Technology, power, and uncontrolled great power strategic competition between China and the United States

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Abstract

Great power competition has returned to the global centre stage. However, the new round competition is developing with unprecedented uncertainties. The fierce competition between China and the U.S. has already expanded from trade to high-tech protection, regional strategies, and two development models supported by different values. The fact of more intertwined geopolitics and technology reflects the underlying intensified competition between China and the U.S. and exacerbates the direct competition between the two powers for control over the rules, norms, and institutions that will govern international relations in the decades to come. This paper discusses whether the competition will slip into a vicious conflict between the two sides or even possibly two blocs that hold differentiated ideologies, political values, and remarkably different economic models.

Keywords China · The United States · Competition · Technology

1 Introduction

Many American experts no longer believe that Western strategies of engagement will lead China evolve into a more liberal, pluralistic, and democratic country (Campbell and Ratner 2018). They argue that because China and Russia increasingly use their power to assert interests and values that often conflict with those of the United States, Washington has awakened to “a new era of great-power competition” (Allison 2020). Therefore, the prevailing wisdom in Washington is that policymakers and experts have settled into a new consensus about China: engagement is dead, long live strategic competition (Ford 2020)! There is no need to argue that great power competition has returned to the global centre stage. The new round of competition is developing with unprecedented uncertainties. The fierce competition between China and the U.S. has already expanded from trade to the protection of

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cutting-edge technologies, regional strategies, and two development models supported by different values. Geo-economics is the primary arena of great power competition, while geopolitics and technology are increasingly intertwined. Moreover, the two countries' divergence in social values and political systems is becoming more intense. As a result, technology is now largely politicalized and has become a more prominent element of great power rivalry, and politicians are racking their brains to assess the risks of and exaggerate the severity of conspiracy in high-tech cooperation with China.

In 2015, the Chinese government released a strategic plan of Made in China 2025 to reduce China's dependence on foreign technology and promote Chinese high-tech manufacturers on the global market. Seeking "indigenous innovation" has long been the focus of the outlines of China's Medium and Long-Term National Science and Technology Development Plan. The National Medium- and Long-Term Plan (2006) laid out, for the first time, the goal of independent innovation in science and technology. However, the onset fourth industrial revolution—an era that will build and extend the impact of digitization in new and unanticipated ways—will make the development of innovation capabilities even more urgent, as reflected by the fact that semiconductors are central to almost all electronic products. While China accounts for about 60 percent of global demand for semiconductors, China only produces 13 percent of global supply. Chinese officials continue to downplay the significance of the plan and seek to mitigate the seriousness and strong reaction from Western countries, particularly the U.S. However, concerns regarding China's ambition to control the entire supply chains of all critical sectors, with strong support from China's state-led model, are intensifying. The critical questions concern how China is going to reach its goals and to what extent China will ultimately dominate the hegemonic role traditionally occupied by Western countries. Such concerns are prone to Gordian knots, especially as China–U.S. relations are not entirely trouble-free but have actually run into serious problems. Made in China 2025 opened the floodgate to pent-up concerns from the U.S. side, serving as a fuse that detonated the accumulated frustration and longstanding potential instabilities between both sides.

Given its intensifying concern about Made in China 2025, the White House has increasingly targeted the Chinese technology industry over both security concerns and trade agreements, particularly after Trump took office. China has been accused for years of intellectual property theft and forcing American enterprises to transfer technology. In 2012, Huawei and ZTE clearly stated that they would not risk becoming involved in national security or economic espionage. Despite this, only because of bias concerns regarding the relationship between the founder of Huawei and the Chinese government, both Huawei and ZTE faced congressional grilling for allegedly stealing trade secrets from U.S. companies and for posing security threats to critical U.S. infrastructure (Nasiripour and Taylor 2012). As the trade war between the U.S. and China escalated, the U.S. imposed an export ban and a massive fine on ZTE for working around U.S. sanctions that prevented sales to Iran and North Korea between 2010 and 2016. ZTE eventually agreed to replace its board, paid a US\$1 billion fine, and put another US\$400 million in escrow in exchange for lifting the trade ban, but the U.S. still believes ZTE to be a critical security threat. Commerce Secretary Wilbur

Ross said the department would "remain vigilant" in monitoring ZTE's actions (U.S. Department of Commerce, Bureau of Industry and Security 2018a). After the U.S. blacklisted Huawei Technologies, tensions have continued to rise, and people naturally fear that the spectre of a Cold War is materializing (Wu et al. 2019). The Trump administration has been accelerating efforts to break ties with Huawei with regard to building 5G networks. National Economic Council Director Larry Kudlow argues that "the big-picture concept is to have all of the U.S. 5G architecture and infrastructure done by American firms, principally, that also could include Nokia and Ericsson because they have big U.S. presences" (Davis and FitzGerald 2020). The China–U.S. relationship now stretches beyond economic competition, increasingly encompassing political and security issues as it approaches potential comprehensive conflict.

Although the meanings of competition and conflict to some degree overlap, competition is not the same as conflict. Conflict implies a struggle or contest between people with opposing needs, ideas, beliefs, values, or goals. By contrast, competition implies, despite some contention, some degree of common goals, interests, and agreements in a framework with rules or norms (Mnookin et al. 2004, 51). This suggests that competition refers to a situation in which the object of the competition is scarce or acquiring more of that object than someone else is of significance (Mazarr et al. 2018). Competition is a "goal-seeking behaviour that strives to reduce the gains available to others" (Milner 1992, 468). An era of intensifying international competition is characterized by growing political, economic, and military competition. Among all dynamics, technology has become one of the most complicated, essential, and prominent challenges of U.S.–China strategic competition (Center and Bates 2019). The dynamics and characteristics of this new rivalry, primarily between the United States and China, will be very different from what took place in the twentieth century. The previous era witnessed more cooperation and engagement, with the two countries' economies being entwined. By contrast, we are now witnessing an era in which there is a "decline in the long-standing rules-based international order" and the two economies are drifting further away at an accelerating pace (Mattis 2018).

While scholarship on this latest iteration of great power competition is emerging, much of the work is on its military, diplomatic, and hard power aspects. Though the two powers have become increasingly enmeshed in mutual interdependence, one of the central areas of competition is the battle for global technology leadership and manufacturing supremacy. As aforementioned, technology is not borderless but highly politicalized. Can the two powers continue to cooperate while the severity of their competition is deepening? Are the two great powers destined to be trapped in the de facto disintegration of economic and political relations even though China and the U.S. share mutually interdependent global value chains? Will competition and confrontation re-emerge between two sides with differentiated ideologies, political values, and remarkably different economic models? This paper reflects on the aforementioned questions on the basis of the competition between China and the U.S., the expanded competition between China and American allies, and the unpredictable shattering of rules-based orders.

2 Technological competitiveness and techno-politik

Theorizing on the relations between states as the central actors in the international system typically starts with the assumption of anarchy (Donnelly 2006, 141). As inherently rational actors in an anarchical international environment, states are desperate to continuously strengthen their national power for survival. Arms races and alliance formation reflect the international system's balance of power. Among hegemonic aspirants, when one strengthens itself by advancing its economic capability or military forces beyond those of others, others will respond in similar ways because of mutual distrust (Waltz 1979). These other powers may also seek achieve a balance of power through "external balancing", which occurs when they increase their security by forming alliances (Waltz 1979). Stability is maintained if the states reach a balance of power equilibrium. However, the return of China to great power status indicates that we may soon witness a compelling transformation of the power equilibrium. At least, in the East Asian region, China's policies and ambitions increasingly conflict with U.S. interests and threaten the region's equilibrium (Bader 2016). As the interests of the U.S. and China are fundamentally competitive or incompatible, a Sino-centric world order would be fundamentally incompatible with the U.S.-led liberal international system (Swaine 2019). Therefore, China and the U.S. will strengthen their respective competitive advantages while possibly weakening those of their adversaries.

According to the research of Schumpeter ([1934] 2008), there are positive correlations among technological innovation, a country's scientific and technical power, and its economic power. Whether an economy can stand out from the competition is primarily determined by the country's technological innovation capability. Technology thus serves as the endogenous driving force behind overall changes in global politics and global economy. Great powers, therefore, strengthen their economic capacities through continuous technology innovation, which provides them with powerful bargaining chips and tangible competitiveness. Breakthroughs in critical fields can substantially shift the future balance of economic and military power. The fourth industrial revolution, which is characterized by discontinuous breakthroughs in areas including artificial intelligence (A.I.), big data, fifth-generation telecommunications networking (5G), nanotechnology and biotechnology, robotics, the Internet of Things (IoT), and quantum computing, motivates governments to compete aggressively over the development and application of these critical high technologies.

In the meantime, technologies also serve to exert substantial impact on the balance of military power. After World War II, Morgenthau noticed that technology, though a driving force behind the progress of human society, also brings about the advancement of destructive power. Keohane and Nye (1977) argue that during the Cold War, nuclear weapons with the ability to destroy all humankind, in addition to the rapid development of technological advances in transportation and communications, made the entire field of international relations reconsider an even more interdependent global political and economic model. Though the mutual constraints imposed by nuclear weapons increased technological interconnections

and transboundary flows between nations, they regretfully failed to continue to motivate people to strengthen economic ties and mitigate mutual distrust. As Graham (2010, 66) claims, "technologies with military origins—refracted through the vast worlds of civilian research, development, and application that help constitute high-tech economies, societies, and cultures—are now being reappropriated as the bases for new architectures of militarized control, tracking, surveillance, targeting and killing."

Meanwhile, we should remember that technological preparation for war after 1945 sowed the seeds of the demise of state. In addition, technological advances also created the conditions for and compounded the threat of war by democratizing the means of violence and empowering non-state actors (Chin 2019). If technological changes eventually transform the means of production and trigger enormous economic and political turmoil in the West, they will lead to increased instability and possibly violence (Chin 2019). Therefore, as aforementioned, technology cannot be described as "apolitical" or "irrelevant" (Porter 2003). It goes beyond the domain of economics and traditional military confrontation. It necessitates a unanimous agreement at the international level and a consensus of values on the proper means of enforcing crisis management systems. However, technological innovations and scientific breakthroughs not only provide tangible metrics of progress in competitions between two different economic systems, but also symbolize national vitality in any ideological contest for the hearts and minds of the world's people (Center and Bates 2019). This implies that it is considerably difficult to reach agreements on how to improve and reform outdated global governance at all levels and across various dimensions.

Technology has implications beyond the technological realm. Therefore, policymakers have to be extremely cautious and concerned about whether cooperation across territorial borders might lead to strategic risks. Designing functional institutions of global economic governance is a vexing process involving complicated balancing between economic opportunities and political risks. Because of the critical role of technology in comprehensive economic development and national military power, great powers, particularly China and the U.S., will inevitably race to develop technology to pursue future global dominance.

3 The rush for technological dominance: economic privilege

The political leaders of both China and the U.S. profoundly recognize that technological innovation is a potent source of national power. Both leaders realize that the importance of technological leadership cannot be overstated. The American government attaches importance to the development of advanced manufacturing and the establishment of a national manufacturing innovation network to ensure that the next industrial revolution originates in the United States. The Obama administration launched American innovation strategies in 2009, 2011, and 2015. According to these strategies, the United States would use 3% of its GDP for research and development to restore its leading position in basic research and promote emerging industries; cultivate a new generation of talents with knowledge and skills in the

new century; build advanced infrastructure; and develop an advanced information technology ecosystem. In addition, the United States would promote key national projects that would achieve breakthroughs in areas including clean energy, biotechnology, nanotechnology, advanced manufacturing, educational and health information technologies, and space technologies, to ensure its dominant position in emerging industries (The White House 2009, 2011).

After Trump came into office, his administration announced the cancellation of several scientific and technological plans, such as the Clean Energy Plan and the Global Climate Change Plan, removing them from the fiscal year 2018 budget. However, this does not mean that the Trump administration undervalues the significance of technological innovation. In 2017, the Trump administration released its National Security Strategy, which emphasizes the necessity of maintaining world leadership in research, technology, and innovation to ensure that the United States has sufficient fighting capabilities and is capable of winning future wars. The Trump administration believes that the U.S.'s competitors are increasingly focusing on the use of emerging technologies that bring new threats to the U.S. Therefore, the United States must increase its investment in defence research and development to maintain military superiority and national security.

Unlike the Obama administration, which heavily invested in scientific and technological innovation research in areas such as energy, health, and education, the Trump administration transferred US\$52.3 billion from public investment to defence development and cut foreign aid funds by one-third to boost the military budget in the U.S.'s 2018 fiscal budget plan. For a long time, there has been a relatively high degree of integration and coordination among the military, enterprises, and the government in the U.S. national innovation system. The military often uses its own institutions to establish direct links with universities and industries, fund their research projects, and hire scientists as consultants. The integration among the military, universities, and research institutions is almost seamless. It encourages cooperative research and the diffusion of military technology to achieve industrial upgrades and enhance economic competitiveness (Block and Keller 2011). Therefore, though the Trump administration seems to have cancelled several research projects, it has only diverted money to the more needy part of overall national development. Moreover, the Budget Guide for F.Y. 2020 (The White House 2019a), which heavily invested on R&D, laid out the critical emerging technologies, including artificial intelligence and quantum information science, strategic computing, interconnection and automatic systems, and new applications of emerging technologies in traditional industries (e.g., agriculture and manufacturing). In addition, the Trump administration is committed to vigorously promoting its national spectrum strategy to enhance the competitiveness of American companies in the development of 5G (The White House 2018). Further, President Trump has signed an executive order requiring "all resources of the federal government" to promote U.S. innovation in the field of artificial intelligence to meet the challenges from "strategic competitors and foreign opponents" (The White House 2018). All in all, no matter how different the Trump administration looks from its predecessors, they have all strived to make the United States remain the land of the future through farsighted investments in innovation and technology, which, as Solow (1957) has shown, notably accounted for almost 90 per

cent of growth in U.S. output per hour in the first half of the twentieth century and will continuously help the U.S. maintain its legacy.

As for China, on 18 February 2009, the State Council reviewed and approved the 4 trillion RMB "Industrial Revitalization and Economic Stimulation Plan". It involves ten important pillar industries. The Chinese central government believes these industries to be the main contributors to China's industrial output and the drivers of economic growth. In 2015, to cope with the needs of the new round of scientific and technological revolution, the State Council, after reviewing and passing 'Made in China 2025'—the government's ten-year plan to update China's manufacturing base by rapidly developing ten high-tech industries—decided to establish a leading group. President Xi wants China to become one of the world's most innovative countries by 2020 and a leading global science and technology power by 2049. Made in China 2025 is regarded as the Chinese version of Industry 4.0 (Dominguez 2015), which "concerns the Chinese National Destiny" (Zhou and Wang 2019). China is implementing Made in China 2025 to promote the deep integration of informatization and industrialization and to realize the leap-forward development of its manufacturing industry. Further, China expects to maximize self-sufficiency. One of the key objectives of Made in China 2025 is to raise the indigenous proportion of the core components and materials in high-tech manufacturing to 70 per cent by 2025. With much more explicit targets, Made in China 2025 applies more favourable policies and intensively distributes more resources to target industries and sectors. When President Xi says that China's goal is "being the master of its own technologies", anxieties seem to be the natural sentiment for Washington, which believes that the U.S. faces real and threatening competition from China's plans to become a leader in high-tech innovation. Made in China 2025, in addition to the Belt and Road Initiative and the Asian Infrastructure Investment Bank, is believed to substantially threaten the global hegemony of the U.S.

The U.S. is concerned that its rivals are moving quickly to surpass it in the deployment of advanced technologies, even though China is still lagging far behind it in terms of Global Competitiveness. As shown in Table 1, China has ranked anywhere from 34 to 27th place since 2008, while the U.S. has maintained its top-ranking position. China is still struggling in critical core technologies, including semiconductors and A.I. HiSilicon, China's largest semiconductor company, reportedly had US\$7.6 billion in revenue in 2018, about one-tenth the revenue earned by U.S. chip giant Intel. As for talents in the AI industry, China had 18,000 AI talents in 2017, while the United States had more than 28,000 people (Wu et al. 2019). With regard to the percentage of R&D expenditure in GDP, China reached 2.15% of GDP in 2017, while the U.S. reached 3.12% of GDP—China is still lower than the U.S. by 0.97 percentage points.

It is important to notice the technological gap between the two sides, and it is even more important to be aware of whether and how quickly the gap is closing. In terms of R&D expenditure of GDP, the gap between the two powers narrowed from 1.32% in 2008 to 0.64% in 2017. If Hong Kong is also included in China's figures, Beijing already exceeded U.S. GDP spending on R&D in 2012, as shown in Table 2. China, as the second-largest R&D expenditure country, funded more R&D than the next four highest countries—Japan, Germany, South Korea, and France—combined

Table 1 Global competitiveness index ranking, 2008–2019

	US		China	
	Score	Ranking	Score	Ranking
2008	5.74	1	4.7	34
2009	5.59	2	4.74	29
2010	5.43	4	4.84	27
2011	5.43	5	4.9	26
2012	5.47	7	4.83	29
2013	5.48	5	4.84	29
2014	5.54	3	4.89	28
2015	5.61	3	4.89	28
2016	5.7	3	4.95	28
2017	5.85	2	5	27
2018	85.6	1	72.6	28
2019	83.7	2	73.9	28

Sources: World Economic Forum, Global Competitiveness Report 2008–2019

The GCI 4.0 introduced a new progress score ranging from 0 to 100 in 2018

Table 2 R&D Expenditure of GDP (%) (2008–2017)

Country name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
China	1.446	1.665	1.714	1.780	1.912	1.998	2.030	2.066	2.118	2.145
Hong Kong SAR, China	0.720	0.773	0.749	0.721	0.727	0.730	0.740	0.762	0.791	0.799
Macao SAR, China	0.102	0.054	0.050	0.044	0.048	0.051	0.087	0.136	0.234	0.172
China (with Macao SAR and HK SAR)	2.267	2.493	2.514	2.546	2.688	2.779	2.857	2.963	3.143	3.116
United States	2.768	2.813	2.735	2.765	2.682	2.710	2.719	2.717	2.760	2.788
Germany	2.597	2.726	2.714	2.796	2.868	2.821	2.867	2.912	2.917	3.022
France	2.061	2.212	2.179	2.192	2.227	2.237	2.276	2.267	2.242	2.185
United Kingdom	1.623	1.683	1.661	1.665	1.594	1.639	1.659	1.668	1.682	1.664
Japan	3.337	3.231	3.137	3.245	3.209	3.315	3.400	3.282	3.155	3.213
Korea, Rep	3.123	3.293	3.466	3.744	4.026	4.149	4.289	4.217	4.227	4.553

Source: World Bank, World Development Indicators (2008–2017), <https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?locations=CN>

(World Bank). In 2017, China accounted for 23% of the world's gross domestic expenditure on R&D (GERD). By examining 36 indicators of China's scientific and technological progress vis-à-vis the United States over the span of about a decade, China has made dramatic progress in innovation relative to the United States (Atkinson and Foote 2019). Moreover, despite problems of efficiency and effectiveness, China contributes 40 per cent of global patent applications, which is more than double the share of the United States. With regard to global competitiveness rankings,

China has steadily risen and is already more advanced than average high-income economies in terms of investing in the research and development sub-pillar of innovation. China was also home to 33% of the world's "unicorns" (private companies valued at over US\$1 billion) in 2017, up from 12% in 2014. As a country that has constructed the world's largest radio telescope, sent the world's first quantum communications satellite into space, and launched manned space flights, China has given sufficient reason for Washington to be concerned about the continuously narrowing gap between the two countries. As the Trump administration claims, a rising China poses an existential threat to American pre-eminence (Friedman 2020).

Moreover, the U.S. is concerned about how China realized all its astonishing developmental and economic achievements. Because of the unique market economy and political system of China, Western countries raise concerns due to the assumption that these accomplishments were achieved through state-led strategies. China is criticized for serving as an authoritarian vanguard in this competition by closing off its markets, subsidizing innovation, and using forced technology transfer and intellectual property theft (Nye and Hart 2019). China's R&D expenditure surged from 1.45 per cent in 2008 to 2.145 per cent of its GDP in 2017. Western countries believe that such a shift was mainly propelled by government measures. Even a report from the Organisation for Economic Co-operation and Development showed that government-financed GERD accounted for 44% of China's GDP. By comparison, R&D financed from the American government accounted for 65% the U.S.'s GDP (OECD 2020). Think tanks in Washington and officials in the White House argue that state-owned enterprises (SOEs), which follow orders from government officials functioning as representatives of ownership, take supreme roles in the Chinese economy (Szamosszegi and Kyle 2011). The privileges of SOEs entitle them to low-interest loans from China's state-owned banks and fiscal allocation. Therefore, the close connections of SOEs with the Chinese government substantively downplay the nature of SOEs as enterprises. SOEs are widely criticized for blurring the boundaries of business environments such that foreign businesses are frequently uncertain whether they are doing business and competing with enterprises or with the Chinese government.

Since Trump came into power, apart from intensifying geopolitical competition, his administration has mainly challenged China's quest for alternative technical standards, its pursuit of technological dominance, and its military advancement (Tellis 2020). Washington believes that the Chinese Communist Party intentionally provides Western markets with irresistible economic benefits and enormous short-term costs, which will eventually help China assume hegemony over the global economy and lead Western countries to inevitably depend more on Chinese technology. Some even exaggerate concerns from the scenario in which China defines most technical and technology standards, which they believe would make more associated data subject to the Chinese government's various data localization and access policies (Kharpal 2020). China is actually drafting a new Data Security Law and facilitating legislation on domestic personal information protection to enable the flow of data into China. In addition, China has begun to promote two-way data flows through international agreements (Liu 2020). However, what China is doing seems resonate with the aforementioned preconceived concerns. China is set to release a

new plan called "China Standards 2035" to influence how the next generation of technologies, from telecommunications to artificial intelligence, will work. This will "shape the playing field and landscape for the future of these technologies" (Kharpal 2020). Even the U.S. recognizes that technological challenges necessitated China's long journey toward potential technological dominance, though such an ambitious plan with clear and frightening targets still drives escalating concerns from the U.S. side.

4 Maintaining military superiority and shifting China–U.S. relations

The growing uneasiness of Washington partly comes from uncertainty regarding China's technological superiority and partly emerges from China's whole national system. President Xi, on April 27, 2020, addressed speeding up the construction of a new nationwide system for core technologies (Xinhuanet 2020). Civil-military fusion, which refers to the translation of commercial technological success to military applications and has been prioritized by the Chinese central government since 2012, is also specifically addressed in Made in China 2025. Xi repeatedly emphasized that "we will speed up implementation of major projects, deepen reform of defence-related science, technology, and industry, achieve greater military-civilian integration, and build integrated national strategies and strategic capabilities" (Xinhuanet 2017b). Just as the conversion of military technologies to civilian technologies extensively accelerated the U.S. economic boom in the 1950s and 1960s, the mutual development and deeper integration of civilian and military technology are fundamental to driving further economic development this era. The Chinese military plays a powerful role in China's economic and institutional development, and it has been deeply embedded in the ideologies of China's political leadership, China's national security and economic development, and China's strategic design and organizational solutions in practice (Feigenbaum 2003). This remains true today.

The Chinese military and defence industries take active roles in R&D and experimentation. However, China did not heavily invest in military modernization until the late 1990s (Fan 2015). Driven by military-civil fusion, the gap between foreign military equipment and domestically manufactured equipment has significantly narrowed. China's People's Liberation Army (PLA) already ranks among the leading militaries in various emerging technologies critical to the future of warfare, including artificial intelligence. Given the rapid economic development of China, it is not unexpected for China to enhance its overall comprehensive power, including military power (Fan 2015). Feigenbaum argues that China harvested U.S. expertise and technology from cooperation or exchanges with foreign businesses and research institutions (Feigenbaum 2020), though these have long been mutually beneficial processes (Xue and Simon 2013). However, as U.S.–China military competition over technological superiority will shape the broader bilateral strategic competition and affect global security and stability through the potential diffusion of new weapons systems and capabilities (Kania 2020), Washington is now soberly aware of putting down the fantasy that China will not turn butter into guns.

Secretary of State Pompeo made a speech in Silicon Valley in which he called on U.S. technology companies to distance themselves from any business with China that might strengthen China's military, "tighten the regime's grip of repression", or help to "power a truly Orwellian surveillance state"(U.S. Department of State 2020). It is absolutely not in the best interests of the U.S. if China is in the American supply chain with regard to military procurement. Department of Defense officials already pay a great deal of attention to actions to improve supply chain security (US Department of Defense 2018). Moreover, the Office of the U.S. Trade Representative's tariffs mainly target the high-tech products defined as China's top priorities in Made in China 2025, including instruments and apparatuses used in telecommunications networks. The U.S. Department of Commerce's Bureau of Industry and Security (BIS) expanded its Entity List on 1 August 2018. The 44 Chinese parties on the list, including large state-owned enterprises, their subsidiaries, and high-tech research institutions involved in the semiconductor industry, are restricted from certain actions, as BIS believes these entities act "contrary to the national security or foreign policy interests of the United States" and are "involved in the illicit procurement of commodities and technologies for unauthorized military end-use in China" (U.S. Department of Commerce, Bureau of Industry and Security 2018b). After FBI Director Christopher Wray warned against buying Huawei and ZTE phones, the Pentagon banned the sale of Huawei and ZTE phones on U.S. military bases. A year later, Huawei, on the basis of the "reasonable cause that Huawei has been involved in activities contrary to the national security or foreign policy interests of the United States", was also added to the Entity List by BIS. Non-U.S. affiliates of Huawei were also added to the Entity List for the same reason. After the Department of Commerce halved the number of licenses that let U.S. companies assign Chinese nationals to sensitive technology and engineering projects, five Chinese companies involved in the Chinese government's supercomputing program were added to the Entity List. As a result, U.S. companies are prevented from doing business with them (Feng and Laskai 2019). All these actions are not based entirely on account of fact-based guilt, but rather substantially reflect the anxiety and concerns of Washington and its intention to preserve its pre-emptive advantages.

The FBI investigated more than 1000 cases of Chinese theft of U.S. technology and disclosed all the methods the Chinese government and its agents have been using to target U.S. companies and universities to steal intellectual property (Reuters 2020a). In February 2020, FBI Director Wray even said that Chinese espionage poses a "whole-of-society threat" and that "non-traditional collectors" of intelligence, including professors, scientists, and students, are exploiting the open environment at U.S. universities (CSIS 2020). It is still too early to tell whether this signifies a recurrence of the 1950s, when promising Chinese talents were forbidden from returning to China. However, the Thousand Talents Program created by the Central Coordinating Group on Talent (CCGT) attracted a great deal of attention from Washington. What is clear is that the long-established international exchange and collaboration between China and the U.S. can no longer be counted on. The era of borderless innovation is over. Critically, Beijing will mobilize China's extensive network of state and military research institutes to develop domestic replacements to critical components to achieve "self-reliance". This means that China's indigenous

innovation capability will increase sharply at an accelerating pace under such unexpected tremendous pressure. This process will inevitably involve even more blurred boundaries with regard to joint efforts between state-owned enterprises and the private sector. This will further exacerbate the divergence and mutual distrust between China and the U.S.

During severe competition, rivals either develop mild cooperation or suffer from weakened critical collaboration. As Carafano claims, "competing effectively with China will require tapping into innovation in critical technologies wherever it may appear", and "competing effectively means it is as important, if not more important, to sustain American strengths and competitive advantages as it is to weaken our adversaries" (Carafano 2020). The rush of new technologies is bound to affect how the national policy decision-makers of the two powers try to either sustain America's competitive strengths or increase China's power. Former U.S. Treasury Secretary Henry Paulson once warned: "I now see the prospect of an economic Iron Curtain—one that throws up new walls on each side and unmakes the global economy, as we have known it" (Paulson 2018). The world is gradually drifting apart technologically. Both China and the U.S. strive to limit the other's access to advanced technologies, seeking self-sufficiency and autonomy. This is not an overestimation, especially since the U.S. is working on this with its long-term traditional allies.

5 Value-Based coalition: America is not alone in its cold-war-style war with China

In the global chess match of great power competition, many countries around the world are struggling in the growing geopolitical and technological contest between America, their main security ally, and China, their top trading partner, and it is not possible for them to play a role as a third force balancing between the two powers. In January 2020, British Prime Minister Johnson announced that the United Kingdom, a founding member of the North Atlantic Treaty Organization (NATO) and the closest American ally, would allow Huawei, a Chinese telecommunications company, to provide equipment for Britain's next-generation 5G mobile network. As a "high-risk vendor", Huawei is subject to a 35% market share cap, as well as technological and geographic restrictions. Even though Huawei technology is strictly excluded from the most sensitive parts of the country's new 5G network, this policy still signals that the British will not completely prohibit the provider, as the United States wishes (Friedman 2020). Similarly, Germany looks poised to allow Huawei to contribute to its 5G network. German Chancellor Merkel, in January 2020, signalled her desire to avoid an outright ban on Huawei and her inclination to instead adopt security standards (Bennhold and Ewing 2020). France, in March 2020, swiftly disclosed similar plans allowing high-risk vendors like Huawei to equip portions of its 5G network (Rosemain and Barzic 2020).

It seems Washington's campaign to isolate Huawei through legal action and financial sanctions has on the whole failed, and "the attempts to construct an explicitly anti-China alliance will fail" (Friedman 2020). However, this does not mean that the traditional alliance between the U.S. and the rest of the West has

suffered a real defeat. The U.S. president was reportedly "apoplectic" in a phone call with British Prime Minister Johnson. Pelosi said the European countries had taken a "very dangerous" path, and "It's about putting the state police in the pocket of every consumer" (Peel et al. 2020). U.S. officials have also given statements that show Washington's displeasure, such as "our special relationship is less special now" and "during the Cold War, Margaret Thatcher never contracted with the KGB to save a few pennies" (Overly and Geller 2020). All these statements are not only face-saving gestures from the U.S. side. Such reactions reinforce European partners' worst fears about zero-sum dynamics between Washington and Beijing. As Singapore's Prime Minister Lee Hsien Loong said, "I think it's very desirable for us not to have to take sides, but the circumstances may come when ASEAN may have to choose one or the other" (Wong 2018). This is also true for the U.S.'s European partners.

Moreover, too much attention to 5G causes insufficient attention to other core high technologies. According to Elsevier (2019), China published more papers on quantum technology than any other country in the decade through 2018. The Chinese government reportedly invested RMB 10 billion in building a national quantum computing laboratory in Anhui Province in 2017 (Xinhuanet 2017a). Given the threats brought by the technology's implications for national security, key powers, including the U.K., Japan, and the U.S., are all striving for possible advantages in the race for a viable quantum computer. The British government founded its National Quantum Technologies Programme in 2013 and poured around £1 billion of massive government investment into it. The British government has since announced an additional £153 million investment to stimulate further quantum technology innovation, backed by more than £200 million in private sector investment (Walmsley 2019). Since the end of 2019, Japan, the U.S., and Europe have teamed up to counter China's quantum rise by conducting joint R&D to seek advances in ultrafast computers and secure communications (Oikawa 2019). With the decades-long head start that British has in quantum technologies, in addition to the powerful strength brought by significant venture capital investment in the sector in the U.S. and Japan's strong track record of foundational research in quantum technology, it is not difficult to imagine the ferocity of the competition is China facing. However, China faces even more challenges. Limits on business cooperation in sensitive fields already indicate that the door is closing for China's partners, which have become accustomed to "win-win" cooperation over the last few decades. What is more, China has to confront an exclusive club that insists on cooperating with fellow members only.

As Friedberg says, "the magnitude of the challenges posed by China by far exceeds any complaints we may have with the E.U., Japan or Korea about trade issues" (Boustany and Friedberg 2019). A report from NBR proposes that the allies join forces to exert the maximum possible leverage to force Beijing to stop its market-distorting trade and industrial policies. Beijing would find itself at an increasing disadvantage in the global economy if it did not adhere to the allies' norms and standards (Boustany and Friedberg 2019). Essentially, the debate on 5G has never been about technological calculations or costs and benefits from an economic perspective. In February 2020, Pelosi underlined the bipartisanship of the U.S.

approach to the Chinese technological threat by saying that the decision on 5G networks represents a choice between democracy and autocracy, claiming, “it is about security, it is about the economy, and it is about values” (Pelosi 2020).

Once values are recognized as the core of the debate, the subject of the conversation is primarily about how to prevent the Western coalition established after 1945 from any possible instabilities. U.K. officials have argued that “Huawei never has been and never will be in our most sensitive networks. The security of our intelligence sharing is wholly protected”, and the U.S. has said it will not change its intelligence-sharing policy with the U.K. despite the British Huawei decision. This shows the tight intelligence ties between the two countries’ part of the “Five Eyes” intelligence alliance is not shaking. Moreover, Sino–Japan relations have been improving since late 2017, with both sides reflecting positively on the 40th anniversary of the signing and taking effect of a friendship treaty between the two nations. However, Japan–China relations remain fragile because of unsolved territorial disputes and the two countries’ long and complicated history. Common strategic interests in the face of a rising China tightly connect the U.S. and Japan. The U.S.–Japan alliance is a vital instrument for tackling uncertainties and risks, including possible instabilities from China’s assertive actions in the Asia Pacific region, such as in the East China Sea, the South China Sea, and Taiwan Strait. Therefore, compared with up-and-down Sino–Japanese relations, the alliance with the United States continues to be the cornerstone of Japan’s diplomacy and security. Tokyo is realistic about the prospects for real progress in its bilateral relationship with China: “...it will be essential to adopt a ‘hedge and engage’ approach. Engagement is implemented to ensure that China does not become a threat while remaining vigilant. Hedging is applied to prepare for any threats” (Kato 2019, 23). Singapore Foreign Minister Vivian Balakrishnan also said that Singapore has to find ways to deepen cooperation with both sides as Sino-US rivalry intensifies (Cheong 2020). This reflects the mindsets of most U.S. allies. Though they might adopt an engagement strategy towards China, they are sober-minded about what the cornerstone of survival is for them, given the long-existing, value-based consensus on where threats come from.

China has become the world’s second-largest economy and is shifting towards a more assertive strategy towards the West. China’s rapid emergence seems to speed up the relative decline of the U.S. As Jones notes, “a strategy of direct confrontation with the United States and its allies will be difficult, risky, and expensive for China. This does not mean it is not possible” (2020). The United States will not risk falling behind in the critical technological competition, nor risk being denied its role as the leading hegemonic power. Compared with an emerging China, the United States still has a better balance of risk and opportunity to shape international affairs in the period that lies ahead (Jones 2020). The U.S. surely realizes that its allies and partners will not separate or decouple from China in key areas in which technology and security meet if the American government only provides them with various risk report without effective and efficient alternative options (Ford 2020). However, allies caught in the competition between China and the U.S. would enlist themselves in a U.S.-led coalition and together usher in a bifurcated world, as the values of the post-war international order fundamentally support the coalition established after 1945. When Pompeo described the Chinese Communist Party as “the central threat

of our times" (Reuters 2020b), and when China was intentionally stigmatized during its efforts to counter coronavirus, the solidarity and unity of the coalition was virtually consolidated. Moreover, no one should undervalue the possible self-correction and cyclical nature of Western powers. If the U.S. and its allies can successfully maintain their prosperity and security, the magnetic power of China and incredibly intertwined international relations will not prevent a Cold War-style great power strategic competition driven by severe technological competition. We are undoubtedly entering a phase of rivalry between great powers again, though we are not yet sure of the intensity of the competition.

6 China and the U.S.: uncontrolled competition on the basis of a shattering rules-based order

The Trump administration clearly intends to decouple from China, particularly by uprooting high-tech supply chains that will be unfortunately maintained in the near future. The U.S. has reached a unanimous bipartisan consensus on an expansive definition of national security and technology. However, China's rise, particularly as an innovation powerhouse, will continue. As President Xi said in a speech commemorating the 70th anniversary of the Chinese Communist Party's rule, "There is no force that can shake the foundation of this great nation", and "No force can stop the Chinese people and the Chinese nation forging ahead" (People Daily's 2019). After 1978, particularly after China entered the World Trade Organization in 2001, China benefited from economic entanglement with other countries, especially the United States, building and strengthening its economic foundation and acquiring new technologies while developing its high-tech sectors. Unlike the last several decades, China might find itself travelling solo in the future. The United States needs sustained effort and collaboration with allies, as well as a firmer consensus with its allies and partners about how to pool resources, to counter China's rise and growing influence. This might have negative consequences for their economies. As Mearsheimer (2014) argues, the United States has a profound interest in seeing the Chinese economy slow down considerably, which could well prove disastrous to American businesses that heavily rely on China. Despite this, the United States should still do what it can to slow the rise of China, which is in America's interest and in the interest of China's neighbours (Mearsheimer 2014).

Many observers conclude that the post-Cold War era of international relations, which is referred to as the "unipolar moment" (with the United States as the unipolar power), began to fade from 2006–2008 (O'Rourke 2020). China's rise is often accompanied by corresponding predictions of inevitable conflict and U.S. decline (Lewis 2018). The idea of a "Thucydides trap", an analogy that draws upon the Peloponnesian War in ancient Greece to suggest that China and the U.S. may be headed for war, is still debatable, since the analogy fails considering the factors including international institutions, economic interdependence and public resentment towards war. However, Washington believes that China clearly "wants to shape a world consistent with their authoritarian model—gaining veto authority over other nations' economic, diplomatic, and security decisions" (Mattis 2018, 2). The 2018 U.S.

National Defense Strategy argues that the U.S. is "facing increased global disorder, characterized by a decline in the long-standing rules-based international order" and that "inter-state strategic competition, not terrorism, is now the primary concern in U.S. national security" (Mattis 2018, 1). When the Cold War took place in the twentieth century, the post-war order and various international institutions gradually came into being and aimed to keep peace through collective military might and shared prosperity. Despite enormous hardships and intermittent disruption, the U.S. made utmost efforts to enforce security and sustain its global leadership, which the majority of its allies recognized. However, the 2008–2009 financial crisis not only signalled that the post-war order that has dominated geopolitical affairs for more than 70 years is on life support, but also indicated that the U.S. has fallen short of its wish to maintain the order as its relative power declines. The stability of the post-war order has been challenged by a surge of nationalism, populism, and, not least, the United States. The primacy of national interests has been readdressed by Trump, which weakens the language of multilateral cooperation and intentionally ignores the sophisticated institutions that hold the world together. The backlash to liberal democracy is not exaggerated. The fact of Brexit concretely knocks down the seemingly firm faith of the West in multilateral cooperation. Liberal internationalism is essentially threatened by developments within the West itself (Ikenberry 2018).

The increased global disorder is characterized by the decline and internal collapse of the rules-based post-war international order, and the U.S. has fallen short, psychologically and economically, of taking on the burdens of global leadership. The democratic system guarded by the U.S. and its allies is even more fragile when it confronts threats from a single high-tech company that is believed to represent an entirely different value system (CGTN 2020). The emergence of a powerful China is only a catalyst for the internal collapse. Critically, even though the U.S. seeks to convince its allies to share more responsibilities and alleviate burdens from American shoulders, the U.S. will not risk considering China for sharing such responsibilities if China's involvement would undermine American dominance. Therefore, the U.S. and its allies have to pick up the broken fragments and pieces of the post-war international order and struggle to glue them back together while creating barricades to prevent threats from a non-Western, non-democratic, and non-market-economy country, China. The United States and its Western allies might stand firmly to protect the 75-year-old order while concealing their sinister motives on premises that have little to do with official post-war institutions, customs, and traditions. The law of the jungle is returning in popularity in an anarchic world where we used to have an illusion of order. In the short term, China might find some opportunities from the dynamics of great power competition, but the correlation of world forces has not changed fundamentally in favour of socialism and to the detriment of Western capitalism (Aspaturian 1980). As the second-largest country in the world, China naturally seeks to enhance its technological superiority, though it should not be overconfident in its inevitable and irresistible rise. There is a long road before China can announce the triumph of its grand plans because of the inherent uncertainty of big plans and external unpredictability. However, the U.S. would rather describe the potential for China's triumph as an imminent threat to call for strength and defeat—but not compete with—China. Before the end of the fierce and vicious competition,

which is for the rules, norms, and institutions that will govern international relations in the decades to come, China and the U.S. will inevitably confront the challenges of preventing competition from falling into conflict.

The fight against a pandemic should be a perfect opportunity for the great powers to resume cooperation. However, COVID-19 is unfortunately becoming one more feature of great power competition, rather than an exception to it (Fontaine 2020). COVID-19 has provided a perfect opportunity for the Trump administration to accelerate the process of disintegration between China and the U.S. across all dimensions. The U.S.'s deep-rooted bipartisan consensus on disintegration, in addition to the politicization of efforts to counter COVID-19, make it challenging to replicate the experience of China and the United States in their fight against the 2014 Ebola outbreak in West Africa. Geopolitics and ideology have replaced positive thinking. COVID-19 further motivates the U.S. side to step up to curb China's technological innovation, deliberately split the global value chain for security, and exacerbate mutual misperceptions between the Chinese and U.S. governments and societies. However, insightful people from both sides still call for working together to fight against the overwhelming pandemic at all levels, which brings a glimmer of hope. Whether China and the U.S. will maintain virtuous competition without falling into vicious competition and severe conflict will fundamentally depend on efforts, tolerance, and restraint from both sides.

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