

PREPARING THE UNITED STATES FOR THE SUPERPOWER MARATHON WITH CHINA

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EXECUTIVE SUMMARY

The U.S. is not prepared for the superpower marathon with China — an economic and technology race likely to last multiple generations. If we are to prevail, we must *compete* rather than contain China. While this competition has many dimensions — political, military, diplomatic, and ideological — the crux of the competition is *gloeconomic*. The key to the economic competition is technology and innovation, which has significant implications for future military advantage as well as commercial prosperity. Investment in long-term research and technology development will have large spillover effects for the economy, creating new industries, companies, and jobs, just as we saw with the space race in an earlier generation.

While there are similarities with the last generational conflict, the Cold War, there are also profound differences which make this a poor historical analogy. Primary among these are China's sheer economic scale and integration into the global economy.

China is well aware of the historical lessons of the Cold War and has committed to not only compete with the United States but to surpass it in technology leadership to fuel continued economic growth. And while the U.S. welcomes global economic growth and champions advancements in technology, the means by which China is pursuing and achieving its goals are often outside the norms of the international economic, financial, and technological system. The U.S. must prepare itself for the most important competition of our generation by ensuring that government, academia, and businesses are fully engaged. Specifically, the U.S. should (1) bolster federal investment in basic

R&D, (2) attract and develop human capital in STEM fields, (3) develop an integrated economic statecraft strategy, and (4) focus on the *long term* in businesses and capital markets.

The outcome of this geoeconomic competition is by no means certain. We must strengthen our resolve and discipline in improving our competitiveness, an issue which draws strong bipartisan support. If the U.S. fails to prepare for this superpower marathon, we will resign ourselves to becoming a second-rate power while the world looks up to a new global leader with strikingly different values and views.

INTRODUCTION

Last summer, we celebrated the 50th anniversary of one of mankind's most significant achievements — landing a man on the moon. But why did the United States go to the moon? This was a direct outcome of the Sputnik moment when the launching of a Soviet satellite signaled a new and dangerous chapter in the Cold War where technological achievement in space was considered paramount to military superiority on earth. The understanding of who our adversary was in ideological terms and the stakes of prevailing in this race were crystal clear to our leaders, to all Americans, and to our allies.

Today, the U.S. faces a dilemma in managing its relationship with China. Born out of the Cold War, American-Sino relations were defined by our confrontation with the Soviet Union and experience on the Korean peninsula: first in identifying China as a Communist adversary; then, after Nixon's trip in 1972, as a useful wedge against the Soviets, until

the collapse of the Soviet Union ushered in a period of globalization with China as an emerging market for U.S. commercial interests.

While today's U.S.-China tensions appear to share similarities with the U.S.-Soviet standoff during the Cold War, it would be ineffective to implement another containment strategy. The current competition with China is like none we have faced before and calls for a unique term in our political vocabulary as well as innovative policy thinking. We are in a *superpower marathon* with China — an economic and technology race likely to last multiple generations for which we are not fully prepared. If we are to prevail, we must *compete with* rather than contain China. While this competition has many geopolitical dimensions — including military, diplomatic, and ideological — the crux of the competition is *geo-economic*. We focus here on the foundation of that economic competition — technology and innovation — which has significant implications for future military advantage, jockeying defense industrial ecosystems, and ultimately for commercial prosperity.

SIMILARITIES WITH THE COLD WAR

The clear similarities with the Cold War are why many reach for this historical analogy. The U.S.-Soviet contest was also global and multidimensional as two opposing superpowers offered dramatically different visions of the relationships between individuals and society and between markets and the state. Beyond national security, the Cold War was also a battle about political economy and societal visions.

Similarly, the competition with China is the national security threat of our generation just as the Soviet Union was the threat of the last. With President Xi Jinping's launch of the Belt and Road Initiative (BRI) in 2013, the competition became global in terms of political influence, investments, and trade. Just as in the Cold War, this is also an ideological conflict since the Chinese Communist Party (CCP) does not value individual freedom and views the rule of law as well as freedoms of speech and press as existential threats.¹ And, just as in the Cold War, there is a propaganda war being waged by China to make the world safe for authoritarianism and highlight what makes the Chinese

model great. Beijing utilizes global media, influence over Chinese students studying abroad, and its presence on university campuses in the United States and other countries through Confucius Institutes and research partnerships to favorably shape global views about the ruling regime.

Adding to passions on both sides, both Americans and Chinese feel (just as the Soviets felt) that history is on their side. The U.S. notion of exceptionalism combined with global leadership since 1945 fuels this perception as the communist ideology that workers will inevitably rise up against capitalism did for the Soviets. China views its rise to global preeminence as a restoration to its rightful place in the world, since prior to the “century of humiliation,” China was the leading power for most of the past 5,000 years.



Despite these emotional views of historical inevitability, global leadership in military and economic terms may well be decided starkly by relative technology advantage and innovation.

Despite these emotional views of historical inevitability, global leadership in military and economic terms may well be decided starkly by relative technology advantage and innovation. In the space race, political and economic commitment to developing advanced technology determined the winner. And just as with the space race, there will be large spillover effects to the economy as technology creates new industries and future economic prosperity. Investment in science and basic research enabled the U.S. to lead the world economically and militarily for decades by building on technology from the Cold War such as: the internet, spaced-based communications and geolocation, semiconductors, software, and computer processing. The culmination of these technologies — command-and-control capability through the Global Positioning System (GPS), encrypted communications and battlefield domain surveillance, night vision, stealth, and precision-guided munitions — provided the U.S. military overmatch for a generation. In winning the

geo-economic battle, the West also won the military competition. Chinese leaders have studied this history and are determined not to repeat the Soviets' mistake of not focusing on the economic competition.

NOT A NEW COLD WAR

There are five key differences between today's People's Republic of China and yesterday's Soviet Union that make the Cold War and containment a poor analogy and prescription for a 21st century Sino-American competition.

China's economic scale

The Soviet Union at its peak was never more than 57% of the U.S. economy, with some experts calculating numbers as low as 43%.² Contrast that with China's meteoric economic rise. China's economy has grown from being a tenth of the size of the U.S. economy in the 1970s to being the world's second largest national economy. By purchasing power parity (PPP), China is already 25% larger than the U.S.,³ and some forecasters expect China to become larger than the U.S. in dollar terms within the next 10 years. Since becoming the world's leading power, the U.S. has never faced a rival with a larger economy. Even during World War II, the combined economies of the Allied powers was over twice as large as those of the Axis.⁴ Contending with a rival economic peer like China is an entirely new problem set for policymakers.

China's integration in the global economy

The Soviet Union was never a member of the General Agreement on Tariffs and Trade (GATT) and trade was not a major factor in the relatively closed Soviet economy.⁵ Compare that with China, who as one foreign policy observer noted is, "the world's largest trading nation and exporter, its overseas interests include, among other things, the safety and security of more than 1 million Chinese nationals working overseas, 140 million Chinese traveling abroad every year, some 40,000 Chinese enterprises around the globe, and overseas property and investment of \$7 trillion."⁶ There are more than 300,000 Chinese students studying in the U.S. each year, an unthinkable occurrence with the Soviets during the Cold War. As the COVID-19 pandemic illustrated, disruptions to China's economy have

significant implications on the global supply chain.⁷ The degree of economic integration is a key reason why a containment strategy is futile.

What's more, China is aggressively taking steps to expand and consolidate its economic sphere of influence through the BRI, which is expanding global markets for Chinese goods, companies, and overseas jobs. While this increased level of investment in other countries benefits the global economy, China's imposition of punishing debt levels and economic coercion enable China to create a web of dependent relationships. A critical underpinning of BRI is the Digital Silk Road which creates a proprietary technology infrastructure to support economic development and power projection. Through a network of submarine and cross-border fiber optic cables, coupled with remote sensing, communications, and other satellite services, the digital component of BRI is seeking to enable everything from e-commerce and artificial intelligence (AI) to satellites and smart cities as part of a closed system controlled by China.

China's desire and ability to manipulate global institutions

Xi has called for his nation to "lead the reform of the global governance system."⁸ By creating new international institutions like the Asian Infrastructure Investment Bank (AIIB) and New Development Bank (NDB) as well as expanding its influence in existing international organizations, Beijing is proving to be very adept at shaping the multilateral system to suit its desired outcomes. From its active use of the World Trade Organization (WTO) to file trade disputes against the U.S. and other advanced economies to its assertiveness in setting the development agenda at the World Bank, China is thoughtfully using the governance and tools of international economic institutions as extensions of its statecraft. Additionally, through its "China Standards 2035" project, Beijing aims to control the global standards setting bodies such as the International Organization for Standardization (ISO), the United Nations International Telecommunications Union (ITU) and the International Electrotechnical Commission (IEC) with overwhelming participation to ensure that its information technology (IT) and telecommunications standards are favored over interoperability.⁹ This stands in stark contrast to the Soviet Union, which repudiated

participation in the Bretton Woods institutions as organizations designed to save capitalism.¹⁰

China's embrace of civil and military technology fusion

China's authoritarian regime can control all economic sectors (government, business and academia) just as the Soviets could, but the CCP recognizes the importance of technology investments to create the spillover economic benefits to a technology leader. Indeed, by actively promoting the fusion of its military, civilian industrial, science, and technology sectors, Beijing's military-civil fusion strategy strives to build the country into an economic, technological, and military superpower while ensuring that overall control of these elements of national power remain firmly in the hands of the CCP. Indeed, as Congressman Mike Gallagher noted "prominent CCP members and Chinese industrialists promote surveillance technology as a means of not only ensuring obedience to the Party, but also succeeding where every other Marxist experiment has failed."¹¹

The pace of technology change has accelerated dramatically relative to the Cold War meaning that disruptive shifts in industries, ecosystems, and global trade occur much more rapidly than ever before. Many of these digital technologies from AI to 5G are dual-use — important commercially as well as militarily — and may even determine military superiority. As Secretary of Defense Mark Esper told the Senate Armed Services Committee during his confirmation hearing, "artificial intelligence will change the character of warfare. I believe whoever masters it first will dominate the battlefield for many, many, many years."¹²



Whereas the Soviets saw information technology and the dissemination of information as a threat to the survival of the regime, the CCP's comprehensive social credit system wholly embraces social media as well as GPS and facial recognition for extreme population control.

Embracing these new technologies enables the CCP to control society in a way the Soviets might only have dreamed of. In fact, whereas the Soviets saw information technology and the dissemination of information as a threat to the survival of the regime, the CCP's comprehensive social credit system wholly embraces social media as well as GPS and facial recognition for extreme population control.

Unlike the Cold War, there is insufficient consensus among Western allies on how to respond

There is inadequate consensus within the United States, or among its allies, of the economic or national security threat that China presents. Near the end of the Obama administration, while officials raised significant concerns about Chinese state-sponsored cyber activity and state-backed semiconductor technology acquisition, there was no systemic assessment of how the U.S. should respond. America's political leadership now agrees that past policies with China have not worked and a more aggressive posture is necessary. While a broad-based, bipartisan coalition to better prepare ourselves for the competition with China has emerged, it is unclear if this will hold for multiple administrations in the same way that containment endured as the dominant U.S. grand strategy during the Cold War.

Furthermore, as the U.K. government's recent decision to not ban Huawei from participating in its 5G network illustrates, many of America's closest traditional allies have thus far been far more reticent to publicly challenge China where economic issues are concerned, even when they bleed into national security.¹³ NATO may very well adapt to confront China's traditional military challenge — as NATO Secretary-General Jens Stoltenberg said at the conclusion of the alliance's December 2019 meeting, "we have now of course recognized that the rise of China has security implications for all allies."¹⁴ But liberal democracies, steeped in free market thinking, are far more comfortable discussing and acting in concert to address shared geopolitical concerns and far less so when the concerns are geoeconomic.

For these reasons, the playbook the U.S. used against the Soviet Union will not work in a geoeconomic competition with China. Perhaps the most dangerous aspect of a Cold War analogy is the implicit belief that because we won the Cold War, we will also win the next strategic competition.

CHINA TRANSFORMING TO FUEL ITS ECONOMY

China is designing its domestic and foreign policy so that it not only can compete with the United States but surpass it, with a singular focus on the importance of technology leadership in transforming the Chinese economy. As Xi made clear in his 19th Party Congress address in 2017, national rejuvenation requires cementing China's standing as a "country of innovators" and implementing an "innovation-driven development strategy."¹⁵ Most members of the Politburo are scientists and engineers who highly value both education and the role that science can play in building a productive society and prosperous economy. In fact, China is executing a multi-decade plan to transfer technology to increase the size and value-add of its economy.¹⁶

To be the world's largest economy, China must transform its economy even faster in the future by increasing the research and development (R&D) intensity of its economy. Beijing has directed academia, business, and the government to collaborate on 16 "Major Special Projects"¹⁷ that are akin in size and scope to the Manhattan Project; the aim of these endeavors is grand-scale technology innovations in quantum communications, next generation broadband wireless mobile communications (5G), genetic transformation, high-resolution Earth observation, and manned space flight. To improve its military capability, China is employing the military-civil fusion strategy ensuring innovation in these endeavors transfers to the military.

China's economic scale is in large part due to its population, which at 1.3 billion people is roughly four times that of the United States. However, China's economic nationalism goes well beyond its larger population or comparative advantage as the government employs all the tools of statecraft to accelerate economic growth. Specifically, over the past 30 years, China has employed many mercantilist

tools to overwhelming advantage in its trading relationships, including currency manipulation, dumping (such as with the solar panel industry to gain market leadership), opaque domestic regulations that benefit Chinese companies, limiting market access to foreign firms (most notably with the "Great Firewall" to regulate the internet), forcing joint ventures to capture foreign firms' intellectual property, and providing state subsidies of land and capital.¹⁸

Additionally, China employs industrial policy, investing in future-oriented economic activity which is technology intensive. This is a far different industrial policy than the Soviets deployed because China makes use of market incentives. Through its successive five-year plans and the "Made in China 2025" strategic plan,¹⁹ China details plans for increasing technological progress and import substitution which, if successful, will transfer global market leadership to China from the U.S. in many high technology markets such as semiconductors, computer hardware and software, networking and communications, automobiles, and genetic engineering. Chinese government support of firms pursuing industrial policy goals includes low-cost capital, state-directed investment funds for foreign technology, and state-directed cybertheft and industrial espionage. The benefits of this industrial policy are most notable in the national champion firms which are protected from domestic competition, building large economies of scale before competing globally. Successful examples in global markets include Huawei (which has overtaken Cisco, Nokia, and Ericsson as the worldwide leader in telecommunications equipment), Baidu (which has the mandate to become the worldwide leader in AI) and Alibaba (which ties Amazon as the global leader in e-commerce). In the defense sector, China is cultivating a robust industrial base to include seven domestic firms exceeding \$5 billion in annual revenues, each of them ranking in the top 20 defense companies globally.²⁰



We should anticipate a long-term coexistence with China rather than a definitive conclusion as we had with the Cold War.

PREPARE FOR A SUPERPOWER MARATHON

To effectively address the national security threat that China presents, we must envision a new paradigm for a multi-generation competition where two powers stand far above other strong regional powers. While the term superpower marathon implies an artificial finish line, U.S. strategy should be designed to improve U.S. competitiveness no matter what the future brings for China. We should anticipate a long-term coexistence with China rather than a definitive conclusion as we had with the Cold War.²¹ Technology — and especially commercial technology — will almost certainly play a more important role in fueling economic competition than in the Cold War. Geopolitical and military competition in this marathon are derived from that economic strength and are not independent dimensions.

Is the U.S. government ready to compete?

When the U.S. government has unity of purpose it is the most powerful and influential entity in the world. The combination of military, economic, and scientific tools at its disposal ensure military and economic preeminence. This was certainly the case in the Cold War when all instruments of statecraft were employed to deter and ultimately defeat the Soviet Union. The government highlighted the competition and inspired the American public while coordinating policy priorities across departments and agencies. In successive administrations — with bipartisan support — the government fostered an unparalleled scientific enterprise that aspired to moonshots and breakthroughs at national laboratories and universities, which the private sector commercialized, creating a virtuous cycle of innovation for both national and economic security.

Tomorrow's battlespace will involve asymmetric technologies designed to neutralize U.S. advantages such as anti-satellite weapons, small drones and improvised explosive devices as well as new competition in the cyber and space domains. Many are dual-use technologies that will enable adversaries to circumvent or attack the monoculture capabilities of the Department of Defense (DOD).²² Therefore the DOD faces a modernization challenge of the highest

order: simultaneously modernizing existing platforms such as the nuclear triad while also changing the force composition by investing in dual-use technologies such as AI, space, cyber, and small drones. Fortunately, Congress and the DOD are already aligned in creating a new acquisition fast lane (Section 804) that allows for earlier prototyping that “keeps flawed concepts from entering production...a whopping 70% of any program's total cost.”²³ Additionally, as one response to China's civil-military fusion strategy, the Pentagon has established the Defense Innovation Unit to accelerate adoption of commercial technology into the military and broaden the base of military suppliers to include companies with leading-edge technology. Similarly, with U.S. Army Futures Command and U.S. Air Force Ventures, the military services are changing to adopt more commercial technology more rapidly from industry. However, in total, these innovation activities are only 1 or 2% of Pentagon procurement which is insufficient to influence investors or entrepreneurs to design with defense needs in mind.

There is much more to be done. While the 2018 National Defense Strategy asserts that the U.S. has returned to an era of great power competition, the government has not aligned all elements — economic, military, and diplomatic — to develop an integrated plan with our allies to compete effectively. The signature initiative on the U.S. trade agenda is taking a firm stance on China's mercantilist practices with the aim of changing behavior, but this could be more effective with allied unity. Similarly, reforms to better protect technology through the Committee on Foreign Investment in the United States (CFIUS) and export controls would also be more effective with allied commitment. We need policies that both promote the export of U.S.-origin dual-use technologies as well as protect intellectual property (IP) and know-how that give American innovators the edge. Moreover, our once-intimidating scientific foundation is no longer unassailable; after many years of budget cuts, federally-funded research now suffers from persistent underinvestment. In a marathon that rewards speed and consistency of commitment, the federal budgeting process provides neither — introducing confusion and setbacks in the execution of policies and programs. The U.S. government must articulate the challenge and unite Americans to create the political support for what's required to maintain a healthy lead in this marathon.

Is academia ready to compete?

It was through our world-class university system that the wellspring of ideas, experimentation, and talent played a signature role in ending World War II and buttressing the space program in the 1960s. Since the fall of the Berlin Wall, however, the national purpose that once pulsed through campuses and motivated students and professors to tackle complex security challenges faded. For American students, the allure of finance and law led to a decline in STEM (science, technology, engineering and mathematics) graduates, while China now graduates six to eight times the number of STEM students that the United States does. University programs are financially strained and must seek higher-paying foreign students — often Chinese nationals — to fill the ranks. But the U.S. immigration system does not allow these students to stay in the U.S. after graduating. So not only are U.S. taxpayers subsidizing the education of foreign talent in advanced STEM fields, we are subsequently losing the potential economic benefits of that investment. For similar financial reasons, universities are exploring creative partnerships with foreign sources of funding, often Chinese. These soft power tools are not benign in their motivations and have been often documented to be vectors for propaganda.

Is the private sector ready to compete?

Given the importance of commercial technology to the competition, the U.S. needs a private sector ready to compete and join the U.S. government and allies in ensuring industrial capacity in sectors we have ceded to China. But an even larger challenge for the private sector is shifting the balance from short-term profits to long-term capability development. Since the shareholder revolution of the 1980s, companies have increasingly focused on return on capital at the expense of long-term R&D and technology development. With the increase in institutional ownership of companies,²⁴ corporate focus shifted to financial returns and away from balancing stakeholders of employees, shareholders, and communities. Capital markets reinforced this in rewarding efficiency of capital in stock price performance.²⁵ Compounding the short-term focus for capital, since 2006, most shares of stock are held for less than one year (compared to eight years in the 1950s).²⁶

The CCP has a contrasting view focused on technology development for the long term — sacrificing capital efficiency in the process — aiming for a first-mover advantage. As McKinsey & Company's former managing director, Dominic Barton, pointed out when arguing for a longer-term approach to Western-style capitalism, "when making major decisions, Asian [companies] typically think in terms of at least 10 to 15 years. In the U.S. and Europe, nearsightedness is the norm."²⁷ Leadership in dual-use technologies fuels economic growth and confers strategic military benefits. As China challenges the U.S. in the game-changing fields of 5G, AI, quantum, and genetic engineering, the outcomes are not predetermined. China's national science and technology plans mean hundreds of billions of dollars are being invested to shift leadership in technology industries from semiconductors to satellites away from the West and towards China. In fact, this is the end-state of "Made in China 2025." How ironic that our excessive focus on profits and the efficiency of capital could aid China's cause.

In recent years, the growth of activist investors amplified the focus on near-term shareholder returns as their business models rely on improved returns to create a subsequent sale or liquidity event to reward investors. Wall Street also benefits from the increasing number of transactions that occur. In this era, corporations have become increasingly short-term oriented as CEOs must focus on *quarterly* earnings as a key metric, in part to avoid take-over or activist interest. Furthering this behavior, CEOs themselves are now in their jobs less than ever before as average tenures are at a historic low of five years.²⁸ We have institutionalized our focus on short-term profits and capital efficiency rather than balancing these goals with research investments for long-term capability development. While activists at first targeted asset-intensive companies, these investors now commonly seek technology companies as targets. Gone are the days when the norm was for shareholders to support corporate labs such as the DuPont Experimental Station and AT&T's Bell Labs which emphasized long-term research and revolutionary inventions like synthetic fibers and the transistor which spawned new industries.

Another response to the drive for higher returns is the erosion of U.S. manufacturing. Many types of manufacturing are simply not as profitable a business activity as design or marketing and sales, resulting in a financial incentive to eliminate or reduce manufacturing investment through offshoring and outsourcing to geographies with low-cost labor, lower-cost infrastructure and fewer regulations. One little understood consequence has been that as manufacturing expertise moves offshore, so do design skills and design-for-manufacturability expertise. In turn, this loss of manufacturing expertise also reduces the innovation that accrues from understanding the manufacturing process, the supplier base, and their interactions.²⁹ As noted by Mforesight's Sridhar Kota and Tom Mahoney, "offshoring by American companies has destroyed our manufacturing base and our capacity to develop new products and processes... Once manufacturing departs from a country's shores, engineering and production know-how leave as well, and innovation ultimately follows."³⁰ Silicon Valley does little of its own manufacturing today which is in stark contrast to the 1960s and 70s when semiconductor fabrication facilities were growing. Today's winning products, like Apple's iPhone, fuel an industry of outsourced Chinese manufacturers such as Foxconn.

Two more trends accelerated U.S. manufacturing erosion. The first is globalization moving manufacturing assets and jobs offshore. The second was the U.S. tax code, which until 2017 provided an incentive for offshore manufacturing. With a differential tax rate of as much as 25 points,³¹ there was a potential 40% improvement in after-tax earnings for U.S. business income that could be sheltered offshore.

Still another response to boosting financial returns is shedding hardware businesses so that what remains are software and services firms. IBM is an iconic example among many that followed this trend selling its PC business to Lenovo. With the loss of hardware businesses, entire ecosystems of suppliers have now moved such that the U.S. does not, for example, build printed circuit boards or flex circuits — integral components of all electronic devices — in any volume nor does it package or fabricate semiconductor wafers at global scale. From a national security standpoint, this is acceptable as long as the U.S. has access among our allies. However, since we rely on China in

so many instances, even in military supply chains, we have inadvertently created a glaring national security risk. The Department of Defense's 2018 analysis of supplier risk states "China is the single or sole supplier for a number of [components]... used in munitions and missiles... A sudden and catastrophic loss of supply would disrupt DOD missile, satellite, space launch, and other defense manufacturing programs. In many cases, there are no substitutes readily available."³² Rare earths provide another well-documented example.

Finally, an additional response to boosting financial returns is the corporate share buyback — companies using their cash balances or even borrowing to repurchase shares to boost earnings per share (EPS) not through improved profitability but simply by reducing the share count in the EPS calculation. In the last decade alone, \$3.8 trillion has been spent on share buybacks.³³ While pursued in the name of capital efficiency, this investment epitomizes short-term thinking, doing nothing to grow corporate capabilities or invest in R&D for the long-term health of the corporation.

The culmination of these trends focused on short-term gains has resulted in "the destruction of America's once vibrant military and commercial industrial capacity in many sectors [that] has become the single biggest unacknowledged threat to our national security. Because of... policies focused on finance instead of production, the United States increasingly cannot produce or maintain vital systems upon which our economy, our military and our allies rely."³⁴ As a glaring example, Americans are reminded as the COVID-19 crisis unfolds that 80% of the ingredients to make our medicines and 97% of our antibiotics come from China.³⁵ Bottom line, to be an effective competitor with a country that has a long-term plan — 50 years instead of a few quarters — and values strategic technology advantage more than financial returns, we need a longer-term focus in our capital markets and corporations that rewards R&D and risk taking in technology development. While the venture capital industry has been closely associated with risk taking, over 90% of the capital deployed by venture in the U.S. is now invested in software³⁶ whereas many hardware ideas, or ideas that involve research, struggle to find U.S. capital.

HOW IS THE U.S. FARING IN THE TECHNOLOGY COMPETITION?

While the U.S. still leads China in more technologies than vice versa, the playing field is rapidly evolving. China already leads the U.S. in the deployment of hypersonics, small drones, quantum communications, 5G, facial recognition software, e-commerce and mobile payments (with 700 million internet users), electric vehicles, clean power technology (wind and solar), high-speed rail, and the world's largest database of genetic engineering data. China challenges U.S. technology leads in AI, genetic engineering, quantum computing and quantum sensors. China's goals are clear — in Xi's words, "catch up and surpass" the U.S.³⁷ Two examples illustrate the rapidly changing dual-use technology landscape, with dramatic implications for the commercial economy and military capability: 5G in telecommunications and quantum technologies.

5G

Mobile wireless technology has been evolving for decades since the first generation (1G) in the late 1970s. The value of each generation has increased exponentially, as each enabled so many technology advancements across the commercial sector and military.³⁸ The U.S. introduced 4G and LTE network services in 2008 featuring data transfer rates of ten times those of 3G by leveraging IP networks enabling video and mobile applications. According to a 2018 Recon Analytics report, "the introduction of 4G contributed to 70% growth in the wireless industry between 2011 and 2014, bolstering GDP while increasing jobs in the wireless industry by over 80%. By leading the charge on 4G, the United States was able to build a global ecosystem of network providers, device manufacturers, and app developers that shaped the future of 4G and the experience of all other countries implementing it."³⁹

Mobile wireless is indicative of the first-mover advantage key technologies empower because the first mover enjoys a network effect setting the foundational infrastructure and specifications for future products. We are now on the cusp of implementing the fifth generation, 5G, which is expected to bring more

improvements in speed and reduced latency enabling applications such as autonomous vehicles and other Internet of Things (IoT) innovations such as AI-powered health care. While 5G is much more than the radio access network and the U.S. may, in fact, lead in the applications of 5G, Huawei has an early jump in deployments with claims of over 250,000 5G base stations shipped, as China will be the largest market for 5G with one-third of the 1.2 billion expected users by 2025.⁴⁰ The military advantages of the world's most advanced communications infrastructure with leading global market share are many: low-cost, nearly ubiquitous infrastructure; cooperation with the leading equipment and service providers for surveillance or denial-of-service to adversaries; speed and reduced latency for military IoT applications like swarms of drones, to name only a few.

5G serves as the tip of the iceberg as an emerging commercial technology that has dramatic implications for economic competitiveness and military capability.

Quantum technologies

At an earlier stage of technology development is quantum technologies, which use what Albert Einstein called the "spooky" properties of quantum physics in communications, sensors, and computing. A recent study by the Center for New American Security highlights that "China's advances in quantum technologies have the potential to alter the military and strategic balance."⁴¹ While much of the attention so far has been on quantum computing which, in theory, may provide the ability to break current encryption methods, there are many other applications. The combination of classical and quantum computing may provide more advanced simulations, enhance machine learning capabilities, and highlight useful information more easily from noisy, unstructured data. Specific applications could include advances in materials science, better understanding of new chemistries for pharmaceutical development, and the next generation of AI. Quantum technology can potentially be applied to sensors that can better detect near-silent submarines and precision navigation that does not rely on GPS. While clearly at a much earlier stage of development than 5G technology, it is not difficult to imagine commercial benefits of these technologies creating new industries and ecosystems where a first-mover advantage could be pivotal.

China's leaders have recognized the potential and are directing a national plan for leadership which includes billions in funding at universities and national labs.⁴² Additionally, national champions such as Alibaba, which recently committed \$15 billion to quantum development, are mobilizing R&D dollars to achieve commercial dominance.⁴³ Provincial governments are also participating: Anhui province through a development fund and the creation of the world's largest quantum research facility⁴⁴ and Shandong province with the intent to create a quantum industry ecosystem in the city of Jinan — "Quantum Valley."⁴⁵ China's national plan also includes recruiting the best talent from overseas — the Thousand Talents Plan — as well as sending gifted students abroad to universities such as Cambridge, Massachusetts Institute of Technology, and Stanford through the Young Thousand Talents plan.⁴⁶ Finally, China has also arranged for several partnerships with universities in Austria,⁴⁷ the United States,⁴⁸ and Canada,⁴⁹ among others.

China is doubling down on investments as "certain PLA [People's Liberation Army] strategists and officers even anticipate the quantum technologies will radically transform future warfare, perhaps possessing strategic significance on a par with nuclear weapons."⁵⁰ Whether the PLA is correct, the commercial and military implications of quantum technologies have the potential to deliver a first-mover advantage. A recent report from the Institute for Defense Analysis questions the ability for quantum sciences to alter the strategic balance since quantum sensors and metrology have not achieved reliable demonstrations, because quantum communications may not be the best means for achieving secure communications and because quantum computing has not established clear economic or pragmatic application in the near-term. However, this same report also wisely recommends more research be applied to ensure there are no technology surprises.⁵¹ This is an opportunity made for a U.S. government-business-academic collaboration — again with commercial and military applications — to ensure the U.S. is not second rate in this field.

RECOMMENDATIONS FOR COMPETING IN A SUPERPOWER MARATHON

While we are not fully prepared today in government, the private sector or academia to compete, some critical work has already begun. America's guiding national security documents, the National Security Strategy and the National Defense Strategy, clearly signal a shift towards great power competition with China. The Department of Defense is developing new warfighting concepts and plans, making modernization investments in new technologies like hypersonics, AI, and quantum a budget priority, and aggressively reforming its acquisition process to better leverage commercial sector innovations. Bipartisan support in Congress funded the largest R&D investment in DOD's history, passed legislation to modernize CFIUS to counter investment-driven technology transfer, and created the Space Force, a new military service whose *raison d'être* is winning the military competition in space. The U.S. Trade Representative (USTR) documented examples of Chinese intellectual property theft and initiated aggressive trade actions. The Department of Justice, through its China Initiative, has made prosecuting Chinese corporate espionage a prime concern, and the State Department is waging a global campaign to counter China's influence. Illustrating the level of bipartisan support, at the 2020 Munich Security Conference, both Trump administration Cabinet officials and Speaker of the House Nancy Pelosi pressed NATO allies on Huawei's presence in Europe's 5G infrastructure.

While all of this is necessary, it is not sufficient to catch up in a marathon that has already begun. Our next steps should focus on the following four areas.

Bolster federal investment in basic R&D

Most important of all these recommendations, the U.S. must recommit to excellence in science and basic research to develop new technologies, particularly in AI, quantum, genetic engineering, autonomous systems, cyber, and space; these technologies are key to the superpower marathon and we cannot lose momentum in any of them. To ensure our future economic prosperity, the U.S. — including the private sector and academia — needs to make a generational commitment to science and technology. For government and academia, we should boost federally funded R&D to facilitate long-term research that creates breakthroughs that individual companies can rarely afford. This government-backed research has spillover effects to create entirely new industries and foundational technologies which venture capital and innovative companies build upon. For example, every technology incorporated into Apple's iPhone was seeded by federally funded research dollars.⁵² In recent years, federally funded R&D has waned to 0.7% of GDP, down from 2% at the height of the Cold War. To stimulate business R&D, we need incentives and tax policies to reinforce long-term commitments to R&D, to support emerging hardware businesses and a manufacturing renaissance. Increases in the federal R&D tax credit would likely stimulate corporate research budgets.⁵³ Together, we should aspire to create many moonshots in the technologies critical to this superpower marathon, bringing government, business, and academia together toward common goals of national purpose.



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Attract, develop, and retain human capital in STEM fields

Along with the increases in federally funded research and moonshots, we need a generational commitment to STEM education. U.S. STEM graduates are in decline (-5% from 2010 to 2015)⁵⁴ while China graduates many times the engineers the U.S. does. We should provide financial incentives to study STEM fields such as government internships that lead to employment offers, partial student loan debt forgiveness for study of STEM fields, and corporate tax credits to hire more engineers.

Additionally, we want to encourage the best foreign talent in the world to come to the U.S. to study but also ensure a clear path to green cards and citizenship so those we educate — especially in STEM fields — remain to contribute to our economy even if we have to invest in additional counterintelligence resources to ensure we do not facilitate economic espionage. Recent studies show that students graduating from advanced STEM fields in U.S. universities are inclined to stay and work in the United States, but that the high-skilled immigration system as currently oriented present significant obstacles to graduates seeking green cards or other forms of sponsorships.⁵⁵

Develop an integrated economic statecraft strategy and build the institutional capacity to execute it

The political-military tools the U.S. government employs to address geopolitical concerns are largely concentrated in the Departments of Defense and State. By contrast, the authorities associated with the use of geoeconomic instruments are diffused across the federal government and the private sector. Congress determines spending priorities through its control of the budget. The Department of the Treasury leads tax policy, convenes CFIUS, and administers economic and trade sanctions. The Department of Commerce administers export controls; the Department of State enforces the International Traffic in Arms Regulations (ITAR) and influences foreign aid; the USTR leads trade policy; and the Federal Reserve drives monetary policy.

The first step in integrating these perspectives is the development of a whole-of-government strategy for economic statecraft including objectives and metrics. The core aim of this strategy is growing a vibrant U.S. economy with the free flow of capital, talent, and ideas among allies in the context of a coherent plan for competing with China. At the federal level, the closest approximation to government-wide strategic planning and coordination occurs through the National Security Council (NSC) and National Economic Council (NEC) and their constituent departments and agencies. However, as national security concerns broaden to encompass economic, environmental and technological issues, these bodies are fragmented and wanting for policy agility. They remain largely unchanged from their inception, rarely interact in an integrated fashion,⁵⁶ and are often reactive and overwhelmed by real-time events.

The NSC, in particular, is over-indexed towards military and diplomatic tools of statecraft.⁵⁷ While the NEC is a non-statutory body, and often accorded lesser importance than the NSC, its participating departments and agencies — which can include Treasury, USTR, Commerce, the Department of Agriculture, the Department of Labor, the Department of Health and Human Services, the National Science Foundation, the Environmental Protection Agency, and others — access a critically important tool kit for a geoeconomic competition that benefits from broad financial and economic data as well as relationships with influential financial, technology, academic, and policy actors. As China and Russia blur the lines between economic and national security, exerting state control over economic assets to further their national interest, the U.S. instead largely defers economic and financial decision-making to the private sector. CEOs of companies large and small are increasingly acknowledging that their companies are outmatched when competing against state actors such as China's national champion firms.

As we contemplate the challenges we face with China — today or in the future — the relative military superiority the United States previously enjoyed will continue to erode. The immediate impulse of policymakers should not be to inventory the number of carriers, the location of destroyers, or the number of special operations forces in theater. The solution sets should instead integrate economic and financial tools

such as sanctions, market access, and export controls along with forward military deterrence⁵⁸ — that should be mobilized at the speed of relevance.

In sum, the geoeconomic competition with China should be paramount in determining a whole-of-government strategy. With that foundation, government organizations can act in concert rather than through the fragmented structure we see today which often creates competing priorities. Achieving this holistic capability also requires addressing the talent deficit the U.S. government currently has in the coming revolutions in biotechnology, quantum information science, AI, and autonomy. Knowledge of technology is an increasingly important prerequisite to develop purposeful and precise policy options designed to strengthen U.S. economic and national security. To better inform these policy options, we also need credible economic assessments of industrial policies such as “Made in China 2025,” and how those plans, if executed successfully, will affect U.S. industries, job creation, and economic growth.

With the decoupling of U.S. and Chinese economies underway, the U.S. government must also galvanize the international community and rally other countries and international institutions to our vision of the future economic order. To be sure, this is a large task with potential to create seismic shifts in global supply chains, capital markets, and trade. But a clear articulation of objectives is necessary as the global investment and business community need to know the new rules of the road for the geoeconomic competition already in progress. American business can then reinforce the goals of this ongoing competition. No U.S. government vision for the future can be manifest without the help of American business.

Focus on the long term in businesses and our capital markets

Perhaps most difficult among these recommendations, we need to shift our thinking to a longer time horizon in businesses and in our capital markets. Reforms here must be jointly agreed to by corporate management and institutional investors which own the majority of total equity. First, the investment horizon and corresponding benchmark metrics must move away from a quarter or a year to a longer timeframe such

as a decade. In addition to decade-long economic value added (EVA), new indicator metrics such as the effectiveness of long-term R&D in creating new products may be more insightful to determine long-term cash flows than quarterly EPS changes.

Second, we should encourage long-term engagement from owners as well as longer holding periods of stocks.⁵⁹ From a policy perspective, this could be supported by tax incentives to hold equity positions longer and disincentives for momentum trading which encourages turnover. Third, we should discourage financial engineering that does not create long-term value.

There is reason to believe American business leaders would welcome a shift away from the current excessive focus on the short term and exclusive focus on shareholder returns. As JPMorgan Chase CEO Jamie Dimon and Berkshire Hathaway Chairman and CEO Warren Buffett observed in a 2018 Wall Street Journal op-ed aptly titled “Short-Termism is Harming the Economy,” “every generation of Americans has the responsibility to leave behind a stronger, more prosperous society than the one it found. The nation’s greatest achievements have always derived from long-term investments.”⁶⁰

These four priorities combine to *make innovation and technology development a national imperative*. Winning a technology race requires academia, business, and government to collaborate in improving U.S. competitiveness through long-term research, investments in human capital and infrastructure, and policies that encourage investment.⁶¹ We do not need to pick winners and losers among companies but rather ensure our policies create global winners focused on long-term technology advantage. From analyzing the federal budget, we would conclude that our national priorities are transfer payments, interest on debt, and affordability of single-family housing. This is not the investment strategy of a focused superpower marathon competitor.

COMPETING FOR THE FUTURE

However, a superpower marathon does not mean we must be at war with an enemy. As former Secretary of Defense James Mattis said regarding China, “cooperation whenever possible will be the name

of the game, and competing vigorously where we must.”⁶² We should always promote a constructive agenda with Beijing where possible on international standards, climate change, nuclear non-proliferation, global health, and the stability of the global economy. We must reject the notion that the competition with China is a “clash of civilizations” and that conflict is inevitable. Our concerns are with the CCP and not the Chinese people. We can collaborate where possible but compete aggressively to protect our national interest and the international order that has kept us safe since 1945.

Responding to COVID-19 is a more recent example where the U.S., China, and international partners could have locked arms early on to collect accurate data and mobilize physical and technical resources to mitigate the spread of the virus. Unfortunately, Chinese authorities prioritized the control of information, refused to allow U.S. Center for Disease Control Experts into China at the outset of the epidemic, and silenced medical professionals from informing the public of the risks. Staunching the spread of the virus is in our collective interest — and the U.S. and China have much more to gain by cooperating.

Going forward, we should not wait a new Sputnik moment. The challenge has been unfolding around us in slow motion; to use a Chinese stratagem, it is hiding in plain sight. With our open system of trade and investment, China’s access to our markets and leading-edge technologies without reciprocity means we may even be facilitating China’s economic and technological superiority. To prepare ourselves for this superpower marathon, we must take actions that ensure we are ready to compete for the long-term. We would be ill-advised to begin as an indifferent, divided country without a plan facing an ambitious, determined competitor with a strategic plan to “catch up and surpass.”

While China faces significant problems of its own in the coming years due to its demographics, pollution, corruption, debt load, and inefficiency in deploying capital, its authoritarian system also brings beneficial dimensions: stability and decisiveness of political direction, long-term planning horizons, and the coordination of government, commercial, and military sectors to achieve national aims. Given China’s growing

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economy, investment in science and technology, and coercive power over its people, the winner of this superpower marathon is by no means certain. The stakes, however, are paramount given China's ideological differences and technology capability fueling an economy that is on a path to eclipse our own. As a result, we must strengthen our resolve and

discipline in improving our competitiveness, benefiting from one of the only issues to enjoy strong bipartisan support amongst policymakers and legislators in Congress. We must prepare now for this superpower marathon or resign ourselves to becoming a second-rate power while the world looks up to a new global leader with strikingly different values and views.

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