Beat China

Targeted Decoupling and the Economic Long War

FEBRUARY 2021

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INTRODUCTION

By Senator Tom Cotton

The Trump administration's most consequential policy will prove to be, in my opinion, a tougher stance against the People's Republic of China. Since the 1980s, presidential candidates of both parties have run as tough on China, only to soften their positions once elected. But President Trump was the exception to this rule, and his administration pursued a campaign to harden our defenses against China's aggressive behavior, and to sound the diplomatic alarm around the world.

This approach deserves praise, and it ought to form the starting point for a long-term, bipartisan national strategy. The ultimate objective of that strategy should be, to quote the document that launched this country's ultimately successful strategy against the Soviet Union, the "breakup or the gradual mellowing" of the Chinese Communist Party's (CCP) power. Our strategy must take seriously the critical military, diplomatic, intelligence, and propaganda challenges posed by Beijing. And it must identify and account for the novel characteristics of strategic competition with an adversary such as the CCP in a nuclear and globalized age—especially the role played by economic policy. As Chairman of the Subcommittee on Economic Policy in the previous Congress, I convened two hearings on these matters in 2020, and directed my staff to conduct further research and outline a strategy for beating China within the economic dimension of our contest. This report is the fruit of that effort.

The economy is the primary theater of our conflict with China. We must, of course, maintain an unmatched military capable of defeating the People's Liberation Army, as well as a diplomatic coalition to counter China. But this report focuses on economic integration between China and the United States and our allies—precisely because the CCP aspires to use this entanglement, which far exceeds trade flows between the free world and the Soviet Union during the Cold War, to displace us and reorder the globe according to its own ugly ideology without a major war. The CCP's methods are subtle. The Party exploits the economic freedom of the United States and most of our allies—a freedom that allows countless actors to pursue their interests without consideration of an American "strategy." No such condition exists in China, and the actions or potential actions of every Chinese firm are ultimately subordinate to the control of the Party.

To be sure, the CCP will risk a military conflict to preserve its hold on power at home—for example, to secure control over Taiwan—or if tempted by American irresolution. But the CCP prefers a gradual, if tense, competition in which, decades from now, Americans wake up to discover ourselves poorer, weaker, and disadvantaged by a global order dictated by China. In this future,

America's freedom and prosperity gradually erode in areas where few pay much attention—telecommunications infrastructure, currency, critical manufacturing capabilities, supply chains for strategically significant resources like pharmaceuticals and rare-earth minerals, semiconductor-design standards, and many more. By the time Americans realize the extent of our loss, the CCP hopes, it will be too late.

Indeed, China's strategic thinkers have openly discussed this objective for a while now. And China's quiet maneuvering across many fields of competition confirms that the CCP actively pursues this objective. But General Secretary Xi Jinping's signal mistake may have been to reveal China's ambitions too early—to "ask the weight of the emperor's cauldrons," to quote an ancient Chinese proverb. This error, combined with the CCP's brutal misrule and systemic deceit, which unleashed a plague upon the world, has opened eyes internationally to the China threat and created an opportunity for action. This opportunity must be seized.

How should America respond? How do we beat China in the economic theater of the conflict? This report proposes a strategy of targeted decoupling from China, matched with policies to mitigate the economic costs of this decoupling. We should, for instance, increase support for basic research and development, expand the American talent pool in advanced scientific and technological fields, deepen economic cooperation with our allies, and rebuild secure, scalable, domestic manufacturing in strategically significant sectors. We also must insist that our allies—whose freedom is also at stake, after all—pursue their own policies of targeted decoupling. Finally, the report calls for re-organizing parts of the federal government with a leading role to play in the economic theater of war.

Our nation has the political will to conceive and execute this strategy on a bipartisan and long-term basis—indeed, the scope of the Chinese threat likely will have a unifying effect on our politics. But any such strategy will have its critics. Some objections are trivial and incoherent, such as those from critics who believe America is too morally compromised to lead or even to defend itself. Such "woke" critics should realize that a racist, imperialist power does, in fact, exist—but in the form of the Han-supremacist CCP, which interns ethnic minorities in concentration camps, despoils the environment, and ruthlessly seizes territory to improve its military position and hoard access to resources.

More significant are critics who mistakenly deprioritize the real, concrete, present-day threat of China in favor of abstract "transnational" challenges. China's leaders eagerly propose to cooperate on, say, climate change because they believe naïve, credulous American policymakers will offer concrete concessions for distant promises. Borrowing from J. Wellington Wimpy, they will gladly promise to reduce carbon emissions in 2060 if the United States would merely give them Taiwan today.

Finally, the most significant domestic resistance will come from the China Lobby: American and Western companies profiting off economic integration with China. The lure of China's subsidized production capabilities and large and increasingly prosperous market has created a powerful coalition with great political influence. The China Lobby recoils at any claim that America's prosperity and security—indeed, our very survival as a free nation—takes precedence over its bottom line.

Sadly, the China Lobby, its influence, and the strategic advantage it provides Beijing, are no happy accidents for the Chinese Communist Party. As in so many other cases, the CCP has patiently cultivated its de facto allies in American business. During tense moments in trade negotiations with the Trump administration, China's leaders explicitly asked American CEOs to lobby the administration and Congress on its behalf. They do the same through governors and mayors, university presidents, and influential cultural and media figures. The time has come, though, to call the China Lobby what it is, and ask if they really want to sell the proverbial rope that the communists in Beijing will use to hang us all.

The challenges of Nazi Germany, Imperial Japan, and the Soviet Union all ended with total American victory; the Cold War was even won without direct military conflict. Once again, America confronts a powerful totalitarian adversary that seeks to dominate Eurasia and remake the world order, albeit with its own unique and subtle approach. China started its struggle for mastery against the United States decades ago, but only recently has America awoken to the challenge. Judging from history, a slow start is perhaps the American way of strategy. But so is victory.

Senator Tom Cotton
February 2021

EXECUTIVE SUMMARY

The United States is in the middle of a strategic competition with China that may last as long as the Cold War. The U.S. and Chinese economies have grown too entangled, particularly in critical sectors such as defense, technology, and medicine. The urgent task for policymakers is to disentangle our economies, encourage strategic partners to do the same, and build new capabilities in America.

This report proposes a strategy of targeted decoupling from China, matched with policies to mitigate the economic costs of this strategy. The report also proposes to partly re-organize some key government agencies to prepare for the long economic war with China.

The costs of targeted decoupling with China pale in comparison to the costs of passivity. We cannot watch as America becomes less prosperous and cedes its position to a totalitarian power dedicated to bending the world to its will. Americans must act decisively to avoid this fate.

TARGETED DECOUPLING

A strategy of targeted decoupling from China will have the following objectives:

- Restore secure, scalable, domestic productive capacity in areas critical to national security
- Maintain technological advantage over China in strategic areas
- Preserve U.S. dollar dominance
- Slow China's growth

Targeted decoupling requires policymakers to focus on broad areas of concern such as trade and investment. It also requires focus on specific sectors such as higher education, entertainment, semiconductors, telecommunications, rare-earth elements and critical minerals, medical supplies and equipment, and artificial intelligence and quantum computing.

RULE-BREAKERS, SANCTIONS, AND TRADE

- Sanction the perpetrators and beneficiaries of Chinese intellectual property theft
- Expand the Treasury Department's Office of Foreign Assets Control to help it carry out this sanctions campaign
- Expand the U.S. Intelligence Community's collection efforts related to China's economic and technological development
- Apply targeted import duties on Chinese companies that engage in anti-competitive practices
- Tighten U.S. export controls on certain advanced technologies for all Chinese end-users
- Revoke China's Permanent Normal Trade Relations status

INVESTMENT

- Expand restrictions on U.S. outbound investment in China to include investments in Chinese technology companies, companies tied to the Chinese Communist Party (CCP), and companies implicated in the CCP's human-rights abuses
- Restrict certain investments in the Chinese market by U.S.-based investment funds, including public and private pension funds
- Require the Committee on Foreign Investment in the United States (CFIUS) to scrutinize inbound Chinese investments into strategic sectors with a presumption of denial

HIGHER EDUCATION

- Bar funding from the Chinese government or nominally private entities acting on its behalf to U.S. universities, laboratories, and other research institutions
- Restrict university faculty and staff from accepting compensation from entities linked to the Chinese government
- End American higher education's satellite university system in China
- Bar Chinese nationals in graduate and post-graduate programs in the United States from studying or conducting research in sensitive science, technology, engineering, and mathematics fields
- Expand the State Department's Visa Mantis program to vet Chinese national applicants
- End the 10-year multi-entry visa program for Chinese nationals

ENTERTAINMENT

- Ban all Chinese investment in U.S. film and television studios, streaming services, and platforms that show movies and TV shows in the United States, such as movie theater operators and cable and broadcast television providers
- End DOD, CIA, and FBI support to any studio that allows content it releases in the U.S. market to be censored by the CCP

SEMICONDUCTORS

- Ban the sale of cutting-edge semiconductors, semiconductor machinery, and software-design tools developed or produced with U.S. technology to Chinese entities
- Explore establishing a multilateral semiconductor trading and export-control bloc
- Upgrade U.S. semiconductor manufacturing capacity via federal grants and public-private partnerships

TELECOMS AND 5G

- Continue efforts to halt Chinese firms from expanding their positions in global 5G telecoms networks and impose further sanctions on Huawei
- Develop a viable 5G alternative to Chinese vendors within a reasonable timeframe, in conjunction with allies
- Establish an American-led 5G coalition

CRITICAL MINERALS AND RARE-EARTH ELEMENTS

- Diversify foreign sources of rare earths to reduce reliance on China
- Build domestic rare-earth production and processing infrastructure that can be scaled quickly in the event of a crisis or protracted conflict
- Prohibit federal purchasing of items containing rare earths and critical minerals mined or processed in China by a certain date
- Establish a national strategic stockpile of rare-earth inputs large enough to sustain the military and economy for as long as it would take to reach full wartime production

MEDICINE AND MEDICAL EQUIPMENT

- Prohibit federal purchasing and reimbursement of drugs that contain active pharmaceutical ingredients made in China by a certain date
- Create an FDA requirement that all drugs sold in the United States must include conspicuous country-of-origin labeling for their active ingredients
- Expand the Strategic National Stockpile so that it contains sufficient medical supplies and equipment to last at least six months during a crisis
- Retain or reshore enough domestic medical-equipment manufacturing so that production can be increased to meet crisis-level demand within six months

ARTIFICIAL INTELLIGENCE AND QUANTUM INFORMATION SCIENCE

- Explore a series of data sharing and data export-control agreements with trusted allies and partners
- Close American artificial intelligence research and development (R&D) centers in China, as well as Chinese artificial intelligence R&D centers in the United States

MITIGATING THE COSTS OF DECOUPLING

Targeted decoupling with China will impose up-front costs and create risk, but government policy can soften the disturbances associated with decoupling. These policies will place the country on a stronger footing over the long term.

- Open new markets to American goods and negotiate high-standard, bilateral trade agreements that prioritize American jobs and exports
- Use the U.S. Agency for International Development, International Development Finance Corporation, and Export-Import Bank to connect U.S. firms with new customers, migrate supply chains out of China, and combat Chinese attempts to dominate sales of key technology
- Reclaim international institutions and standards-setting bodies from Chinese influence where possible, and establish new groups comprised of U.S. partners when existing institutions cannot be reclaimed
- Conduct a top-to-bottom regulatory and tax-code review to accelerate the development of advanced technologies and regain U.S. leadership in strategic industries where China has the advantage
- Deepen the U.S. science, technology, engineering, and mathematics talent pool by training American engineers and specialists
- Increase federal support for R&D to Cold War levels and pair this surge in R&D funds with strict controls to ensure American research does not flow back to China

FEDERAL GOVERNMENT LEADERSHIP

A FLAWED STATUS QUO

Our government failed before 2017 in most cases to engage and fight the economic long war with China for several reasons:

- Elected leaders and political appointees before the Trump administration failed to recognize and lead in the face of Beijing's challenge, and so the federal bureaucracy did not work to counter China's economic strategy
- Powers vital to economic competition with China are vested in large organizations that focus primarily on economic development and corporate interests, not national security and strategic competition
- Five separate government entities are responsible for U.S. export-control licensing, while some of these licensing entities—particularly the Bureau of Industry and Security—are buried within organizations hostile to the aggressive use of export controls
- CFIUS, until recently, suffered from serious loopholes
- The government has paid insufficient attention to America's declining industrial base and reliance on foreign supply chains
- Oversight of the U.S. research enterprise is inadequate

The federal government is unprepared to compete with China because it is organized in a haphazard manner that is damaging to national security.

A PATH FORWARD

The government should make the following organizational changes to better position itself for the economic long war:

- Consolidate export-control licensing authorities across the federal government into a single licensing agency within the State Department
- Give the Secretary of Defense a new role, Deputy Chair of CFIUS, to ensure that Treasury addresses national-security concerns raised by Defense and other organizations on the committee
- Charge the Department of Commerce with continuous analysis of the industrial base and supply chain, resulting in an annual report on the state of America's industrial base and dependency on key foreign inputs, as well as contingency plans to insulate the United States against supply-chain disruptions
- Empower the Department of Commerce to support the regeneration of U.S. manufacturing in key sectors
- Establish a permanent interagency committee to oversee the security of the U.S. research enterprise, coordinate federal funding of R&D, and create and enforce rigorous insider threat and foreign influence policies

SECTION ONE: The State of the U.S.-China Economic Relationship

The Chinese Communist Party (CCP) should be worried. The U.S.-China trade war and the coronavirus pandemic have shattered an elite narrative about the benefits of economic integration between our two countries. This account had dismissed China's unfair and deceptive practices as irritations that would melt away once China reached the nirvana of political and economic liberalization. It also deemphasized national security interests in return for unevenly distributed economic gains. The narrative served to normalize the CCP's rule, enable China's rise, and deeply entangle our two economies, generating points of reliance—and leverage—in both directions.

China has developed into an industrial and technological powerhouse relatively unchallenged, with the aid of American capital, technology, managerial expertise, and market access. China undeniably needed the United States in order to hit its ambitious economic-growth targets. It's less obvious that the United States needed China, yet it was conventional wisdom for decades that we did.[1,2]

President Nixon's opening to China in 1972 followed from a calculated decision to cultivate a partner bordering the Soviet Union and to thereby drive a deeper wedge between Beijing and Moscow. What began primarily as a strategic calculation turned into a gold rush for U.S. businesses after Deng Xiaoping's reforms. Following the Soviet Union's collapse, with globalization ascendant and great-power politics seemingly in the past, American businesses promoted integration with China as an opportunity to offshore manufacturing and open China's vast market to American goods, services, and capital. U.S. investment flooded China in the 1990s, helping transform its largely backward economy, reliant on agriculture and decrepit state-owned enterprises, into a hub of low-cost, low-value manufacturing.[3] Deeper ties followed China's 2001 accession to the World Trade Organization (WTO).[4] This economic relationship in turn created a powerful, new "China Lobby" composed of those working to protect their China-related interests from national-security hawks, human-rights activists, labor organizers, and protectionists who supported a harder line against Beijing.[5]

This China Lobby dominated policymaking for decades, as administrations of both parties attempted to engage and balance a rising China—but in practice did more of the former than the latter. For example, President George H.W. Bush offered a muted response to the Tiananmen Square Massacre in 1989. Days after the slaughter, he stated, "now is the time to look beyond the moment to important and enduring aspects of this vital relationship for the United States."[6] President Bill Clinton pledged early in his presidency that he would condition renewal of China's Most Favored Nation trading status with tangible progress on human rights, but ultimately broke

that promise in the face of intransigence from Beijing and pressure from business interests.[7] Clinton ended his presidency championing Permanent Normal Trade Relations and WTO membership for China, which he called a "win-win" that would "protect our prosperity" while "promot[ing] the right kind of change in China."[8] The George W. Bush administration likewise promised a tougher line with Beijing, stating China must become a "responsible stakeholder" in the world.[9] However, the administration further expanded commercial ties with China. It presided over the "China trade shock" that devastated America's industrial communities following China's accession to the WTO in 2001.[10] If anything, the Obama administration proved more committed to engagement than its predecessors, despite unmistakable warning signs of the deteriorating political situation in China. At best, this generational effort at engagement was an experiment to see whether greater economic integration would generate political change in China. The results are in.

Today, China is far richer than it was several decades ago. Economic integration has turned China into an industrial powerhouse and, as its advocates note so often, lifted many millions out of grinding poverty. But the political change that was supposed to come from this transformation has failed to materialize. To the contrary, the CCP under Xi Jinping is more powerful and provocative than ever, rolling back the tentative reforms of earlier eras and recommitting to struggle against "false trends" such as "Western Constitutional Democracy," "universal values," and "civil society."[11] Instead of weakening the CCP and empowering the Chinese people, decades of engagement, investment, and encouragement have helped make the Party's dictatorship a global force.

The United States is waking up to the reality that we are not in a cooperative and constructive partnership with China, but rather a strategic competition that could be even more protracted and difficult than the Cold War. China is already wealthier than the Soviet Union at its peak relative to the United States, and is far more entangled with us economically.

Two recent events illustrate the extent of interdependence between China and the United States. First, the coronavirus pandemic reveals how interdependence with China threatens the United States. Second, the tougher approach to trade initiated by President Trump reveals how interdependence also poses risks for China.

The pandemic exposed major weaknesses in America's supply chains and domestic manufacturing capacity for basic goods like personal protective equipment. In the early days of the pandemic, China repeatedly prevented American companies from exporting products made in their China-based factories to the United States. China also threatened to initiate other measures to withhold essential supplies.[12,13]

The pandemic illustrated how an economic relationship that appeared tolerable in normal times could be exposed as foolish in times of crisis. When worldwide emergencies occur, nations logically protect their own interests before attending to the needs of others, even those of allies. Meanwhile, opportunistic and aggressive powers like China exploit emergencies to weaken other nations. These are old lessons of history that recent events have made impossible to ignore.

The U.S.-China trade war also revealed an asymmetry in the two countries' reliance on one another for foreign trade under normal conditions. The American economy grew at a healthy clip from 2017 to early 2020 despite trade tensions.[14] China's official economic growth during this period, though still higher than that of the United States, slowed to its lowest rate in decades, even before the onset of the pandemic.[15] Chinese industrial output growth fell to nearly 18-year lows while its total debt ballooned to over 300 percent of Gross Domestic Product (GDP).[16,17] Despite the "Phase One" trade agreement, the trade war hastened the closing of China's strategic window of opportunity, the period of advantage Beijing enjoys before the likely onset of a demographic crisis and all-but-inevitable balancing measures by its foreign adversaries.[18] The trade war also revealed the extent to which Chinese economic growth relies on the U.S. consumer market, a reliance which cannot comfort the strategic thinkers in Beijing.

It is now clear that the U.S. and Chinese economies are too entangled, particularly in critical sectors such as medicine, defense, and technology. The urgent task for policymakers and businesses is to end our dependence on China and build new capabilities in America.

This is a major undertaking, fraught with difficulty. The good news is that China ultimately needs us more than we need China. The United States has more power than many realize to reshape the economic relationship with China on our own terms. We must use this power to forge a new American economic policy that will beat the CCP in the long run.

The U.S. government needs to pursue targeted decoupling with China. America can reduce its dependence on its chief global rival by, for example, cutting off China from high-end semiconductor designs and equipment, sanctioning Chinese companies that steal and benefit from U.S. intellectual property, and preventing the federal government from buying products that contain Chinese active pharmaceutical ingredients and Chinese rare earths and critical minerals.

At the same time, the United States can make investments to mitigate the effects of decoupling by, for example, boosting federal research and development (R&D) funding, rebuilding the STEM (science, technology, engineering, mathematics) talent pool, and restoring secure, scalable, domestic manufacturing in key sectors. Finally, this strategy demands a careful look at how key elements of the federal bureaucracy are organized and incentivized to fight the economic long war.

HOW ARE THE U.S. AND CHINESE ECONOMIES INTERTWINED?

Before outlining an economic strategy to beat China, we need to understand how precisely our economies are intertwined.

TRADE

The U.S. and Chinese economies remain deeply intertwined despite the recent trade war, leaving both countries vulnerable to the other. The early days of the coronavirus pandemic underscored the significance of this connection, when calls to restrict travel with China in the interest of public health elicited sharp criticism from groups whose fortunes are tied to China. Our dependence on Chinese producers for medicine, surgical masks, and other essential supplies became tragically clear later in the crisis.[19]

The United States buys far more from China than the other way around. In 2019, $634.8 billion in trade passed between the two.[20] That trade consisted of $471.8 billion in U.S. imports from China and $163.0 billion in U.S. exports to China, for a bilateral trade deficit of $308.8 billion.[21]

While U.S.-China trade is substantial, it accounts for only a small share of overall economic activity and growth in the United States. U.S. exports to all countries accounted for a mere 11.7 percent of U.S. GDP in 2019, after peaking at 13.5 percent in 2013.[22] U.S. exports to China accounted for under one percent of U.S. GDP in 2019.[23]

China is our single largest goods supplier, far surpassing key allies like the United Kingdom, Japan, and Australia.[24] Eighteen percent of all U.S. imports by value came from China in 2019. And although China first entered our market by selling low-cost, low-quality consumer goods, today it occupies a higher position on the value chain, producing both high- and low-value manufactures. China's top exports to the United States by category in 2019 were electrical machinery ($125 billion), machinery ($92 billion), furniture and bedding ($27 billion), toys and sports equipment ($25 billion), and plastics ($18 billion).[25]

American exports to China also are sizeable, accounting for six percent of overall U.S. exports in 2019.[26] Our exported goods consist mostly of high-end manufactures in areas where China has not developed cutting-edge capabilities. Top exports by category were electrical machinery ($14 billion), machinery ($14 billion), aircraft ($10 billion), optical and medical instruments ($9.7 billion), and vehicles ($9.1 billion), with an additional $14 billion of agricultural products such as soybeans, cotton, and pork.[27]

China exported $20.1 billion in services to the United States in 2019, principally in categories related to transportation, travel, and R&D.[28] U.S. provision of services to China was much higher in 2019, reaching $56.5 billion.[29]

CAPITAL

Foreign Direct Investment (FDI)

The United States and China invest billions of dollars in each other's countries. These financial flows have slowed in recent years due to investor uncertainty about the trade war, capital controls imposed by the Chinese government, tougher scrutiny of Chinese acquisitions by the Committee on Foreign Investment in the United States (CFIUS), and, most recently, the pandemic.

Chinese FDI in the United States peaked in 2016 at $46.5 billion. That same year, U.S. FDI into China was $12.9 billion, down from a high of $20 billion in 2008. Yet by the end of 2019, Chinese FDI into the United States had plummeted to less than $4.8 billion, a 90 percent decline from 2016. U.S. FDI into China remained relatively constant at $13.3 billion in 2019.[30]

While foreign investment is typically a good thing for the recipient country, the details matter. Foreign investment can build factories, warehouses, plants, and other physical infrastructure in the recipient country. It also can license a country's most valuable technology and intellectual property. Licensing is profitable in the short term for the lawful owners of intellectual property, but it can also facilitate the development of foreign competitors.

Roughly two-thirds—over $170 billion—of American investment in China over the last 30 years funded 'greenfield' projects to expand China's industrial base and productive capacity.[31] By contrast, Chinese entities devoted eight percent of their investment in the United States to building new physical infrastructure. The other 92 percent of Chinese investment funded acquisitions of American companies and intellectual property.[32]

Until recently, Chinese venture capital and private equity have been active in U.S. biotech, health, technology, and other sectors.[33,34] These financial relationships, which have historically not always been captured in foreign-investment figures, have acted as a Chinese gateway to sensitive American technology.[35]

The CCP has directed Chinese firms to acquire stakes in American companies in order to obtain cutting-edge technology in strategically important areas. Between 2013 and 2016, Chinese firms spent $37 billion in an attempt to acquire or invest in at least 27 American semiconductor firms. Chinese firms also invested in at least 51 American AI startups between 2010-16.[36] Over the past decade, one Chinese defense contractor has purchased at least seven U.S. general aviation companies.[37] Due to state involvement, Chinese acquisitions are not made on a purely commercial basis. Chinese firms can thus offer patient capital to firms with promising technology, while profit-seeking investors operating on shorter timeframes pass over those same firms.

Chinese VC investments, while harder to trace, have followed a similar model.[38] They target firms in areas that the government prioritizes, such as AI, autonomous vehicles, virtual reality, robotics, and blockchain technologies.[39] Chinese investors targeted advanced technologies in more than three-quarters of the funding rounds they participated in between 2000 and mid-2018.[40]

China also has exploited Joint Ventures (JV) by forcing foreign companies to hand over proprietary technology as a condition for producing or selling goods in the Chinese market.[41] Technology transferred from foreign firms is often the Chinese partners' most advanced technology. These forced transfers give Chinese firms a shortcut in the innovation process, allowing them to reverse-engineer the technology and spur future domestic innovation.

Debt

U.S. sovereign debt surpassed $27 trillion at the end of October 2020.[42] China (including Hong Kong but not Taiwan) held $1.28 trillion of that debt in U.S. Treasury securities, making it the United States' largest foreign creditor, barely ahead of Japan.[43]

Despite this large sum, China's appetite for U.S. debt has waned. Mainland China in October 2020 held only five percent of U.S. outstanding public debt, down from a high of 14 percent in 2011.[44,45] Beijing appears to be exploring alternatives to the U.S. dollar as a long-term store of value. In January 2020, China's State Administration of Foreign Exchange (SAFE), which manages China's foreign reserves, announced plans to diversify its holdings.[46]

China's long-term goal is to develop an alternative to the U.S. dollar trading system. In 2005, U.S. dollar assets comprised 79 percent of China's foreign reserves.[47] By 2019, this figure fell to an estimated 59 percent.[48] China has tried to develop alternative cross-border trading mechanisms to the ubiquitous, U.S.-dependent SWIFT (Society for Worldwide Interbank Financial Telecommunication) clearing system, such as the Cross-Border Interbank Payment System (CIPS).[49] As early as 2009, China called for a global currency to replace the dollar trading system.[50]

KNOWLEDGE

Knowledge, innovation, and technology are force multipliers that allow a country of 330 million people to compete against a country of 1.4 billion people. The United States will be unable to compete against China over the long run if it doesn't retain a decisive—and *proprietary*—edge in science, technology, innovation, and development. China understands the importance of knowledge in driving outcomes, which is why it has been working for decades to reach the cutting edge of scientific and technological disciplines—whether by innovation or theft. This campaign has yielded results. In some areas, including quantum computing, China has reached the frontier of technical knowledge, and is now pressing ahead of the pack as an innovator.

The Chinese government prioritizes acquiring knowledge—specifically, American knowledge—in its economic, technological, and intelligence-gathering strategies. This priority is evident in China's systematic and largely successful infiltration of American knowledge institutions, such as U.S. colleges and universities, research labs, and private companies.[51] The United States must treat these institutions, and the knowledge they generate, as key national assets. America's economic edge depends on it.

Higher Education

China acquires American technology and know-how prior to its commercialization and deployment by infiltrating the U.S. higher-education system and research laboratories. In 2018-19, roughly 370,000 Chinese students studied in the United States, up from fewer than 100,000 a decade earlier.[52] Nearly half of these students are enrolled in STEM courses, which are of special relevance to any nation's technological and military advancement.[53] U.S. universities trained some of the Chinese military's top minds. One report found that the Chinese military sponsored more than 2,500 scientists and engineers to study abroad in the past decade, with an estimated 500 of these individuals conducting research in the United States.[54] The American footprint in Chinese higher education is, by comparison, trivial.

Unfortunately, American citizens and legal permanent residents are sometimes agents of Beijing's economic espionage. The CCP has created over 200 foreign talent recruitment programs that offer salaries, research funding, and lab space, among other incentives, to entice U.S.-based scientists and engineers to turn over the fruits of their research.[55] The Department of Justice has charged a number of American scientists for lying about their ties to the Thousand Talents Program, China's most prominent foreign talent initiative. For example, Charles Lieber, chair of Harvard's chemistry department and a world-renowned leader in the field of nanoscale electronics, signed on to be a "strategic scientist" at China's Wuhan University of Technology. For his participation, the CCP allegedly gave Lieber $50,000 a month, a $150,000 annual stipend, and a laboratory in Wuhan worth more than $1.5 million.[56] Lieber now faces federal charges for hiding the full scale of his financial ties to China.[57] U.S. officials announced Lieber's charges on the same day as charges against another Harvard researcher, Zaosong Zheng, who was caught attempting to transport 21 stolen vials of cells to China.[58]

National security officials have warned repeatedly of the threat posed by Beijing's "non-traditional collectors" on U.S. college campuses. In July 2020, the FBI announced it was investigating almost 2,500 cases of Chinese espionage and intellectual property theft. Such cases occupied the time and resources of every FBI field office and comprised roughly half of the FBI's counterintelligence cases.[59] These warnings have largely fallen on deaf ears in academia.

The CCP's penetration of American higher education has encountered little resistance from American faculty and administrators who depend on full-freight tuition payments of international students. Take a recent case at Boston University, where a People's Liberation Army (PLA) officer embedded within a laboratory conducting cutting-edge artificial intelligence research with a renowned physicist. When authorities uncovered the plot in January 2020, the physicist stated he was "not interested in politics…If a person anywhere in the world wants to come to my group, and they have the money to come, I say why not?"[60] According to that physicist's resume, roughly 75 of the more than 200 research associates and visiting scientists that worked in his labs were from China.[61]

These cases are the tip of the iceberg. China's dark money permeates U.S. higher education. The Department of Education opened investigations into both Harvard and Yale in February 2020 as part of a review that indicates U.S. universities had not reported at least $6.5 billion in foreign funding, including funding from China.[62] These investigations followed similar inquiries into Georgetown University, Cornell University, and the Massachusetts Institute of Technology.[63]

Corporate and National Laboratories

China's drive to infiltrate U.S. research institutions extends to our most sensitive laboratories. The Department of Energy (DOE), which oversees 17 national laboratories and the U.S. nuclear-weapons stockpile, is fighting Chinese efforts to recruit its researchers.[64] Investigators have exposed evidence of Chinese recruitment and penetration within the government. In May 2019, for instance, a former scientist at the Los Alamos National Laboratory was indicted for making false statements about his alleged involvement in a Chinese recruitment program.[65] This came after an employee of the National Oceanic and Atmospheric Administration pleaded guilty to illegally accepting money from a Chinese recruitment program.[66]

The Thousand Talents Program also recruits through professional associations for Chinese engineers such as the Silicon Valley Chinese Engineers, the Hua Yuan Science & Technology Association (HYSTA), and the China Association for Science and Technology (CAST).[67] According to one analysis, Silicon Valley is "ground [zero] for…legal, illegal and quasi-legal practices that fall just below the thresholds set by U.S. law."[68]

China has made infiltrating, manipulating, and exploiting U.S. research organs a central plank of its economic and military strategy. Today, China wields immense, if hidden, power within American higher education and the U.S. research-innovation complex. The full depth and breadth of this influence is unknown. However, the CCP has publicly pledged more than $2 trillion to acquire top talent in support of its strategy to dominate key emerging technologies.[69] This figure provides a sense of the scope, scale, and seriousness of the CCP's science and technology efforts.

Labor Force

Chinese nationals play an outsized role at U.S. technology firms such as Apple, Amazon, Google, and Facebook, in part because of their access to U.S. higher-education institutions and focus on STEM education.[70] In FY2019, the U.S. government issued 50,609 H-1B visas to specialized Chinese workers, making China the second-most represented country after India. Sixty-six percent of H-1B visas granted in FY2019 were for computer-related fields. [71]

The United States relies heavily on foreign workers in high-technology sectors, partly due to the crisis in STEM education in America.[72] The number of U.S. citizens enrolled in upper-level science and engineering programs is in steady decline. The United States ranked 18th in science and 37th in math out of 77 countries on the Programme for International Student

Assessment (PISA) in 2018.[73] The United States places 13th in science and 31st in math within the 37-state Organization for Economic Co-operation and Development (OECD).[74]

The unique risk of espionage posed by Chinese nationals must be acknowledged when evaluating the cost and benefit of accepting foreign workers. From 2011-18, 90 percent of the Department of Justice's cases alleging economic espionage involving a state actor concerned China, as did more than two-thirds of its cases alleging theft of trade secrets.[75] Economic espionage cases with a connection to China have increased by roughly 1,300 percent over the past decade.[76] While some of these cases involve China's relentless cyberespionage, a significant portion involve physical theft by workers operating on U.S. soil. Recent examples of this practice include a Chinese scientist who stole hundreds of genetically engineered rice seeds with direct pharmaceutical applications from a U.S. research facility and a Chinese-born employee at Raytheon who was caught smuggling top-secret missile-defense technology to China.[77,78,79]

In the words of a recent White House report, "Law enforcement efforts alone cannot keep up with (or adequately deter) a state sponsored campaign of theft."[80] The United States must take more aggressive action to limit the number of Chinese nationals working in sensitive positions in U.S. laboratories and companies.

KEY POINTS OF RELIANCE

U.S. RELIANCE ON CHINA

China's most significant point of leverage over the United States is its productive capacity, which supplies components for a multitude of American goods. American companies' unwise dependence on Chinese manufacturing risks America being cut off from essential supplies in the event of a crisis.

American dependence on China for basic medicine and medical equipment was exposed during the coronavirus pandemic. American medical supply chains are so sensitive that policymakers worried the pandemic could lead to shortages of 150 prescription drugs.[81] CCP propaganda outlets insinuated that Beijing could cut off supplies of drugs and other critical supplies to the United States at a moment's notice, plunging the United States into "the mighty sea of coronavirus."[82] The dependence goes beyond drugs, encompassing key medical supplies like surgical and respirator masks. In February 2020, Beijing effectively nationalized production at American-owned onshore factories, including factories owned by 3M and General Motors.[83] This move imperiled America's ability to procure personal protective equipment at the outset of the pandemic, likely costing American lives.

Another pressure point involves the supply and processing of rare-earth minerals. These minerals are used to produce modern technology as diverse as smart phones, electric car motors, satellites, and jet engines.[84] China dominates the trade of rare earths, supplying roughly 80 percent of U.S.

rare-earth imports from 2016-19. The CCP has exploited its position in this market, including in 2010 when it cut off rare-earth supplies to Japan over a dispute involving a fishing trawler.[85,86] The United States is struggling to break free from CCP dependence, but is limited by a lack of domestic rare-earth processing facilities. Mountain Pass, the only U.S. rare-earth mine, ships its yearly rare-earth extraction to China for processing, though Mountain Pass and other rare-earth companies are currently pursuing rare-earth processing capabilities.[87,88,89]

China lured American companies to its shores with its cheap, unskilled labor and permissive regulatory environment. Today, it attracts companies because of its experienced engineers, sophisticated networks of suppliers, and industrial capabilities. All of these attributes speak to China's successful development as an economic power.[90,91]

For over a decade, China has been the world's largest producer and consumer of machine tools, which are the core components of industrialization.[92] China also installed over 36 percent of the world's new industrial robots in 2018, which are the machines used in advanced manufacturing. The United States installed just under 10 percent of the world's industrial robots that year.[93]

While many companies eagerly offshored production to China, offshoring was not an entirely free choice for others. The CCP pressures companies to build factories in China and transfer technology as conditions for accessing its vast market. Boeing opened a large plant in China in 2018 partly as a concession to the CCP, which has sought for decades to obtain the technology needed to create a world-class commercial aircraft company.[94]

China's market empowers the CCP to exert control over U.S. businesses. The CCP has forced airlines to remove references to Taiwan and strong-armed Hollywood studio MGM to change the 2012 movie *Red Dawn* to depict an implausible invasion of the United States by North Korea—rather than by China, as originally scripted.[95,96] The 2019 NBA scandal illustrated the power China wields over American companies, when the CCP nearly succeeded in having a Houston Rockets executive fired over tweets he sent in support of pro-democracy protests in Hong Kong.[97,98] The NBA's biggest star, Lebron James, effectively sided with the CCP in that controversy.[99]

Every time an American business, cultural institution, or celebrity adopts the CCP party line, it justifiably weakens the American people's confidence in their leaders and institutions. This in turn undercuts national unity, morale, and resolve in the competition against China. The CCP's ability to turn powerful American institutions and individuals against the values of the United States is a potent tool of coercion. The United States thought that it could change China by opening China's market. Recent examples demonstrate that China can change America, as well—and for the worse.

Network equipment from Chinese firms like Huawei and ZTE gives Beijing another access point into the United States. U.S. intelligence reportedly has confirmed that Huawei can covertly access mobile-phone networks and has had this capability for over a decade.[100] The U.S. government has acted quickly to block Huawei and ZTE gear from American 5th Generation (5G) telecommunication networks and launch efforts to convince allies and partners to do the same.[101] The FY2021 National Defense Authorization Act (NDAA) nearly included a ban on federal

government use of commercial drones from Chinese companies like DJI over fears they could transmit information about our critical infrastructure and law enforcement to China.[102,103] Such a ban would be challenging for many companies and government bodies that rely on drones, as DJI has captured 70 percent of the world's commercial drone market.[104]

Chinese penetration of U.S. networks raises the possibility that CCP agents could steal the personal information of Americans and use it for blackmail. CFIUS forced a Chinese firm to sell the gay dating app, Grindr, reportedly due to concerns over blackmail.[105] The Pentagon banned the Chinese video-sharing application TikTok from government-issued smartphones for similar reasons.[106]

China's information-collection technologies act as a powerful data vacuum, sucking up information at scale and applying it in ways that advance the CCP's interests. This information is useful for intelligence and espionage, but China can also apply the constantly expanding datasets to artificial intelligence and machine-learning efforts, such as facial recognition and location tracking.[107,108] The proliferation of Chinese technology in the United States and around the world thus provides China with leverage over its adversaries, while honing the tools of coercion it uses on its own subjects.

CHINA'S RELIANCE ON THE UNITED STATES

While the United States relies on China in key areas, the knife cuts both ways; one country's point of exposure is another's point of leverage. Indeed, China's fortunes are tied to the United States more closely than ours are to China, a fact that American strategists must keep in mind.

China relies on the United States to access high-end research and technology. It embeds agents in U.S. research and development institutions in order to acquire early-stage research at minimal cost and risk.[109] Chinese firms then apply this research, scale it quickly, and compete with U.S. firms in the global marketplace on unfair terms. Qiaohai Shu of the China Academy of Social Sciences (CASS) explained the logic behind this strategy when he wrote, "Innovation is time-consuming, laborious and risky…but when it comes to *applying* technology, the opportunity cost to leap ahead is low, the chances of success are high."[110]

This strategy helps explain why China allocates only six percent of its R&D budget to basic research, while the United States allocates 17 percent.[111] It also sheds light on why Beijing spends a whopping 84 percent of its R&D funds on experimental development while the United States spends only 63 percent.[112]

Access to American research and innovation is therefore a central plank in China's long-term economic, military, and political planning. Chinese strategists fret, with good reason, about a "high-tech blockade" that could slow the country's economic development.[113]

Washington could confound and disrupt the CCP's economic strategy by ending this parasitic relationship. If China is denied access to U.S. research and high-end technology, such as semiconductors, it would have to make additional investments in basic research. These

investments would be funded by a smaller economy with a more burdensome debt load—China's total domestic debt was an estimated 335 percent of GDP in late 2020.[114] Beijing would have to make these investments while simultaneously maintaining its proficiency in experimental development, rapid scaling, and production. This would tax China more severely than the status quo.

Foreign investment is another key point of reliance in the U.S.-Chinese economic relationship. U.S. real estate and equities are a safe harbor for Chinese companies and elites, although strict controls imposed by the CCP in 2017 to stabilize the balance of payments have curtailed capital flight.[115,116]

American investment, meanwhile, plays a critical role in China's economic rise. This investment lends legitimacy to the CCP, builds its industrial and technological capabilities, and creates a political constituency within the United States committed to preventing confrontation with the CCP. Reducing this investment would do material harm to China's economy, international standing, and, potentially, the CCP itself.

Another related point of reliance is China's ability to list companies on U.S. stock exchanges, despite its refusal to comply with the Security and Exchange Commission's auditing standards.[117] This refusal spurred Congress to pass legislation, co-sponsored by Senator Cotton and signed into law late last year, that delists Chinese and Hong Kong-based companies from U.S. stock exchanges if they fail to comply with audits by the Public Company Accounting Oversight Board (PCAOB).[118] The combined market capitalization of the more than 250 Chinese and Hong Kong firms listed on U.S. exchanges is over $2 trillion.[119]

Meanwhile, China's access to the U.S. dollar and dollar-denominated trading system is another point of leverage for the United States. Because most dollar transactions clear through the American financial system, the United States has the power to block, hold, or otherwise intervene in many Chinese transactions.

China also depends on access to the U.S. market, which received 19 percent of China's exports in 2018.[120] The U.S. export market is an irreplaceable outlet for goods generated by China's oversupplied economy. Though China has made efforts to accelerate domestic innovation and reduce its reliance on exports, it is a long way from matching the strength of U.S. innovation or becoming as self-contained as the American economy.[121] The large trade surplus China runs with the United States is thus both a sign of China's remarkable productive capacity and a potential weakness the United States can exploit.

This dynamic has important political implications because slower growth has the potential to cause internal discontent. Chinese citizens willing to accept an increasingly heavy-handed authoritarian state in exchange for a higher standard of living may think twice if growth slows or stagnates. As a result, the CCP fears that declines in exports, growth, and employment could pose political liabilities. Other domestic problems would intensify pressure on the regime. These problems include restrictions on home ownership, the absence of a humane welfare state, the

inability of many Chinese men to find wives, and a lack of children to care for the elderly.[122,123] The 90-million-member CCP may find it increasingly difficult to govern China's 1.4 billion people if the economy stagnates.

U.S. policymakers must recognize the immense leverage they have over China. Having grown used to China wielding its domestic market as a weapon, many in the United States seem to have forgotten that U.S. market access is one of the most valuable prizes in the world, particularly for the world's largest exporter. Access to the U.S. market may therefore be the single most powerful point of leverage in the entire competition, provided the United States can create resilient supply chains for essential goods that do not depend on Chinese manufacturing.

But time may be running short to exploit this opportunity. China's economy is not as export-oriented as it once was. Exports accounted for 36 percent of China's GDP in 2006, but only 18 percent of its GDP in 2019.[124] America's window of opportunity to pressure China by restricting access to its market is closing.

SECTION TWO: Targeted Decoupling

The United States has entered a phase of open and mutual antagonism with China, yet the failed dream of engagement haunts our economic policy. We must identify and disentangle strategically important economic sectors while thwarting China's parasitic approach to global trade and commerce.

Such a task requires a focus on broad areas of concern such as trade and investment, higher education, entertainment, and advanced technologies and essential supplies for which reliance on China is unacceptable. This section examines a selection of these technologies and essential supplies in greater detail, including semiconductors, telecommunications, rare-earth elements and critical minerals, medical supplies and equipment, and artificial intelligence and quantum computing.

This section is not an exhaustive list of areas where decoupling from China is advisable. No doubt some of the technologies and fields that will shape the future strategic landscape are unknown to or underappreciated by today's policymakers. Rather, this list identifies sectors of urgent concern to the United States right now. China is already a world leader in some of these sectors, and is targeting all of them through massive investment and espionage—including espionage that masquerades as investment. The United States must end its reliance on China in sectors that will affect the relative strength of nations in the future.

OBJECTIVES AND CONSIDERATIONS FOR TARGETED DECOUPLING

RESTORE SECURE, SCALABLE, DOMESTIC PRODUCTIVE CAPACITY IN AREAS CRITICAL TO NATIONAL SECURITY

The most basic obligation of the federal government is to provide for the common defense. Yet today, key sectors of the economy rely heavily on Chinese suppliers and manufacturing. The United States cannot be fully free or safe if its access to essential supplies is subject to the whims of the CCP. America must therefore restore secure, scalable, and domestic productive capacity in strategic areas. Private industry, finance, and the government have roles to play in regenerating manufacturing that has been lost to China.

American industry has declined, in part, because of China's 2001 accession to the WTO and the related decision to grant China Permanent Normal Trade Relations status. In 2004, the United States was the world's dominant manufacturer, producing approximately $1.61 trillion in value-

added manufacturing (22.3% of global output) to China's $625 billion (8.7% of global output). By 2019, the United States produced $2.35 trillion (16.8% of global output) in value-added manufacturing while China produced $4 trillion (28.7% of global output).[125] The nation that brought manufacturing technology to maturity in the nineteenth and twentieth centuries has been overtaken by its number-one rival in the twenty-first century.

The health of the manufacturing sector thus is not simply a commercial concern, but also a national-security imperative. Domestic manufacturers—and to some extent those of allies and trusted partners—provide the foundation and expertise for the nation to arm itself in wartime. Under present conditions, it is unclear if the United States would be able to organize the kind of rapid, large-scale industrial mobilization that contributed decisively to Allied victory in World War II. This mobilization was possible because the United States already had a deep industrial base and pool of skilled engineers and laborers.[126] Disturbingly, China may be better positioned to play the role of World War II-era America in any major conflict today, given its strong industrial base and deep pool of engineering talent. This must change.

A strong industrial base not only supports vital national-security goals, it lays the groundwork for future innovation.[127] The process knowledge and human capital gained through manufacturing leads to improvements in the production process itself. Robust industrial initiatives can thus spark virtuous cycles of expansion, reinvestment, and innovation. By contrast, a lack of investment today could jeopardize American prosperity and safety tomorrow.

MAINTAIN TECHNOLOGICAL ADVANTAGE OVER CHINA IN STRATEGIC AREAS

Outnumbered more than four to one in population, the United States must maintain decisive advantages in technology and per-capita productivity to compete with China. This objective requires accelerating the development of advanced technologies and implementing safeguards so that China cannot steal our technological breakthroughs.

Current investment in R&D is inadequate to this task. The federal government spent $164 billion, or 0.7 percent of GDP, on R&D in 2020.[128] By comparison, it spent between one and 1.5 percent of GDP on R&D during much of the Cold War, when the United States faced a less populous and affluent competitor.[129] Overall R&D spending in the United States has been buoyed by the private sector, which increased R&D spending more than fourfold between 1980 and 2016.[130] In 2018, U.S. firms invested more than $5 in R&D for every $1 spent by Chinese companies.[131] However, private-sector R&D often focuses on incremental improvements to existing products with clear, short-term commercial applications. It is not optimized for the long-term, theoretical, or risky development projects that lead to breakthroughs and technology revolutions.

Federal support for technological development must be paired with policies to protect the fruits of that research. Otherwise, China will continue to benefit from American investment through

theft. Spending large sums of taxpayer money to develop leap-ahead technology without implementing controls to stop China from stealing that technology could, in effect, be worse than doing nothing.

PRESERVE U.S. DOLLAR DOMINANCE

The dollar trading system allows the United States to maintain its global financial preeminence and weaken its adversaries through non-military means. Preserving this pillar of American power therefore is a key element of competing with China.

The dollar is the undisputed king of global exchange, much to the CCP's chagrin. Dollars accounted for 61 percent of known central bank foreign exchange reserves in the second quarter of 2020.[132] By contrast, the Euro accounted for 20 percent of official reserves. China's Renminbi barely cracked two percent.[133] The dollar likewise is the currency of choice for virtually every kind of exchange across borders, from oil sales to debt contracts.

The ubiquity of the dollar allows the United States to weaken its enemies at relatively low cost. With the stroke of a pen, the United States can inflict tremendous damage, often equal to what otherwise could be achieved only through military operations—but without violence. For example, Iran's economy shrank 5.4 percent in 2018, the year the Trump administration reimposed sanctions, and shrank again by 6.5 percent in 2019.[134] The Iranian Rial, which traded at roughly 40,000-to-one against the dollar on the eve of those sanctions, traded at over 300,000-to-one in October 2020.[135,136] U.S. sanctions have also helped weaken the regimes of Bashar al-Assad in Syria and Vladimir Putin in Russia.[137] Sanctions dampened Russia's economic growth by as much as six percent from 2014-2018.[138]

Still, every major sanctions designation by the U.S. Treasury Department's Office of Foreign Assets Control (OFAC) puts the U.S. dollar system at incrementally greater risk by making the dollar less appealing as a reserve currency and less reliable as a medium of exchange. This tension between the power of sanctions and the threat such sanctions pose to the dollar must be managed carefully.

As Washington activates the Treasury Department against Chinese entities that violate U.S. law or threaten U.S. national security interests, it must simultaneously implement policies to modernize the dollar and make it more attractive to legitimate economic actors.

SLOW CHINA'S GROWTH

The CCP's ambitious political goals depend on China's ability to become wealthier than the United States. It may have a finite window in which to achieve this goal, given impending demographic pressures.[139] Beginning in 2030, the Chinese economy will lose an estimated five to ten million working-age citizens each year. By 2050, the Chinese working-age population is expected to have

shrunk by 180 million people, slightly less than the entire U.S. working-age population today.[140] Slower growth would force the CCP to make difficult choices about where to direct its resources. Should it invest in anti-ship missiles aimed at U.S. warships in the South China Sea, long-range nuclear weapons, national champions like Huawei, security cameras and secret police at home, or other priorities? A China with slower growth means a CCP that has a harder time choosing "all of the above." Resource constraints could bind the CCP just as it has to contend with a shrinking workforce and rapidly aging population, which has grown accustomed to constant improvements in quality of life.

Additionally, slower growth likely would weaken public support for the CCP, which justifies its heavy-handed authoritarianism as the price for strong economic growth. Without consistent growth, it's not clear how many of China's 1.3 billion non-Party members would accept the CCP's tactics—or even its rule.

Slowing China's growth is not without risk. Such a policy could compel Beijing to drastic measures abroad to distract from problems at home or out of recognition that its strategic window of opportunity is closing. Alternatively, slower growth could make the CCP more risk-averse. China's boldness over the past three decades has increased with its strength. Only in the last decade, near the height of China's power, has the CCP decided to stop hiding its capabilities and intentions and compete in the open.

However the CCP reacts, if China is placed on a slower growth trajectory, it will undeniably have fewer resources to control its citizens, intimidate its neighbors, and threaten the United States and its allies.

TARGETED DECOUPLING IN PRACTICE

RULE-BREAKERS, SANCTIONS, AND TRADE

Sanctions are extraordinary tools of American statecraft, but they have yet to be meaningfully applied to China. The integration of Chinese actors into the U.S. financial system inadvertently has given the United States a unique strategic advantage, namely the means to impose costs for unacceptable Chinese behavior. The United States should employ credible, reliably enforced threats of sanctions against Chinese firms and sectors that break the rules.

China has paid little price for its espionage and theft of U.S. trade secrets and intellectual property, including highly sensitive defense secrets like fighter-jet blueprints and satellite technology. China has applied these stolen secrets in its ambitious military modernization program, as well as its technology strategy, which has built commercial behemoths like Huawei. Efforts to curb China's abuses through negotiations and dispute-resolution mechanisms at international organizations have not succeeded.

The U.S. Treasury Department can achieve better results by sanctioning Chinese companies that steal IP, preventing them from doing business with U.S. entities. Given the importance of the U.S. market to China's economic model, sanctions could have immediate ramifications for designated companies and the Chinese economy.

The Treasury Department should sanction the beneficiaries and perpetrators of IP theft. Sanctioning beneficiaries is arguably more important than pursuing the IP thieves themselves. While not undoing the theft, it would deny Chinese companies the benefits of such thefts. Sanctioning beneficiaries is also more practical in many cases. It is difficult to catch a thief in the act, and China is extremely clever in its use of proxies and "plausible" deniability. It may be easier to identify knock-offs or clones on the market and target their producers. Such sanctions would create a new incentive structure that may cause Chinese companies to think twice before using IP stolen from the United States.

Given the stakes of the U.S.-China technology competition, the United States should pursue remedies for IP violations that occurred well in the past. The United States should expose and sanction major Chinese companies that have benefited from stolen U.S. technology. These actions would force Chinese companies that steal U.S. technology once to look over their shoulder forever. While such an approach would not require America to sanction every Chinese company that has engaged in or benefited from IP theft, it would provide us with the right to do so at a time and place of our choosing.

Treasury can also apply secondary sanctions, which target all entities, including non-U.S. entities and individuals, that engage in transactions with a sanctioned target. Secondary sanctions could be used to effectively cut China's national champions from the international market—the commercial equivalent of the death sentence. Such sanctions would force foreign companies to choose between maintaining business ties with the sanctioned entities or maintaining access to the U.S. market and dollar.

A sustained sanctions campaign against China will require an expansion of Treasury's OFAC, which primarily wields U.S. sanctions power. Additionally, the federal government should establish a well-resourced task force to work full-time on Chinese sanctions issues, from IP theft and forced technology transfers to offshore shell companies and money-laundering operations.

Sanctioning any foreign entity requires an immense amount of evidentiary work. China's massive size, countless opaque and criminal firms, systematic abuses, and sophisticated sanctions-skirting methods mean that OFAC needs more resources to properly do its job. Congress should increase OFAC's budget so it can carry out this new mission without abandoning other valuable lines of effort.

This OFAC budget increase would be taxpayer money well spent: for the cost of one F-35A airframe ($82.4 million in 2020), Congress could fund hundreds of new OFAC analysts.[141] A team even a fraction of that size could radically curtail the power of China's biggest rule-breakers, such as Huawei and ZTE, slowing China's economic growth and changing the strategic calculus on issues like 5G.

As part of this effort, the U.S. Intelligence Community (IC) should expand its collection efforts relating to China's economy, including IP theft, the corporate and capital structures of Chinese firms, the shareholders of China's strategic companies, and technological developments within Chinese companies. This information can help U.S. officials understand China's economy and identify targets for sanctions.

The message to China must be loud and clear: cheaters do not prosper, and crime does not pay.

The United States also can use targeted import duties against Chinese exporters that receive substantial state subsidies or engage in anti-competitive practices, such as export dumping. Unlike general tariffs that treat cheaters and rule-followers identically, targeted import duties clearly delineate between actors that compete on fair terms and those that do not. Using import duties in this way would give Chinese firms a clear incentive to play by the rules—while hammering those that do not.

The federal government can apply import duties more incrementally than other coercive methods like sanctions, which can cripple the operations of a company. In cases that do not involve IP theft, high-end technology, or trade with national security implications, import duties can protect U.S. firms and alter the behavior of Chinese companies without potentially undermining the dollar.

Import duties also are well suited to exploit the asymmetry in trade between the United States and China. The United States imports hundreds of billions of dollars more in Chinese goods than China imports from us, so we have more potential targets to sanction than China has to retaliate against.

The U.S. government must fully implement the Export Control Reform Act of 2018 (ECRA) to expand its export controls toward hostile powers like China. Given the way the Chinese system operates, where private actors freely pass sensitive information and technology to the Chinese government, the United States should consider barring the export of certain high-end technologies to all Chinese end-users, rather than specific entities.

The United States should also revoke China's Permanent Normal Trade Relations (PNTR) status, which Congress granted in 2000 upon its accession to the WTO.[142] Revoking PNTR would not by itself terminate China's Most Favored Nation (MFN) status. Instead, it would require the president to make a decision each year about whether to grant China this status, while empowering Congress to overrule this decision.[143] This annual review would increase the United States' leverage to shape China's economic behavior by giving America a credible threat to end China's MFN status. This annual debate would also inject further uncertainty into U.S.-China economic relations, discouraging U.S. companies from investing in China. While China likely would appeal to the WTO after any change in its trade status, WTO rules permit trade actions that are essential to a country's national defense.[144] In any event, so long as the WTO dispute-resolution process is at a standstill, China would have little recourse to counter such a move at the WTO.[145]

INVESTMENT

Sanctions and tariffs are not the only financial weapons the United States can wield against China. Managing access to our equity markets is another powerful tool. Congress demonstrated this recently by passing legislation that requires the delisting of Chinese and Hong Kong-based companies from U.S. stock exchanges if they fail to comply with audits by the PCAOB.[146]

In October 2020, the PCAOB identified 169 Chinese firms and 53 Hong Kong firms, many of which supply powerhouses such as Alibaba, that had failed to meet U.S. transparency requirements.[147] Delisting these companies from U.S. exchanges would deal a blow to these companies and serve as a warning to *all* foreign firms that ignore standards of transparency.

Policymakers also should align rules governing outbound investment with America's broader economic competition against China. This should mean, in practice, a ban on U.S. investment in Chinese firms that operate in strategic sectors. These investment restrictions should include Chinese tech companies, companies connected to the CCP, and companies implicated in human-rights abuses such as those in Hong Kong, Tibet, and Xinjiang. Additionally, restrictions should apply to Chinese firms that produce strategic resources and inputs, such as critical minerals and active pharmaceutical ingredients.

CFIUS or a similar body could implement such restrictions. The responsible entity should have the ability to restrict outbound investment transiting through third-party countries, such as the Cayman Islands, to ensure U.S. companies do not circumvent restrictions and illicitly finance Chinese entities.[148]

U.S.-based investment funds, including private and public pension funds, should face similar restrictions in the Chinese market. The largest of these funds manage hundreds of billions of dollars. They should not subsidize Chinese companies that compete on unfair terms with American companies. Recently, the Trump administration took action to ensure that the retirement savings of federal employees and servicemembers are not invested in Chinese and Russian firms under U.S. sanctions or with close ties to the state.[149] Congress should expand these restrictions to protect the retirement savings of non-federal employees as well.

The United States also should close loopholes in foreign-investment restrictions that allow U.S. companies to form offshore joint ventures (JV) with Chinese firms in sensitive areas, like advanced computer-chip manufacturing.[150] Given that such JVs almost always involve the transfer of U.S. IP to Chinese companies and not the other way around, China clearly benefits most from these loopholes. Foreign-investment restrictions and bodies like CFIUS serve little purpose if China can acquire offshore what it otherwise would have acquired through direct investment.

In addition to tightening rules on outbound investment, the United States should continue to strengthen its oversight of inbound investment from China. CFIUS scrutiny of inbound Chinese investment in key sectors—such as higher education, entertainment, semiconductors, advanced telecommunications, rare-earth elements, medical supplies and equipment, and artificial

intelligence—should start from a presumption of denial. CFIUS should also apply a presumption of denial to inbound investment from Chinese tech companies, companies connected to the Communist Party or the PLA, and companies implicated in Chinese human rights abuses. Any entity directed by the CCP or integral to its strategy must be heavily scrutinized.

HIGHER EDUCATION

American universities and laboratories are victims of a systematic campaign of Chinese intellectual property theft and espionage. Over the last decade, the United States has lost vast sums of money to state-supported Chinese firms that have beat innovative American companies with cheap imitations based on stolen technology.[151] Inadvertently, the United States also has helped build China's military into the second most powerful force in the world.

U.S. research institutions have yet to adapt to China's methodical espionage. This must change. Reforms to protect American research and technology from spies can end China's ability to freeride off stolen research and force China to spend great sums of money on basic scientific research to keep pace with the United States. The United States should welcome such a competition, as it has significant inherited advantages in basic research. Also, such a competition would force painful resource trade-offs on Beijing. Every dollar spent by China on basic research is a dollar not spent on applying that research or developing a new missile the PLA Rocket Force can aim at U.S. forces on Guam.

The United States should impose a research blockade on China and fence off institutions like universities and laboratories from potential CCP spies. Chinese strategists already fret over the possibility of such an embargo. American policymakers should realize their fears.[152]

The United States should bar Chinese funding to U.S. universities, laboratories, and other research institutions, whether that funding emanates from the Chinese government or nominally private entities operating on its behalf. The U.S. government should take aggressive action against universities that have failed to disclose Chinese dark money they received over the past two decades, as required by the Higher Education Act.[153] Congress should support the Department of Education by enhancing penalties against universities that have shirked their legal reporting requirements. Americans deserve to know the extent to which the colleges and universities where they send their sons and daughters have been corrupted by a foreign power. As with joint ventures, it makes little sense for the government to enforce investment restrictions through CFIUS if it allows a higher-education loophole so sensitive research can leave through the back door.

Similarly, the United States should restrict university faculty and staff from taking compensation from China, whether in the form of salaries, grants, onshore laboratories, subsidized travel, or honorariums. Too many American researchers, including leaders in their fields, have been enticed by substantial payouts from Chinese talent recruitment programs. Many of these researchers face prison time for hiding their involvement with these programs.[154,155]

The United States should withhold federal grants from scholars who accept payment from Chinese talent recruitment programs and require them to register under the Foreign Agents Registration Act (FARA). Further, the government should require universities that receive federal funding to pledge they will not knowingly hire faculty on the CCP's payroll. These steps will prevent more American researchers from getting caught in China's web.

America also needs to end the satellite system of American college campuses, research campuses, and joint research centers in mainland China. Nothing is private on Chinese soil, including research done at American universities. The United States should also end peer reviews performed by Chinese nationals for federally funded research, which are another means by which Chinese researchers steal American innovation.[156]

Many Chinese STEM students have no direct involvement with the CCP's spy rings. However, it is often impossible to distinguish honest students from spies. This shows the inherent problem in allowing hundreds of thousands of Chinese nationals to study advanced STEM in America each year. Even when U.S. counterintelligence and law enforcement are able to catch and prosecute China's agents, it's often too late. A stiff sentence will not make China return stolen IP or prevent it from recruiting new agents.

A preemptive approach is needed to stop China's spying in U.S. universities. The United States must bar Chinese graduate and post-graduate students from studying or conducting research in STEM fields that involve sensitive technology. The government should also closely scrutinize any Chinese national undergraduate students engaging in similar cutting-edge research.

To successfully implement these policies, the State Department must expand its vetting process for Chinese national applicants, a program known as Visa Mantis. Congress must ensure State Department consular officers have the legal authorities they need to deny applicants who pose a national security or technology transfer risk.[157] Likewise, the Department of Homeland Security should mandate that colleges and universities seeking a DHS certification to host foreign students attest that they will comply with these rules in their enrollment procedures.

The U.S. government should also end the 10-year multi-entry visa program for Chinese nationals, a program that President Obama started in 2014 over the objections of U.S. intelligence officials.[158] These officials rightfully worried that it would enable Chinese intelligence agents and IP thieves to enter and exit the country at will.

So long as Chinese nationals are kept out of sensitive STEM fields, the United States should continue to permit Chinese nationals to study non-STEM subjects, such as the humanities. These subjects could provide China's future elites with an alternative view of history, justice, and politics than the one mandated by the CCP, fostering skepticism of Party rule. The U.S. government should take steps to ensure that all Chinese students who remain in America can carry out their studies free of CCP intimidation and surveillance. The government must counter the Party's campaign to control on-campus Chinese student groups and pressure Chinese students to report their classmates for expressing dissent.[159,160]

Universities and other elite institutions will object to any attempt to restrict their access to Chinese nationals and force them to reexamine their institution's ties to China. Many college administrators will object to taking necessary action because of the politically correct culture on their campuses. Others will plead poverty, pointing to their dependence on full tuition payments from Chinese nationals, while likely not mentioning the donations their institutions receive from opaque Chinese sources. Some may even suggest they will need to shut down entire STEM departments for lack of students (roughly 25 percent of STEM graduates in the United States are Chinese nationals), lack of funding, or both.[161]

These institutions may be more receptive to protective measures and willing to make sacrifices if law enforcement, the Intelligence Community, and policymakers engage with them as partners, explain the grave threat of Chinese espionage, and attempt to mitigate their concerns. The government should make clear that good-faith efforts to investigate Chinese influence will be rewarded and supported. It also has an obligation to clearly explain and justify the rules, standards, and restrictions that must now govern exchange between Chinese nationals and their hosts.

ENTERTAINMENT

Much like the higher education system, the U.S. entertainment industry is the envy of the world. At their best, Hollywood movies, TV shows, and other productions represent American culture and values to the world. They can reveal the rot at the heart of the world's most repressive regimes and exercise their freedom to criticize their own government. For years, Hollywood justified its presence in China by arguing that it served a greater good by giving the Chinese people access to films made in the free world. Hollywood did not succeed in changing China. Instead, it became addicted to Chinese money and responsive to CCP control.

The CCP, like other totalitarian movements, views entertainment, the arts, and sports as means to maintain social control at home and export propaganda abroad. In 2014, Xi Jinping said that cultural works should exist only to serve politics. Paraphrasing Mao and Stalin, Xi said, "Art and literature is the engineering that molds the human soul… Art and literary workers are the engineers of the human soul."[162]

The CCP's censorship of U.S. productions, then, is not simply a reactionary measure to ensure regime security, but a part of China's grander ambitions for global ideological competition. The CCP is intent on subverting the power of American movies and television in the short term. Its ultimate aim is to overthrow Hollywood as the world's cinematic powerhouse, replacing it with a Chinese entertainment and media industry that can suppress all content critical of the CCP and engineer a world safe for autocracy.

With these goals in mind, China's film industry operates according to the same playbook as China's other strategic industries, utilizing forced acquisitions, joint ventures, and technology transfers to claw its way to global market dominance. In 2012, the Chinese company Dalian Wanda acquired a substantial stake in America's largest theater chain, AMC Theatres, which critics warned could give

China influence over what's shown on American screens.[163] Director James Cameron announced a joint venture in 2012 that would transfer cutting-edge 3D-camera technology to China, likely to help his films gain wider play in the country.[164] With indirect U.S. government support, a joint venture between DreamWorks and a Chinese firm led to the creation of Oriental DreamWorks, now known as Pearl Studio.[165] All of this work is overseen by the CCP's Central Propaganda Department, which took control of the film industry from a government department in 2018 in order to better shape the industry toward Party objectives.[166]

China has long censored ideologically threatening content, yet Hollywood only began to bend to CCP censorship upon China's rise as a major movie market. Several films in the 1990s focused on Beijing's repressive practices, especially those in Tibet.[167] Yet when Beijing expressed outrage in 1998 at Disney's *Kundun*, a biopic of the Dalai Lama, Disney's CEO flew to Beijing to apologize personally to Chinese leadership.[168] Since then, Beijing's share of the global movie market has grown to be the second-largest in the world. Due to the pandemic, the Chinese box office will likely overtake the U.S. box office this year.[169]

In addition to preventing ideologically threatening content from reaching the Chinese population, the CCP has increasingly forced the censorship of movies abroad, changing what American audiences can see. Many U.S. studios self-censor out of fear their films will be banned from the Chinese market. U.S. film studios erased references to Taiwan in *Top Gun: Maverick* and changed the ethnicity of a Tibetan character in *Doctor Strange*.[170,171] Paramount's 2013 thriller *World War Z* was based on a book banned by the CCP because its fictional virus came from China and was covered up by the Chinese government, allowing it to spread around the world.[172] Afraid of suggesting that China could cause a global pandemic, Paramount reportedly cut a scene explaining the virus's origins.[173]

Collaboration with Chinese entertainment firms has, in several cases, caused Hollywood to promote the CCP line outright. The Pearl Studio joint venture created 2019's *Abominable*, a children's movie that featured a map promoting the CCP's illegal territorial claims in the South China Sea.[174] In 2020, Disney's *Mulan* thanked eight Chinese government entities in Xinjiang Province, including a security agency that the United States sanctioned for its role in the CCP's massive concentration camp system.[175] In 2014, *Transformers: Age of Extinction* went so far as to portray U.S. officials as ridiculous and diabolical figures, while portraying the Chinese military and government officials as selfless heroes defending Hong Kong from invasion.[176] One reviewer called the movie "a splendidly patriotic film, if you happen to be Chinese."[177]

The United States must realize that culture and information are battlefields in the competition with China. To that end, America must ensure that Hollywood can produce its content free of malign foreign influence and that the CCP has no control over what Americans can watch. As such, the federal government should ban Chinese investment in U.S. studios and streaming services. U.S. entertainment companies should divest from Chinese sources and dissolve existing joint ventures. The government should also prohibit Chinese investment in platforms that show movies and TV shows in the United States, such as movie theater companies and cable and broadcast television providers. Assuming that AMC Theatres survives the pandemic, the government should require it to separate from Dalian Wanda.

While these actions would limit the CCP's ability to directly control American entertainment, they would not prevent Beijing from using its market access to compel U.S. companies to comply with CCP censorship. The federal government has limited leverage to stop film and TV studios from selling their products to such a massive and profitable entertainment market. However, it can withhold the benefits these studios receive at home if they comply with Beijing's dictates.

Support from the DOD is a highly desirable benefit that can make or break many Hollywood films, particularly those that rely on flashy military hardware, access to a secure facility, or technical advice to improve the movie's realism.[178] The CIA and FBI provide similar support for the entertainment industry.[179,180] The United States should prohibit the DOD, CIA, and FBI from supporting any television and film studios that allow the content they release in the U.S. market to be censored by the CCP.

Still, the impact of these policies will be limited if Hollywood does not commit to resisting malign foreign influence. The federal government must work with Hollywood to raise awareness about the CCP's systemic campaign to manipulate, infiltrate, and capture its studios.

Entertainment executives must understand that the CCP, while a profitable partner in the short term, is ultimately hostile to their freedom and creativity. They must be willing to face down this threat, as brave artists have done with past totalitarian regimes, by placing their ideals ahead of their short-term financial interests. The government can help these executives have the courage of their convictions by weakening the CCP's hold on their industry.

SEMICONDUCTORS

Semiconductors are the building blocks of electronic devices, including next-generation technologies considered in this report, such as 5G wireless networks, artificial intelligence, and quantum computing.[181] The nation that builds an enduring advantage in semiconductors is positioned to succeed in other areas of advanced technology.

The United States revolutionized semiconductor technology thanks to innovation by private companies and public institutions like DARPA. Today, American semiconductor companies are still sales leaders. In 2019, firms headquartered in the United States accounted for 47 percent of global market share, followed by South Korea at 19 percent, Japan and Europe each at 10 percent, Taiwan at six percent, and others at three percent.[182] Chinese firms had a mere five percent of market share.[183]

Despite favorable market position, many American companies depend on foreign sources to fabricate, test, and assemble semiconductors. Semiconductors are one of the most capital-intensive industries in the world. American companies invest between 15-20 percent of sales in R&D per year.[184] Building new factories for each generation of technology likewise costs billions of dollars; a facility planned by TSMC, the Taiwanese firm that is the world's largest dedicated semiconductor fabricator, is expected to cost $19.6 billion.[185,186] Concerns about cost have driven most American

companies to stop investing in next-generation manufacturing facilities. Others have gone "fabless," outsourcing production to contract manufacturers like TSMC.[187] For example, Texas Instruments, whose corporate laboratory invented the integrated circuit, quit the race to develop new process technology in 2007 and outsourced high-end production to foundry partners in Asia.[188]

The United States' ability to manufacture semiconductors at home has weakened as a consequence of this shift. 77 percent of cutting-edge wafer fabrication capacity is now located in Asia; leaders include South Korea (25%), Taiwan (22%), Japan (16%), and China (14%). North America has fallen behind China, at 11 percent.[189] While a large, advanced semiconductor foundry will soon break ground in Arizona, it is being built by the Taiwanese champion, TSMC, not an American company.[190]

The concentration of semiconductor manufacturing in Asia raises the alarming possibility that the United States' supply of microchips could be cut off in the event of a crisis in that region. Many of the chips needed for America's most advanced weapon systems are fabricated in Taiwan and South Korea, areas within range of thousands of Chinese missiles and aircraft, as well as North Korean missiles.[191]

More alarming are China's grand ambitions to move up the value chain of semiconductor production. China is pursuing a $150 billion strategy to develop its own semiconductor industry.[192] China's Ministry of Finance supports its semiconductor industry through national funds capitalized by itself, local governments, state-owned enterprises (SOEs), and private companies. These funds target specific segments of the semiconductor supply chain, with the ultimate goal of building an "independent, self-sufficient and 'controllable' industrial chain for the Chinese IC industry."[193] This investment push aims to end China's dependence on foreign countries, especially the United States, for semiconductors. China's goal is to produce 70 percent of its own semiconductors by 2025, though recent analysis predicts that China will fall short of this goal.[194] Recent financial struggles by Chinese semiconductor firms will also complicate China's path to self-sufficiency.[195]

There is a clear and pressing national-security need to build more independence and resiliency into the U.S. semiconductor value chain. Despite this need, the industry has resisted the prospect of decoupling from China because its members rely on China for sales and some aspects of production, such as packaging and testing. The industry's resistance to change poses long-term risks to the country and its own viability as Chinese semiconductor companies become more formidable.

Despite U.S. semiconductor companies' desires to maintain the lucrative but self-defeating status quo, the decoupling process has already begun and is gathering pace. In May 2020, the Department of Commerce banned the export of electronic design automation (EDA) tools—sophisticated licensed software used to design chips—to HiSilicon, Huawei's subsidiary and fabless chipmaker.[196] In August, Commerce banned Huawei from obtaining chips that were developed or produced with any U.S. software or technology without a license.[197] In September, Commerce banned the sale of technology to SMIC, China's largest and most advanced semiconductor foundry—recently designated by the DOD as a Chinese military company—without a license.[198,199] In December, Commerce added SMIC to the Entity List.[200]

Despite these necessary steps, more comprehensive restrictions are needed to prevent Chinese entities from circumventing U.S. export restrictions.[201,202] The United States must ban the sale of cutting-edge semiconductors developed or produced with U.S. software or technology to all Chinese entities, with legacy chips made available for export to Chinese firms not on the Entity List or designated as military companies. To ensure Chinese firms cannot mitigate this high-end chip ban by designing their own cutting-edge chips, the United States should expand its export ban of U.S. EDA tools to all Chinese end-users, not just Huawei. Semiconductor machinery and software design tools represent significant choke points which can slow Chinese semiconductor efforts.

Delaying the progress of China's semiconductor industry by even a few years would impose immense hardship on the CCP and protect American commercial and military advantages. However, dire predictions about the consequences of decoupling in this sector are common. These predictions rely on the dubious assumption that the U.S. government would do nothing while foreign competitors replaced U.S. firms in selling semiconductors to China. However, the United States can act to insulate its semiconductor sector while preventing foreign firms from entering the Chinese semiconductor market.

Where possible, the United States should seek to win the cooperation of allies and partners. A multilateral semiconductor strategy to keep China from dominating the industry involving powerhouses like Taiwan, Japan, South Korea, and the Netherlands is in order. None of these countries want to lose market share or equip the PLA with cutting-edge semiconductors that will later be used against them.

America could propose a semiconductor trading bloc built on a shared commitment to secure supply chains, common market access and synchronized commercial standards. Where appropriate, this bloc could pool resources for R&D, capital projects, and other joint initiatives to advance these goals. Such an organization could form the basis of a multilateral export-control regime against China, starting with semiconductors but with the potential to expand to other shared challenges, such as 5G and critical minerals.

Such a coalition is not without precedent. During the Cold War, Western countries established the Coordinating Committee for Multilateral Export Controls (CoCom), which included 17 member states, to coordinate the trade of sensitive goods, including dual-use technology, with Communist countries.[203] Western nations disbanded CoCom in 1994 and reconstituted it as the Wassenaar Arrangement. [204] Wassenaar remains a useful forum, but its large membership, which even includes Russia, makes it less useful for dealing with China. Moving forward, the old CoCom framework is a useful guide for efforts to oversee sensitive exports to China. A semiconductor export control group could further be limited to the small circle of semiconductor powerhouse countries. If collaboration fails, secondary sanctions can be used to prevent Chinese firms from obtaining cutting-edge semiconductors.

Restricting China's access to advanced technology is not a winning strategy on its own. The United States must simultaneously upgrade its semiconductor manufacturing capacity using federal grants and public-private partnerships.

It must be noted that semiconductor decoupling will cause short-term disruptions to U.S. semiconductor companies, most of which have at least a quarter of their sales coming from the Chinese market.[205] If barred from selling to China, these companies could be forced to reduce R&D or capital expenditures. Therefore, the government must provide support—to be discussed in the following chapter—to smooth the transition and ensure U.S. semiconductor firms continue to lead from the front.

The end state of U.S. semiconductor strategy cannot realistically be autarky. What the United States should seek to establish is adequate, secure, and scalable semiconductor production capacity on American soil, while thwarting China's semiconductor ambitions.

TELECOMS AND 5G

For the foreseeable future, 5G networks will be the means by which the world accesses, channels, and—in malicious hands—manipulates global data. This is not a fight the United States can afford to lose, and certainly not to China, which has made tremendous strides in fielding 5G technology using "national champions" like Huawei and ZTE.

In the short term, the United States should continue its aggressive efforts to halt Huawei and ZTE's expansion, using methods that go beyond diplomatic persuasion and export controls. Huawei and ZTE, both designated by the U.S. government as national security threats, achieved dominant positions in part by stealing and scaling U.S.-developed technology, as well as purposefully evading U.S. sanctions.[206,207,208] The United States should punish and, if possible, bankrupt both companies through further sanctions. Applying OFAC sanctions and an airtight designation by Commerce's Bureau of Industry and Security (BIS) would deny these companies critical supply chain inputs, access to the U.S. market and financial system, and potentially access to some foreign markets, as well.

Though Huawei and ZTE are taking steps to reduce their vulnerability by stockpiling chips and undertaking efforts to achieve semiconductor self-sufficiency, both companies depend heavily on U.S. firms for high-end processors and chips. Huawei has been effectively cut off from most high-end U.S. chips; the United States should ensure ZTE is cut off, as well. When the next Huawei or ZTE arises, the government should deal with it in the same manner. This approach would reduce the quality and appeal of China's 5G products. It would also necessitate further investment by the Chinese government to keep these countries afloat. Given China's heavy debt load, this investment would be a painful burden on the CCP.

In addition to sanctions, the United States should further bar outbound investment in Chinese telecommunications companies and their foreign subsidiaries so that Americans cannot assist in building the next Huawei or ZTE. The United States should likewise ban Chinese investment—including through venture capital and offshore investment vehicles—in U.S. companies involved in telecommunications, 5G, or other associated technologies.

The United States should also continue its diplomatic pressure campaign to halt China's telecoms momentum and keep untrustworthy vendors out of allied and partner 5G networks. Though this campaign has encountered setbacks, it has made considerable progress in producing formal and informal vendor bans, as well as raising public awareness and political opposition to Chinese technology.[209,210,211] The United States must be willing to call out partners who are making short-sighted decisions on 5G. If these countries exclude dangerous Chinese vendors from their 5G networks, they will protect their citizens—as well as Americans living on their soil—from Chinese surveillance and manipulation.

Beyond the diplomatic campaign, the United States must offer a viable alternative to China's heavily subsidized, end-to-end 5G technology within a reasonable timeframe. No such alternative exists today. The United States must upset this dynamic by rapidly fielding a 5G alternative and laying the groundwork to dominate 6G.

It is unnecessary for the United States to copy China's national champion model to compete in 5G. Doing so may inadvertently strengthen the hardware-driven 5G delivery model which gives China a competitive advantage. The United States should instead focus on breakthroughs that would liberate 5G networks from proprietary and expensive equipment. Focusing on open interfaces over vertically-integrated hardware would lower 5G barriers to entry and shift the field of play from an arena in which the United States has fallen behind to one where it has a competitive advantage: software development.[212,213] Moving from a hardware- to software-centric model would counteract vendor-driven hardware "lock-in" and incentivize a competitive division of labor within the sector, with smaller firms able to focus on specific aspects of 5G systems rather than being forced to build an end-to-end system. On balance, this patchwork approach could prove more innovative, nimble, and efficient than a national champion.

The United States needs to foster grassroots innovation in ways that can beat Huawei. To this end, the U.S. government could lend its support to the Open Radio Access Network (ORAN) Coalition—a group of private-sector companies working to develop common 5G standards.

U.S. allies should also be involved in these efforts, as an American-led 5G coalition could thwart China's attempts to pick off countries one by one on 5G. The United Kingdom has proposed that the G7, plus Australia, South Korea, and India (the so-called D10), convene with their respective industry players to hammer out common 5G standards.[214] This 5G coalition could pool resources, build common network architectures, harmonize technological lines of effort, and reclaim international 5G standard-setting bodies. By sharing market access with one another and denying access to Chinese companies, members of this coalition could secure their 5G networks while inhibiting the growth of Chinese firms.

The United States must also be more aggressive in international standard-setting—5G's hidden battlefield. For over a decade, Huawei has carried out a standards submissions carpet-bombing campaign through international Standard Development Organizations (SDOs), capturing key patent territory and winning critical "compromises," such as the removal from 5G of U.S.-led Low Density Parity Check (LDPC) codes.[215] In 2018, Huawei and HiSilicon comprised 33 percent of

submissions to standard-setting bodies.[216] Ultimately, Chinese companies comprised 59 percent of the submissions. European companies accounted for another 23 percent. Only 10 percent came from the United States.[217] By going on offense while America slept, Huawei shaped intellectual property rights standards in ways that bolstered its bottom line and strengthened its market position.

CRITICAL MINERALS AND RARE-EARTH ELEMENTS

In June 2019, the Commerce Department released an unnerving analysis of U.S. dependence on China for critical minerals.[218] The analysis found that China is a major or dominant supplier of many of the 35 minerals it examined.[219] For example, in 2017, all of America's scandium imports (used in lasers and solid oxide fuel cells) came from China, along with 74 percent of America's bismuth (used in pharmaceuticals and semiconductor manufacturing).[220,221] This dependency on China is especially alarming since the United States has no ability to process these minerals. The report found the United States is entirely reliant on imports for 14 of the 35 minerals it examined. Lack of timely access to 16 of the 35 materials has "already caused some kind of significant weapon system production delay for DoD."[222]

U.S. dependence on China for rare-earth elements is an area of special concern. These 17 elements are required to build many commercial and military electronics, from taptic engines, which allow an iPhone panel display to imitate a physical button, to the guidance systems that allow U.S. Air Force missiles to accurately hit their targets.[223,224] Despite their name, rare-earth minerals are commonly found in nature. However, they are only mined and processed in a few places on Earth, as both activities are difficult, expensive, and dangerous.

The United States was the world's largest producer of rare earths through the 1980s.[225] China's strategic planners, however, recognized their significance as inputs to modern technology and methodically worked to corner the market over the intervening decades. Today, China dominates the rare-earth industry globally, supplying roughly 80 percent of U.S. imports from 2016-19.[226] Beyond raw rare-earth material, China also houses at least 85 percent of the world's rare-earth processing capacity, which turns extracted rare-earth elements into useful inputs for production.[227]

This reliance is dangerous given China's history of using access to rare earths as a weapon against adversaries with developed electronics sectors. In 2010, China halted rare-earth exports to Japan over a dispute involving a fishing trawler, causing prices to soar.[228,229] China threatened to do the same to the United States during the recent trade dispute.[230] While the United States is attempting to break free from dependence on China for rare-earth mining—domestic production increased 44 percent in 2019 to 26,000 metric tons—this will do little good if China remains dominant in rare-earth *processing*.[231] Mountain Pass, the only rare-earth mine in America, currently ships its rare-earth extraction to China for processing, though it plans to begin processing rare earths onsite in 2022 and has received assistance from the DOD to achieve this capability.[232,233]

Processed rare earths are often turned into highly specialized magnets for use in electronics and weapons systems.[234] China is the largest permanent-magnet maker, accounting for more than 90

percent of global supply.[235,236] The United States has no domestic producers of these magnets, including the neodymium iron boron (NdFeB) magnets invented by a U.S. Navy researcher in the 1980s that are needed to build the military's most advanced weapons systems.[237] China is so dominant in this specific, critical application of rare earths that the Pentagon has had to repeatedly waive a ban on using Chinese-built components in U.S. weapons so that it could install rare-earth magnets in F-35 fighters.[238] So precarious is the Pentagon's NdFeB magnet supply that it sought to establish a rotating, six-month stockpile in 2019 and recently provided a grant for rare earth magnet supply chain studies.[239,240]

The United States needs to end its dependence on China for rare-earth elements and other critical minerals to protect its commercial and military production from embargoes and other supply shocks.

America should seek to diversify its foreign sources of rare earths away from China, with special emphasis on allied and partner countries. The United States must also build domestic rare-earth infrastructure that it can scale quickly in the event of crisis. Finally, the United States should seek other opportunities to undermine China's rare-earth market dominance.

The best and most obvious way to undermine China's dominance is to become a reliable extractor and processor with excess capacity in our own right, cutting in on China's market share and reducing U.S. allies and partners' reliance on Chinese rare-earth elements. To further this goal, the U.S. government should require that, by a certain date specific to the global availability of each rare-earth element and critical mineral, all products purchased by the federal government do not contain rare earths and critical minerals mined or processed in China. This requirement would incentivize manufacturers with rare-earth inputs to pull their supply chains out of China and encourage the growth of rare-earth mining and processing companies outside of China. The government could supplement this requirement with grants for domestic rare-earth projects and tax surcharges on companies that continue to use Chinese rare earths.

The U.S. government should also establish a national strategic stockpile of rare-earth inputs, from magnets to backup processing equipment. Where appropriate, this stockpile should include other critical minerals. These stockpiles should be large enough to sustain the U.S. military and economy in the event of a high-intensity conflict—including replacements for projected losses—for as long as it would take to reach full-scale wartime production. The government should update and restock inputs as necessary, to ensure that inventories remain useable and the stockpile keeps pace with the ever-changing needs of the economy and military.

U.S. development finance organizations have a role to play in securing the rare-earth and critical mineral supply chains. The U.S. International Development Finance Corporation (DFC) and United States Agency for International Development (USAID) should identify and invest in processing and magnet-production facilities in friendly countries. Such efforts would increase the number of non-Chinese suppliers, breaking China's stranglehold on the market.

The United States should also restrict Americans from investing in Chinese firms that touch the rare-earth supply chain, from extraction to magnetization. It would be nonsensical for American investors to subsidize their country's rare-earth dependency at the same time taxpayers are funding countervailing attempts to end that dependency. Finally, until a U.S. rare-earth stockpile is established, the United States should work with its allies and partners on joint contingency planning for situations where China suddenly restricts access to its rare earth market. China caught Japan by surprise in 2010 when it weaponized its supply of rare earths. If the United States had possessed a robust rare-earth industry at the time, it could have stepped in and softened China's blow, while forging a new commercial relationship.

Current U.S. mineral dependency is not set in stone, so to speak. China insinuated itself into key areas of the global mineral supply chain over many years, while the United States was unaware of the threat. Now the United States has awoken to the threat. If it responds aggressively, it can potentially overturn decades of meticulous Chinese planning at relatively low cost.

MEDICINE AND MEDICAL EQUIPMENT

American medical supply chains are anchored in China, which dominates the production of basic chemicals, active pharmaceutical ingredients (APIs), and medical equipment. Researchers at the University of Minnesota claim that two-thirds of the active ingredients in American generic drugs, which account for almost 90 percent of U.S. retail prescriptions, come from China.[241] The United States can no longer make penicillin, aspirin, vitamin C, and many generic antibiotics at home.[242] In recent years, Chinese manufacturers supplied more than 90 percent of American antibiotics, vitamin C, ibuprofen, and hydrocortisone, in addition to more than 70 percent of acetaminophen and 40 to 45 percent of heparin.[243]

In some cases, there are no non-Chinese suppliers of essential medicines, meaning American patients are hostage to the strategic calculations of the CCP. The pandemic exposed this dependency, with CCP propaganda outlets crowing that the United States would "sink into the hell of a novel coronavirus epidemic" if China banned the export of drugs.[244] Supply disruptions during the early stages of the pandemic threatened shortages of 150 critical prescriptions drugs from China, some of which had no alternate supplier.[245,246]

Chinese drug safety and quality standards also are notoriously low. This is of particular concern because the FDA does not regularly test finished drugs or their ingredients, instead relying on voluntary company testing.[247] Information may be omitted or falsified by drug manufacturers—an FDA inspector observed that four-fifths of Chinese drug manufacturers engage in data manipulation.[248] The FDA may not know about problems until it is too late, such as when a contaminated blood thinner from China killed more than 200 Americans in 2008.[249]

China's position in the medical supply chain is not happenstance. As with rare earths, the CCP identified the sector as strategic and used its power to support domestic producers and put their foreign competitors out of business.[250] Over time, China positioned itself as the dominant player in the global

value chain. Indeed, China has openly announced its intention to dominate global medical markets; the "Made in China 2025" technology strategy identifies bio-medicine and medical supply equipment as one of ten key sectors the CCP seeks to dominate by the middle of this decade.[251]

China's brazen strategy contributed to the destruction of medicine manufacturing in the United States. In the case of penicillin, Chinese firms created a cartel and started dumping ingredients for the drug onto international markets in 2004.[252] Firms around the world could not compete. That year, America's last penicillin production facility announced its closure. Penicillin fermentation plants from Europe to India would soon follow.[253] Within four years, China had gained a chokehold on the world's production of this vital, life-saving drug. Then, with its competition obliterated, it dramatically raised prices.[254]

American reliance on China also extends to medical equipment. Chinese companies manufacture key components for critical U.S. medical devices, such as pulse oximeters that measure blood-oxygen levels, MRI machines, and catheters.[255] The United States even outsourced production of basic supplies such as medical masks, gloves, and body suits to China, a mistake that became sorely apparent during the early months of the pandemic, as the United States lacked the domestic capacity to provide sufficient personal protective equipment (PPE) for its doctors.[256] Untold numbers of American lives were lost as a result.

The United States' inability to produce essential medical supplies is a tremendous danger to Americans. Early in the pandemic, China nationalized PPE production at American-owned factories in China, ensuring a steady supply of PPE for itself.[257] However, even allied or partner countries can renege on commercial agreements during emergencies. India briefly nationalized and limited antibiotic exports in an attempt to stockpile supplies.[258] South Korea, Germany, and even Taiwan restricted the export of masks and other protective equipment over concern for their own supplies.[259]

Our dependence on medical supplies from overseas could have been mitigated if the United States possessed a well-maintained stockpile large enough to weather a crisis. The U.S. Strategic National Stockpile (SNS)—designed for this very purpose—was neither properly maintained nor large enough to handle a pandemic.[260] The failure of the SNS caused the federal government and states to scramble for PPE, basic testing supplies, and ventilators—a task greatly complicated by desperate foreign buyers and export restrictions.[261]

The threat of U.S. dependency on China extends well beyond disruptions associated with pandemics. The U.S. military relies upon medical supplies from China to care for U.S. servicemembers, including those forward deployed in Asia to deter China.

America must begin by reducing its reliance on Chinese APIs. The U.S. government should mandate that, by a certain date, all federally purchased or reimbursed drugs do not contain APIs produced in China. These restrictions would impact drugs paid for by the DOD and Department of Veterans Affairs (VA), as well as the Centers for Medicare and Medicaid Services (CMS). By using the federal government's purchasing power, we can incentivize pharmaceutical manufacturers to pull their supply chains out of China. If companies are unmoved by federal purchasing requirements, the government could phase in increasingly painful tax surcharges for companies whose medical production chains

include China, while at the same time offering tax credits to those that bring production back home.

The United States must also reduce its reliance on overseas medical equipment manufacturing. The government should not only fully restock the SNS, it should expand the SNS to ensure the United States has sufficient PPE, ventilators, and testing supplies and equipment to weather at least six months of a pandemic. This would greatly reduce the need for federal, state, and local governments to compete for scarce materials during the next crisis. The government should also ensure that the United States retains or reshores enough domestic medical equipment manufacturing so that domestic production could be scaled up to meet crisis levels of demand by the end of the six-month buffer. This domestic capacity could be secured through Buy America requirements for the restocking and expansion of the SNS.

In areas where fully reshoring production is infeasible or unnecessary, the United States could task organizations such as the DFC and USAID to fund medical supply-chain ventures in friendly locations close to the continental United States. The United States should further explore with allies and partners how to pool resources and build medical supply resiliency within its alliances.

The U.S. government must work to make the medical supply chain more transparent. The FDA should require all drugs sold in the United States to include conspicuous country-of-origin labeling for the drug's active ingredients. If Americans knew that the medicine they were buying at the drug store came from China, they might avoid it altogether, increasing demand for non-Chinese alternatives. Properly informed consumers could thus attack China's dominant position as a drug manufacturer. Similar country-of-origin labels could be applied to key medical devices, equipment, and their associated parts.

The FDA should also maintain an online website for generic drugs, in the style of "Consumer Reports."[262] The website could include information about where drug ingredients are sourced and where production occurs. This tracker would give companies a reputational incentive to move their supply chains to trusted countries or the United States while empowering consumers. The United States should compel private companies to disclose this information, which they normally do not reveal. The FDA also will have to increase its efforts to independently verify the origins of American drugs.[263] The agency likely will have to increase the size of its foreign inspection team (including foreign-language speakers), move to a "drop-in" inspection model, and curtail the use of warning letters—which have at times given second chances to untrustworthy Chinese producers—in favor of bans.[264]

Medicine and medical devices are strategic national resources as surely as food, oil, and weapons. U.S. policy should finally treat them accordingly by addressing the nation's alarming dependence on China for its health.

ARTIFICIAL INTELLIGENCE AND QUANTUM INFORMATION SCIENCE

China has not hidden its desire to achieve dominance in artificial intelligence (AI). In 2017, China's State Council released a road map, the New Generation Artificial Intelligence Development Plan (NGAIDP), for turning China into the AI world leader within a decade.[265] This roadmap is notable in that it calls upon China to shape the global development of laws, regulations, and ethics surrounding AI.[266]

These are ambitious but not implausible goals. In 2000, China had none of the world's 500 fastest supercomputers; today, it has well over 200, almost twice as many as the United States.[267] Those supercomputers are being put to good use. Chinese universities graduate several times as many computer scientists as their U.S. counterparts—which themselves graduate many Chinese nationals.[268] And while the exact amount the Chinese government invests in AI R&D is unclear, it is manifestly a substantial sum. For instance, the *cities* of Shanghai and Tianjin have pledged $15 billion and $16 billion, respectively, for AI over the coming decade. [269,270] Such investments are on top of government venture funds that manage hundreds of billions of dollars.[271] By comparison, the U.S. government is expected to spend $5 billion on AI research in 2020; as one industry expert observed, the U.S. federal government is "at present at risk of being outspent by a provincial government of China."[272,273] While this spending by Chinese local governments can be inefficient, the sheer scale should attract our notice.

While the United States likely retains an edge in AI due to the strength of its commercial sector and research enterprise, this position is under real threat.[274] Moreover, too much public discussion of this critical sector breezes past its profound implications for military applications and national security—considerations that should be preeminent. How can America respond to the Chinese AI challenge?

U.S. policy should acknowledge that data access, dataset size, and quality of datasets are key inputs enabling AI development, while data scarcity represents a barrier to entry for many AI startups and researchers.[275] China has a significant structural advantage in constructing massive datasets for AI development, as it can leverage its 1.4 billion people, hyper-invasive surveillance state, and advanced 5G infrastructure.[276]

While the United States can do little to roll back China's control of and access to the data generated by its own population, it can act to restrict China's access to the rest of the world's data. Such an information denial strategy could reduce the rate of Chinese AI technological advancement, widen the gaps between Chinese AI and American AI in the United States' favor over time, and deny exploitable information to the Chinese security apparatus. Machine learning is only as effective as the dataset on which it trains. The fewer high-quality overseas datasets the CCP and its national champions can acquire, the less rapidly their AIs can develop and the less effectively their algorithms can function in a non-Chinese context.

The United States should consider a series of data sharing and data export control agreements with trusted allies and partners, perhaps in a coalition of nations similar to the D10 group proposed

to address 5G issues. The participants in this framework must work to restrict and penalize the further distribution of this shared data to any country outside of this pact, especially China. This framework should specify what kinds of data should be export controlled—such as citizens' personally identifiable information, personal and vehicle location data, etc.—and realistically consider what data export controls are enforceable and what data is simply unprotectable in an open society.

At the same time, the United States and its partners could collaborate to pool data, allowing them to offset, and perhaps even surpass, China's advantage of scale. The United States and its partners could also work to determine and enforce international AI standards and ethics, thus combating China's attempts to dominate these discussions in international organizations and standard-setting bodies.

In addition to encouraging AI development, the United States must take measures to ensure breakthroughs stay out of China's hands. Due to the thoughtless integration achieved over the past generation, this task will not be easy. Chinese Internet giant Baidu has two laboratories focused on AI, robotics, and autonomous vehicles in Silicon Valley, staffed with hundreds of researchers.[277] Tencent, Huawei, Didi, and iFlytek also have AI labs in the United States.[278] Meanwhile, major U.S. tech companies like Google, Qualcomm, Amazon, IBM, and Microsoft have AI R&D centers onshore in China, where no proprietary information is safe.[279]

These beachheads must be closed if the United States is to retain a long-term AI advantage.

The United States government should review outbound investment in Chinese tech companies, including investment via offshore entities and foreign subsidiaries. Likewise, Chinese firms' presence in Silicon Valley should not be treated as aboveboard commercial ventures but as spying outposts for the CCP.[280] Similarly, it should be assumed that cutting-edge research done by American tech companies in mainland China likely will be stolen by the CCP. At the very least, these ventures train cadres of Chinese engineers who go on to found the next generation of national champions for the CCP.

The United States also must compete in quantum information science and restrict both inbound and outbound Chinese investment in this strategic research sector. Quantum technology holds enormous military potential, ranging from ironclad data encryption to breakthroughs in radar, sensing, imaging, and navigation.[281] The United States must maintain its lead in quantum computing and redouble its efforts in aspects of quantum science where it has been matched or surpassed by China, which outspends the United States significantly in quantum.[282] The United States has begun to address this imbalance through additional funding.[283] Yet, such funding must be paired with heightened oversight of inbound investment, joint ventures and other means by which Chinese entities acquire the fruits of U.S. research and circumvent U.S. investment restrictions.[284] America must ensure that its quantum advances remain American, while looking for opportunities to pool resources and technology with allied governments and firms.

SECTION THREE:
Mitigating the Costs of Decoupling

Targeted decoupling with China will entail risk and upfront costs.

American companies could lose access to China's lucrative market. Even though decoupling would be a gradual process in most—but not all—sectors, disruptions to supply chains could raise prices as firms scramble to move production out of China. American investors with heavy exposure to China would likely see lower returns. Decoupling also could provoke countermeasures from the CCP, such as accelerating its drive for domestic self-sufficiency and innovation, imposing further tariffs on U.S. goods, and expanding efforts to undermine the U.S. dollar's status as the global reserve currency.

As for the possibility of countermeasures, policymakers should bear in mind that China is still reliant on the United States in critical areas. Overcoming its points of dependence would be more difficult and expensive than many assume. While China is racing to develop domestic capabilities in advanced technology, it has yet to achieve this goal in many sectors. For instance, China's domestic semiconductor industry is significantly behind the world's most cutting-edge technology. In a decade, China could be in a better position to weather any attempt to decouple, as its homegrown semiconductor sector likely will be more mature and domestic substitutes will be more readily available. America's window of opportunity is real but not without limit.

The United States has even more leverage in the case of higher education. U.S. universities and laboratories offer high-level training and research opportunities not easily acquired elsewhere. With the right incentives, these institutions could substitute most—if not all—of their Chinese graduate students with Americans or students from allied and partner countries that do not systematically steal from us, such as India, Japan, South Korea, and many more. By cutting China out of STEM institutions, the United States could jam China's innovation and technology pipeline, forcing it into a costly search for alternatives.

Finally, while China seeks to topple the dollar-dominated trading system, it almost certainly would not risk catastrophically damaging its economy in order to weaken the U.S. dollar at the margins. Such efforts would isolate its most important companies, such as Huawei and ZTE, which are heavily reliant on foreign inputs, international trade, and the dollar system; they also would invite strong countermeasures from the United States. Moreover, the United States can take measures to shore up the dollar's position, such as modernizing the currency and offsetting potential crisis-of-confidence issues that could arise from a sanctions campaign focused against China's worst economic offenders.

While breaking from post-Cold War patterns of behavior will be disruptive, maintaining the status quo would be the far more dangerous path, as China would continue its rise as a superpower subsidized by American investors and consumers. If China is not stopped, it will soon match or surpass the United States in wealth and military power. It will then exert its power in ways far more disruptive to America's economy and society than the targeted decoupling proposed in this report.

How can targeted decoupling be achieved in a way that minimizes the costs to the United States? The U.S. government can implement numerous policies to soften the disturbances associated with decoupling and place the country on a stronger footing over the long term.

OPEN NEW MARKETS

A reduced role in the Chinese market would be a blow to several U.S. economic sectors, including aerospace and semiconductors. To offset these losses, the United States should seek to revise existing trade agreements and enter new agreements with allies and partners to open markets to American goods while putting pressure on China in those markets.

Carefully negotiated trade agreements that prioritize American jobs and exports could provide at least five benefits to the United States. First, they could foster access to other foreign markets to offset loss of access to the Chinese market. Second, they could secure reliable access to inputs in key industries currently dominated by China. Third, they could promote a level playing field in regulations to make U.S. producers more competitive. Fourth, they could enable coordinated supply-chain security efforts. Fifth, and perhaps most important, they could generate a powerful counterweight to China's predatory economic and trade practices.

The concept of an American-led, China-excluded trading order with trusted nations in the Indo-Pacific remains promising, despite poorly-executed efforts to achieve the same goal in the past. A favorable series of high-standard, bilateral trade agreements could increase U.S. market access to protected economies such as Japan, while creating alternatives to China for low-value production in places like Malaysia and Vietnam.

The United States should launch a similar effort with respect to the United Kingdom and the European Union, America's top export market.[285] In light of China's aggression, the United States and European nations have strong strategic reasons to work together to build a fair and reciprocal trade order. Though still reliant on heavily subsidized Chinese goods, Europe is gradually waking up to the threat of China's authoritarian designs and predatory economic behavior.

Any new trade agreements must do more than simply increase cross-border trade volume. Successful agreements also must limit the depth and nature of China's economic and financial integration with the parties. In practice, this should include restrictions on collaboration in strategically vital arenas such as telecommunications, semiconductors, and AI and quantum computing. These agreements also should encourage caps on Chinese market exposure for

imports and exports and limits on inbound and outbound Chinese investment, especially in areas of high technology.

The United States also must protect its workers and maintain secure, scalable, domestic manufacturing in strategic areas. So long as the United States defends its core interests, it can also benefit from expanding commercial ties with foreign countries, many of which distrust China and could be persuaded to work with us. China aggressively pursues its interests by exploiting its leverage over individual countries, using subsidized goods as a gateway drug. Creating a system of American-led trade agreements that excludes China could weaken and ultimately break China's grip.

LEVERAGE DEVELOPMENT FINANCE AND FOREIGN AID

The United States has powerful development-finance tools that will be useful during the economic long war with China. These include the U.S. Agency for International Development (USAID), U.S. International Development Finance Corporation (DFC), and Export-Import Bank (EXIM).[286,287,288] Each could play an important role in softening the disruption of targeted decoupling by connecting U.S. firms with new customers, hastening the movement of supply chains out of China, and combatting Chinese attempts to dominate sales of key technology to foreign countries.

USAID manages or partially manages close to $20 billion in foreign aid. Despite recent positive moves in a more strategic direction, this aid has generally been distributed to projects with humanitarian purposes primarily in mind.[289] USAID should continue supporting such priorities, but it must also continue to adapt to global competition with China. DFC partners with private industry to invest in a wide portfolio of international projects, from energy to critical infrastructure. In recognition of DFC's importance, Congress increased DFC's Fiscal Year 2021 funding to $571 million, up from $301 million the previous year.[290,291] Though DFC's predecessor, the Overseas Private Investment Corporation (OPIC), emphasized traditional development and business metrics when choosing ventures, DFC will have a role in securing U.S. national security interests in technology, which do not always promise maximum returns on investment.[292] DFC's ability to influence decisions about 5G networks and semiconductor fabrication facilities makes it a compelling weapon in America's decoupling arsenal.

Finally, EXIM is an export finance agency that extends credit to foreign entities to facilitate the purchase of American goods. EXIM could jumpstart exports of high-end technology and cultivate new markets for American goods to partially offset the loss of China's market. The United States should deploy EXIM in support of strategically important technology sectors such as 5G and other vital areas of domestic production once they come online, such as pharmaceuticals and processed rare earths. EXIM could play a role in sustaining U.S. manufacturers by cultivating foreign demand

for their products. In this way, EXIM is more than a vehicle for promoting U.S. exports; it also is a tool to reduce global dependency on China.

Mobilizing these powerful institutions can support a U.S. strategy for targeted decoupling by incentivizing foreign countries to resist Chinese entreaties, such as participation in the Belt and Road Initiative, and supporting American companies in strategic sectors. While our laws ought to encourage and support domestic production, in some circumstances it is not strategically or economically necessary to locate production at home. The government could use development finance to support European 5G alternatives to Huawei, fund and finance 5G packages for developing countries at a competitive price, and construct rare-earth processing plants or penicillin plants. So long as the United States rebuilds and retains adequate manufacturing capacity, its firms and consumers should continue to reap benefits from cross-border value chains. The United States can do so at substantially lower risk if it moves vulnerable production bottlenecks toward its shores, away from Beijing's military and political reach. USAID, DFC, and EXIM are well suited to this task.

These agencies also can increase demand for U.S. high technology and reduce demand for products from Chinese technology giants by offsetting the substantial advantages these companies receive from the state. Huawei reportedly benefits from "hundreds of millions of dollars in annual subsidies and… is guaranteed a majority share of the domestic market, the world's largest."[293] This support includes "loans at below-market interest rates, drawing on a staggering $100 billion line of credit at state-owned banks."[294] These privileges allow Huawei to underbid competitors by as much as 70 percent.[295]

U.S. development finance organizations should chip away at the subsidized price differential between China's 5G offerings and their competitors. Such actions could include defraying the cost of U.S.-produced 5G cell towers in foreign countries and reducing the price of U.S.-developed 5G equipment. This can help level the playing field for American firms competing against China's anti-competitive practices. While U.S. equipment may never be able to match China's on a pure price basis, closing even some of the price gap could change purchasing decisions in capitals around the world.

American firms will not win every bid, contract, or export order—even with government support—but simply by choosing to compete in the development finance and foreign aid arenas, the United States can raise China's cost to compete, forcing it to allocate more funding to protect the market share of its exporters. Even when the United States loses a DFC- or EXIM-supported skirmish with China, it still can be a strategic victory if it reduces the margins of Chinese firms or forces them to sell at a loss. Therefore, the U.S. government should see agencies like USAID, DFC, and EXIM as more than promoters of American companies, but as strategic instruments to beat China.

RECLAIM INTERNATIONAL INSTITUTIONS AND STANDARD-SETTING BODIES

China has burrowed its way into the power structures of many international institutions and standard-setting bodies. By perverting their charters from within, China has used these groups to advance its interests and rewrite the rules at America's expense.

For example, China continues to exploit its status as a "developing economy" in the WTO to get favorable subsidy preference, a position China has retained despite its flagrant violations of its obligations as a member of the WTO.[296,297,298] China is also aggressively building its power at the United Nations, where it dominates key U.N. specialized agencies, heading the International Telecommunication Union, the Industrial Development Organization, the International Civil Aviation Administration, and the Food and Agriculture Organization. Its commanding position in these organizations allows Beijing to set international standards, norms, and conduct as well as to interfere with UN human rights mechanisms.[299]

America must fight to reverse China's gains in these institutions and build new, separate organizations of willing and like-minded partners when these organizations cannot be reclaimed. With these organizations out of Beijing's hands, the United States can ensure that international rules and standards are written to support emerging technologies where America is naturally suited to prevail. With serious WTO reform, America can eliminate China's unfair legacy advantages in global trade, further reducing the discrepancy between the costs of U.S. and Chinese goods.

Where international organizations cannot be reclaimed from Chinese influence, select groups of U.S. partner nations should come together to coordinate, establish, and enforce rules and norms on an array of issues, including trade, export controls, data sharing, and emerging technologies. Critics will argue that such groups undermine existing international organizations. However, all such organizations are means to particular ends—and those ends should all contribute to a world that is open, not one that is dominated by a repressive, totalitarian power. By cutting China out of the rulemaking equation, smaller multilateral groups may succeed in some cases where international organizations have failed.

If the United States fails to compete in the international arena to advance its interests, it will cede power to China. Should China succeed in driving global standards in areas as diverse as 5G, intellectual property, and bioethics, Americans will one day wake up to find ourselves living in a world shaped by the CCP.

MODERNIZE REGULATIONS AND THE TAX CODE

The United States should continue the work of the Trump administration in determining where we are getting in our own way through excessive regulation and lack of incentives in the tax code. The federal government should pursue a renewed, top-to-bottom regulatory and tax code review, with the goal of accelerating the development of advanced technologies—particularly in strategically essential AI, quantum computing, and advanced telecommunications technologies. This review should also focus on regaining U.S. leadership in strategic industries where China currently holds the advantage, such as critical minerals and medical supplies and equipment. This review process would create a more attractive business environment at home.

Burdensome regulations and lengthy permitting and approval processes can doom many innovative projects from the start. In areas deemed strategically essential, the United States could establish a pipeline for rapid regulatory review and approval. This new process, perhaps modeled on the Pentagon's Other Transaction Authority, should incentivize rapid prototyping, experimentation, and commercial production.[300] The pipeline ideally would be available through an easily accessible online portal governed by a strict "no-purgatory" policy. The initiative's goal would be to democratize America's national technology effort, so that tiny startups in Silicon Valley could navigate regulations as easily as multinational corporations with armies of lawyers. A streamlined regulatory pipeline would spur progress in critical areas and save good ideas from an unjust death at the hands of bureaucrats. America's attitude toward technology should be one of aggressive innovation and experimentation. This is especially true in areas where the alternative is, in effect, giving China the advantage to establish global standards and norms.

For example, in supporting AI research, the United States clearly cannot adopt China's data practices, which provide national champions with comprehensive datasets from all facets of its mass surveillance state. Nonetheless, America must explore ways to make data available to developers in ways that still respect Americans' privacy. Important datasets needed to spur innovation encompass everything from crop distribution and soil composition to electricity use and traffic patterns. With necessary precautions to ensure this data is protected and utilized responsibly by developers, readily available government data could both fuel and democratize America's AI research. As mentioned above, a series of data sharing agreements among democratic states could fuel even further innovation in AI research.

The United States should also calibrate its tax code to encourage more rapid development of key strategic technologies.[301] Today, current federal R&D tax credits reimburse roughly five percent of research investments.[302] This is unacceptably low for vital strategic fields, and is a far lower level of tax support than other OECD countries give to R&D.[303] The government should significantly expand tax credits related to these fields, along with direct support for R&D and capital expenditures.

The U.S. government can also help private tech companies accelerate their work by allowing accelerated depreciation of assets relating to R&D. It could further allow companies to deduct qualified expenses from net income rather than revenue.[304]

The federal government could also support research by offering tax credits for costs associated with participation in Standard Development Organizations (SDO) and patent-protection activities. It could further provide assistance through the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs.[305,306]

Finally, when regulations are imposed in critical sectors, they should include mandatory sunset provisions that force policymakers to continuously revisit their effectiveness. If left unattended, regulations that once spurred progress can become silent killers of innovation. Sunset provisions should also be included with tax credits. These positive incentives exist to spur the development of nascent initiatives, not to subsidize mature industries which are now highly profitable and benefit from economies of scale.

Of course, all of these regulatory changes will be of little use if the U.S. research enterprise cannot keep its groundbreaking research secure. The government should provide material assistance and expertise to help universities, research institutes, and relevant private sector firms harden their information infrastructure and labs against Chinese government infiltrations. This is a pressing concern, as higher education ranked dead last in cybersecurity, according to a 2018 review of 17 major industries.[307] Government partnerships with all aspects of the U.S. research enterprise can mitigate this problem.

REBUILD THE U.S. STEM TALENT POOL

Though necessary, reforms which exclude Chinese nationals from studying STEM in U.S. graduate schools will be disruptive. Still, the United States can mitigate negative side-effects. China is not the only country in the world with STEM talent. To the extent that additional foreign talent is sought, the federal government should give priority to researchers and workers from nations that are America's partners—for example, Israel, Taiwan, Japan, and India.

But America must do more than restrict Chinese nationals and welcome new sources of talent from abroad. It must do a better job of training Americans in STEM. American math and science results are poor relative to other OECD counties, which explains in part why so many STEM fields are dominated by foreign students. In 2016-17, foreign students received 54 percent of STEM-related masters degrees and 44 percent of STEM-related doctorates issued by American institutions of higher learning.[308] In 2018-19, China alone had at least 171,000 STEM students in U.S. higher education, the largest amount of any country.[309]

While America's STEM deficiencies extend into its K-12 system, the United States could do a great deal, absent wholesale education reform, to increase the number of Americans in STEM. The U.S. government could provide supplemental research funding to colleges and universities, tied to the number of American citizens that are awarded STEM degrees at that institution. The U.S. military could also create a "STEM-ROTC," so that American high school and college students could commit to serving their country while the government invests in their education in critical fields.

Efforts to revitalize American STEM cannot begin and end on campus, as most Americans never receive a college degree. The U.S. government should work to ensure that America's non-college workforce has more opportunities to train in key vocations associated with the defense industrial base and national security, such as shipbuilding, high-end welding, and machine tooling. This effort might include enhanced recruitment on high-school campuses, STEM recruitment "road shows," subsidized vocational training, and greater efforts to support schools in creating a streamlined classroom-to-workforce pipeline.

The federal government should utilize the White House Office of Science and Technology Policy's Committee on STEM Education (CoSTEM), an interagency review board re-chartered by the Trump administration in 2018 to coordinate federal investments in STEM education, to set such STEM education efforts in motion.[310]

INCREASE FEDERAL SUPPORT FOR R&D

The federal government provides insufficient support for the research and development of key technologies. While the private sector continues to invest significantly in applied research and experimental development, federal support is essential for long-term innovation, as it can better fund speculative and theoretical research with no clear commercial benefit.

Federal spending on R&D peaked at almost two percent of GDP in 1964, hovered at about 1.2 percent in 1970s and 1980s, and declined sharply after the end of the Cold War.[311,312] Federal R&D spending has languished at less than one percent of GDP ever since.[313] In 2018, the federal government spent $146 billion on R&D, roughly 0.7 percent of GDP.[314] U.S. research spending has also declined in relative terms. In 1960, the United States accounted for 69 percent of global private and public research spending.[315] By 2000, this figure had fallen to 40 percent. In 2018, it stood at just 27.6 percent.[316] Meanwhile, China's spending grew from five percent of global R&D spending in 2000 to 26.3 percent in 2018, slightly over one percentage point behind the United States.[317] China's total R&D spending increased by 1,600 percent in 18 years.[318] Absent any substantial increase in federal R&D spending, China will soon surpass the United States in R&D spending. It may already have done so.

Notably, 84 percent of China's R&D spending goes to experimental development, while America spends 63 percent on such work.[319] China's emphasis on experimental development allows it to quickly commercialize and scale the fruits of basic and applied research—much of which it steals from the United States.[320]

While America benefited from the technological competitive advantage it gained through its substantial Cold War investments in R&D long after the Cold War ended, those benefits have since largely evaporated. It is time for the country to renew its commitment to federally supported R&D to face the threat posed by China. The United States should return to Cold War levels of investment in research. The government should earmark new funds for "mini-

moonshots" in technical fields that could radically alter the balance of power between the United States and China and power a new era of American growth and prosperity.

Increased funding is not an end in itself, but a means to secure the technological high ground. Funding increases must be focused, specific, and directly tied to areas of technological competition between the United States and China. Such key technologies include semiconductors, 6G telecommunications networks, critical mineral recycling and substitution efforts, and AI and quantum computing. Other technologies not addressed in this report, such as nuclear energy, biotechnology, space travel, advanced manufacturing, and next-generation robotics, should be included as well.

While planting the seeds of future innovation, an R&D buildup could also offset lost revenue for technology companies as a result of targeted decoupling. Many U.S. companies fear that decoupling will harm their ability to invest in R&D, thus making them less competitive in the long term. To the extent that this is true, the federal government, as the initiator and overseer of targeted decoupling, has a responsibility to mitigate its consequences. Research grants to key technology sectors adversely affected by decoupling, such as the semiconductor industry, will be critical in keeping America at the forefront of innovation. Applied science grants to U.S. companies would help smooth revenue disruption, maintain R&D efforts, and help them translate basic and applied research into commercially viable products.

However, the United States must ensure that the benefits of such an increase in support for R&D do not simply flow to China. Any surge in funds must be paired with a strict research blockade of Chinese entities and the fencing off of U.S. research institutions from potential CCP spies.

SECTION FOUR:
Federal Government Leadership

A FLAWED STATUS QUO

America's strategic position and industrial base did not erode overnight. Decades of complacency and the unwillingness of both major political parties to confront the damage incurred by their policies led us to this moment. As America's economy became more deeply entangled with China, U.S. officials treated the task of managing economic relations as a fundamentally collaborative rather than competitive matter. Policymakers gave little consideration to the national security implications of this economic entanglement. The United States was reckless in its attitude toward technology protection, industrial capacity, and supply chain reliance—including in areas vital to our survival.

It is clear today that the belief that liberalized economics would transform China into a liberal democracy was mistaken. This conviction was highly questionable following the mass murder of student protestors at Tiananmen Square in 1989. The actions of Chinese leaders in the two decades that followed provided ample reasons for it to be revisited. Yet the error persisted until Xi Jinping's unambiguous chauvinism made the full scope of the CCP's ambitions undeniable.

But even as the failure of engagement became clear, U.S. economic integration with China deepened. U.S. trade, investment, and supply chain dependency grew despite China's brazen behavior, including systematic industrial espionage, forced technology transfers, mercantilist trade policies, and confrontational rhetoric and behavior in the South and East China Seas.

Given that the U.S. government had ample time to react and an obligation to respond, its complacency toward China represents a stunning failure of governance. Several factors have contributed and still contribute to the specific failures of the U.S. federal government in our effort to compete with China:

- ***Elected leaders and the federal bureaucracy lacked political will and strategic direction to counter China's economic strategy.*** China's national strategy is a web of mutually-reinforcing initiatives that combine the efforts of its military, civilian industry, and the CCP. This incremental and cross-cutting strategy did not fall neatly under the purview of any one U.S. government department or agency. As a result, there was no political will for any one entity of the federal bureaucracy to act against China's predatory economic behavior, and each

government entity had significant incentive to pass the buck and continue the status quo. The effective capture of certain elements of the bureaucracy by private sector interests who benefited from ever more open engagement with China aggravated these conditions. The bureaucracy did not begin taking action until elected leadership began specifically directing them to do so, such as in the 2017 National Security Strategy.[321]

- ***Powers vital to economic competition with China are housed within larger organizations whose institutional interests and inclinations run counter to competition.*** Subordinate offices whose authorities are critical to the economic long war, such as the Bureau of Industry and Security (BIS) or the Office of Foreign Assets Control (OFAC), are housed within larger organizations whose institutional culture, interests, and focus are not primarily oriented toward national security. These entities treat critical national security tasks, like sanctioning foreign companies for IP theft, as inconveniences to avoid rather than duties. These parent organizations can stifle national security objections offered by these sub-offices before such concerns reach the interagency. This institutional culture problem undermines U.S. policy.

- ***U.S. export-control licensing is divided among several government entities.*** Export-control licensing is a key tool for protecting propriety technology and punishing foreign entities by barring them from parts of the U.S. market. However, under the current U.S. export-control system, five government entities have the authority to issue licenses: the State Department's Directorate of Defense Trade Controls (DDTC) oversees munitions licensing, the Commerce Department's BIS handles dual-use goods and technologies, the Treasury Department's OFAC restricts exports based on U.S. sanctions, and the Nuclear Regulatory Commission and Department of Energy (DOE) each have roles in licensing certain nuclear materials.[322] As mentioned previously, some of these licensing entities, particularly BIS and OFAC, are buried within organizations that have been hostile to the aggressive use of export controls. While the Export Control Reform Act of 2018 (ECRA) improved these agencies' ability to track and restrict export licenses for critical technologies, this diffusion of responsibility among departments with starkly different priorities is highly imperfect and presents barriers to coordination.[323]

- ***CFIUS, until recently, suffered from serious loopholes. Its leadership is still hesitant to act aggressively.*** Until CFIUS was strengthened by the Foreign Investment Risk Review Modernization Act (FIRRMA) of 2018, the government seldomly utilized CFIUS. CFIUS could not discriminate among foreign investors by country of origin, and it suffered from a number of loopholes that allowed foreign entities to acquire export-controlled U.S. technology through company buyouts and joint ventures.

- ***The government has paid insufficient attention to the health of America's industrial base and its reliance on foreign supply chains.*** While the government has occasionally assessed the nation's industrial capacity or specific supply chains, the government usually performed these assessments on a single economic sector or on an ad-hoc basis. Recent attempts to

examine the state of the industrial base, such as the laudable 2018 interagency assessment of the U.S. defense industrial base, arrived too late.[324]

- ***Oversight of the U.S. research enterprise is still inadequate.*** Federal R&D spending is highly diffuse, with 20 different agencies and departments allocating funds according to their own priorities. U.S. research in areas vital to competition with China is underfunded and lacks a high-level coordinating entity. The Department of Education and several other organizations split the task of securing the research enterprise, such as higher education and the national laboratory system, from CCP spies. Universities have accepted substantial funding from Chinese entities, flouting Department of Education requirements to disclose large foreign gifts, which the Department itself did not enforce until recently.[325] Tens of millions of dollars in federal grants went to researchers later found to be in the employ of the Chinese government. While the Department of Justice's China Initiative has made great strides in rooting out these Chinese agents, there still needs to be a formal oversight process to ensure a common insider threat and foreign influence policy for the U.S. research enterprise.

Despite these shortcomings, the Trump administration brought a welcome renewal of serious action on China after decades of inertia and strategic atrophy. However, the current federal government division of labor for fighting the economic long war with China puts U.S. national security at a disadvantage. The U.S. federal government has powerful policy tools in its arsenal, but its national security architecture is organized to compete with the Soviet Union and, due to post-9/11 reforms, with terrorism. Its economic policy elements are organized according to a wide variety of domestic considerations. To effectively compete with China, the U.S. government needs to consistently pursue its strategic objectives across all—potentially unwilling—government agencies, and ensure that inter- and intra-agency policy tensions do not undermine America's overall strategy.

In theory, the president is responsible for coordinating government efforts to compete economically with China. Entities within the Executive Office of the President (EOP), such as the National Security Council (NSC), the National Economic Council (NEC), and the Council of Economic Advisers (CEA) would assist in this task. Without a doubt, the president and these EOP organizations should play critical roles in shaping and coordinating a U.S.-China economic, science, and technology strategy. However, given the scale of the challenge and the work needed to address the China challenge, in practice most of the work and much of the coordination falls to the cabinet departments and agencies themselves. These departments can more effectively perform the specialized, long-term tasks which EOP entities, consumed with broader and more urgent matters, cannot.

After the end of the Second World War, the United States dramatically reorganized its national-security architecture through the 1947 National Security Act to reflect lessons learned during the war and better position the United States for competition against the Soviet Union.[326] Today, America's long-term economic, industrial, and technological efforts need to be updated to reflect the growing threat posed by Communist China.

A PATH FORWARD

The U.S. federal government needs to reorganize itself to synchronize America's formidable but poorly coordinated policy instruments to win the economic long war.

To fulfill these objectives, policymakers should consolidate many of the authorities necessary to manage America's economic competition with China under cabinet officials whose primary concern is national security. This consolidation can reduce bureaucratic incentives to evade responsibility and water down or delay decisive policies.

A national security-focused organization does not need to have responsibility for the health of the overall U.S. industrial base and supply chains, so long as the responsible department coordinates heavily with national security entities. The same departments which were institutionally hostile to restricting ties to China can be quite adept at assessing and overseeing funding toward building up U.S. productive capacity and supply chains, so long as other organizations can voice a national security perspective during the decision-making process.

Lastly, responsibility for improving the coordination of the vast array of federal entities which fund R&D—and then instituting the tough measures necessary to protect that research from Chinese espionage—is a vital task that will require an interagency solution. The federal government funds far too broad a spectrum of research for any one department to be solely responsible for managing the U.S. research enterprise. A more formal interagency system with common policies will also make it more difficult for parts of the research enterprise to resist the efforts necessary to combat Chinese foreign influence and insider threats.

With these objectives and concerns in mind, the United States should pursue the following changes to government roles and responsibilities in order to position itself to win the economic long war:

- ***The government should consolidate export control licensing authorities within the State Department.*** The federal government cannot continue to have critical national security authorities such as export control licensing dispersed and housed in larger organizations which oppose the decisive use of export controls. Policymakers must move BIS out of Commerce and into a department like State, which can approach matters of trade and investment from a national security perspective and push BIS to prioritize these concerns. State should also receive the modest nuclear export control licensing authorities in the Nuclear Regulatory Commission and DOE. Finally, in order to further improve coordination, State should consolidate all of its new licensing authorities with DDTC into a single licensing agency. The new single licensing agency should receive Intelligence Community information and assessments to aid in its licensing decisions.

- ***The Secretary of Defense should share in oversight of CFIUS.*** Although Treasury has been hesitant to employ CFIUS in a timely and effective manner, investment into the United

States is primarily a matter of domestic policy. As a result, the CFIUS chairmanship should remain under Treasury's control. However, due to the need to elevate the role of national security entities in America's economic long war effort, policymakers should establish a new position of Deputy Chair of CFIUS for the Secretary of Defense. Such a change would ensure that Treasury will address national security concerns brought up by Defense and other organizations on the committee that approach Chinese investment from the perspective of competition rather than cooperation.

- ***The Department of Commerce should be responsible for conducting continuous analysis of the industrial base and supply chain.*** Commerce should be responsible on a permanent basis for collecting data on the state of the U.S. industrial base and supply chain vulnerability, working with the DOD and the Intelligence Community where necessary. This data should then inform an annual report on the state of America's industrial base and its dependency on key foreign inputs, providing an economic early warning system for dangerous industrial trends. This report should include a U.S. sector-by-sector supply chain reliance breakdown and should identify potential bottlenecks in the event of a crisis or war. Based on this data, Commerce should then work with State and DOD to prepare regularly updated and detailed contingency plans to insulate the United States against supply chain shocks.

- ***The Department of Commerce should be responsible for supporting the regeneration of U.S. productive capacity in key sectors.*** The Commerce Department is well suited to act in support of U.S. industry and U.S. supply chains, especially if armed with the analytical capabilities described previously. However, Commerce should not take over the DOD Office of Industrial Policy's responsibility to oversee and support the defense industrial base (DIB). Commerce and DOD must work closely on industrial base matters, as a substantial degree of overlap exists between DIB suppliers and the broader civilian economy, and Commerce would benefit from DOD's national security perspective in its decision making.

- ***Policymakers should establish a permanent interagency committee to oversee the security of the U.S. research enterprise and to coordinate federal funding of research.*** This committee should include representatives of each cabinet department, independent agency, and, where appropriate, significant subordinate offices that provide federal grants for research and development. Departments or agencies which oversee a national laboratory or the higher education system, The Office of the Director of National Intelligence (ODNI), and the Department of Justice should also sit on this committee. An official in the Executive Office of the President should chair the committee. Such a group of government entities would be able to oversee the federal R&D grant process, streamline it where possible, and ensure that R&D in fields vital to economic competition with China are properly funded. Finally, in order to ensure federally-funded research does not simply flow back to China, the committee must create common, rigorous, and strictly-enforced insider threat and foreign influence policies. A U.S. research enterprise protected by these new rules would be primed for a surge in federal R&D spending.

Current U.S. federal government organization is not optimized to thwart China's whole-of-society approach to the economic long war. This has led to serious gaps in the performance of U.S. institutions, which today punch well below their weight, even given the positive reforms and initiatives of the past few years.

By putting national security concerns at the forefront of our economic contest with China, strengthening our industrial base and supply chains, and better coordinating and protecting our nation's research enterprise, America can create the government infrastructure it needs to properly utilize its vast capabilities and triumph in the long economic war.

SOURCES

SECTION 1

1 Donohue, Thomas. "Why We Need China and Why China Needs Us," July 28, 2001. US Chamber of Commerce. https://www.uschamber.com/op-ed/why-we-need-china-and-why-china-needs-us.

2 Zoellick, Robert. "'Whither China? From Membership to Responsibility'." National Committee on U.S.-China Relations, September 21, 2005. https://www.ncuscr.org/sites/default/files/migration/Zoellick_remarks_notes06_winter_spring.pdf

3 Morrisson, Wayne M. "China-U.S. Trade Issues". U.S. Congressional Research Service. (RL33536; July 30, 2018). https://fas.org/sgp/crs/row/RL33536.pdf.

4 Morrisson, Wayne M. "China-U.S. Trade Issues". U.S. Congressional Research Service. (RL33536; July 30, 2018). https://fas.org/sgp/crs/row/RL33536.pdf.

5 Rapoza, Kenneth. "Trump Making The China Lobby Extremely Nervous." Forbes. Forbes Magazine, May 11, 2020. https://www.forbes.com/sites/kenrapoza/2020/05/10/trump-making-china-lobby-extremely-nervous/?sh=517c80cf39d9.

6 Baker, Gerard. "In 1989, the U.S. Decided to Let Beijing Get Away With Murder." The Wall Street Journal, May 31, 2019. https://www.wsj.com/articles/in-1989-the-u-s-decided-to-let-beijing-get-away-with-murder-11559311545.

7 Broder, John M, and Jim Mann. "Clinton Reverses His Policy, Renews China Trade Status: Commerce: President 'De-Links' Most-Favored-Nation Privilege from Human Rights. He Admits Failure of Earlier Course and Says Broader Strategic Interests Justify Switch." Los Angeles Times. Los Angeles Times, May 27, 1994. https://www.latimes.com/archives/la-xpm-1994-05-27-mn-62877-story.html.

8 The White House Office of the Press Secretary. "Remarks by the President on Administration Efforts to Grant China Permanent Trade Relations Status." January 10, 2000 [Press Release]. https://1997-2001.state.gov/regions/eap/000110_clinton_china.html.

9 Zoellick, Robert. "'Whither China? From Membership to Responsibility'." National Committee on U.S.-China Relations, September 21, 2005. https://www.ncuscr.org/sites/default/files/migration/Zoellick_remarks_notes06_winter_spring.pdf

10 The China Trade Shock. Accessed July 9, 2020. https://chinashock.info/.

11 The ChinaFile Editors. "Document 9: A ChinaFile Translation." ChinaFile, October 30, 2015. https://www.chinafile.com/document-9-chinafile-translation.

12 Strutter, Karen M, Andres B. Schwarzenberg, and Michael D. Sutherlan. "COVID-19: China Medical Supply Chains and Broader Trade Issues." U.S. Congressional Research Service. (R46304; October 8, 2020), by. https://crsreports.congress.gov/product/pdf/R/R46304.

13 Chand, Nandika. "China Threatens to Restrict Drug Exports To US Amid Coronavirus Pandemic." International Business Times, March 18, 2020. https://www.ibtimes.com/china-threatens-restrict-drug-exports-us-amid-coronavirus-pandemic-2941920.

14 The World Bank. "GDP Growth (Annual %) - United States," Accessed July 9, 2020. https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2019&locations=US&start=2011.

15 Yao, Kevin, and Gabriel Crossley. "China's GDP Growth Grinds to near 30-Year Low as Tariffs Hit Production." Reuters. October 18, 2019. https://www.reuters.com/article/us-china-economy-gdp/chinas-gdp-growth-grinds-to-near-30-year-low-as-tariffs-hit-production-idUSKBN1WX05A.

16 Yao, Kevin, and Stella Qiu. "China's Slowdown Deepens; Industrial Output Growth Falls to 17-1/2 Year Low." Reuters. September 16, 2019. https://www.reuters.com/article/us-china-economy-activity/chinas-slowdown-deepens-industrial-output-growth-falls-to-17-1-2-year-low-idUSKBN1W102H.

17 Lee, Amanda. "China Now Accounts for Some 15 per Cent of Overall Global Debt." South China Morning Post, July 19, 2019. https://www.scmp.com/economy/china-economy/article/3018991/chinas-total-debt-rises-over-300-cent-gdp-beijing-loosens.

18 McMaster, H.R. "How China Sees the World." The Atlantic, May 2020. https://www.theatlantic.com/magazine/archive/2020/05/mcmaster-china-strategy/609088/.

19 Reuters Staff. "Coronavirus Shows U.S. Too Dependent on Cheap Medical Imports, USTR Says." Reuters, March 31, 2020. https://www.reuters.com/article/us-health-coronavirus-trade-ustr/coronavirus-shows-u-s-too-dependent-on-cheap-medical-imports-ustr-says-idUSKBN21I042.

20 "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china.

21 "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china.

22 The World Bank. "Exports of goods and services (% of GDP) - United States". Accessed July 9, 2020. https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?locations=US.

23 According to the U.S. Trade Representative, U.S. exports to China accounted for 6% of overall U.S. exports in 2019. According to the World Bank, total U.S. exports in 2019 accounted for 11.7% of GDP. Therefore, U.S. exports to China in 2019 were roughly 0.7% of U.S. GDP, less than 1%. See: "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china; and The World Bank. "Exports of goods and services (% of GDP) - United States". Accessed January 19, 2021. https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?locations=US..

24 "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china.

25 "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china.

26 "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china.

27 "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china.

28 "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china.

29 "The People's Republic of China: US-China Trade Facts." United States Trade Representative, December 2019. https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china.

30 "FDI Data." The US-China Investment Hub. Rhodium Group. Accessed July 9, 2020. https://www.us-china-investment.org/fdi-data.

31 "FDI Data." The US-China Investment Hub. Rhodium Group. Accessed July 9, 2020. https://www.us-china-investment.org/fdi-data.

32 "FDI Data." The US-China Investment Hub. Rhodium Group. Accessed July 9, 2020. https://www.us-china-investment.org/fdi-data.

33 Hancock, Tom. "China Biotech Groups Spend Billions on Overseas Drug Candidates." Financial Times, June 24, 2019. https://www.ft.com/content/869a918c-9185-11e9-aea1-2b1d33ac3271.

34 Yang, Brian. "Aim High And Keep Pushing: China Biotech Dealmakers Borrow Page From Trump." Pharma Intelligence, 2018. https://pharmaintelligence.informa.com/resources/product-content/aim-high-and-keep-pushing-china-biotech-dealmakers-borrow-page-from-trump.

35 O'Conner, Sean. Rep. How Chinese Companies Facilitate Technology Transfer from the United States. US-China Economic and Security Review Commission: Staff Search Report. May 6, 2019. https://www.uscc.gov/sites/default/files/Research/How%20Chinese%20Companies%20Facilitate%20Tech%20Transfer%20from%20the%20US.pdf.

36 O'Conner, Sean. Rep. How Chinese Companies Facilitate Technology Transfer from the United States. US-China Economic and Security Review Commission: Staff Search Report. May 6, 2019. https://www.uscc.gov/sites/default/files/Research/How%20Chinese%20Companies%20Facilitate%20Tech%20Transfer%20from%20the%20US.pdf.

37 Office of the United States Trade Representative. "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". Executive Office of the President (pp. 105-107). March 22, 2018. https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF.

38 O'Conner, Sean. Rep. How Chinese Companies Facilitate Technology Transfer from the United States. US-China Economic and Security Review Commission: Staff Search Report. May 6, 2019. https://www.uscc.gov/sites/default/files/Research/How%20Chinese%20Companies%20Facilitate%20Tech%20Transfer%20from%20the%20US.pdf.

39 O'Conner, Sean. Rep. How Chinese Companies Facilitate Technology Transfer from the United States. US-China Economic and Security Review Commission: Staff Search Report. May 6, 2019. https://www.uscc.gov/sites/default/files/Research/How%20Chinese%20Companies%20Facilitate%20Tech%20Transfer%20from%20the%20US.pdf.

40 O'Conner, Sean. Rep. How Chinese Companies Facilitate Technology Transfer from the United States. US-China Economic and Security Review Commission: Staff Search Report. May 6, 2019. https://www.uscc.gov/sites/default/files/Research/How%20Chinese%20Companies%20Facilitate%20Tech%20Transfer%20from%20the%20US.pdf.

41 O'Conner, Sean. Rep. How Chinese Companies Facilitate Technology Transfer from the United States. US-China Economic and Security Review Commission: Staff Search Report. May 6, 2019. https://www.uscc.gov/sites/default/files/Research/How%20Chinese%20Companies%20Facilitate%20Tech%20Transfer%20from%20the%20US.pdf.

42 "The Debt to the Penny and Who Holds It," TreasuryDirect. December 2, 2020. https://www.treasurydirect.gov/govt/reports/pd/pd_debttothepenny.htm.

43 US Treasury Department. "Major Foreign Holders of Treaury Securities". Accessed July 9, 2020. https://ticdata.treasury.gov/Publish/mfh.txt.

44 At the end of October 2020, Mainland China held $1.054 trillion of U.S. Treasury securities. On October 30, 2020, the U.S. outstanding public debt (not including intragovernmental holdings) was $21.079 trillion. $1.054 trillion is roughly 5% of $21.079. The data on China's U.S. Treasury holdings was accessed through: U.S. Treasury Department. "Major Foreign Holders of Treaury Securities". Accessed July 9, 2020. https://ticdata.treasury.gov/Publish/mfh.txt. The public debt data was accessed through: "The Debt to the Penny and Who Holds It," TreasuryDirect. December 2, 2020. https://www.treasurydirect.gov/govt/reports/pd/pd_debttothepenny.htm.

45 Leong, Richard. "Explainer: Will China Dump U.S. Bonds as a Trade Weapon? Not so Fast." Reuters, May 28, 2019. https://www.reuters.com/article/us-usa-trade-china-bonds-explainer/explainer-will-china-dump-u-s-bonds-as-a-trade-weapon-not-so-fast-idUSKCN1SY0BS.

46 Yeung, Karen "China Vows 'Prudence' in Diversifying Foreign Exchange Assets in 2020." South China Morning Post, January 6, 2020. https://www.scmp.com/economy/china-economy/article/3044891/china-pledges-prudence-diversifying-its-foreign-exchange.

47 Yeung, Karen. "China Vows 'Prudence' in Diversifying Foreign Exchange Assets in 2020." South China Morning Post, January 6, 2020. https://www.scmp.com/economy/china-economy/article/3044891/china-pledges-prudence-diversifying-its-foreign-exchange.

48 Tan, Weizhen. "China Is Building up Its 'Shadow Reserves' to Counter Its Reliance on the US Dollar." CNBC, November 18, 2019. https://www.cnbc.com/2019/11/18/china-diversifying-fx-reserves-assets-to-counter-us-dollar-exposure.html.

49 Reuters Staff. "Chinese Banks Urged to Switch Away from SWIFT as U.S. Sanctions Loom." Reuters, July 29, 2020. https://www.reuters.com/article/us-china-banks-usa-sanctions/chinese-banks-urged-to-switch-away-from-swift-as-u-s-sanctions-loom-idUSKCN24U0SN.

50 McDonald, Joe. "China Calls For New Global Currency." ABC News. ABC News Network, March 24, 2009. https://abcnews.go.com/International/story?id=7156932.

51 Cohen, Zachary, and Alex Marquardt. "US Intelligence Warns China Using Student Spies to Steal Secrets." CNN. Cable News Network, February 2, 2019. https://www.cnn.com/2019/02/01/politics/us-intelligence-chinese-student-espionage/index.html.

52 Korn, Melissa. "Colleges Brace for Sharp Drop in Foreign Students, Especially From China." The Wall Street Journal, July 7, 2020. https://www.wsj.com/articles/colleges-brace-for-sharp-drop-in-foreign-students-especially-from-china-11594114202.

53 International Student Data from the 2019 OpenDoors Report. "Fields of Study by Place of Origin," 2019. https://public.tableau.com/views/InternationalStudentsFieldsofStudy_1/FieldsofStudybyPlaceofOrigin?%3Aembed=y&%3Adisplay_count=yes&%3AshowVizHome=no.

54 Joske, Alex. "Issue brief. Picking Flowers, Making Honey: The Chinese Military's Collaboration with Foreign Universities". Wall Street Journal, October 2018. https://www.wsj.com/public/resources/documents/PickingFlowersMakingHoney10-29-18.pdf?mod=article_inline.

55 Staff Report. "Threats to the U.S. Research Enterprise: China's Talent Recruitment Plans." US Senate Permanent Subcommittee on Investigations. November 18, 2019. https://www.hsgac.senate.gov/imo/media/doc/2019-11-18%20PSI%20Staff%20Report%20-%20China's%20Talent%20Recruitment%20Plans.pdf.

56 Barry, Ellen. "U.S. Accuses Harvard Scientist of Concealing Chinese Funding." The New York Times, January 28, 2020. https://www.

nytimes.com/2020/01/28/us/charles-lieber-harvard.html.

57 Barry, Ellen. "U.S. Accuses Harvard Scientist of Concealing Chinese Funding." The New York Times, January 28, 2020. https://www.nytimes.com/2020/01/28/us/charles-lieber-harvard.html.

58 Barry, Ellen. "Stolen Research: Chinese Scientist Is Accused of Smuggling Lab Samples." The New York Times, De cember 31, 2019. https://www.nytimes.com/2019/12/31/us/chinese-scientist-cancer-research-investigation.html.

59 "The Threat Posed by the Chinese Government and the Chinese Communist Party to the Economic and National Security of the United States." FBI, July 7, 2020. https://www.fbi.gov/news/speeches/the-threat-posed-by-the-chinese-government-and-the-chinese-communist-party-to-the-economic-and-national-security-of-the-united-states.

60 O'Keeffe, Kate, and Aruna Viswanatha. "Chinese Military Turns to U.S. University to Conduct Covert Research." The Wall Street Journal, February 23, 2020. https://www.wsj.com/articles/chinese-military-turns-to-u-s-university-to-conduct-covert-research-11582466400.

61 O'Keeffe, Kate, and Aruna Viswanatha. "Chinese Military Turns to U.S. University to Conduct Covert Research." The Wall Street Journal, February 23, 2020. https://www.wsj.com/articles/chinese-military-turns-to-u-s-university-to-conduct-covert-research-11582466400.

62 O'Keeffe, Kate. "Education Department Investigating Harvard, Yale Over Foreign Funding." The Wall Street Journal, February 13, 2020. https://www.wsj.com/articles/education-department-investigating-harvard-yale-over-foreign-funding-11581539042.

63 O'Keeffe, Kate. "Education Department Investigating Harvard, Yale Over Foreign Funding." The Wall Street Journal, February 13, 2020. https://www.wsj.com/articles/education-department-investigating-harvard-yale-over-foreign-funding-11581539042.

64 Puko, Timothy, and Kate O'Keeffe. "U.S. Targets Efforts by China, Others to Recruit Government Scientists." The Wall Street Journal. June 10, 2019. https://www.wsj.com/articles/energy-department-bans-personnel-from-foreign-talent-recruitment-programs-11560182546.

65 Puko, Timothy, and Kate O'Keeffe. "U.S. Targets Efforts by China, Others to Recruit Government Scientists." The Wall Street Journal. June 10, 2019. https://www.wsj.com/articles/energy-department-bans-personnel-from-foreign-talent-recruitment-programs-11560182546.

66 Puko, Timothy, and Kate O'Keeffe. "U.S. Targets Efforts by China, Others to Recruit Government Scientists." The Wall Street Journal. June 10, 2019. https://www.wsj.com/articles/energy-department-bans-personnel-from-foreign-talent-recruitment-programs-11560182546.

67 Brown, Michael, and Pavneet Singh. Rep. China's Technology Transfer Strategy: How Chinese Investments in Emerging Technology Enable A Strategic Competitor to Access the Crown Jewels of U.S. Innovation. Defense Innovation Unity Experimental (DIUx). January 2018. https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_(1).pdf.

68 Hannas, William C., James C. Mulvenon, and Anna B. Puglisi. Chinese Industrial Espionage: Technology Acquisition and Military Modernisation. 1st ed. New York: Routledge, 2013.

69 Viswanatha, Aruna, and Kate O'Keeffe. "China's Funding of U.S. Researchers Raises Red Flags." The Wall Street Journal. January 31, 2020. https://www.wsj.com/articles/chinas-funding-of-u-s-researchers-raises-red-flags-11580428915.

70 Paquette, Danielle. "Tech Giants to Trump: We Need Chinese Workers." The Washington Post, April 30, 2019. https://www.washingtonpost.com/news/wonk/wp/2018/05/02/tech-giants-to-trump-we-need-chinese-workers/.

71 U.S. Department of Homeland Security, Rep. Characteristics of H-1B Specialty Occupation Workers, March 5, 2020. https://www.uscis.gov/sites/default/files/document/reports/Characteristics_of_Specialty_Occupation_Workers_H-1B_Fiscal_Year_2019.pdf.

72 Herman, Arthur, Edward R. Dougherty, and Gladden Pappin. "America's STEM Crisis Threatens Our National Security." American Affairs Journal, February 20, 2019. https://americanaffairsjournal.org/2019/02/americas-stem-crisis-threatens-our-national-security/.

73 Schleicher, Andreas. "PISA 2018: Insights and Interpretations." Organisation for Economic Co-operation and Development. 2019. https://www.oecd.org/pisa/PISA%202018%20Insights%20and%20Interpretations%20FINAL%20PDF.pdf

74 Organisation for Economic Co-operation and Development. "OECD Skills Survey". Accessed July 9, 2020. https://pisadataexplorer.oecd.org/ide/idepisa/.

75 Demers, John C. "Statement before the United States Senate Committee on the Judiciary for a hearing on China's Non-Traditional Espionage Against the US: The Threat and Potential Policy Responses". December 12, 2018. https://www.justice.gov/sites/default/files/testimonies/witnesses/attachments/2018/12/18/12-05-2018_john_c._demers_testimony_re_china_non-traditional_espionage_against_the_united_states_the_threat_and_potential_policy_responses.pdf.

76 Wray, Christopher. "The Threat Posed by the Chinese Government and the Chinese Communist Party to the Economic and Nation-

al Security of the United States." FBI, July 7, 2020. https://www.fbi.gov/news/speeches/the-threat-posed-by-the-chinese-government-and-the-chinese-communist-party-to-the-economic-and-national-security-of-the-united-states.

77 "Foreign Economic Espionage in Cyberspace". National Counterintelligence and Security Center. 2018. https://www.dni.gov/files/NCSC/documents/news/20180724-economic-espionage-pub.pdf.

78 Demers, John C. "Statement before the United States Senate Committee on the Judiciary for a hearing on China's Non-Traditional Espionage Against the US: The Threat and Potential Policy Responses". December 12, 2018. https://www.justice.gov/sites/default/files/testimonies/witnesses/attachments/2018/12/18/12-05-2018_john_c._demers_testimony_re_china_non-traditional_espionage_against_the_united_states_the_threat_and_potential_policy_responses.pdf.

79 Justin Rohrlich, Tim Fernholz. "Raytheon Engineer Arrested for Taking US Missile Defense Secrets to China." Quartz, February 1, 2020. https://qz.com/1795127/raytheon-engineer-arrested-for-taking-us-missile-defense-secrets-to-china/.

80 "How China's Economic Aggression Threatens the Technologies and Intellectual Property of the United States and the World". White House Office of Trade and Manufacturing Policy. June 2018. https://www.whitehouse.gov/wp-content/uploads/2018/06/FINAL-China-Technology-Report-6.18.18-PDF.pdf.

81 Cerullo, Megan. "Coronavirus Outbreak Causes First Drug Shortage in U.S., FDA Says." CBS News. CBS Interactive, February 28, 2020. https://www.cbsnews.com/news/coronavirus-human-drug-shortage-food-drug-administration/.

82 Chakraborty, Barnini. "China Hints at Denying Americans Life-Saving Coronavirus Drugs." Fox News. FOX News Network, March 13, 2020. https://www.foxnews.com/world/chinese-deny-americans-coronavirus-drugs.

83 Sutter, Karen M., Andres B. Schwarzenberg, and Michael D. Sutherland. "COVID-19: China Medical Supply Chains and Broader Trade Issues." Congressional Research Service (R46304). October 8, 2020. https://crsreports.congress.gov/product/pdf/R/R46304.

84 Reuters Staff. "U.S. Dependence on China's Rare Earth: Trade War Vulnerability." Reuters, June 27, 2019. https://www.reuters.com/article/us-usa-trade-china-rareearth-explainer/u-s-dependence-on-chinas-rare-earth-trade-war-vulnerability-idUSKCN1TS3AQ.

85 U.S. Geological Survey. "Mineral Commodity Summaries 2021." U.S. Department of the Interior, January 29, 2021. https://pubs.usgs.gov/periodicals/mcs2021/mcs2021.pdf.

86 Reuters Staff. "U.S. Dependence on China's Rare Earth: Trade War Vulnerability." Reuters, June 27, 2019. https://www.reuters.com/article/us-usa-trade-china-rareearth-explainer/u-s-dependence-on-chinas-rare-earth-trade-war-vulnerability-idUSKCN1TS3AQ.

87 Scheyder, Ernest. "California Rare Earths Miner Races to Refine amid U.S.-China Trade Row." Reuters, August 23, 2019. https://www.reuters.com/article/us-usa-rareearths-mpmaterials/california-rare-earths-miner-races-to-refine-amid-u-s-china-trade-row-idUSKCN1VD2D3.

88 Reuters Staff. "Explainer: U.S. Dependence on China's Rare Earth - Trade War Vulnerability." Reuters, June 3, 2019. https://www.reuters.com/article/us-usa-trade-china-rareearth-explainer/explainer-u-s-dependence-on-chinas-rare-earth-trade-war-vulnerability-idUSKCN1T42RP.

89 Reuters Staff. "Factbox: Rare Earths Projects under Development in U.S." Reuters, April 22, 2020. https://www.reuters.com/article/us-usa-rareearths-projects-factbox/factbox-rare-earths-projects-under-development-in-u-s-idUSKCN2241L6.

90 Stapleton, Katherine. "China Now Produces Twice as Many Graduates a Year as the US." World Economic Forum, April 13, 2017. https://www.weforum.org/agenda/2017/04/higher-education-in-china-has-boomed-in-the-last-decade.

91 The World Bank. "Manufacturing, value added (current USD)". Accessed July 9, 2020. https://data.worldbank.org/indicator/NV.IND.MANF.CD.

92 Kline, Steven. "The Global Machine Tool Boom Continues, Except in China." Modern Machine Shop, May 3, 2019. https://www.mmsonline.com/blog/post/the-global-machine-tool-boom-continues-except-in-china.

93 "Executive Summary World Robotics 2019 Industrial Robots". World Robotics, 2019. https://ifr.org/downloads/press2018/Executive%20Summary%20WR%202019%20Industrial%20Robots.pdf

94 Moss, Trefor. "Boeing Flies Close to Trade Tussle With New Facility in China." The Wall Street Journal, December 15, 2018. https://www.wsj.com/articles/boeing-flies-close-to-trade-tussle-with-new-facility-in-china-11544875263.

95 Wee, Sui-lee. "Giving In to China, U.S. Airlines Drop Taiwan (in Name at Least)." The New York Times, July 25, 2018. https://www.nytimes.com/2018/07/25/business/taiwan-american-airlines-china.html.

96 Hughes, Mark. "Red Dawn Film Replaces Chinese Villains with North Koreans." The Telegraph. Telegraph Media Group, November 22, 2012. https://www.telegraph.co.uk/culture/film/film-news/9697307/Red-Dawn-film-replaces-Chinese-villains-with-North-Koreans.html.

97 Deb, Sopan. "N.B.A. Commissioner: China Asked Us to Fire Daryl Morey." The New York Times, October 17, 2019. https://www.nytimes.com/2019/10/17/sports/basketball/nba-china-adam-silver.html.

98 Deb, Sopan, and Marc Stein. "N.B.A. Executive's Hong Kong Tweet Starts Firestorm in China." The New York Times, October 6, 2019. https://www.nytimes.com/2019/10/06/sports/daryl-morey-rockets-china.html.

99 Arkin, Daniel. "LeBron James Criticized for Saying Rockets GM 'Misinformed' on Hong Kong." NBCNews. NBCUniversal News Group, October 15, 2019. https://www.nbcnews.com/news/sports/lebron-james-criticized-saying-rockets-gm-misinformed-hong-kong-n1066351.

100 Pancevski, Bojan. "U.S. Officials Say Huawei Can Covertly Access Telecom Networks." The Wall Street Journal, February 12, 2020. https://www.wsj.com/articles/u-s-officials-say-huawei-can-covertly-access-telecom-networks-11581452256.

101 Swanson, Ana. "U.S. Delivers Another Blow to Huawei With New Tech Restrictions." The New York Times, May 15, 2020. https://www.nytimes.com/2020/05/15/business/economy/commerce-department-huawei.html.

102 Beasley, Stephanie. "Chinese Drone Ban Struck From Final NDAA Bill." Politico Pro, December 4, 2020. https://subscriber.politicopro.com/article/2020/12/chinese-drone-ban-struck-from-final-ndaa-bill-3985694?source=email.

103 Margaritoff, Marco. "Pentagon Orders U.S. Military to Ban DJI Equipment." The Drive, August 9, 2017. https://www.thedrive.com/article/13323/pentagon-orders-u-s-military-to-ban-dji-equipment.

104 Lampert, Allison. "Amid Privacy Backlash, China's DJI Unveils Drone-to-Phone Tracking." Reuters, November 13, 2019. https://www.reuters.com/article/us-aviation-drones/amid-privacy-backlash-chinas-dji-unveils-drone-to-phone-tracking-idUSKBN1XN2JR.

105 Kim, Robert. "CFIUS Scrutiny Forces Chinese Sale of Grindr." Bloomberg Law, April 16, 2019. https://news.bloomberglaw.com/bloomberg-law-analysis/analysis-cfius-scrutiny-forces-chinese-sale-of-grindr.

106 Vigdor, Neil. "U.S. Military Branches Block Access to TikTok App Amid Pentagon Warning." The New York Times, January 4, 2020. https://www.nytimes.com/2020/01/04/us/tiktok-pentagon-military-ban.html.

107 Bean, Randy. "How Big Data Is Empowering AI and Machine Learning at Scale." MIT Sloan Management Review. MIT, May 8, 2017. https://sloanreview.mit.edu/article/how-big-data-is-empowering-ai-and-machine-learning-at-scale/.

108 Mozur, Paul. "One Month, 500,000 Face Scans: How China Is Using A.I. to Profile a Minority." The New York Times, April 14, 2019. https://www.nytimes.com/2019/04/14/technology/china-surveillance-artificial-intelligence-racial-profiling.html.

109 Staff Report. "Threats to the U.S. Research Enterprise: China's Talent Recruitment Plans." US Senate Permanent Subcommittee on Investigations. November 18, 2019. https://www.hsgac.senate.gov/imo/media/doc/2019-11-18%20PSI%20Staff%20Report%20-%20China's%20Talent%20Recruitment%20Plans.pdf.

110 "Military-Civil Fusion: China's Approach to R&D, Implications for Peacetime Competition, and Crafting a US Strategy." Horizon Advisory China Standards Series. Horizon Advisory. March 10, 2020.

111 "The State of U.S. Science and Engineering 2020". US National Science Board Science and Engineering Indicators. Accessed July 9, 2020. https://ncses.nsf.gov/pubs/nsb20201/preface.

112 "The State of U.S. Science and Engineering 2020". US National Science Board Science and Engineering Indicators, https://ncses.nsf.gov/pubs/nsb20201/preface.

113 "Military-Civil Fusion: China's Approach to R&D, Implications for Peacetime Competition, and Crafting a US Strategy." Horizon Advisory China Standards Series. Horizon Advisory. March 10, 2020.

114 Lee, Amanda. "How Big Is China's Debt, Who Owns It and What Is next?" South China Morning Post, December 15, 2020. https://www.scmp.com/economy/china-economy/article/3084979/china-debt-how-big-it-who-owns-it-and-what-next.

115 Reuters Staff. "China Steps up Capital Controls, Tightens Investment Rules for State Firms." Reuters, January 18, 2017. https://www.reuters.com/article/us-china-economy-foreigninvestment-state/china-steps-up-capital-controls-tightens-investment-rules-for-state-firms-idUSKBN1520U1.

116 Rao, Sujata. "China Net 2016 Outflows at Record $725 Billion: IIF." Reuters, February 2, 2017. https://www.reuters.com/article/us-emerging-china-iif/china-net-2016-outflows-at-record-725-billion-iif-idUSKBN15H1FL.

117 Rogin, Josh. "It's Time to End the 'China Hustle' on U.S. Stock Exchanges." The Washington Post, August 30, 2018. https://www.washingtonpost.com/opinions/global-opinions/its-time-to-end-the-china-hustle-on-us-stock-exchanges/2018/08/30/50137c1a-ac8d-11e8-8a0c-70b618c98d3c_story.html.

118 Fabian, Jordan. "Trump Signs Bill That Could Remove China Stock Listings," Bloomberg News. December 18, 2020. https://www.bloomberg.com/news/articles/2020-12-18/trump-signs-bill-that-could-remove-china-stock-listings-in-u-s?sref=chOuzoqH.

119 Michaels, Dave, and Alexander Osipovich. "Congress Sets Stage for Exiling Chinese Stocks From U.S. Over Audit Dispute." The Wall Street Journal, December 2, 2020. https://www.wsj.com/articles/congress-sets-stage-for-exiling-chinese-stocks-from-u-s-over-audit-dispute-11606946071?mod=markets_lead_pos3.

120 The World Bank. "China Trade." World Integrated Trade Solution. Accessed July 9, 2020. https://wits.worldbank.org/countrysnapshot/en/CHN.

121 The World Bank. "China Trade." World Integrated Trade Solution. Accessed July 9, 2020. https://wits.worldbank.org/countrysnapshot/en/CHN.

122 Gan, Nectar. "China's Ailing Social Welfare System Needs Two Big Fixes, Says Finance Minister." South China Morning Post, November 25, 2015. https://www.scmp.com/news/china/policies-politics/article/1883074/chinas-ailing-social-welfare-system-needs-two-big-fixes.

123 Campbell, Charlie. "China's Aging Population Is a Major Threat to Its Future." TIME, February 7, 2019. https://time.com/5523805/china-aging-population-working-age/.

124 The World Bank. "Exports of goods and services (% of GDP) - United States, China, Russian Federation, Germany". World Bank national accounts data. Accessed July 9, 2020. https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?locations=US-CN-RU-DE.

SECTION 2

125 "Basic Data Selection - AmaWebClient." United Nations. December 2020. https://unstats.un.org/unsd/snaama/Basic.

126 Herman, Arthur. "Arthur Herman: Could We Launch Another D-Day Now?" Hudson Institute, Inc. June 6, 2019. https://www.hudson.org/research/15080-arthur-herman-could-we-launch-another-d-day-now.

127 National Economic Council. "Revitalizing American Manufacturing, The Obama Administration's Progress in Establishing a Foundation for Manufacturing Leadership." White House, October 2016 https://www.whitehouse.gov/sites/whitehouse.gov/files/images/NEC_Manufacturing_Report_October_2016.pdf.

128 "Historical Trends in Federal R&D." American Association for the Advancement of Science, n.d. https://www.aaas.org/programs/r-d-budget-and-policy/historical-trends-federal-rd.

129 Hourihan, Matt, and David Parkes. "Federal R&D Budget Trends: A Short Summary." AAAS, n.d. https://www.aaas.org/sites/default/files/2019-01/AAAS%20RD%20Primer%202019_2.pdf.

130 Segal, Adam. "Keeping Our Edge: Restoring Federal Funding for Research and Development." Council on Foreign Relations. September 19, 2019. https://www.cfr.org/blog/keeping-our-edge-restoring-federal-funding-research-and-development.

131 Martin, Timothy W. "American Tech Firms Are Winning the R&D Spending Race With China." The Wall Street Journal. October 30, 2018. https://www.wsj.com/articles/american-tech-firms-are-winning-the-r-d-spending-race-with-china-1540873318.

132 "Currency Composition of Official Foreign Exchange Reserves (COFER)." International Monetary Fund, September 30, 2020. https://data.imf.org/?sk=E6A5F467-C14B-4AA8-9F6D-5A09EC4E62A4.

133 "Currency Composition of Official Foreign Exchange Reserves (COFER)." International Monetary Fund, September 30, 2020. https://data.imf.org/?sk=E6A5F467-C14B-4AA8-9F6D-5A09EC4E62A4.

134 "Real GDP Growth." International Monetary Fund, 2019. https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/IRN?zoom=IRN.

135 "Six Charts That Show How Hard US Sanctions Have Hit Iran." BBC News. December 9, 2019. https://www.bbc.com/news/world-middle-east-48119109.

136 Reuters Staff. "Iran's Rial Falls to New Low, as Coronavirus Deaths Hit New High." Reuters, October 11, 2020. https://www.reuters.com/article/iran-economy-rial-idUSKBN26W0N3.

137 Verma, Pranshu, and Vivian Yee. "Trump's Syria Sanctions 'Cannot Solve the Problem,' Critics Say." The New York Times. August 4, 2020. https://www.nytimes.com/2020/08/04/world/middleeast/trump-assad-syria-sanctions.html.

138 Doff, Natasha. "Russia Still Paying Price for Crimea Five Years After Annexation." Bloomberg, March 17, 2019. https://www.

bloomberg.com/news/articles/2019-03-17/russia-still-paying-price-for-crimea-five-years-after-annexation.

139 Myers, Steven Lee, Jin Wu, and Claire Fu. "China's Looming Crisis: A Shrinking Population." The New York Times. January 17, 2019. https://www.nytimes.com/interactive/2019/01/17/world/asia/china-population-crisis.html.

140 Based on calculations using data projections from the UN World Population Prospects 2019 through https://population.un.org/wpp/DataQuery/. The data sample selected was "Population by Age and Sex," using the population between ages 15-64 in the United States and China to represent working age population. China's working age population peaked in 2015 at 1.022 billion people and has been declining since at increasing rates. Between 2030-2039, China's working age population is projected to shrink by six to ten million people every year. By 2050, China is projected to have a working age population of 838.4 million, or 183.2 million fewer people than in 2015. The entire U.S. working age population in 2019 was estimated at 214.7 million.

141 Stone, Mike. "Pentagon Announces F-35 Jet Prices for next Three Years." Reuters, October 29, 2019. https://www.reuters.com/article/us-usa-lockheed-f35/pentagon-announces-f-35-jet-prices-for-next-three-years-idUSKBN1X81I5.

142 U.S. Congress. House of Representatives. To authorize extension of nondiscriminatory treatment (normal trade relations treatment) to the People's Republic of China, and to establish a framework for relations between the United States and the People's Republic of China. HR 4444, 106th Congress, 2nd Sess. Introduced in House October 10, 2000. https://www.congress.gov/bill/106th-congress/house-bill/4444.

143 Olsen, Henry. "It's Time to Strip China of Its Trade Status." The Washington Post, September 18, 2020. https://www.washingtonpost.com/opinions/2020/09/18/its-time-strip-china-its-trade-status/.

144 Murrill, Brandon J. "The 'National Security Exception' and the World Trade Organization. U.S. Congressional Research Service (LSB10223). November 28, 2018. https://fas.org/sgp/crs/row/LSB10223.pdf.

145 Palmer, Doug. "Lighthizer: No One Misses WTO Appellate Body." Politico, December 10, 2020. https://www.politico.com/news/2020/12/10/lighthizer-wto-appellate-judges-444290.

146 AEIdeas. "We Won't Restrict Investment in China, But We Should." American Enterprise Institute, October 1, 2019. https://www.aei.org/foreign-and-defense-policy/we-wont-restrict-investment-in-china-but-we-should/.

147 "Public Companies That Are Audit Clients of PCAOB-Registered Firms from Non-U.S. Jurisdictions Where the PCAOB Is Denied Access to Conduct Inspections." Public Company Accounting Oversight Board, October 1, 2020. https://pcaobus.org/oversight/international/denied-access-to-inspections.

148 Scissors, Derek. "American funding of China is becoming dangerous." American Enterprise Institute. December 2, 2020. https://www.aei.org/research-products/report/american-funding-of-china-is-becoming-dangerous/.

149 Swanson, Ana. "Federal Retirement Fund Halts Planned China Investment Under Pressure." The New York Times, May 13, 2020. https://www.nytimes.com/2020/05/13/business/economy/china-tsp-federal-retirement-fund.html.

150 O'Keeffe, Kate, and Brian Spegele. "How a Big U.S. Chip Maker Gave China the 'Keys to the Kingdom'." The Wall Street Journal. June 27, 2019. https://www.wsj.com/articles/u-s-tried-to-stop-china-acquiring-world-class-chips-china-got-them-anyway-11561646798.

151 The National Bureau of Asian Research. "The Report of the Commission on the Theft of American Intellectual Property." The IP Comission Report, May 2013. https://www.nbr.org/wp-content/uploads/pdfs/publications/IP_Commission_Report.pdf.

152 de La Bruyère, Emily, and Nathan Picarsic. "How to Beat China's Military-Civil Fusion." The American Interest. The American Interest LLC, June 22, 2020. https://www.the-american-interest.com/2020/06/22/how-to-beat-chinas-military-civil-fusion/.

153 Office of the General Counsel. "Institutional Compliance with Section 117 of the Higher Education Act of 1965". U.S. Department of Education. October 2020. https://www2.ed.gov/policy/highered/leg/institutional-compliance-section-117.pdf.

154 Barry, Ellen. "Scientist Accused of Hiding Chinese Funds Sues Harvard, Saying It Abandoned Him." The New York Times, October 9, 2020. https://www.nytimes.com/2020/10/09/us/charles-lieber-harvard-china.html.

155 Barry, Ellen, and Gina Kolata. "China's Lavish Funds Lured U.S. Scientists. What Did It Get in Return?" The New York Times, February 6, 2020. https://www.nytimes.com/2020/02/06/us/chinas-lavish-funds-lured-us-scientists-what-did-it-get-in-return.html.

156 Pear, Robert. "U.S. Officials Warn Health Researchers: China May Be Trying to Steal Your Data." The New York Times. January 6, 2019. https://www.nytimes.com/2019/01/06/us/politics/nih-china-biomedical-research.html?auth=login-email.

157 Staff Report. "Threats to the U.S. Research Enterprise: China's Talent Recruitment Plans." US Senate Permanent Subcommittee on Investigations. November 18, 2019. https://www.hsgac.senate.gov/imo/media/doc/2019-11-18%20PSI%20Staff%20Report%20-%20China's%20Talent%20Recruitment%20Plans.pdf.

158 Dorfman, Zach. "Beijing Ransacked Data as U.S. Sources Went Dark in China." Foreign Policy, December 22, 2020. https://foreignpolicy.com/2020/12/22/china-us-data-intelligence-cybersecurity-xi-jinping/.

159 Allen-Ebrahimian, Bethany. "China's Long Arm Reaches Into American Campuses." Foreign Policy, March 7, 2018. https://foreignpolicy.com/2018/03/07/chinas-long-arm-reaches-into-american-campuses-chinese-students-scholars-association-university-communist-party/.

160 Bagshaw, Eryk, and Fergus Hunter. "'The Fear Is Real': Chinese Students in Australia Dread Reprisal from Beijing." The Sydney Morning Herald. August 4, 2020 https://www.smh.com.au/politics/federal/the-fear-is-real-chinese-students-in-australia-dread-reprisal-from-beijing-20200804-p55iht.html.

161 Interagency Task Force in Fulfillment of Executive Order 13806. "Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States," September 2018. https://media.defense.gov/2018/Oct/05/2002048904/-1/-1/1/ASSESSING-AND-STRENGTHENING-THE-MANUFACTURING-AND%20DEFENSE-INDUSTRIAL-BASE-AND-SUPPLY-CHAIN-RESILIENCY.PDF.

162 Bishop, Bill. "Engineers of the Soul: Ideology in Xi Jinping's China by John Garnaut". Sinocism. January 16, 2019. https://sinocism.com/p/engineers-of-the-soul-ideology-in.

163 Fox News. "Critics Worry Wang Jialin's Purchase of AMC Theaters Could Be Part of China's 'Soft Power Initiative'." Fox News, November 12, 2014. https://www.foxnews.com/entertainment/critics-worry-wang-jialins-purchase-of-amc-theaters-could-be-part-of-chinas-soft-power-initiative.

164 Armstrong, Nicholas and Sean O'Connor. "Directed by Hollywood, Edited by China: How China's Censorship and Influence Affect Films Worldwide". U.S. – China Economic and Security Review Commission. October 28, 2015.https://www.uscc.gov/sites/default/files/Research/Directed%20by%20Hollywood%20Edited%20by%20China.pdf.

165 Halper, Evan. "How Joe Biden Won Friends in Hollywood by Helping Studios Get Their Movies into China." Los Angeles Times, July 18, 2019. https://www.latimes.com/politics/story/2019-07-17/joe-biden-money-hollywood-studios-china.

166 Tager, James. "Made in Hollywood, Censored by Beijing." PEN America, September 16, 2020. https://pen.org/report/made-in-hollywood-censored-by-beijing/.

167 Allen-Ebrahimian, Bethany. "Hollywood Is Paying an 'Abominable' Price for China Access." Foreign Policy, October 23, 2019. https://foreignpolicy.com/2019/10/23/abominable-china-dreamworks-propaganda-hollywood/.

168 Tager, James. "Made in Hollywood, Censored by Beijing." PEN America, September 16, 2020. https://pen.org/report/made-in-hollywood-censored-by-beijing/.

169 Tager, James. "Made in Hollywood, Censored by Beijing." PEN America, September 16, 2020. https://pen.org/report/made-in-hollywood-censored-by-beijing/.

170 Lindahl, Chris. "Tom Cruise's Jacket Stripped of Taiwanese, Japanese Patches in 'Top Gun: Maverick' Trailer." IndieWire, July 23, 2019. https://www.indiewire.com/2019/07/tom-cruises-jacket-taiwanese-japanese-patches-in-top-gun-maverick-trailer-1202160078/.

171 Allen-Ebrahimian, Bethany. "Hollywood Is Paying an 'Abominable' Price for China Access." Foreign Policy, October 23, 2019. https://foreignpolicy.com/2019/10/23/abominable-china-dreamworks-propaganda-hollywood/.

172 Brooks, Max. "China Barred My Dystopian Novel About How Its System Enables Epidemics." The Washington Post, February 28, 2020. https://www.washingtonpost.com/outlook/china-barred-my-dystopian-novel-about-how-its-system-enables-epidemics/2020/02/27/cc0446f0-58e5-11ea-9000-f3cffee23036_story.html.

173 Shaw, Lucas. "Fearing Chinese Censors, Paramount Changes 'World War Z' (Exclusive)." TheWrap, April 1, 2013. https://www.thewrap.com/fearing-chinese-censors-paramount-changes-world-war-z-exclusive-83316/.

174 Allen-Ebrahimian, Bethany. "Hollywood Is Paying an 'Abominable' Price for China Access." Foreign Policy, October 23, 2019. https://foreignpolicy.com/2019/10/23/abominable-china-dreamworks-propaganda-hollywood/.

175 Barnes, Brooks, and Amy Qin. "Disney Wanted to Make a Splash in China With 'Mulan.' It Stumbled Instead." The New York Times, September 12, 2020. https://www.nytimes.com/2020/09/12/business/media/disney-mulan-china.html.

176 Cohen, David S. "'Transformers': A Splendidly Patriotic Film, If You Happen To Be Chinese (Opinion)." Variety, July 3, 2014. https://variety.com/2014/film/columns/transformers-age-of-extinction-patriotic-for-china-1201257030/.

177 Cohen, David S. "'Transformers': A Splendidly Patriotic Film, If You Happen To Be Chinese (Opinion)." Variety, July 3, 2014. https://variety.com/2014/film/columns/transformers-age-of-extinction-patriotic-for-china-1201257030/.

178 Lang, Katie. "How & Why the DOD Works With Hollywood." U.S. DEPARTMENT OF DEFENSE. Accessed December 25, 2020. https://www.defense.gov/Explore/Inside-DOD/Blog/Article/2062735/how-why-the-dod-works-with-hollywood/.

179 Alford, Matthew. "Washington DC's Role behind the Scenes in Hollywood Goes Deeper than You Think." The Independent, September 3, 2017. https://www.independent.co.uk/voices/hollywood-cia-washington-dc-films-fbi-24-intervening-close-relation-

ship-a7918191.html.

180 "How Can Screenwriters, Authors, and Producers Seeking Authenticity Work with the FBI?" FBI. FBI, December 21, 2016. https://www.fbi.gov/about/faqs/how-can-screenwriters-authors-and-producers-seeking-authenticity-work-with-the-fbi-.

181 "Winning The Future. A Blueprint for Sustained U.S. Leadership in Semiconductor Technology." Semiconductor Association, April 2019. https://www.semiconductors.org/wp-content/uploads/2019/04/FINAL-SIA-Blueprint-for-web.pdf.

182 Platzer, Michaela D., Josh F. Sargant Jr., and Karen M. Sutter. "Semiconductors: U.S. Industry, Global Competition, and Federal Policy". U.S. Congressional Research Service (R46581). October 26, 2020. https://fas.org/sgp/crs/misc/R46581.pdf.

183 Platzer, Michaela D., Josh F. Sargant Jr., and Karen M. Sutter. "Semiconductors: U.S. Industry, Global Competition, and Federal Policy". U.S. Congressional Research Service (R46581). October 26, 2020. https://fas.org/sgp/crs/misc/R46581.pdf.

184 Platzer, Michaela D., and John F. Sargent. "U.S. Semiconductor Manufacturing: Industry Trends, Global Competition, Federal Policy." U.S. Congressional Research Service (R44544). June 27, 2016. https://fas.org/sgp/crs/misc/R44544.pdf.

185 Platzer, Michaela D., Josh F. Sargant Jr., and Karen M. Sutter. "Semiconductors: U.S. Industry, Global Competition, and Federal Policy". U.S. Congressional Research Service (R46581). October 26, 2020. https://fas.org/sgp/crs/misc/R46581.pdf.

186 Everington, Keoni. "TSMC Starts Work on US$19.6 Billion 3nm Fab in S. Taiwan." Taiwan News. October 28, 2019. https://www.taiwannews.com.tw/en/news/3805032.

187 Platzer, Michaela D., and John F. Sargent. "U.S. Semiconductor Manufacturing: Industry Trends, Global Competition, Federal Policy." U.S. Congressional Research Service (R44544). June 27, 2016. https://fas.org/sgp/crs/misc/R44544.pdf.

188 Clarke, Peter. "Texas Instruments Exits Process Development Race -." EETimes. AspenCore, Inc., January 24, 2007. https://www.eetimes.com/texas-instruments-exits-process-development-race-2/.

189 "Report Contents." IC Insights. IC Insights, Inc. Accessed February 3, 2021. https://www.icinsights.com/services/global-wafer-capacity/report-contents/.

190 Nellis, Stephen. "Phoenix Okays Development Deal with TSMC for $12 Billion Chip Factory." Reuters, November 18, 2020. https://www.reuters.com/article/us-tsmc-arizona/phoenix-okays-development-deal-with-tsmc-for-12-billion-chip-factory-idUSKBN27Y30E.

191 Clark, Don. "Pentagon, With an Eye on China, Pushes for Help From American Tech." The New York Times. October 25, 2019. https://www.nytimes.com/2019/10/25/technology/pentagon-taiwan-tsmc-chipmaker.html.

192 Beddor, Christopher. "Breakingviews - Money Can't Buy China's Chip Industry Much Love." Reuters, February 19, 2019. https://www.reuters.com/article/us-china-semiconductors-breakingviews/breakingviews-money-cant-buy-chinas-chip-industry-much-love-idUSKCN1Q805V.

193 Liu, Luffy. "China's 'Big Fund' Phase II Aims at IC Self-Sufficiency -." EETimes. AspenCore, Inc., October 30, 2019. https://www.eetimes.com/chinas-big-fund-phase-ii-aims-at-ic-self-sufficiency/.

194 Ryugen, Hideaki. "China Chip Drive Far Short of 'Made in China 2025' Goal: Report." Nikkei Asia, June 7, 2020. https://asia.nikkei.com/Business/Technology/China-chip-drive-far-short-of-Made-in-China-2025-goal-report.

195 Babones, Salvatore. "China's Drive to Make Semiconductor Chips Is Failing." Foreign Policy, December 14, 2020. https://foreignpolicy.com/2020/12/14/china-technology-sanctions-huawei-chips-semiconductors/.

196 Brown, Chad P. "How Trump's Export Curbs on Semiconductors and Equipment Hurt the US Technology Sector." PIIE, September 28, 2020. https://www.piie.com/blogs/trade-and-investment-policy-watch/how-trumps-export-curbs-semiconductors-and-equipment-hurt-us.

197 Shepardson, David. "U.S. Tightening Restrictions on Huawei Access to Technology, Chips." Reuters, August 17, 2020. https://www.reuters.com/article/us-usa-huawei-tech/u-s-tightening-restrictions-on-huawei-access-to-technology-chips-idUSKCN25D1CC.

198 Whalen, Jeanne. "U.S. Restricts Tech Exports to China's Biggest Semiconductor Manufacturer in Escalation of Trade Tensions." The Washington Post, September 26, 2020. https://www.washingtonpost.com/technology/2020/09/26/us-restricts-exports-chinas-smic/.

199 Alper, Alexandra, and Humeyra Pamuk. "United States Adds China's SMIC and CNOOC to Defense Blacklist." Reuters. December 3, 2020. https://www.reuters.com/article/us-usa-china-military-companies/united-states-adds-chinas-smic-and-cnooc-to-defense-blacklist-idUSKBN28D3CR.

200 "Commerce Adds China's SMIC to the Entity List, Restricting Access to Key Enabling U.S. Technology." Press Release, U.S. Department of Commerce, December 18, 2020. https://www.commerce.gov/news/press-releases/2020/12/commerce-adds-chinas-smic-entity-list-restricting-access-key-enabling.

201 Swanson, Ana, and Raymond Zhong. "U.S. Places Restrictions on China's Leading Chip Maker." The New York Times. October 5, 2020. https://www.nytimes.com/2020/09/26/technology/trump-china-smic-blacklist.html.

202 Yamada, Shuhei. "US Chip Software Makers Thrive in China with Non-Huawei Clients." Nikkei Asia. June 9, 2020. https://asia.nikkei.com/Business/China-tech/US-chip-software-makers-thrive-in-China-with-non-Huawei-clients.

203 "Multilateral Export Control Policy: The Coordinating Committee (CoCom)." Technology and East-West Trade. Princeton. Accessed July 9, 2020. https://www.princeton.edu/~ota/disk3/1979/7918/791810.PDF.

204 "The Wassenaar Arrangement: Origins." The Wassenaar Arrangement. December 17, 2020. https://www.wassenaar.org/about-us/ - origins.

205 Thomas, Christopher A. "Lagging but Motivated: The State of China's Semiconductor Industry." Brookings Institution, January 8, 2021. https://www.brookings.edu/techstream/lagging-but-motivated-the-state-of-chinas-semiconductor-industry/#:~:text=Every%20year%2C%20China%20imports%20more,technology%20sectors%20in%20both%20countries.

206 Ramey, Corinne, and Kate O'Keeffe. "China's Huawei Charged With Racketeering, Stealing Trade Secrets." The Wall Street Journal. February 13, 2020. https://www.wsj.com/articles/chinas-huawei-charged-with-racketeering-11581618336.

207 Hendel, John. "FCC Votes to Edge Huawei, ZTE out of U.S. Networks." Politico. March 3, 2020. https://www.politico.com/news/2019/11/22/fcc-huawei-zte-subsidies-072901.

208 Stacey, Kiran. "US Accuses Huawei of Stealing Technology from Six Companies." Financial Times, February 14, 2020. https://www.ft.com/content/3174481a-4e8b-11ea-95a0-43d18ec715f5.

209 Kelion, Leo. "Huawei 5G Kit Must Be Removed from UK by 2027." BBC News. July 14, 2020. https://www.bbc.com/news/technology-53403793.

210 Rosemain, Mathieu, and Gwénaëlle Barzic. "Exclusive: French Limits on Huawei 5G Equipment Amount to De Facto Ban by 2028." Reuters, July 22, 2020. https://www.reuters.com/article/us-france-huawei-5g-security-exclusive/exclusive-french-limits-on-huawei-5g-equipment-amount-to-de-facto-ban-by-2028-idUSKCN24N26R.

211 Rinke, Andreas. "EXCLUSIVE-German Draft IT Security Law Strives for Consensus on Telecoms Vendor Risks." Reuters, November 20, 2020. https://www.reuters.com/article/germany-huawei/exclusive-german-draft-it-security-law-strives-for-consensus-on-telecoms-vendor-risks-idUSL1N2I61RZ.

212 "Top 100 Digital Companies." Forbes. Forbes Magazine. Accessed January 30, 2021. https://www.forbes.com/top-digital-companies/list/.

213 Ignatius, David. "The U.S. Has a Stronger Hand in Its Tech Battle with China than Many Suspect." The Washington Post, July 21, 2020. https://www.washingtonpost.com/opinions/the-us-has-a-stronger-hand-in-its-tech-battle-with-china-than-many-suspect/2020/07/21/76129704-cb79-11ea-91f1-28aca4d833a0_story.html.

214 Judah, Ben, and Erik Brattberg. "Forget the G-7, Build the D-10." Foreign Policy, June 10, 2020. https://foreignpolicy.com/2020/06/10/g7-d10-democracy-trump-europe/.

215 Dr. Clancy, Charles. "Hearing on 5G: The Impact on National Security, Intellectual Property, and Competition," US Senate Committee on the Judiciary. June 4, 2019. https://www.judiciary.senate.gov/imo/media/doc/Clancy%20Responses%20to%20QFRs.pdf.

216 Dr. Clancy, Charles. "Hearing on 5G: The Impact on National Security, Intellectual Property, and Competition," US Senate Committee on the Judiciary. June 4, 2019. https://www.judiciary.senate.gov/imo/media/doc/Clancy%20Responses%20to%20QFRs.pdf.

217 Dr. Clancy, Charles. "Hearing on 5G: The Impact on National Security, Intellectual Property, and Competition," US Senate Committee on the Judiciary. June 4, 2019. https://www.judiciary.senate.gov/imo/media/doc/Clancy%20Responses%20to%20QFRs.pdf.

218 U.S. Department of Commerce. "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals." U.S. Department of Commerce, June 4, 2019. https://www.commerce.gov/data-and-reports/reports/2019/06/federal-strategy-ensure-secure-and-reliable-supplies-critical-minerals.

219 U.S. Department of Commerce. "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals." U.S. Department of Commerce, June 4, 2019. https://www.commerce.gov/data-and-reports/reports/2019/06/federal-strategy-ensure-secure-and-reliable-supplies-critical-minerals.

220 U.S. Department of Commerce. "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals." U.S. Department of Commerce, June 4, 2019. https://www.commerce.gov/data-and-reports/reports/2019/06/federal-strategy-ensure-secure-and-reliable-supplies-critical-minerals.

221 U.S. Geological Survey. "Mineral Commodity Summaries 2021." U.S. Department of the Interior, January 29, 2021. https://pubs.usgs.gov/periodicals/mcs2021/mcs2021.pdf.

222 McGroarty, Daniel. "Getting Critical Medicines From China Is Risky. Critical Minerals, Too." Real Clear Politics. March 17, 2020. https://www.realclearpolitics.com/articles/2020/03/17/getting_critical_medicines_from_china_is_risky_critical_minerals_too__142671.html.

223 Nellis, Stephen. "Apple Taps Recycled Rare Earth Elements for IPhone Parts." Reuters, September 18, 2019. https://www.reuters.com/article/us-apple-rareearths/apple-taps-recycled-rare-earth-elements-for-iphone-parts-idUSKBN1W31JG.

224 Kenlan, Alyk Russell. "Rare Elements of Security." Air Force Magazine, November 6, 2020. https://www.airforcemag.com/article/rare-elements-of-security/.

225 Reality Check team and BBC Monitoring. "Are Rare Earth Minerals China's Trump Card in Its Trade War with US?" BBC News. May 28, 2019. https://www.bbc.com/news/world-asia-48366074.

226 U.S. Geological Survey. "Mineral Commodity Summaries 2021." U.S. Department of the Interior, January 29, 2021. https://pubs.usgs.gov/periodicals/mcs2021/mcs2021.pdf.

227 Reuters Staff. "U.S. Dependence on China's Rare Earth: Trade War Vulnerability." Reuters, June 27, 2019. https://www.reuters.com/article/us-usa-trade-china-rareearth-explainer/u-s-dependence-on-chinas-rare-earth-trade-war-vulnerability-idUSKCN1TS3AQ.

228 Bradsher, Keith. "Amid Tension, China Blocks Vital Exports to Japan." The New York Times. September 23, 2010. https://www.nytimes.com/2010/09/23/business/global/23rare.html.

229 Shida, Tomio. "History Offers Lessons in Escaping China's Rare-Earth Dominance." Nikkei Asia. June 25, 2019. https://asia.nikkei.com/Economy/Trade-war/History-offers-lessons-in-escaping-China-s-rare-earth-dominance2.

230 Groll, Elias, and Keith Johnson. "China Raises Threat of Rare-Earths Cutoff to U.S." Foreign Policy, January 1, 6709. https://foreignpolicy.com/2019/05/21/china-raises-threat-of-rare-earth-mineral-cutoff-to-us/.

231 Javier, Luzi-Ann, and Justina Vasquez. "U.S. Drones Scouring for Rare Earths to End Reliance on China." Bloomberg. February 7, 2020. https://www.bloomberg.com/news/articles/2020-02-07/u-s-scours-for-rare-earths-to-end-addiction-to-chinese-imports?srnd=premium.

232 Puko, Timothy. "Pentagon Invests in Strategic Metals Mine, Seeking to Blunt Chinese Dominance." Wall Street Journal. April 26, 2020. https://www.wsj.com/articles/pentagon-invests-in-strategic-metals-mine-seeking-to-blunt-chinese-dominance-11587924001.

233 Magnuson, Stew. "WEB EXCLUSIVE: Mining Company Determined to Restore U.S. Rare Earth Supply Chain (Updated)." National Defense Industrial Association, November 20, 2020. https://www.nationaldefensemagazine.org/articles/2020/11/20/mining-company-determined-to-restore-us-rare-earth-supply-chain.

234 Scheyder, Ernest. "Exclusive: Pentagon to Stockpile Rare Earth Magnets for Missiles, Fighter Jets." Reuters, December 20, 2019. https://www.reuters.com/article/us-usa-rareearths-magnets-exclusive/exclusive-pentagon-to-stockpile-rare-earth-magnets-for-missiles-fighter-jets-idUSKBN1YO0G7.

235 Bloomberg News. "Chinese Rare-Earth Magnet Producer to Expand as EV Demand Booms." Bloomberg. June 23, 2019. https://www.bloomberg.com/news/articles/2019-06-24/chinese-rare-earth-magnet-producer-to-expand-as-ev-demand-booms?sref=QuG7FWGN.

236 Suga, Masumi. "China's Rare-Earth Curbs Could Benefit Japan, Says Magnet Maker." Bloomberg. July 16, 2019. https://www.bloomberg.com/news/articles/2019-07-17/top-magnet-maker-says-china-rare-earth-curbs-would-benefit-japan?sref=QuG7FWGN.

237 Scheyder, Ernest. "Exclusive: Pentagon to Stockpile Rare Earth Magnets for Missiles, Fighter Jets." Reuters, December 20, 2019. https://www.reuters.com/article/us-usa-rareearths-magnets-exclusive/exclusive-pentagon-to-stockpile-rare-earth-magnets-for-missiles-fighter-%20jets-idUSKBN1YO0G7.

238 Shiffman, John, and Andrea Shalal-Esa. "Exclusive: U.S. Waived Laws to Keep F-35 on Track with China-Made Parts." Reuters, January 3, 2014. https://www.reuters.com/article/us-lockheed-f35/exclusive-u-s-waived-laws-to-keep-f-35-on-track-with-china-made-parts-idUSBREA020VA20140103.

239 Scheyder, Ernest. "Exclusive: Pentagon to Stockpile Rare Earth Magnets for Missiles, Fighter Jets." Reuters, December 20, 2019. https://www.reuters.com/article/us-usa-rareearths-magnets-exclusive/exclusive-pentagon-to-stockpile-rare-earth-magnets-for-missiles-fighter-jets-idUSKBN1YO0G7.

240 "DOD Announces Rare Earth Element Awards to Strengthen Domestic Industrial Base." U.S. Department of Defense, November 17, 2020. https://www.defense.gov/Newsroom/Releases/Release/Article/2418542/dod-announces-rare-earth-element-awards-to-strengthen-domestic-industrial-base/.

241 Roos, Robert. "Experts Say COVID-19 Will Likely Lead to US Drug Shortages." Center for Disease Research and Policy. University of Minnesota, March 27, 2020. https://www.cidrap.umn.edu/news-perspective/2020/03/experts-say-covid-19-will-likely-lead-us-drug-shortages.

242 Gibson, Rosemary. "Author of China Rx: Exposing the Risks of America's Dependence on China for Medicine' Before the U.S.-China Economic and Security Review Commission 'Exploring the Growing U.S. Reliance on China's Biotech and Pharmaceutical Products.'" Rosemary Gibson Testimony US China Commission July 31, 2019. https://www.uscc.gov/sites/default/files/RosemaryGibsonTestimonyUSCCJuly152019.pdf.

243 Swanson, Ana. "Coronavirus Spurs U.S. Efforts to End China's Chokehold on Drugs." The New York Times. March 11, 2020. https://www.nytimes.com/2020/03/11/business/economy/coronavirus-china-trump-drugs.html.

244 Cotton, Tom. "Sen. Cotton and Rep. Gallagher: China Stole US Capacity to Make Drugs - We Must Take It Back." Fox News Network, March 25, 2020. https://www.foxnews.com/opinion/sen-cotton-and-rep-gallagher-china-stole-us-capacity-to-make-drugs-we-must-take-it-back.

245 Owens, Caitlin. "Coronavirus Threatens Shortages of about 150 Prescription Drugs." Axios, February 23, 2020. https://www.axios.com/coronavirus-threatens-drug-shortage-318c9e7b-5d92-4a5e-b992-2478023c6d01.html?utm_source=newsletter.

246 "Coronavirus (COVID-19) Supply Chain Update." FDA, February 27, 2020. US Food and Drug Administration. https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-supply-chain-update?utm_campaign=022720_Statement_Coronavirus%20%28COVID-19%29%20Supply%20Chain%20Update&utm_medium=email&utm_source=Eloqua.

247 Edney, Anna. "America's Love Affair With Cheap Drugs Has a Hidden Cost." Bloomberg. January 29, 2019. https://www.bloomberg.com/news/features/2019-01-29/america-s-love-affair-with-cheap-drugs-has-a-hidden-cost?sref=QuG7FWGN.

248 Eban, Katherine. "Testimony before the U.S.-China Economic and Security Review Commission 'A Healthy Relationship? Assessing the Risks and Opportunities of China's Medicine and Health Development.'" Testimony Katherine Eban US China Commission, July 31, 2019. https://www.uscc.gov/sites/default/files/Testimony%20Katherine%20Eban%20US%20China%20Commission.pdf.

249 Edney, Anna. "America's Love Affair With Cheap Drugs Has a Hidden Cost." Bloomberg. January 29, 2019. https://www.bloomberg.com/news/features/2019-01-29/america-s-love-affair-with-cheap-drugs-has-a-hidden-cost?sref=QuG7FWGN.

250 Gibson, Rosemary. "Testimony of Rosemary Gibson, Safeguarding Pharmaceutical Supply Chains in a Global Economy". Rosemary Gibson Testimony Before the Committee on Energy and Commerce Subcommittee on Health. October 30, 2019. https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/Testimony-Gibson-API_103019.pdf.

251 "'Made in China 2025' Plan Issued." Implementation stressed for manufacturing vision. The State Council, The People's Republic of China. May 19, 2015. http://english.www.gov.cn/policies/latest_releases/2015/05/19/content_281475110703534.htm.

252 Gibson, Rosemary. "Testimony of Rosemary Gibson, Safeguarding Pharmaceutical Supply Chains in a Global Economy". Rosemary Gibson Testimony Before the Committee on Energy and Commerce Subcommittee on Health. October 30, 2019. https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/Testimony-Gibson-API_103019.pdf.

253 Gibson, Rosemary. "Testimony of Rosemary Gibson, Safeguarding Pharmaceutical Supply Chains in a Global Economy". Rosemary Gibson Testimony Before the Committee on Energy and Commerce Subcommittee on Health. October 30, 2019. https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/Testimony-Gibson-API_103019.pdf.

254 Gibson, Rosemary. "Testimony of Rosemary Gibson, Safeguarding Pharmaceutical Supply Chains in a Global Economy". Rosemary Gibson Testimony Before the Committee on Energy and Commerce Subcommittee on Health. October 30, 2019. https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/Testimony-Gibson-API_103019.pdf.

255 Cerullo, Megan. "Coronavirus Outbreak Causes First Drug Shortage in U.S., FDA Says." CBS News. CBS Interactive, February 28, 2020. https://www.cbsnews.com/news/coronavirus-human-drug-shortage-food-drug-administration/.

256 "US Mulls Using Sweeping Powers to Ramp up Production of Coronavirus Protective Gear." CNBC., February 28, 2020. https://www.cnbc.com/2020/02/28/us-mulls-using-sweeping-powers-to-ramp-up-production-of-coronavirus-protective-gear.html.

257 Sutter, Karen M., Andres B. Schwarzenberg, and Michael D. Sutherland. "COVID-19: China Medical Supply Chains and Broader Trade Issues." Congressional Research Service (R46304). October 8, 2020. https://crsreports.congress.gov/product/pdf/R/R46304.

258 Thomas, Chris, and Neha Dasgupta. "Global Supplier India Curbs Drug Exports as Coronavirus Fears Grow." Reuters, March 3, 2020. https://www.reuters.com/article/us-health-coronavirus-india-idUSKBN20Q0ZZ.

259 Ha, K. Oanh. "The Global Mask Shortage May Get Much Worse." Bloomberg Businessweek. https://www.bloomberg.com/news/articles/2020-03-10/the-global-mask-shortage-may-be-about-to-get-much-worse.

260 Evstatieva, Monika. "A Revamped Strategic National Stockpile Still Can't Match The Pandemic's Latest Surge." NPR. November 23, 2020. https://www.npr.org/2020/11/23/937978556/a-revamped-strategic-national-stockpile-still-cant-match-the-pandemics-latest-su.

261 Evstatieva, Monika. "A Revamped Strategic National Stockpile Still Can't Match The Pandemic's Latest Surge." NPR. November 23, 2020. https://www.npr.org/2020/11/23/937978556/a-revamped-strategic-national-stockpile-still-cant-match-the-pandemics-latest-su.

262 Gibson, Rosemary. "'Exploring the Growing U.S. Reliance on China's Biotech and Pharmaceutical Products". Rosemary Gibson Testimony Before the U.S.-China Economic and Security Review Commission. July 31, 2019. https://www.uscc.gov/sites/default/files/RosemaryGibsonTestimonyUSCCJuly152019.pdf.

263 Gibson, Rosemary. "Testimony of Rosemary Gibson, Safeguarding Pharmaceutical Supply Chains in a Global Economy". Rosemary Gibson Testimony Before the Committee on Energy and Commerce Subcommittee on Health. October 30, 2019. https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/Testimony-Gibson-API_103019.pdf.

264 Eban, Katherine. "Testimony before the U.S.-China Economic and Security Review Commission 'A Healthy Relationship? Assessing the Risks and Opportunities of China's Medicine and Health Development.'" Katherine Eban Testimony, US China Commission, July 31, 2019. https://www.uscc.gov/sites/default/files/Testimony%20Katherine%20Eban%20US%20China%20Commission.pdf.

265 Carter, William A., and William D. Crumpler. "Smart Money on Chinese Advances in AI." Center For Strategic & International Studies, September 2019. https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/191023_SmartMoneyChinaAdvancesInAI.pdf.

266 Carter, William A., and William D. Crumpler. "Smart Money on Chinese Advances in AI." Center For Strategic & International Studies, September 2019. https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/191023_SmartMoneyChinaAdvancesInAI.pdf.

267 Allison, Graham. "Is China Beating America to AI Supremacy?" The National Interest. The Center for the National Interest, December 23, 2019. https://nationalinterest.org/feature/china-beating-america-ai-supremacy-106861.

268 Loyalka, Prashant, Ou Lydia Liu, Guirong Li, Igor Chirikov, Elena Kardanova, Lin Gu, Guangming Ling, et al. "Computer Science Skills across China, India, Russia, and the United States." PNAS. National Academy of Sciences, April 2, 2019. https://www.pnas.org/content/116/14/6732.

269 Ren, Daniel. "Shanghai Aims to Raise at Least US$15 Billion to Gain Upper Hand in AI." South China Morning Post, July 5, 2018. https://www.scmp.com/business/companies/article/2153792/shanghai-aims-raise-us15b-funds-gain-upper-hand-ai-development.

270 Reuters Staff. "China's City of Tianjin to Set up $16-Billion Artificial Intelligence Fund." Reuters, May 17, 2018. https://www.reuters.com/article/us-china-ai-tianjin/chinas-city-of-tianjin-to-set-up-16-billion-artificial-intelligence-fund-idUSKCN1II0DD.

271 Huang, Tianlei. "Government-Guided Funds in China: Financing Vehicles for State Industrial Policy." Peterson Institute for International Economics, June 17, 2019. https://www.piie.com/blogs/china-economic-watch/government-guided-funds-china-financing-vehicles-state-industrial-policy.

272 Rasser, Martijn, Megan Lamberth, Ainikki Riikonen, Chelsea Guo, Michael Horowitz, and Paul Scharre. "The American AI Century: A Blueprint for Action." CNAS Tech, December 2019. https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Tech-American-AI-Century_updated.pdf?mtime=20200103081822.

273 Westervelt, Eric. "How China's Artificial Intelligence Strategy Stacks Up Against U.S. Investments." WBUR, February 25, 2019. https://www.wbur.org/hereandnow/2019/02/25/china-artificial-intelligence.

274 Schmidt, Eric. "Eric Schmidt: I Used to Run Google. Silicon Valley Could Lose to China." The New York Times. February 27, 2020. https://www.nytimes.com/2020/02/27/opinion/eric-schmidt-ai-china.html.

275 Rasser, Martijn, Megan Lamberth, Ainikki Riikonen, Chelsea Guo, Michael Horowitz, and Paul Scharre. "The American AI Century: A Blueprint for Action." CNAS Tech, December 2019. https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Tech-American-AI-Century_updated.pdf?mtime=20200103081822

276 Tomás, Juan Pedro. "China to End 2020 with over 600,000 5G Base Stations: Report." RCR Wireless News, June 9, 2020. https://www.rcrwireless.com/20200609/5g/china-end-2020-over-600000-5g-base-stations-report.

277 Yang, Yuan. "China's Tencent to Open First US-Based AI Laboratory." Financial Times, May 2, 2017. https://www.ft.com/content/5628724c-2f28-11e7-9555-23ef563ecf9a.

278 Danielle Cave, Samantha Hoffman. "Mapping China's Tech Giants: Australian Strategic Policy Institute." Mapping China's Tech Giants | Australian Strategic Policy Institute. Accessed July 9, 2020. https://chinatechmap.aspi.org.au/.

279 Rasser, Martijn, Megan Lamberth, Ainikki Riikonen, Chelsea Guo, Michael Horowitz, and Paul Scharre. "The American AI Century: A Blueprint for Action." CNAS Tech, December 2019. https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Tech-American-AI-Century_updated.pdf?mtime=20200103081822.

280 Dorfman, Zach. "How Silicon Valley Became a Den of Spies." Politico Magazine, July 27, 2018. https://www.politico.com/magazine/story/2018/07/27/silicon-valley-spies-china-russia-219071.

281 Deng, Iris. "Chinese Researchers Hail Google's Quantum Computing Breakthrough." South China Morning Post, October 29, 2019.

https://www.scmp.com/tech/start-ups/article/3035204/chinese-researchers-hail-googles-quantum-computing-breakthrough-call.

282 Deng, Iris. "Chinese Researchers Hail Google's Quantum Computing Breakthrough." South China Morning Post, October 29, 2019. https://www.scmp.com/tech/start-ups/article/3035204/chinese-researchers-hail-googles-quantum-computing-breakthrough-call.

283 Metz, Cade. "White House Earmarks New Money for A.I. and Quantum Computing." The New York Times. February 10, 2020. https://www.nytimes.com/2020/02/10/technology/white-house-earmarks-new-money-for-ai-and-quantum-computing.html.

284 Metz, Cade. "White House Earmarks New Money for A.I. and Quantum Computing." The New York Times. February 10, 2020. https://www.nytimes.com/2020/02/10/technology/white-house-earmarks-new-money-for-ai-and-quantum-computing.html.

SECTION 3

285 "European Union". Office of the United States Trade Representative. Accessed July 9, 2020. https://ustr.gov/countries-regions/europe-middle-east/europe/european-union.

286 "Who We Are." United States Agency for International Development. October 4, 2019. https://www.usaid.gov/who-we-are.

287 "Investing in Development." U.S. International Development Finance Corporation. Accessed July 9, 2020. https://www.dfc.gov/.

288 Akhtar, Shayerah Illias. "Export-Import Bank: Overview and Reauthorization Issues" U.S. Congressional Research Service (R43581) August 9, 2019. https://fas.org/sgp/crs/misc/R43581.pdf.

289 "Budget". United States Agency for International Development. March 4, 2020. https://www.usaid.gov/cj.

290 "Congress Finalizes FY21 Spending: Protects International Affairs Budget in the Midst of Global COVID-19 Pandemic." U.S. Global Leadership Coalition. December 30, 2020. https://www.usglc.org/the-budget/congress-finalizes-fy21-spending-protects-international-affairs-budget-in-the-midst-of-global-covid-19-pandemic/.

291 "Congressional Budget Justification: Fiscal Year 2021." U.S. International Development Finance Corporation. February 2020. https://www.dfc.gov/sites/default/files/media/documents/FY2021_DFC_CBJ-Final-04222020.pdf.

292 Runde, Daniel F, Romina Bandura, and Janina Staguhn. "The DFC's New Equity Authority." Center for Strategic and International Studies, December 30, 2021. https://www.csis.org/analysis/dfcs-new-equity-authority.

293 Nakashima, Ellen. "U.S. Pushes Hard for a Ban on Huawei in Europe, but the Firm's 5G Prices Are Nearly Irresistible." The Washington Post, May 29, 2019. https://www.washingtonpost.com/world/national-security/for-huawei-the-5g-play-is-in-europe--and-the-us-is-pushing-hard-for-a-ban-there/2019/05/28/582a8ff6-78d4-11e9-b7ae-390de4259661_story.html.

294 Nakashima, Ellen. "U.S. Pushes Hard for a Ban on Huawei in Europe, but the Firm's 5G Prices Are Nearly Irresistible." The Washington Post, May 29, 2019. https://www.washingtonpost.com/world/national-security/for-huawei-the-5g-play-is-in-europe--and-the-us-is-pushing-hard-for-a-ban-there/2019/05/28/582a8ff6-78d4-11e9-b7ae-390de4259661_story.html.

295 Nakashima, Ellen. "U.S. Pushes Hard for a Ban on Huawei in Europe, but the Firm's 5G Prices Are Nearly Irresistible." The Washington Post, May 29, 2019. https://www.washingtonpost.com/world/national-security/for-huawei-the-5g-play-is-in-europe--and-the-us-is-pushing-hard-for-a-ban-there/2019/05/28/582a8ff6-78d4-11e9-b7ae-390de4259661_story.html.

296 Lee, Amanda. "China Refuses to Give up 'Developing Country' Status at WTO." South China Morning Post, April 8, 2019. https://www.scmp.com/economy/china-economy/article/3004873/china-refuses-give-developing-country-status-wto-despite-us.

297 Baschuk, Bryce. "U.S. Revokes WTO Subsidy Preferences for Some Developing Nations." Bloomberg, February 10, 2020. https://www.bloomberg.com/news/articles/2020-02-10/u-s-revokes-wto-subsidy-preferences-for-some-developing-nations?sref=QuG7FWGN.

298 United States Trade Representative. "2018 Report to Congress On China's WTO Compliance," February 2019. https://ustr.gov/sites/default/files/2018-USTR-Report-to-Congress-on-China%27s-WTO-Compliance.pdf.

299 Lee, Kristine. "Coming Soon to the United Nations: Chinese Leadership and Authoritarian Values." Foreign Affairs, September 16, 2019. https://www.foreignaffairs.com/articles/china/2019-09-16/coming-soon-united-nations-chinese-leadership-and-authoritarian-values.

300 Peters, Heidi M. and Moshe Schwartz. "Department of Defense Use of Other Transaction Authority: Background, Analysis, and Issues for Congress" U.S. Congressional Research Service (R45521). February 22, 2019. https://fas.org/sgp/crs/natsec/R45521.pdf.

301 Rasser, Martijn, Megan Lamberth, Ainikki Riikonen, Chelsea Guo, Michael Horowitz, and Paul Scharre. "The American AI Century: A Blueprint for Action." CNAS Tech, December 2019. https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Tech-American-AI-Century_updated.pdf?mtime=20200103081822.

302 "R&D Tax Incentives: United States, 2019". The Organization for Economic Co-operation and Development. December 2019. https://www.oecd.org/sti/rd-tax-stats-united-states.pdf.

303 "Measuring Tax Support for R&D and Innovation." OECD, December 2020. http://www.oecd.org/sti/rd-tax-stats.htm.

304 Rasser, Martijn, Megan Lamberth, Ainikki Riikonen, Chelsea Guo, Michael Horowitz, and Paul Scharre. "The American AI Century: A Blueprint for Action." CNAS Tech, December 2019. https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Tech-American-AI-Century_updated.pdf?mtime=20200103081822.

305 Dr. Clancy, Charles. "Questions for the Record Response for Dr. Charles Clancy, Bradley Professor of Cybersecurity, Virginia Tech before the Senate Committee on the Judiciary, Hearing on 5G: The Impact on National Security, Intellectual Property, and Competition". Senate Committee on the Judiciary, June 4, 2020. https://www.judiciary.senate.gov/imo/media/doc/Clancy%20Responses%20to%20QFRs.pdf.

306 "About". The Small Business Innovation Research (SBIR) Program. Accessed July 9, 2020. https://www.sbir.gov/about.

307 "2018 Education Cybersecurity Report". SecurityScorecard. December 2018. https://explore.securityscorecard.com/rs/797-BFK-857/images/SSC-EducationReport-2018.pdf?mkt_tok=eyJpIjoiTXpreE9HUmxNRFF4TTJVNCIsInQiOiJTWnpmZ2p0ck8yWEErWFFESVJRRlRDQTlnbXM5RU5ZTCs5VFF2U2FIVThYekpPZ21ERHNiQVhvTFZPMVwvVENSRDN4azlvclTK01FVkRuSDFkU01aNE9QcHp4MTVYZ0pPME4rUG5yZERjZFluYXM2bEpneitiK2d3eXkreUJjVWYifQ%3D%3D.

308 Granovskiy, Boris and Jill H. Wilson. "Foreign STEM Students in the United States". U.S. Congressional Research Service (IF11347). https://crsreports.congress.gov/product/pdf/IF/IF11347.

309 Postrel, Virginia. "Banning Chinese STEM Students Would Backfire on U.S." Bloomberg, May 28, 2020. https://www.bloomberg.com/opinion/articles/2020-05-28/banning-chinese-stem-students-would-backfire-on-u-s?sref=chOuzoqH.

310 The Committee on STEM education of the National Science & Technology Council. "Chartering a Course for Success: America's Strategy for STEM Education" US Executive Office of the President, December 2018. https://web.archive.org/web/20210116172617/https://www.whitehouse.gov/wp-content/uploads/2018/12/STEM-Education-Strategic-Plan-2018.pdf.

311 Orzag, Peter R. "Federal Support for Research and Development" Congressional Budget Office. June 2007. https://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/82xx/doc8221/06-18-research.pdf.

312 Atkinson, Robert D, and Caleb Foote. Federal Support for R&D Continues Its Ignominious Slide. Information Technology and Innovation Foundation, August 12, 2019. https://itif.org/publications/2019/08/12/federal-support-rd-continues-its-ignominious-slide.

313 Henry, Mike. "US R&D Spending at All-Time High, Federal Share Reaches Record Low." American Institute of Physics, November 8, 2016. https://www.aip.org/fyi/2016/us-rd-spending-all-time-high-federal-share-reaches-record-low.

314 Manyika, James, William H. McRaven, and Adam Segal. "Innovation and National Security Keeping Our Edge" Council on Foreign Relations Independent Task Force Report No. 77, September 2019 https://www.cfr.org/report/keeping-our-edge/pdf/TFR_Innovation_Strategy.pdf.

315 Sargent, John F. "Global Research and Development Expenditures: Fact Sheet" U.S. Congressional Research Service (R44283). April 29, 2020. https://fas.org/sgp/crs/misc/R44283.pdf.

316 Sargent, John F. "Global Research and Development Expenditures: Fact Sheet" U.S. Congressional Research Service (R44283). April 29, 2020. https://fas.org/sgp/crs/misc/R44283.pdf.

317 Sargent, John F. "Global Research and Development Expenditures: Fact Sheet" U.S. Congressional Research Service (R44283). April 29, 2020. https://fas.org/sgp/crs/misc/R44283.pdf.

318 Sargent, John F. "Global Research and Development Expenditures: Fact Sheet" U.S. Congressional Research Service (R44283). April 29, 2020. https://fas.org/sgp/crs/misc/R44283.pdf.

319 Robbins, Carol, Beethika Khan, and Abigail Okrent. "The State of U.S. Science and Engineering 2020." National Science Board.

National Science Foundation, January 15, 2020. https://ncses.nsf.gov/pubs/nsb20201/global-r-d.

320 Fitt, Joshua, Daniel Kliman, Ben FitzGerald, and Kristine Lee. "Forging an Alliance Innovation Base" Center For a New American Security Asia-Pacific Security Program. Accesed July 9, 2020. https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Report-Alliance-Innovation-Base-Final.pdf?mtime=20200329174909.

SECTION 4

321 United States. 2017. The National Security Strategy of the United States of America. [Washington]: President of the U.S. https://web.archive.org/web/20201104201514/https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf?mod=article_inline

322 "The U.S. Export Control System and the Export Control Reform Initiative," U.S. Congressional Research Service (R41916). January 28, 2020. https://fas.org/sgp/crs/natsec/R41916.pdf.

323 Fergusson, Ian F., and Paul K. Kerr. "The U.S. Export Control System and the Export Control Reform Initiative. U.S. Congressional Research Service (R41916). January 28, 2020. https://fas.org/sgp/crs/natsec/R41916.pdf

324 U.S. Department of Defense. "Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States" Report to President Donald J. Trump by the Interagency Task Force in Fulfillment of Executive Order 13806. September 2018. https://media.defense.gov/2018/Oct/05/2002048904/-1/-1/1/assessing-and-stengthening-the-manufacturing-and%20defense-industrial-base-and-supply-chain-resiliency.pdf.

325 Press Office. "U.S. Department of Education Uncovers Vast Underreporting of Foreign Gifts and Contracts by Higher Education Institutions." U.S. Department of Education, October 20, 2020. https://www.ed.gov/news/press-releases/us-department-education-uncovers-vast-underreporting-foreign-gifts-and-contracts-higher-education-institutions.

326 "REF BOOK - 1947 NATIONAL SECURITY ACT." Office of the Director of National Intelligence. Accessed July 9, 2020. https://www.dni.gov/index.php/ic-legal-reference-book/national-security-act-of-1947.

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