oct. 2019).
[68] Issaku, H. (2019), 'China bans forced tech transfer in proposed investment bill: Narrow focus on "administrative organs" leaves loopholes', Nikkei Asian Review, 9 March 2019, https://asia.nikkei.com/Politics/China-People-s-Congress/China-bans-forced-tech-transfer-in-proposed-investment-bill (accessed 15 Oct. 2019).

Foreign R&D activities are a small proportion of the R&D that takes place in China, and tend to be more costly than those funded domestically. Table 2 indicates the expenditure on R&D, the number of invention patent applications, and the number of invention patent applications per RMB 1 billion spent on R&D, by enterprises in China under different ownership: domestic; Hong Kong, Macao and Taiwan (HKMT); and foreign, between 2009 and 2017.

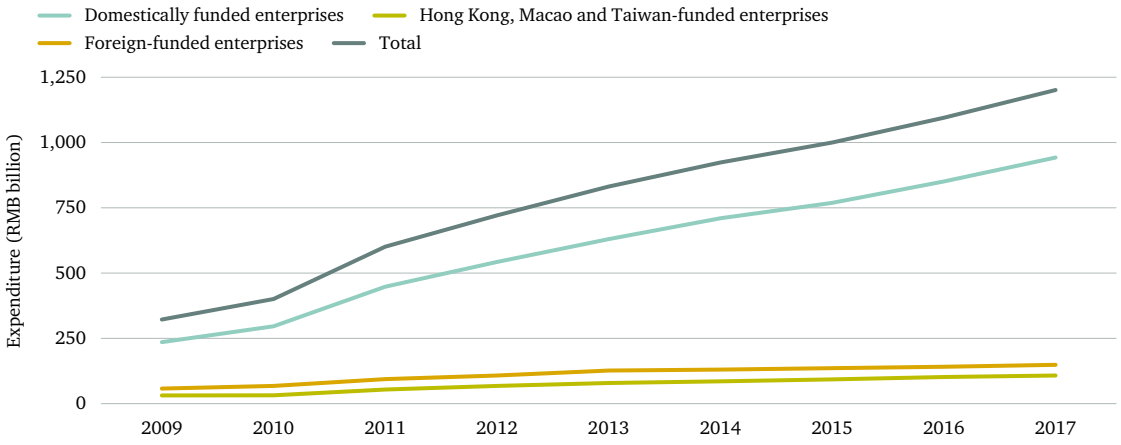
Figure 2 shows that the expenditure of Chinese enterprises on R&D has increased faster than that of both HKMT and foreign firms, which underpins the dominant role of domestic R&D in China. Figure 3 demonstrates the dominance of domestic enterprises in invention patent applications in China, whereas the number of applications made by foreign enterprises has declined recently. In addition, as shown in Figure 4, it costs HKMT and foreign enterprises more to generate an invention patent application compared to their domestic opponents; and such costs have increased further recently. It could be because the patents created by foreign R&D have higher values. Overall, the space for foreign R&D in China is relatively limited.

Table 2: Enterprises' expenditure on R&D and invention patent applications in China (2009–17)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Expenditure on R&D (RMB billion)									
Domestically funded enterprises	234.5	296.7	449.7	543.7	630.3	710.4	771.2	852.5	942.3
Hong Kong, Macao and Taiwan-funded enterprises	31.2	35.7	56	67.2	77.2	85.2	94.8	101.4	111.5
Foreign-funded enterprises	55.4	69.1	93.6	109.1	124.3	129.8	135.4	140.6	147.5
Total	**321.2**	**401.5**	**599.4**	**720.1**	**831.8**	**925.4**	**1,001.4**	**1,094.5**	**1,201.3**
Number of invention patent applications									
Domestically funded enterprises				135,421	158,978	188,392	198,262	236,768	274,490
Hong Kong, Macao and Taiwan-funded enterprises				17,426	18,124	20,661	21,507	22,581	24,272
Foreign-funded enterprises				23,320	28,044	30,872	25,919	27,638	21,864
Total				**176,167**	**205,146**	**239,925**	**245,688**	**286,987**	**320,626**
Number of invention patent applications/RMB 1 billion spent on R&D									
Domestically funded enterprises				249.1	252.2	265.2	257.1	277.7	291.3
Hong Kong, Macao and Taiwan-funded enterprises				259.3	234.8	242.5	226.9	222.7	217.7
Foreign-funded enterprises				213.7	205.4	237.8	191.4	196.6	148.2
Total				**244.6**	**246.6**	**259.3**	**245.3**	**262.2**	**266.9**

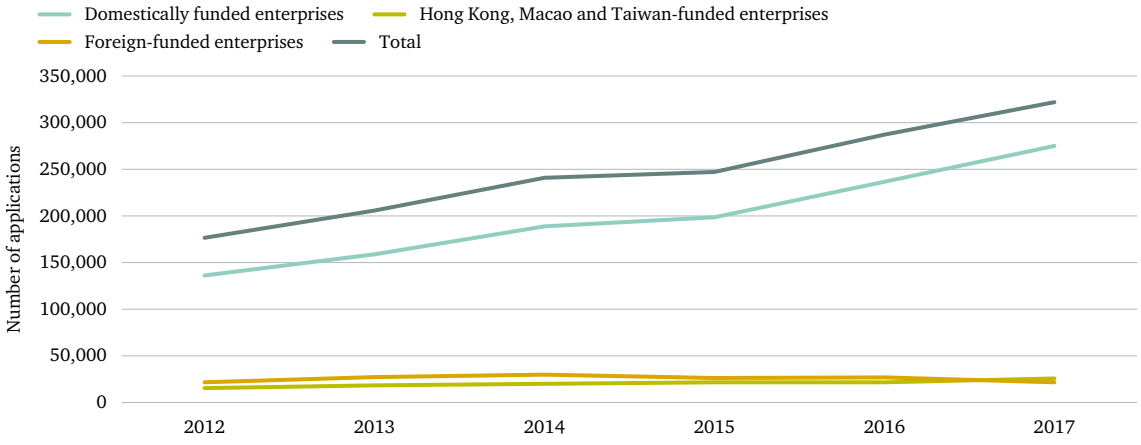
Source: NBS data on R&D activities 2010–2018, available at: http://www.stats.gov.cn/english/Statisticaldata/AnnualData/.

Figure 2: Expenditure on R&D (RMB billion) in China



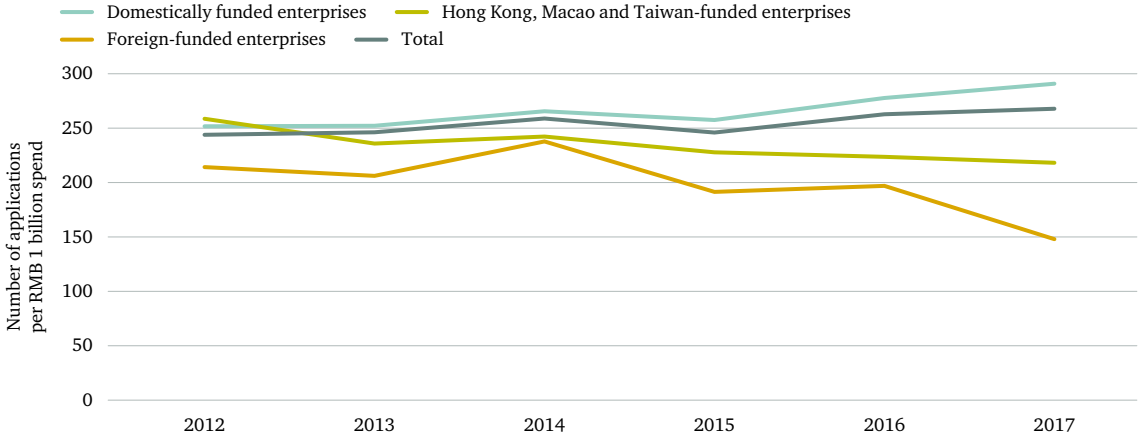
Source: NBS data on R&D activities 2010–2018, available at: http://www.stats.gov.cn/english/Statisticaldata/AnnualData/.

Figure 3: Number of invention patent applications in China



Source: NBS data on R&D activities 2010–2018, available at: http://www.stats.gov.cn/english/Statisticaldata/AnnualData/.

Figure 4: Number of invention patent applications per RMB 1 billion spent on R&D in China



Source: NBS data on R&D activities 2010–2018, available at: http://www.stats.gov.cn/english/Statisticaldata/AnnualData/.

Chinese companies also enthusiastically seek to invest in high-tech R&D abroad, aiming to benefit from more advanced financial and human capital and a more consistent business and policy environment. So far, most of the R&D investment has flown to Europe, North America and China's rich Asian neighbours, but an increasing amount is now going towards emerging and developing economies, especially those involved in Belt and Road Initiative (BRI) projects, for example, Israel, Russia, Turkey, Pakistan, Thailand and Nigeria.[69] The most popular sectors are semiconductors, AI, aerospace, pharmaceutical and biotech, telecommunications and data science.

Among the top 2,500 R&D firms worldwide, 438 are Chinese.[70] Although most of their R&D expenditure stays in China, many Chinese firms have set up R&D centres abroad. Huawei recently ranked fifth in terms of global R&D investment and has offices in Europe that boost the company's technological innovation. However, a 2012 study showed that Chinese overseas R&D investment was mainly engaged in superficial exploration of existing technologies rather than facilitating radical technological innovation.[71]

Another method of accessing technological innovation is through mergers and acquisitions (M&A), which are popular with Chinese companies. At present, there are numerous proposed deals under scrutiny by national authorities. The Chinese government is supportive of both these forms of overseas investment in the HTS. Almost all Chinese overseas M&As aiming to acquire technology have taken place in western developed economies, and the number of these deals peaked in 2016.[72] In particular, deals in the 'technology, media and telecommunication' (TMT) sector surged between 2012 and early 2018.[73]

The tide of Chinese buy-ups caused major concern among European and US politicians and business communities. They are worried that China would soon control a substantial part of their HTS, a fundamental driving force of their economies,[74] despite the investment in high-tech companies being a relatively small part of China's total overseas FDI.[75] Moreover, some Chinese companies invested in or approached western companies whose technology or complete products have both civilian and military applications or whose products are sold to other production lines with a military application.[76] These actions have made the US government particularly vigilant, as it is concerned about the possibility of military conflict with China.[77]

[69] American Enterprise Institute (AEI) (n.d.), 'China Global Investment Tracker', http://www.aei.org/china-global-investment-tracker/ (accessed 15 Oct. 2019).
[70] European Commission (2018), *The 2018 EU Industrial R&D Investment Scoreboard,* Luxembourg: Publications Office of the European Union.
[71] Di Minin, A., Gammeltoft, P. and Zhang, J. (2012), 'Chinese foreign direct investment in R&D in Europe: A new model of R&D internationalization?', *European Management Journal,* 30(3), pp. 189–203.
[72] American Enterprise Institute's (AEI) (n.d.), 'China Global Investment Tracker'; Shepard, W. (2016), 'China hits record high M&A investments in western firms', Forbes, https://www.forbes.com/sites/wadeshepard/2016/09/10/from-made-in-china-to-owned-by-china-chinese-enterprises-buying-up-western-companies-at-record-pace/#7d9f1a225d87 (accessed 15 Oct. 2019).
[73] Xinhua (2017), 'China TMT overseas M&A market to grow steadily in 2017: Deloitte', http://www.xinhuanet.com//english/2017-03/06/c_136107188.htm (accessed 15 Oct. 2019); Ernst and Young (2018), 'EY China outbound analysis 2018', https://www.ey.com/Publication/vwLUAssets/ey-china-outbound-analysis-2018-q1/$FILE/ey-china-outbound-analysis-2018-q1.pdf (accessed 15 Oct. 2019).
[74] Stock, S., Bott, M. and Horm, M. (2019), 'Stolen Secrets: With Economic Espionage on the Rise, Silicon Valley Must Better Protect Secrets, Feds Warn', NBC Bay Area, https://www.nbcbayarea.com/news/local/Stolen-Secrets-Economic-Espionage-Silicon-Valley-Federal-Warning-505814301.html (accessed 15 Oct. 2019).
[75] Chinese National Bureau of Statistics (n.d.), '11-20 Overseas Direct Investment by Sector', *China Statistical Yearbook 2018*, http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm (accessed 15 Oct. 2019). According to Chinese National Bureau of Statistics data, the proportion of Chinese overseas FDI in 'information transmission, software and information technology' and 'scientific research and technical service' in all overseas FDI dropped from 11.7 per cent in 2016 to 4.3 per cent in 2017.
[76] Mozur, P. and Perlez, J. (2016), 'Concern grows in US over China's drive to make chips', 4 February 2016, *New York Times*, https://www.nytimes.com/2016/02/05/technology/concern-grows-in-us-over-chinas-drive-to-make-chips.html (accessed 15 Oct. 2019).
[77] Kennedy, A. and Lim, D. (2018), 'The innovation imperative: technology and US-China rivalry in the twenty-first century', *International Affairs*, 94(3): pp. 553–572.

China's outbound M&A in the HTS met strong resistance from the US and Europe in 2017,[78] and President Trump's 'trade war' in 2018 has particularly targeted China's HTS. In response the Committee on Foreign Investment in the United States (CFIUS), the main foreign investment screening institution of the country, strengthened its rules and practices for screening and investigating foreign investment in key strategic sectors, including technology. Prior to the 'trade war', China was already CFIUS's main target; there is now little doubt that a stronger CFIUS will make Chinese FDI in US HTS even more difficult. This has also encouraged EU lawmakers to strengthen their own screening mechanism for foreign investment in sectors with important security influences.[79] The new EU foreign investment framework aims to safeguard 'Europe's security and public order in relation to foreign direct investments into the Union'.[80] The political implication of China's cross-border technology investment has escalated.

Cross-border R&D collaboration

Chinese firms also organize and participate in cross-border R&D collaboration, which is strongly encouraged and supported by the Chinese government. The '13th Five-Year National Plan for the Development of Strategic Emerging Industries', issued by the Chinese State Council in 2016, explicitly encouraged building 'new platforms' for international collaboration in R&D, including 'international innovation collaboration centres', 'innovation parks', and 'overseas R&D centres' that bring together firms, industry associations, governments, investors, researchers, and legal and other service institutes from various countries.[81] In fact, the Chinese government has encouraged and facilitated such collaboration since the announcement of the 'going global' strategy in the early 2000s, which drove the establishment of numerous 'China overseas technology parks'[82] abroad, and 'international science and technology collaboration bases'[83] in China, but these projects only started to proliferate and generate research products in recent years.

Chinese overseas technology parks were initially built with Chinese government funding in developed economies and tended to be co-managed by both Chinese and host governments, though occasionally private enterprises managed these parks. As the Chinese economy expanded, more and more Chinese and foreign enterprises took the initiative to build and manage such parks.[84] Recent examples include Hanhai Investment Inc. (the first Sino–US high tech business incubator in Silicon Valley); the Cambridge Innovation Park China Centre; China Belgium Technology Centre; China–Germany Innovation and Technology Exchange Centre in Hamburg; and the forthcoming Sino–German Scientific and Technological Innovation Park, in Heidelberg.

[78] Hou, Q. and Shen, T. (2018), 'Chinese Companies' Overseas Acquisitions Slump in First Half', Caixing, https://www.caixinglobal.com/2018-10-12/chinese-companies-overseas-acquisitions-slump-in-first-half-101334422.html (accessed 15 Oct. 2019); Wong, C. and Zhou, X. (2017), 'China's plan to buy up foreign technology meets increasing resistance from US and Europe', *South China Morning Post*, https://www.scmp.com/news/china/economy/article/2111230/chinas-plan-buy-foreign-technology-meets-increasing-resistance-us (accessed 15 Oct. 2019).
[79] Reuters (2019), 'With eyes on China, EU lawmakers back investment screening', https://www.reuters.com/article/us-eu-china-investment/with-eyes-on-china-eu-lawmakers-back-investment-screening-idUSKCN1Q31JU (accessed 15 Oct. 2019).
[80] European Commission (2019), 'EU foreign investment screening regulation enters into force', http://trade.ec.europa.eu/doclib/press/index.cfm?id=2008 (accessed 15 Oct. 2019).
[81] Chinese State Council (2016), *13th Five-Year National Plan for the Development of Strategic Emerging Industries,* Beijing: Chinese State Council.
[82] Ministry of Science and Technology (2003), 'Guideline for Pilot Projects for China Overseas Technology Park', http://www.most.gov.cn/kjzc/gjkjzc/gjkjhz/201308/P020130823585368903647.pdf (accessed 15 Oct. 2019).
[83] International science and technology collaboration bases host both enterprise-led R&D and university- and research institute-led research. There are four types of such bases: international innovation park (enterprise-led), international collaborative research centre (university- and research institute-led), international technology transfer centre (university- and research institute-led), and pioneer international science and technology collaboration base (mixed). Ministry of Science and Technology (2011), 'Management Methods for International Science and Technology Cooperation Bases', http://www.most.gov.cn/kjzc/gjkjzc/gjkjhz/201308/P020130823585367961932.pdf (accessed 15 Oct. 2019).
[84] The enterprises behind these parks have various backgrounds: Chinese state-owned enterprises, private Chinese companies, joint ventures between Chinese and foreign companies, foreign companies founded by Chinese migrants, foreign companies founded by entrepreneurs with no Chinese origins, Chinese industry associations abroad.

Meanwhile, operational matters for international science and technology collaboration bases are all organized at the local level, apart from the initial certification by the Chinese Ministry of Science and Technology. Until March 2017, there were 642 certified international science and technology collaboration bases in China, engaging in various R&D activities and generating diverse research products.

Cross-border R&D collaboration allows Chinese innovators to be a more constructive part of the global technology network and appear less threatening in Europe and North America. For example, Yili, China's largest dairy producer, together with Wageningen University, a Dutch university with strong agricultural research, founded an innovation centre in 2014 on the university campus. The centre aims to explore new technologies for food processing and packaging as well as new scientific insights in food safety and nutrition. In January 2018, US pharmaceutical company Pfizer signed an agreement with a Chinese partner, Kintor, to develop medicine for cancer treatment together.[85] Daimler and Chinese automobile company BYD founded a joint venture in 2010 in order to develop an electric car together, Denza, which was eventually launched in December 2014. China's NIO automobile company has recently signed a strategic cooperation agreement with German manufacturer Continental AG, aiming to collaborate on developing self-driving technology.[86]

International techno-scientific research collaboration

This is a type of collaboration operated by academic researchers in techno-scientific fields, often initiated by governments, universities and/or other research institutes. The Chinese government has been actively pursuing opportunities for international techno-scientific research collaboration that involves Chinese scientists. President Xi Jinping advocated collaboration with foreign academic and research institutes and endorsed the concept of 'science with no borders' in a recent speech.[87] A large number of the international science and technology collaboration bases mentioned above are led by universities and other research institutes and granted large autonomy and financial resources. The '13th Five-Year National Plan for the Development of Strategic Emerging Industries' explicitly encourages Chinese institutes to participate in international 'large-scale science' research plans and projects. Less than two years later, in March 2018, the Chinese State Council issued a set of guidelines to assist Chinese researchers to take the lead in launching international 'large-scale science research' plans and projects and use both domestic and overseas scientific resources. This shows the Chinese government's confidence and ambition in making original breakthroughs to solve key scientific problems and in becoming a leader in the global technology network.[88]

Apart from the traditional method of providing funding, the Chinese government has also played a direct role in recruiting scientists from abroad through a series of incentive schemes, such as the 'Thousand Talents Plan', 'Thousand Youth Talents Plan', 'Thousand Foreign Experts Plan', 'Special Talent Zone', and 'Ten Thousand Talents Plan'.[89] These schemes promise talented researchers good

[85] Pfizer (2018), 'Pfizer authorizes Kintor to develop new medicine for cancer treatment', http://www.pfizer.com.cn/(S(l5gm5o3v5mvzrt45wiotazew))/news/news_cn.aspx?id=562 (accessed 15 Oct. 2019).
[86] Xinhua (2018), 'Continuously deepened Sino-German electric car cooperation- interview with chairman of NIO Li Bin', http://www.xinhuanet.com/power/2018-07/12/c_129912189.htm (accessed 15 Oct. 2019).
[87] CCTV (2018), 'Enlarging technological opening, reorganizing resources for innovation at the global scale', http://news.cctv.com/2019/02/18/ARTIWVqObPTjGJbmURoQ71NY190218.shtml (accessed 15 Oct. 2019).
[88] Ministry of Science and Technology (2018), *Actively taking the lead to organize international big science plans and projects*, http://www.most.gov.cn/mostinfo/xinxifenlei/fgzc/gfxwj/gfxwj2018/201803/t20180329_138847.htm (accessed 15 Oct. 2019).
[89] Liu, H. and van Dongen, E. (2016), 'China's Diaspora Policies as a New Mode of Transnational Governance', *Journal of Contemporary China,* 25 (102): pp. 805–821; Kennedy (2017), *The Conflicted Superpower*, p. 32.

salaries, research funds and accommodation. Through these scientists, their new employers, namely top Chinese universities and research institutes, aim to integrate further with international academic communities that are committed to the most advanced techno-scientific research. These schemes have successfully attracted some scientists, mostly of Chinese origin, to return to China. Many of them retain affiliations with various institutes abroad, and thus play the desired 'bridging' role.

> The '13th Five-Year National Plan for the Development of Strategic Emerging Industries' explicitly encourages Chinese institutes to participate in international 'large-scale science' research plans and projects.

However, some of the scientists were caught in the crossfire of the US–China trade war and accused of illegally transferring key technologies from the US to China.[90] In August 2018, the US National Institutes of Health sent a letter to more than 10,000 institutions warning about some 'foreign entities' interfering in biomedical research in the US.[91] In April 2019, three ethnically Chinese scientists were ousted by MC Anderson Cancer Center because of their undisclosed links with China; soon after, two Chinese-American geneticists were fired by Emory University for not disclosing funding from China.[92] In January 2019, the US Department of Energy banned its employees and grant recipients from participating in talent-recruitment programmes run by 'sensitive' countries, a decision clearly targeting China.[93] The US–China conflicts have spread to other parts of knowledge and academic exchanges. In June 2018, the US government reduced the duration of visas for Chinese students who study robotics, aviation and high-tech manufacturing in the US, from five years to one year. Meanwhile, the US government has cancelled the 10-year US visa of several Chinese intellectuals because of their connections with the Chinese government.[94] In return, China did not grant a visa to the White House adviser Michael Pillsbury who, as a result, could not attend a forum in Beijing in April 2019.[95] These events have made the future for China–US techno-scientific research collaboration more uncertain.

Political implications of China's rise in global technological innovation

China's engagement in global technological innovation has important political implications. First, it is revising the state's role in the globalization of technological innovation. When technology was not dominating daily life as it is now, scholars had already argued that as technology, especially information technology, continued to develop and diffuse, the scope and structure of both

[90] Capaccio, A. (2018), 'U.S. Faces "Unprecedented Threat" From China on Tech Takeover', Bloomberg, https://www.bloomberg.com/news/articles/2018-06-22/china-s-thousand-talents-called-key-in-seizing-u-s-expertise (accessed 15 Oct. 2019).
[91] Collins, S. F. (2018), 'Letter from the director of NIH', *Science*, 20 August 2018, https://www.sciencemag.org/sites/default/files/NIH%20Foreign%20Influence%20Letter%20to%20Grantees%2008-20-18.pdf (accessed 15 Oct. 2019).
[92] Nedelman, M. (2019), 'Scientists with ties to China ousted from US cancer center amid fears of foreign influence', *CNN*, 25 April 2019, https://edition.cnn.com/2019/04/25/health/md-anderson-investigation-nih-china/index.html (accessed 15 Oct. 2019).
[93] Tollefson, J. (2019), 'Chinese American scientists uneasy amid crackdown on foreign influence', 3 June 2019, *Nature*, https://www.nature.com/articles/d41586-019-01605-9 (accessed 15 Oct. 2019).
[94] Kwon, D. (2019), 'US-China Tensions Leave Some Researchers on Edge', 7 June 2019, *The Scientist*, https://www.the-scientist.com/news-opinion/how-tensions-between-the-us-and-china-affect-scientists--65986 (accessed 15 Oct. 2019).
[95] Reuters (2019), 'Former Trump adviser says China delayed visa to attend forum', 18 April 2019, https://uk.reuters.com/article/uk-usa-china-diplomacy/former-trump-adviser-says-china-delayed-visa-to-attend-forum-idUKKCN1RU0D3 (accessed 15 Oct. 2019).

domestic and international governance would change. The state's role would weaken, and new actors and networks would emerge to fill the governance role.[96] This reflects the general trend of globalization of technological innovation, but it does not entirely apply to China.

The Chinese state remains powerful in making national-level technology policies and technology-oriented industrial policies. Instead of losing authority to the informed masses, the Chinese state uses technology to strengthen its own executive power. The state–technology relationship in China is complex. On the one hand, the Chinese government's strong political and financial support has allowed a number of tech giants to rise and expand. It has facilitated Chinese companies' R&D activities, both at home and abroad. It has strongly pushed foreign companies to collaborate with Chinese companies in R&D and to transfer their technology to China. Moreover, Chinese companies' outbound M&A in foreign HTS are often backed by Chinese state-owned banks, without which many deals would not be possible.

There exists different degrees of scepticism and distrust of China's political regime among western governments, in particular, the US government is concerned about potential military conflict with China and the EU sees China as a 'systemic rival'.

On the other hand, China's strong push for domestic technological progress and outward technological expansion has caused uneasiness in the US and Europe. First, European and US companies are frustrated with the Chinese government's strict control over their business in China, especially regarding technology transfer, information sharing and operational prohibitions. Second, foreign companies are concerned about the Chinese state's financial assistance for Chinese companies' overseas M&As, which may cause unfair competition. Third, Western governments' objection to letting Chinese companies build telecommunication infrastructure or provide internet and communication services in their countries is mostly to do with concerns about the Chinese state's interference in these companies. There exists different degrees of scepticism and distrust of China's political regime among western governments, in particular, the US government is concerned about potential military conflict with China and the EU sees China as a 'systemic rival'. Hence, they are deeply worried that the Chinese government may access crucial data of western economies and societies through Chinese telecommunication and information companies that operate in the west and use these data against their governments. Although there is no concrete evidence showing the Chinese government manipulating foreign data, the scepticism and distrust mentioned above is strong enough to persuade some Western governments to ban Chinese telecommunication and information companies.

An additional political implication refers to the prominence of having a comprehensive mechanism in the concerned country/region that measures the risks of engaging with foreign tech companies and academic and research institutes. The EU is currently trying to build one. An effective mechanism must involve technicians and scientists who can accurately detect technical problems and assess the possible risks of cross-border technological collaboration from a technical perspective. This would help to ensure that normal cross-border collaboration in technological innovation is not hijacked by geopolitical competition and rivalries between superpowers.

[96] Rosenau, J. and Singh, J. P. (eds) (2002), *Information Technologies and Global Politics: The Changing Scope of Power and Governance*, Albany: State University of New York Press.

As mentioned above, the globalization trend of technological innovation is irreversible. With appropriate regulations, cross-border collaboration significantly increases the efficiency and productivity of technological innovation. The rapid growth in the Chinese HTS would not be possible without an open environment for collaboration. Even after Huawei was heavily criticized by the US government, its director Ren Zhengfei still expressed the company's appreciation to the US companies that provided Huawei with equipment, technology and consultancy and 'taught Huawei how to walk' in the past 30 years. He was particularly grateful for those US companies that strived to negotiate with the US government about continuing to cooperate with Huawei after it was blacklisted.[97] Meanwhile, western tech companies also benefit from collaborating with their Chinese peers, presumably in a fair and transparent policy environment. Especially in the field of AI technology, no company would like to lose access to a database as large as China's given its huge population and market circulation. Therefore, state and regional governments need a way to accurately measure the risks of engaging with foreign tech companies and academic and research institutes, so that conducive collaboration is not affected by shifts in political environments.

In addition, an important condition for conducive cross-border collaboration of technological innovation is effective regulations on development, transfer, utilization, and commercialization of technology, both at the domestic and international levels. This demonstrates a further political implication of China's globalization of technological innovation: governance of technology. Many conflicts between China and the US that are fuelling the trade war refer to inadequate IP protection in China. The US is concerned about China's efforts in technological innovation threatening the rule-based global technological order that respects IP.[98] In contrast, the Chinese government thinks the US-led international technology standard-setting system is not suitable for late developers like China. As a result, the Chinese government has established national technology standards that satisfy China's interests better and sought to promote some of them as alternative global standards.

[97] Economic Daily (2019), 'Ren Zhengfei answers to 42 questions from the Media', 21 May 2019, http://www.sohu.com/a/315543218_118392 (accessed 15 Oct. 2019).
[98] Kennedy and Lim (2018), 'The innovation imperative: technology and US-China rivalry in the twenty-first century'.

4. A Power Shift in International Technology Standard-setting

Yu Jie

Introduction

Although there is a high probability that the US–China trade war will subside with time, it is likely that the two countries will continue to aggressively compete to lead the global high-tech sector. US political elites alongside leaders from the Five Eyes countries suspect that China's controversial 'Made in China 2025' industrial upgrade strategy will challenge the West's monopoly in high-tech sectors. As a result, China's technological stridency, together with its distinctive one-party government apparatus at home, is now reshaping the global technological and economic order.

In the current context, the setting of technology standards becomes more pivotal in the race to economic and technological supremacy. While many discussions of the 'Thucydides Trap' – the idea that competition between an established power and a rising power tends to result in war – fixate on the US and China's military and economic rivalry, President Trump's attacks on Chinese technology signals a new front on which the two countries may clash.

This chapter aims to examine China's evolving role in global technology governance. In particular, where the decision-making power in global technology governance lies; how China's role in the global technology regime is evolving; and, most important, what is the key to success for Beijing in promoting its favoured standards in global technology governance.

Global governance and technology standard-setting

In recent years, the inclusion of technology standard-setting in global governance has sparked intense debates among academia and the policy community.

Global governance incorporates 'the rules, procedures, and norms that define appropriate behaviour, facilitate cooperation, and manage differences among states and non-state actors from multiple countries'.[99] In the eyes of the Chinese leadership, setting the global governance agenda is part of projecting China's 'discursive power', in other words, testing its ability to shape the international norms and widely practised standards.[100]

[99] Kennedy, S. (2018), *Global Governance and China: The Dragon's Learning Curve*, London: Routledge, p. 5; Breslin, S. (2018), 'Global Reordering and China's Rise: Adoption, Adaptation and Reform', *International Spectator,* 53(1), p. 56, https://doi.org/10.1080/03932729.2018.1401804 (accessed 5 Apr. 2019).

[100] Xi, J. (2014), 'The Rejuvenation of the Chinese Nation Is A Dream Shared by All Chinese', Speech, 6 June 2014, *Xi Jinping: The Governance of China,* p. 70; Kania, E. (2018*), 'The Right to Speak: Discourse and the Chinese Power',* Centre for Advanced China Research, https://www.ccpwatch.org/single-post/2018/11/27/The-Right-to-Speak-Discourse-and-Chinese-Power (accessed 5 Apr. 2019).

It is mostly developed countries that decide the global governance rules for technology use and establish organizations that effectively enforce agreed norms and procedures. Other corporate actors and non-governmental organizations initiate changes according to their technological innovation capacity and institutional preferences. Both state and non-state actors also join forces to combat transnational technological challenges to this order.

Global technology standards are the crucial benchmark for the development of the technology regime. Countries and non-state actors that seek to establish new global technology standards do so to project influence. As well as clarifying and defining what is considered safe use of new technologies, these standards are there to eliminate confusion and reduce costs that may arise from transnational/cross-border trade and manufacturing. To a large extent, a clear set of technology standards could be considered a public good for the whole world.

The competition to influence global technology standards reflects countries' parallel desires for global economic dominance. Ostensibly, setting a technology standard may appear to be a politically neutral act carried out by relevant expert engineers and technocrats. However, the essence of this competition is to decide who sets the standards and the relevant legislation and who follows these standards. The followers tend to bear massive costs in switching to adhere to new standards, which affects profits and revenues.

The setting of global technology standards tends to include two approaches.[101] One is the so-called 'market access approach', which broadly aligns with the goals of leading multinational corporations. Major influential producers who monopolize key technologies and consistently innovate tend to prefer to establish their own global standards and propagate these worldwide. For example, Huawei and its contentious but economical 5G communication technologies and Microsoft's Windows software, which is used by most computers in the world.

The second approach is a conventional rule-based institutional one established by international organizations. There are two major international organizations setting global technology standards: the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).[102] Both organizations form a broad consensus and attempt to include as many of its members' preferred standards as possible. Each organization also hosts a simple majority decision-making process for the adoption or rejection of proposed specifications as an international standard. Both organizations are largely funded by private-sector members through voluntary contributions and not subject to public scrutiny.

In the past decade, national governments have delegated a single international private-sector body to act as the standard-setting authority. According to Ernst, 'developed countries remain the dominant players whereas developing countries face intense pressure to choose the prevailing international standards over indigenous ones as they seek to secure the inflow of global capital'.[103]

[101] Breznitz, D. and Murphree, M. (2013), *The Rise of China's Technology Standards: New Norms in Old Institutions*, Research Report US–China Economic Security Review Commission, https://www.uscc.gov/sites/default/files/Research/RiseofChinainTechnologyStandards.pdf (accessed 4 Oct. 2019); Kuang, Y. (2018), 'China In Global Technology Governance', *ISPI: China of (Which) Globalisation?,* pp. 82–83, https://www.ispionline.it/en/pubblicazione/china-champion-which-globalisation-20718 (accessed 5 Apr. 2019).
[102] ISO (n.d.), 'About Us', https://www.iso.org/about-us.html; IEC: https://www.iec.ch/about/ (accessed 5 Apr. 2019).
[103] Ernst, D. (2011), *Indigenous Innovation and Globalisation: The Challenge for China's Standardisation Strategy*, East-West Centre: Hawaii, p. 20, https://www.eastwestcenter.org/system/tdf/private/ernstindigenousinnovation.pdf?file=1&type=node&id=32939 (accessed 5 Apr. 2019).

China's competition with the West in global technology governance

China's expanding international influence has always made it less likely that Beijing would continue to accept existing global standards and institutions established and widely practised by developed countries based on 'the Washington Consensus'. Irrespective of who leads the Chinese government from Zhongnanhai,[104] China's geographical size, economic might and self-confidence will inevitably lead Beijing to propose and implement changes to the rules of international politics and the standards set for global technology governance.

However, China does not want to wholly revise global technology governance nor does it wish to accept the status-quo. China established its national patent agency in 1980 and subsequently joined the World Intellectual Property Organization (WIPO).[105] By 2001, a selected number of Chinese companies gradually accepted IP norms defined by the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS), as a result it was admitted to the WTO.[106]

The role of the state is of vital importance to the establishment of a science and technology sector. The Chinese government launched the 'National Medium- and Long-Term Program for Scientific and Technological Development (2006–20)' in 2006, intending to advocate for indigenous innovation and create an 'innovative society' in China by 2020.[107]

An indispensable element of this programme is the establishment of home-grown Chinese standards that incorporate domestic IP. From Beijing's perspective, the quantity of patents and the country's role in the establishment of standards demonstrate China's innovation success. Due to tireless efforts by both central and provincial governments, 'China has moved to the second position as filer of international patent application at WIPO in 2017 just below the United States'.[108]

China has not only managed a technological leap forward by implementing new national/indigenous technology standards, but also effectively internationalized some of those standards as viable alternatives. These actions have caused some consternation in the international arena. As a result, competitors see these as moves of a revisionist China seeking to change existing power structures. An example of China's success in this area is the approval of its home-grown Internet of Things standards, Intelligent Grouping and Resources sharing (IGRS), as a joint ISO-IEC standard.[109]

The launch of the BRI also offered China an opportunity to widen and internationalize the distribution of its own national standards under the framework of ISO and IEC in neighbouring countries signed up to the BRI.[110]

[104] The official residence of the Chinese Communist Party and the State Council.
[105] WIPO (n.d.), 'China', https://www.wipo.int/directory/en/details.jsp?country_code=CN (accessed 4 Apr. 2019).
[106] Bacchus, J. (2018), 'How the World Trade Organisation Can Curb China's Intellectual Property Transgression', CATO Institute, https://www.cato.org/blog/how-world-trade-organization-can-curb-chinas-intellectual-property-transgressions (accessed 4 Apr. 2019).
[107] The PRC State Council (2006), National Medium- and Long-Term Program for Scientific and Technological Development [国家中长期科技发展规划 (2006-2020)], http://www.gov.cn/jrzg/2006-02/09/content_183787.htm (accessed 4 Apr. 2019).
[108] Science/Business (2018), 'China moves to Number two in international patent applications', https://sciencebusiness.net/news/china-moves-number-two-international-patent-applications (accessed 8 Oct. 2019).
[109] CNBC (2014), 'Technologies from STMicroelectronics Support IGRS Protocol to Enable the Chinese Standard Home Gateway', https://www.cnbc.com/2014/04/01/globe-newswire-technologies-from-stmicroelectronics-support-igrs-protocol-to-enable-the-chinese-standard-home-gateway.html (accessed 5 Apr. 2019).
[110] World Economic Forum (2018), 'China is building a New Silk Road, this one is Digital', https://www.weforum.org/agenda/2018/08/china-is-building-a-new-silk-road-and-this-one-s-digital (accessed 5 Apr. 2019); Kuang, Y. (2018), *China In Global Technology Governance,* ISPI: China of (Which) Globalisation?, pp. 82–83, https://www.ispionline.it/en/pubblicazione/china-champion-which-globalisation-20718 (accessed 4 Oct. 2019).

China's influence on global technology standards

Beijing's strident promotion of its own technology standards has not been well received by countries with competing technologies. Traditionally the setting of international technology standards has been the preserve of developed economies, which in some areas has essentially been a monopoly. When a technology standard is accepted and approved by ISO and IEC, all members of these organizations have commercial incentives and legal obligations to comply. If a private company has developed the approved technology standard, then it is likely to dominate that particular sector.

While emerging Chinese technology may have ruffled some feathers, new substantive global standards based on Chinese home-grown technologies will widen the choice available to companies and consumers worldwide and diminish any existing monopolization of technology standards.

The current spat between Beijing and Washington over 5G networks provides the best illustration of the impact of global technology standards on competition. The Chinese government and businesses see the often-proposed global technology standards as belonging to a small number of developed and relatively wealthy Western liberal democracies. Such standards might not be applicable to China and other non-Western developing countries.

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Beijing's stridency in utilizing alternative technology standards will also require multinational corporations to adjust their strategies for entering the vast Chinese domestic market. It poses a dilemma for companies unenthusiastic about accepting Beijing's preferred technology standards, but which rely on access to China's market for growth.

The biggest hindrance to China's desire to lead the global governance of technology standards are heavy-handed interventions by the authoritarian political regime in Beijing. This hurdle has already sparked intense debates such as the recent rows over Huawei and its development of 5G networks.

The Chinese leadership aims to achieve its long-desired economic re-balancing from a hub of labour-intensive manufacturing to a global innovation powerhouse. This remains the absolute priority of the ruling Communist Party. Beijing is cultivating national champions that can drive China's technological innovation, with the goal of using domestic suppliers to reduce reliance on foreign technology.

However, this growing prowess has stoked fears across advanced economies in North America and Europe. Huawei's 5G mobile network is widely used in medical devices, domestic white goods, electric vehicles and other communication technology. However, using Huawei's 5G technology could potentially expose users' personal information and data in strategic sectors. Many Western security services are convinced that the Chinese state dominates the economy in part to use companies like Huawei and ZTE to advance its own ends. As such, if Beijing were to engage in political espionage it is likely to be through high-tech Chinese companies that have developed the latest standards.

It is unclear if Chinese government intervention will eventually achieve the technological self-sufficiency Beijing has long desired. China's approach to macroeconomic management diverges significantly from that of the US and other real market economies, particularly in its policy towards driving innovation. While Beijing financially supports government-controlled technological enterprises, Washington's laissez-faire attitude ensures minimum state intervention in the business sector.

Moreover, in line with most libertarian economists, Washington believes the government should refrain from market intervention whereas Beijing stresses a state-dominated economy as a necessary precondition both to the future growth of the Chinese economy and to the legitimization of one-party rule. China has firmly dismissed allegations of 'forced technology transfer' from its major economic partners and competitors.

It is natural for China to look to develop 'indigenous innovation', however, by employing measures to support home-grown enterprises, the government is contravening free-market norms and WTO rules. For example, under the 'Made in China 2025' initiative, Semiconductor Manufacturing International Corps, one of China's home-grown semiconductor manufacturers, received a subsidy worth over $100 million.[111]

Conclusion

In the race for global influence, China must recognize that advantages in the technological sphere are much harder won than in conventional battlegrounds. Many of China's actions in international technology standard-setting have provided an alternative to the monopolies controlled by a few wealthy countries, but these initiatives have not always been well received by end-users.

China's desire to be an alternative champion of technology standard-setting remains unfulfilled. Its ample innovation talent is a solid foundation in its quest for global technology supremacy, but tightening controls over personal freedoms could undermine it and deter the desire of global partners to cooperate. Simultaneously, innovation and authoritarian control are flourishing in China. According to one expert, 'the unanswered question for China is whether it is possible to have scientific innovation without personal rights'.[112]

Rather than attempting to overturn the existing international technology governance framework, Chinese companies and relevant institutions have followed the rules of international standardization on most occasions. They have continued to observe the current international framework and rapidly expanded China's influence in relevant international institutions. China's steep learning curve has meant that the country is now well versed in the formal rules of technological standardization.

Seen in this light, Chinese companies may have an advantage over their US competitors in technology standardization institutions – not because of protectionism by the Chinese state, but because of their understanding of the rules of the game.

Yet, inherent tensions in Chinese policy and one-party rule make Beijing's desire for a leading role in the international technological standard-setting more complicated and problematic. Due to the legacy of a state planned economy, China increasingly believes that simply relying on market forces

[111] Xie, Y. (2018), 'China's top chip maker SMIC sees revenue grow as state subsidies surge amid trade war', *South China Morning Post*, 10 August 2018, https://www.scmp.com/business/companies/article/2159076/chinas-top-chip-maker-smic-sees-revenue-grow-state-subsidies (accessed 7 Oct. 2019).
[112] Lewis, J. (2018), *Technological Competition and China*, CSIS, https://www.csis.org/analysis/technological-competition-and-china (accessed 7 Oct. 2019).

is insufficient, as these favour the incumbent international technology governance framework. As a result, there is a strong inclination towards state-led developments of technology standard-setting among both the government and companies.

To many, Beijing represents an authoritarian Leninist regime, which stands apart from the representative democracies in the West. In a more liberal political system, the strength of technological innovation tends to go hand in hand with individual political freedom. China might have the ambition and financial capacity to lead global technological governance, however, it lacks sufficient political credibility to win over competing nations.

On the other hand, policymakers in Washington are overlooking the inherent dynamism of technology. By regarding technology as a fixed object rather than a process in a constant state of flux, the US believes it can block Chinese technology and maintain the US monopoly over the market. This flawed approach has inadvertently emboldened Beijing to boost technology standards and achieve greater self-sufficiency. Consequently, China's technological advancements may well boost the Communist Party's means of governing and monitoring the population, yet simultaneously create more controversies on how to handle those technologies without stoking even greater fear on the other side of Pacific.

5. Impact of the US–China Economic Conflict on Trade and Investment Flows in Asia

James Crabtree

A new era of protectionism

The longer trade conflict between the US and China goes on, the more it looks like a new and enduring feature of the global economy rather than a temporary aberration. Over the last two years President Donald Trump has targeted various restrictions at China, aimed in part at curbing the US's yawning trade deficit with its Asian rival. The impact of these policies is now being felt, hitting growth forecasts globally as well as in both the US and China. Threats to domestic prosperity might eventually push the two parties towards a deal to defuse some of these tensions in the short-term. Even so, their recent disputes have revealed wider geopolitical rivalries and competition for global technological leadership that are likely to fester for years to come. After decades of successful economic liberalization these forces are pushing the world towards an era of protectionism.

The prospect of ongoing and potentially rising trade tensions will be especially damaging for Asia, hitting investment flows into the world's most trade-dependent region, and economic development overall. Estimates suggest $150 billion could be wiped off global gross domestic product if the US implements the tariffs that it notified the WTO of in 2018, around one-third of which would come from the Asia-Pacific region.[113]

Increasing trade costs, for instance by making Chinese goods more expensive for US companies, will nonetheless produce winners and losers. As a result, there has been a good deal of recent speculation about which countries might gain from a period of prolonged trade conflict.[114] Specifically, if multinational companies shift production away from China and begin to seek new production locations, some analysts suggest that various trade-dependent Southeast Asian nations could, perversely, end up benefiting from trade restrictions elsewhere.[115] Unfortunately, this image of trade war 'winners' is misleading.

This chapter highlights three ways in which an ongoing trade war is likely to be negative for Asia's future growth. First, a period of growing trade uncertainty will dampen investor confidence in Asia as a whole. At the same time, a likely slowdown in global growth will hit trade-dependent Asian exporters in particular. These broad negative effects are likely to outweigh any narrow positive gains that could arise as investment patterns shift away from China. Second, rising trade costs are likely to push multinational companies (MNCs) to reshape their global production networks, making

[113] UN Economic and Social Commission for Asia and the Pacific (2018), *Asia-Pacific Trade and Investment Report: Recent Trends and Developments 2018*, https://www.unescap.org/publications/asia-pacific-trade-and-investment-report-2018 (accessed 18 Jun. 2019).
[114] Crabtree, J. (2018), 'Asia – the myth of trade war "winners"', Nikkei Asian Review, 5 December 2018, https://asia.nikkei.com/Opinion/Asia-the-myth-of-trade-war-winners (accessed 18 Jun. 2019).
[115] Economist Intelligence Unit (2018), *Creative Disruption Asia's winners in the US-China trade war*, London: The Economist Intelligence Unit, http://www.eiu.com/Handlers/WhitepaperHandler.ashx?fi=US_China_trade_war.pdf&mode=wp&campaignid=TradeWar (accessed 18 Jun. 2019).

them generally less reliant on outsourced production in Asia. Finally, trade tensions are likely to make it harder for poorer developing countries around Asia, notably India, to follow the path of integration into global supply chains, which previously helped East Asian nations to rapid economic development.

Background to Asia's trade war

Rapid international integration helped to propel Asia's rise over recent decades, leading to what trade economist Richard Baldwin dubs a 'great convergence' between rich industrial nations and a select few emerging exporting economies.[116] Improvements in communications technology allowed MNCs in the US, Europe and Japan to move production to countries like China, using basic tools like e-mail and spreadsheets to manage ties with distant foreign suppliers. More liberal trade laws helped too, as rules governed by institutions like the WTO made it cheaper and easier to move goods around globally. For around two decades after the end of the cold war global trade roared ahead, often expanding at twice the rate of the overall world economy.

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Asia's rise was aided by the creation of 'global value chains' (GVCs), a term used to refer to complex production networks involving everything from basic components to high-end services in areas like IP and product design. During this period of rapid trade expansion, often known as the decades of 'hyper globalization', GVCs grew ever more intricate. Industries like car manufacturing and electronics developed complex production networks in which intermediate goods crisscrossed borders in emerging markets before being assembled – often in China – and shipped overseas for sale in rich industrial economies. As well as making consumer goods cheaper, GVCs allowed exporters in developing economies to play a larger role in the global economy, increasing sales, raising productivity, and helping to boost growth in their home nations. The likes of Taiwan, Singapore and South Korea prospered during the early stages of this era of new global connections, although China was the most notable beneficiary of all. Today, Chinese growth remains heavily tied to global production networks: last year 43 per cent of its exports were made by foreign-invested enterprises.[117]

The 2008 global financial crisis brought this period of ever-closer integration to a halt. Global trade growth stalled after the crash, expanding more slowly than the world economy as a whole for many years. Foreign direct investment (FDI) flatlined. Restrictions on trade began to tick up, too, as policymakers lost their taste for global trade agreements. It was only after Trump's victory in 2016, however, that this period of relative trade stagnation took a fully protectionist turn.

The US moved first to introduce restrictions on goods like solar panels and washing machines. Then in 2018 it began targeting China with repeated waves of restrictions. By the end of 2018, the US had placed tariffs on $250 billion worth of Chinese imports, and threatened imports worth a further $257 billion.[118] By early 2019, US tariffs alongside the retaliatory responses from other affected

[116] Baldwin, R. (2016), *The Great Convergence Information Technology and the New Globalization*, Cambridge, MA: The Belknap Press of Harvard University Press.
[117] Hancock, T. (2018), 'China's relentless export machine moves up the value chain', *Financial Times*, 23 September 2018, https://www.ft.com/content/cdc53aee-bc2e-11e8-94b2-17176fbf93f5 (accessed 18 Jun. 2019).
[118] Leonard, J. and Jacobs, J. (2018), 'U.S. Plans More China Tariffs If Trump-Xi Meeting Fails, Sources Say', *Bloomberg*, 29 October 2018, https://www.bloomberg.com/news/articles/2018-10-29/u-s-said-to-plan-more-china-tariffs-if-trump-xi-meeting-fails (accessed 18 Jun. 2019).

nations, had hit nearly $430 billion of global imports, or more than 2.5 per cent of global goods trade.[119] These restrictions have already pushed the WTO to downgrade its trade growth outlook repeatedly.[120] Similarly, the IMF cited the trade war for its decision in 2019 to cut its global growth outlook, the latest in a succession of downward estimates.[121]

The myth of trade war winners

There can be little doubt that an escalating trade war will dent growth in the US and China, as well as the wider global economy. Yet this downbeat prospect will at least be partially offset when companies, and indeed some countries, pick up business resulting from restrictions introduced by the US and China.

Two kinds of shifts will affect Asia, both linked to the impact of tariffs on China. The first involves short-term changes in trade from one country to another, as happened for instance when China stopped buying soybeans from the US and sourced them from Brazil instead. In Asia, this is likely to have an effect as US companies seek to replace tariff-hit Chinese goods with cheaper products sourced from elsewhere around the region. Researchers from Nomura, a Japanese bank, created an 'import substitution index' to examine which countries might benefit from these kinds of short-term movements, considering factors ranging from their comparative advantage in particular industries to their distance from the US and China.[122] In the short-term, they found that Malaysia is the most likely trade diversion beneficiary, in part because of its vibrant electronic and communication equipment industries. Japan, Pakistan and Thailand are also likely to gain in industries ranging from car parts to cotton yarn.

The second shift is longer-term and more significant, as companies look to shift some of their production away from China. This could happen either by companies seeking to source products from new suppliers in other countries, or by replacing factories they operate in China with new facilities elsewhere in the region. A second Nomura 'production relocation index' examined countries that might take advantage of this, with a particular emphasis on those that showed a similar exporting profile to China and those likely to attract FDI.[123] According to this index, Vietnam was the 'clear standout beneficiary', followed by Malaysia, and then Singapore and India.

In the same vein, a recent report by the Economist Intelligence Unit suggested that both Vietnam and Malaysia were also likely to see 'strong benefits' from trade restrictions, given both were already home to production facilities for big companies like Dell and Samsung, which would allow these firms to shift production from their facilities in China.[124] These theoretical estimates chime with media reports suggesting that a number of big suppliers of Chinese-made goods are indeed pondering relocation to Vietnam in particular, not least iPhone-maker and electronics contract manufacturer Foxconn.[125]

[119] World Bank (2019), *Global Economic Prospects: Darkening Skies (English)*, Washington, DC: World Bank Group, p. 32, http://documents.worldbank.org/curated/en/307751546982400534/pdf/133493-PUB-9781464813863.pdf (accessed 18 Jun. 2019).
[120] World Trade Organization (2018), 'WTO downgrades outlook for global trade as risks accumulate', 27 September 2018, https://www.wto.org/english/news_e/pres18_e/pr822_e.htm (accessed 18 Jun. 2019).
[121] International Monetary Fund (2019), 'World Economic Outlook Update, January 2019: A Weakening Global Expansion', January 2019, https://www.imf.org/en/Publications/WEO/Issues/2019/01/11/weo-update-january-2019 (accessed 18 Jun. 2019).
[122] Subbaraman, R., Varma, S., Kalcic, T. and Seth, C. (2018), *A US-Sino trade war is not all lose-lose: We assess the potential beneficiaries in Asia*, Asia Special Report Global Markets Research, NOMURA, 20 November 2018.
[123] Ibid.
[124] Economist Intelligence Unit (2018), *Creative Disruption Asia's winners in the US-China trade war*.
[125] Nguyuen, M. and Yu, J. (2018), 'Apple assembler Foxconn considering iPhone factory in Vietnam – state media', Reuters, 4 December 2018, https://www.reuters.com/article/us-foxconn-iphone-vietnam/apple-assembler-foxconn-considering-iphone-factory-in-vietnam-state-media-idUSKBN1O3128 (accessed 18 Jun. 2019).

Yet this talk of trade war winners is still misleading. Any prolonged trade war will indeed produce investment shifts between countries. Some nations in Southeast Asia will find themselves winning business as anxious companies, for example in the smartphone sector, hedge their bets and move production away from China. At present, though it does not appear likely that the US will target countries like Vietnam with trade restrictions that could change in the future. Yet overall, these benefits must still be weighed against the broader impacts of the trade war – and here the omens are much less positive.

For starters, Asian countries are likely to win some portion of Chinese production only to see this effect counterbalanced as Chinese companies hit by tariffs purchase fewer products. Most Asian value chains pass through China at some point, as intermediate goods traverse the region prior to final assembly. Chinese exports are already falling fast, dropping by 4 per cent in December 2018, their largest decline in more than two years.[126] Further declines during the first half of 2019 are likely to have a knock-on effect across the continent.[127] Almost all Asia's exporters face risks here, although Taiwan and South Korea are especially vulnerable given the quantities of electronics they export to China.[128]

Even worse could be the effect on global investor confidence. Rather than suddenly building new factories in countries like Malaysia and Vietnam, many global companies could simply decide to delay or pause investment in the face of rising uncertainty. Here the effects of the trade war are also combining with deeper structural changes, for instance the fact that automation is making it more attractive to move production away from countries with low labour costs and towards markets that are closer to final consumers. Changes in China's economy, such as rising wages, are part of a similar trend. Either way, there is already ample evidence that the trade war is hitting global FDI flows, which fell by nearly a quarter in 2017, [129] and then by one-third again in the first half of 2018.[130] This picture is not uniform: FDI flows into Southeast Asia rose slightly over that same period, with Thailand and the Philippines the major gainers.[131] Yet the wider risk remains that, if the trade war continues, FDI to the region could quickly dry up.

The risk to Asia's value chains

The broader worry is that an ongoing trade conflict will begin to shift the direction of globalization. For the best part of a generation, MNCs have constructed longer and more elaborate chains of production around the world. Today about half of world trade passes through production networks that are owned or directed by global companies.[132] Yet a combination of geopolitical uncertainty and rising trade costs are now set to reduce the advantages of making goods overseas. In turn, MNCs are likely to shorten and simplify their supply chains, with potentially wide-ranging implications for Asia.

[126] Locket, H., Hancock, T. and Mitchell, T. (2019), 'China exports fall most in 2 years as slowdown and trade war bite', *Financial Times*, 14 January 2019, https://www.ft.com/content/713ee398-179a-11e9-9e64-d150b3105d21 (accessed 18 Jun. 2019).
[127] Chen, Y. and Yao, K. (2019), 'China April exports unexpectedly fall but imports rebound as U.S. tariffs loom', Reuters, 8 May 2019, https://www.reuters.com/article/us-china-economy-trade/china-april-exports-unexpectedly-fall-but-imports-rebound-as-fresh-u-s-tariffs-loom-idUSKCN1SE0B4 (accessed 18 Jun. 2019).
[128] UN Economic and Social Commission for Asia and the Pacific (2018), 'Recent Trends and Developments 2018', p. 94.
[129] United Nations Conference on Trade and Development (2018), *World Investment Report Investment and New Industrial Policies Key Messages and Overview*, Geneva: United Nations, https://unctad.org/en/PublicationsLibrary/wir2018_overview_en.pdf (accessed 18 Jun. 2019).
[130] Organisation for Economic Co-operation and Development (2018), *FDI in Figures*, London: OECD, http://www.oecd.org/investment/FDI-in-Figures-October-2018.pdf (accessed 18 Jun. 2019).
[131] Iwamoto, K. (2018), 'Southeast Asia benefits from FDI surge in first half', Nikkei Asian Review, 27 October 2018, https://asia.nikkei.com/Economy/Trade-war/Southeast-Asia-benefits-from-FDI-surge-in-first-half (accessed 18 Jun. 2018).
[132] The Economist (2017), 'The retreat of the global company', 28 January 2017, https://www.economist.com/briefing/2017/01/28/the-retreat-of-the-global-company (accessed 18 Jun. 2019).

These changes are in part the result of a dramatic shift in American policy, based on concerns about predatory Chinese manufacturing policies and the risk China poses to US technological supremacy. Previous US governments had broadly supported moves by American companies to produce abroad, particularly in China. However, recent years have seen a shift in thinking in Washington on the potential risks of producing goods in China, many of which relate to the country's state-led economic model. Some critics cite a lack of reciprocity, in which US companies in China face more stringent business restrictions than Chinese companies operating in the US. In March 2018, US trade representative, Robert Lighthizer produced a lengthy report claiming widespread problems relating to the theft of technological know-how from US companies.[133] Elsewhere Lighthizer has highlighted the risk that China might use US trade links as a weapon in a period of future geopolitical competition.

Global production by US companies has become a focus for Trump and some of his allies. In a tweet last year, Trump called on companies such as Apple and Ford to begin undoing the worldwide production networks that they had spent many decades constructing. 'Make your products in the United States instead of China', he wrote. Trump's one-time policy adviser Steve Bannon has been even more explicit, saying repeatedly that US policy now aimed specifically at curbing China's ability to be a location to produce goods for US companies. 'China has always been taking advantage of the rules', he said last October. 'This is not about a trade war. This is about the realignment of the global supply chain'.[134] Essentially, the US under Trump is seeking a trade war not simply against China, but also against its own multinational companies.

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Even if US policy was neutral on production locations, MNCs themselves are already reacting to the prospect of higher future trade costs. Long, complex value chains that organize production across different locations are economically efficient but also vulnerable to arbitrary trade restrictions. MNCs producing abroad enjoy benefits of scale and low labour costs. But in competitive industries with thin margins these advantages can be overturned by small increases in trade costs or political risks.

This is not to say that many MNCs will choose suddenly to reshore production back to their home markets in North America or Europe. Companies source products from China not only because of low costs but also because of its complex ecosystem of skilled labour and quality producers. This mix cannot quickly be replicated in countries like the US, as Tim Cook, CEO of Apple, has noted.[135] Nonetheless US companies facing rising trade costs are likely to try to reduce their reliance on complex foreign sourcing arrangements. Some might pull production closer to home, for instance by producing in Mexico.

[133] Office of the United States Trade Representative Executive Office of the President (2018), *Findings of the Investigation Into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation Under Section 301 of the Trade Act of 1974*, Washington, DC: Office of the United States Trade Representative, https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF (accessed 18 Jun. 2019).
[134] Schwartz, B. (2018), 'Steve Bannon lauds Trump's new trade deal – and unleashes on Gary Cohn', CNBC, 1 October 2018, https://www.cnbc.com/2018/10/01/steve-bannon-blasts-gary-cohn-after-trumps-trade-deal-with-canada.html (accessed 18 Jun. 2019).
[135] Campbell, M. (2017), 'Apple CEO Tim Cook talks Chinese supply chain, censorship and more in interview', Appleinsider, 5 December 2017, https://appleinsider.com/articles/17/12/06/apple-ceo-tim-cook-talks-chinese-supply-chain-censorship-and-more-in-interview (accessed 18 Jun. 2019).

Others could develop regional trading networks to service particular parts of the world, following the strategy of regional production 'localization' adopted by companies like General Electric, the US industrial group.[136]

For Asia, this is one of many possible outcomes of the trade war. It is at least possible to imagine a more dramatic scenario, in which ongoing trade belligerence from the US alongside further statist turns in China's economic model gradually push the world's two largest economies to decouple from one another. Such a scenario could see a larger change in trade patterns affecting Southeast Asia in particular, with US companies seeking to replicate its Chinese outsource production capabilities in the region. Yet there are good reasons to be sceptical about this possibility, too, given the odds that the world will in effect split into two trading zones – with one linked to the US, and the other to China – remain slim.

Equally, were this decoupling to come to pass, nations in Southeast Asia might in effect be forced to choose between trading ties with the US and China. It is by no means clear they would pick the US. China is already the largest trading partner for nearly all Asian nations. As China continues to grow, ever-more Asian exports will end up serving Chinese domestic consumption, rather than the US. In much the same way, as China's trade within its own region has increased, its reliance on the US has gradually shrunk. In 2015, the US accounted for just 5 per cent of China's GDP, roughly half the level at the turn of the millennium.[137] In this sense, a growing trade schism between the US and China is likely to have two unintended long-term effects. First, it will make China less reliant on trade in general, as its economy seeks to replace imported goods with those produced domestically. And second, China's economy may well end up more closely integrated with its Asian neighbours, not less.

The trade war and Asia's economic development

Whatever else happens as the trade war develops, an era of rising trade restrictions is likely to make it more difficult for poorer Asian nations – from Bangladesh and India to Cambodia and Myanmar – to develop deeper connections to global markets. In turn this is likely to make it harder for countries to follow the path first pioneered by richer economies in East and Southeast Asia like Japan and South Korea, whose development models relied in part on rapid growth in developing exporting industries. More recently economies like Thailand and Malaysia have achieved some measure of the same success, if not by developing full exporting sectors of their own, then at least by plugging their companies into existing global production networks.

This model of economic integration is far from a guaranteed path to development. Relatively few emerging nations have managed to mimic the export-led path charted first by Asia's pioneers, a point made by economist Dani Rodrik and others.[138] So far perhaps only Vietnam among today's lower middle-income Asian economies shows signs of repeating the trick. Even so, many such economies around Asia harbour hopes that they might soon be able to integrate their domestic producers with

[136] Bhatia, K., Evenett, S. and Hufbauer, G. (2016), 'Why General Electric is localising production', Vox CEPR Policy Portal, 21 June 2016, https://voxeu.org/article/why-general-electric-localising-production (accessed 18 Jun. 2019).
[137] Quah, D. (2018), 'How important is America to global trade?', *The Straits Times*, 8 September 2018, https://www.straitstimes.com/opinion/how-important-is-america-to-global-trade (accessed 18 Jun. 2019).
[138] Rodrik, D. (2018), *New Technologies, Global Value Chains, and the Developing Economies*, University of Oxford, Pathways for Prosperity Commission, September 2018, https://drodrik.scholar.harvard.edu/files/dani-rodrik/files/new_technologies_global_value_chains_developing_economies.pdf (accessed 11 Jul. 2019).

global markets. However, the higher trade restrictions become, the less likely this is to happen. East Asia grew prosperous against a benign backdrop of spreading globalization. South Asia, in particular, is likely to have to chart its development path in less auspicious circumstances.

Worse still, without remedial action, the risk is that the trade war will spread both in its scope and geography. So far, US trade restrictions have almost entirely hit trade in goods. But if tensions with China deepen, this could easily spread to include restrictions targeting services, or indeed high-profile companies, such as Huawei on the Chinese side or Apple on the US side.

Equally, a prolonged trade war is likely to spread to other countries too. Just as China has responded to US restrictions 'tit for tat', so other nations are soon likely to begin to follow their lead. Previous eras of trade restrictions suggest that domestic pressure builds quickly to replicate trade restrictions introduced by other nations. This risk is most pronounced in countries with a history of activist trade policies like India, which has already introduced various kinds of import controls over the last year.

Rising anti-trade sentiment is also likely to be reflected in higher non-tariff barriers, from subsidies and government procurement rules to other less obvious trade restrictions, all of which have been increasing over recent years. Here Asia's trading economies are potential victims, given their exports are often hit by restrictions from other less efficient markets. But they are perpetrators too: around one in three discriminatory trade measures affecting economies in the region last year were introduced by other Asian nations, according to data from the UN.[139]

> China's outbound FDI to the US and Europe plunged in 2018 as the trade war began to bite. But it is also at least possible to imagine that its investments around Asia might increase over the coming years, as it seeks new trading partners and potentially expands its giant BRI.

The wider geopolitical ramifications of the trade war are hard to predict. Continued US–China tensions are likely to complicate trading relationships, for instance as tussles over companies like Huawei or issues like IP force countries to pick sides. In some cases, it is at least possible that political and investment relations around Asia could improve, however. This has been true of late in China's case, as deteriorating US ties pushed Beijing to improve ties with countries like Australia, Japan and India. These moves may even spur investment increases in some cases, for instance if China decides selectively to make its economy more open to companies from countries like Germany or Japan. China's outbound FDI to the US and Europe plunged in 2018 as the trade war began to bite. But it is also at least possible to imagine that its investments around Asia might increase over the coming years, as it seeks new trading partners and potentially expands its giant BRI.[140]

The odds that the US and China can return to normal trading relations are slim. America's complaints about Chinese behaviour are deeply rooted in China's state-led economic model, which shows no signs of changing under President Xi. If some kind of trade deal were to be struck, it is likely that it would only act at best as a temporary reprieve on rising tensions. Equally an agreement to monitor and manage what the US perceives to be Chinese transgressions in areas like IP theft or state support for domestic industries will in itself only likely become a recipe for further wrangling in future.

[139] UN Economic and Social Commission for Asia and the Pacific (2018), *Recent Trends and Developments 2018*, p. 83.
[140] Yiu, E. (2019), 'Chinese direct investment in US and Europe falls by 73 per cent to a six-year low as firms face tougher scrutiny', *South China Morning Post*, 14 January 2019, https://www.scmp.com/business/banking-finance/article/2181903/chinese-direct-investment-us-and-europe-falls-73-cent-six (accessed 18 Jun. 2019).

That said, there are at least some ways in which the two countries might more successfully manage their developing rivalry. Changes to international trade rules, especially in contested areas like IP, could help to alleviate some US complaints that prompted the trade war in the first place. Much the same is true with China's domestic reforms, where President Xi could decide to use the tension created by the trade war to justify a gradual return to market-based reforms in specific sectors, for instance by introducing long-awaited reforms to Chinese state-owned enterprises. And, of course, there is always the chance that Trump might lose the 2020 presidential election, which while it would not herald a dramatic improvement in US–China ties it would at least make a further deterioration less likely.

Even if none of this happens, there are steps that countries around Asia can take to counteract the trade war's effects by promoting steps to greater regional integration. The WTO remains in crisis, meaning there is almost no chance that it will develop a new global trade liberalization agenda. But the passage of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) in 2018, even without US participation, proved there was still life in regional trade deals in Asia. In the same vein the eventual passage of the 16-nation Regional Comprehensive Economic Partnership (RCEP) deal would provide a welcome fillip to integration attempts. As it faces the new reality of US trade policy, China at least appears to be more willing to push forward both with plans to strike new bilateral and regional deals.

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