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A Report of the CSIS Trade Commission on Affirming American Leadership

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About the CSIS Trade Commission on Affirming American Leadership

U.S. economic leadership faces pressure at home and abroad. The global institutions built on the back of the post-war U.S. alliance structure, and the rules and norms they support, were constructed for the twentieth century, not the twenty-first century. New challengers to the existing system have emerged. Confidence in the international order is eroding within the United States, as many Americans feel that the benefits of the existing system are not as widely shared as they once were. A mishandled health pandemic has raised questions about U.S. competence. As a result of these and other forces, American leadership on the global stage has been seriously eroded. Allies are beginning to question America's commitment to the institutions and rules that it enlisted them to craft and uphold, and adversaries are seeking to take advantage of these doubts. As history moves toward a pivot point, there is an urgent need for revitalization and affirmation of American leadership.

The CSIS Commission on Affirming American Leadership was created in the summer of 2019 to develop a series of recommendations to cement U.S. global leadership in light of these twenty-first century challenges. In a series of reports, the commission lays out recommendations for the U.S. workforce, U.S. innovation policy, and U.S. engagement in the international trading system.

Members of the commission are listed below. Each commissioner participated in an individual capacity, not on behalf of their organizations. Members of the commission do not necessarily endorse each of the recommendations in this paper.

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Contents

00

Executive Summary

Over the next decade, changes in the U.S. and global economy will accelerate. Whether the United States maintains its growth and global leadership in the face of these changes, or is diminished by them, is a choice. U.S. primacy in 2030, particularly American leadership on trade, is not a foregone conclusion but can be achieved if the United States does what is necessary to produce a more resilient and agile workforce, maintain its innovative edge, and pursue a bold trade agenda.

Some changes that will take place over the next decade are continuations of familiar trends. Manufacturing will account for a smaller share of the U.S. economy, while services and digital commerce will play a larger role. Likewise, the global economy will become more services oriented. The United States will remain the world's wealthiest country, but it will continue to face internal challenges such as inequality, the scale of which may be accelerated by new technology and the Covid-19 pandemic. The pandemic will set back growth around the world over the next few years, but it will not prevent emerging economies from eventually growing more rapidly than advanced economies, including the United States. Climate change will also be a drag on global growth and pose a particularly significant challenge for the least developed countries. China's growth will slow but remain above the average of advanced country members of the Organization for Economic Coopera-

tion and Development (OECD). And China will continue to close the gap with the United States in high-end, knowledge-intensive industries and products that drive innovation.

Demographics over the decade ahead favor newly developing countries, which will maintain a healthy ratio of working-age and elderly population, while a number of advanced economies—and China—will be beset by a shrinking labor force and growing elderly population. Population growth combined with economic growth in Asia will result in the formation of a new global middle class in that region. A burgeoning middle class in Asia will shift the globe's economic center of gravity further toward that region as the decade progresses. This in turn will affect global patters of trade and investment. Although some companies will maintain a global footprint or produce in and for particular markets such as China, several factors will drive a trend toward regionalization of supply chains. Productivity gains and rising wages in emerging markets will reduce incentives for offshoring to far-away locations. Increasingly frequent and intense weather events driven by climate change will add risks and costs to drawn-out supply chains. Europe, China, and India will continue to strive to produce national champions, often at the expense of market-opening policies. Finally, the Covid-19 pandemic has offered fresh justification for reshoring production.

Data's role in the global economy will grow in the decade ahead, demonstrating the need for global rules and norms governing data usage and privacy. In the absence of such a globally agreed regime, the internet, as well as advances in artificial intelligence (AI) and automation, will be fragmented, diminishing the potential positive impact of these technologies on wealth and productivity growth. China's AI model provides its economy and technology companies certain advantages over democratic and market-driven economies, but it may be difficult to export to countries whose privacy and data control policies are very different.

Ultimately, the United States will remain a dynamic engine of global growth but account for a smaller share of the global economy as the decade progresses and developing economies in Asia grow.

The trends outlined above will present challenges to U.S. trade leadership. At home, adoption of AI and automation—accelerated by Covid-19—will generate new stresses and opportunities in the labor market. A robust response that includes incentives and pathways for lifelong skills development, reformed unemployment insurance, and other measures will be necessary to smooth the transition for vulnerable workers and ensure the U.S. workforce remains competitive. China's continued movement up the global value chain in knowledge- and technology-intensive industries will need to be met with a robust innovation strategy. And shifting trade trends, rising protectionist pressures, and shortcomings in existing institutions and rules of the global trading system will require a bold new U.S. trade strategy.

01

The Makeup of the U.S. Economy

The U.S. economy is well positioned to take advantage of economic trends over the next decade, but its global lead could falter without appropriate government policies. The United States is already highly competitive in services-producing sectors, which will continue to grow in economic importance. The United States maintains strong talent pipelines in sectors that are expected to be among the fastest growing, such as health care and information and communications technology (ICT). The United States can also ride two connected trends on the goods-producing side of the economy: the declining importance of labor-arbitrage in international trade, leading to the regionalization of supply chains; and the increasing ubiquity of robotics and automation in manufacturing. The United States maintains high value added in knowledge- and technology-intensive industries (KTIs), a key indicator of proficiency in advanced manufacturing and services, including those that will undergird robotics, automation, and the formation of efficient regional supply chains.

The manufacturing sector, however, will continue to play a smaller role in the U.S. economy. The Federal Reserve Economic Data's (FRED) manufacturing production index, which measures manufacturing industrial production, shows steady growth since data became available in 1972, except during the Great Recession.[1] The average earnings of U.S. manufacturing production

workers have also grown unabated for decades, reaching over $22 per hour as of May 2019.[2] However, the manufacturing sector makes up a smaller share of the total value-added output and jobs. The value added by manufacturing production as a percentage of GDP has fallen sharply, from 16.1 percent in 1997 to 11.2 percent in 2017.[3] Manufacturing employment has shrunk from its 1979 peak of 19.5 million to around 13 million today.[4] During the last recession alone, the United States lost 2 million manufacturing jobs and has yet to return to pre-recession levels. While manufacturing employment, even among production workers, has tracked slowly upwards since its 2009 nadir, the overall job market seems unlikely to reach its former scale.[5] The U.S. economy has tipped away from manufacturing and toward service industries. Manufacturing value added has slumped, and value added by services ballooned from 71.8 percent of GDP in 1997 to 77.4 percent in 2017.[6] Meanwhile, the gap between services and manufacturing employment has grown to historic levels.[7] In June 1979, the United States only had about 2.5 service jobs for every manufacturing position; now, that ratio is nearly 8.5 to 1.

The long-term impact that Covid-19 may have on occupational growth is difficult to project, as is the impact of the inevitable future pandemics or other "black swan" events. The uncertainties are numerous. The pace of the pandemic's decline, the timing of a potential vaccine or effective treatment, its potential for resurgence, the quality of response to new cases, and, perhaps most importantly, how societies may permanently change as a result of the pandemic will fundamentally impact the future of the labor market. Months after the outbreak, significant layoffs have taken place in hospitality, recreation, retail, travel, and other non-essential industries requiring in-person contact. The future of those industries depends on the variables described above, and therefore the employment picture is foggy at best. Other industries that require close contact between individuals in enclosed spaces—meatpacking, home health services, certain manufacturing and agricultural work, and some office jobs such as call centers—may lean into automation in order to avoid some of the uncertainties associated with workers. A scenario in which jobs in these industries do not come back would put millions of people out of work for a sustained period of time and create a drag on growth.

Prior to the Covid-19 outbreak, the automation trend was projected to continue for at least roughly a decade. Employment in services-providing sectors was projected to grow annually by 0.6 percent through 2028, while employment in goods-producing sectors excluding agriculture was projected to grow annually by just 0.1 percent. Manufacturing employment was projected to continue to decline by 0.5 percent annually through 2028, the same rate of decline as from 2008 to 2018. In line with recent trends, the decline in manufacturing employment was not projected to bring about a decline in manufacturing output, which was expected to grow faster in the next 10 years than the previous 10 years. In the United States, services industries have expanded in the past few decades. Contributions to real GDP by financial services, information technology (IT), health care, and logistics have all experienced nearly unmitigated growth for the last 20 years. Services accounted for 75.5 percent of U.S. GDP in 2000 and 80.2 percent of GDP in 2017.

According to BLS projections made before the Covid-19 pandemic, the fastest-growing industries in the United States were projected to be health care, with a 1.6 percent annual growth rate, and private educational services, with a 1.2 percent annual growth rate. Due to a rapidly aging population, personal care aides could experience a 36.4 percent growth in employment by 2028, despite the median annual salary being only $24,020 in 2018.[8] Covid-19 may add to the growing demand for health care workers. The U.S. workforce must be prepared for the expected rise in demand in these services industries. Employment in utilities, wholesale trade, and retail trade is set to decline over the next decade, the latter bucking a growth trend from the previous decade. The pandemic is likely to accelerate declines in these sectors. Like manufacturing, however, declining employment does not equate to declining output. Indeed, wholesale

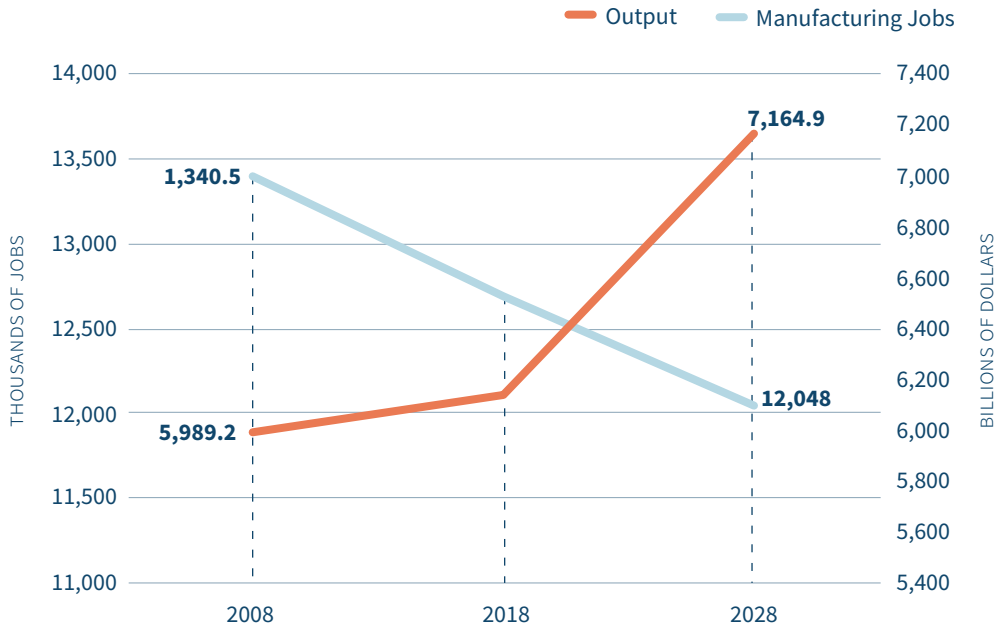
trade is projected to have the largest output growth in the next decade despite seeing the third-largest decline in employment among services-providing industries.

Growth may be slowed by the projected continued rise in inequality in the United States. Already at record levels, economic inequality creates a drag on overall growth and narrows economic opportunities across all segments of the population.[9] Income inequality has been connected to social ills such as increased crime, health disparities, the opioid crisis, and political polarization.[10] Through 2035, earnings are projected to decline or remain stagnant for workers outside of the top 10 percent of earners.[11] Following 2035, income inequality is projected to plateau; however, other factors such as unequal access to quality education, health care, housing, and other services will likely persist and contribute to inequality.[12] Further, advances in AI and automation may generate transition costs that disproportionately impact low-skilled, low-wage workers. The implications of AI and automation are further discussed in this section and the commission's workforce report. Without intervention, the Covid-19 pandemic will also expand inequality.[13] Job losses have been most severe for women, minorities, and low-income workers, some of whom also face disproportionate risk from the virus.

These macroeconomic trends should continue through 2030. It appears unlikely that the United States, already an advanced economy, will retreat from its services-driven growth model. For decades, the U.S. and global economies have grown increasingly services-oriented, a transition that has occurred at a much faster rate than the centuries-long shift from agricultural to manufacturing production.[14] Especially in the United States, the services sector will be buoyed by a world-class digital economy that will continue to be an engine for growth if the United States pursues the policies necessary to maintain it.

For similar reasons, developing economies such as China and India will consistently experience GDP growth at a higher rate than the United States and therefore will account for a greater percentage of the overall total. That said, faster growth in select U.S. services industries can expect to fuel the national economy for years to come. Robust intellectual property protection, government support for public and private R&D, strong graduation rates per capita in STEM (science, technology, engineering, and mathematics) fields, and relatively favorable demographics provide the United States with a foundation for the services industry and advanced manufacturing to grow. However, that foundation rests on continued support for policies that undergird the positive features of the U.S. economy.

FIGURE 1 / **Manufacturing Productivity on the Rise as Employment Shrinks**



Source: U.S. Bureau of Labor Statistics.

On the other hand, concerns about the demise of U.S. heavy manufacturing seem contradicted by production levels of motor vehicles, a key indicator of a developed, high-value-added manufacturing sector. The United States did see production plummet during the last recession, but it also has experienced a significant rebound.[15] Automobile sales in the United States peaked in 2017; however, the decline in sales since then has not been dramatic, which suggests the industry is relatively resilient amid sustained consumer demand. In 2019, U.S. consumers purchased over a million more automobiles than in 2007. Global motor vehicle demand has crept upward, leading to regionalization of production in only a handful of countries, such as the United States, Japan, Germany, South Korea, and increasingly China.[16] Despite slowing sales in the United States, China, and elsewhere, global production and demand remain well above levels during the 2008 recession. Leading automotive companies are among the top spenders on R&D globally and are quickly shifting investment toward high-tech components and upgrades, reflecting the industry's perception that it will need to adopt advanced technology to remain competitive.

02

International Economic Projections

The Future Economic Makeup

Like the United States, the global economy will become more services-oriented in the future. As economies develop, most will shift away from manufacturing and raw material production and toward services. Value added from services has floated around 40 percent of GDP among low-income countries for the past decade, whereas the percentage has grown from 49 percent to almost 54 percent among middle-income countries over the same period.[17] For OECD members, the services sector makes up about 70 percent of GDP.[18]

Services will continue to play a growing role in manufacturing, both in maximizing productivity and adding value to products, even as manufacturing employment declines in the United States and other economies that are shifting toward the digital economy. Services are increasingly embedded in and offered alongside manufactured products. The manufacturing sector has become reliant on services such as management, research, design, sales, logistics and supply chain management, and finance, as well as a host of data-driven services.[19] In that sense, competitive services industries will continue to drive competitive manufacturing in the future. Currently, between 30 and 40 percent of manufacturing exports among OECD countries is value added by domestic and foreign services industries. The

share of the value of services in manufacturing exports grew among nearly all OECD members between 1995 and 2009 and is expected to continue to grow.[20]

Technological advances will encourage additional outsourcing of services, which will lead to a greater measured contribution of services to manufacturing, as in-house services provided by manufacturers are currently counted as manufacturing output. The increasing digitization and connectivity of goods requires that services and manufacturing become even more intertwined, highlighted by the classic example of modern high-end automobiles.[21] Smarter products, factories, and manufacturing processes will make manufacturing more efficient, agile, and flexible; they rest upon services. Other production innovations that are likely to dominate the future of manufacturing, such as additive manufacturing and robotics, will similarly operate on a backbone of services.[22]

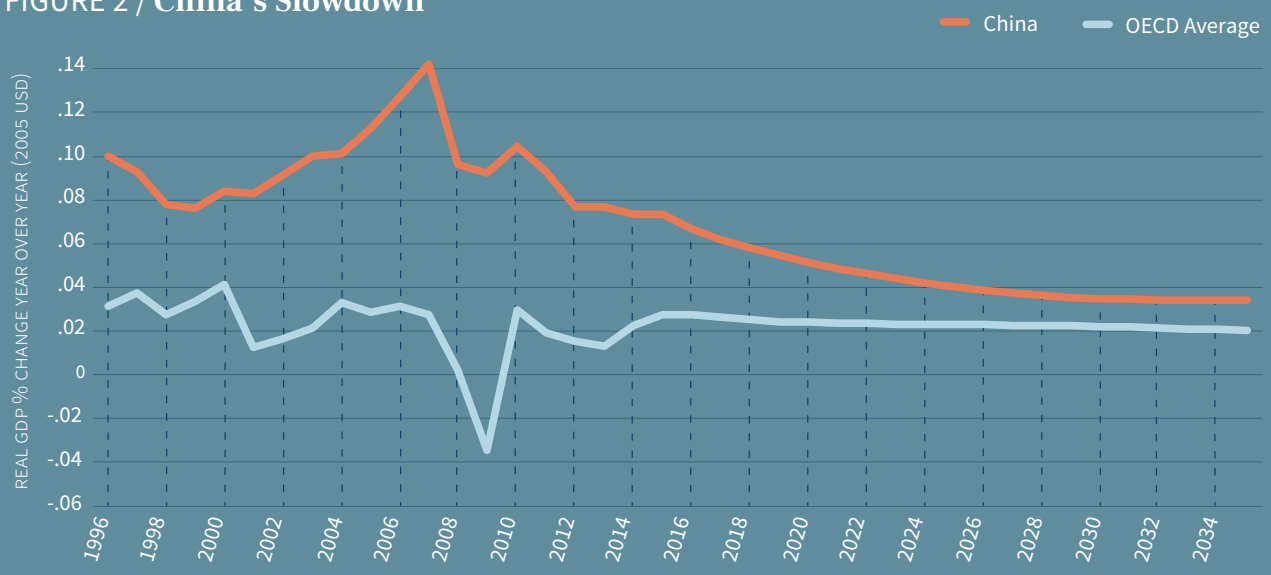
In 2030 and beyond, the U.S. economy will make up a smaller—but still high-value—share of a larger global economy. According to PwC's The World in 2050 report, the United States has already fallen behind China in GDP in terms of purchasing power parity and will be behind India by 2050.[23] The U.S. share of global GDP will fall from 16 percent to 12 percent during the same time frame. Prior to the pandemic, the International Monetary Fund (IMF) projected U.S. real GDP growth to slow from 2.9 percent in 2018 to 1.6 percent in 2024.[24] Most advanced economies shared this trend, including the European Union, Japan, South Korea, and Canada. Emerging economies in Latin America, the Caribbean, the Middle East, and Africa were on track to see growth accelerate. While China's real GDP growth rate was also predicted to decrease, it was estimated to remain well above that of OECD countries, at 5.6 percent.

A Note on Chinese Economic Data and Growth Outlook

Many observers mistrust China's officially reported GDP growth rates, and some alternative measures offer slightly different interpretations of its economic growth. China's economy is opaque, and the size and complexity of its economy creates challenges in data collection. The Federal Reserve Bank of San Francisco's China Cyclical Activity Tracker (CAT), a weighted average of several non-GDP indicators, shows Chinese growth slowing faster than GDP reports suggest. While the CAT does not predict economic contraction, it does see cyclical activity as falling short of long-term trend lines rather than exceeding them. A study on China's national accounts by the Brookings Institution found that local governments inflate economic data in a bid to meet growth targets necessary to receive awards from Beijing.[25] Taking that data exaggeration into account, China's GDP growth from 2008 to 2016 should be 1.7 percent lower than officially reported. In 2018, the gap between economic output data provided by China's provinces and its national GDP was about the size of the GDP of New Zealand, about $205 billion.[26]

There are a number of structural issues which could act as a drag on China's growth in the coming years.[27] Despite some attempts at deleveraging, China's debt-to-GDP ratio exceeded 300 percent in 2019, which may limit Beijing's ability to extend credit and offset slower growth with stimulus packages. Questions about the stability of China's small and medium-sized banks and the strength of China's interbank market were also raised in 2019 with the government takeover of Baoshang Bank. China has not managed to stamp out shadow banking, which, despite deleveraging efforts in 2018, saw a strong return in 2019 amid slowing growth and the U.S.-China trade dispute, an $8.4 trillion-dollar industry in China. Shadow banking stymies monetary policy, prevents effective banking regulation, and can lead to a buildup of risky assets with little oversight.[28] China is also experiencing a surge in household debt; its household

FIGURE 2 / **China's Slowdown**



Note: Data is pre-Covid-19. Source: "Real GDP Long-Term Forecast," OECD, https://data.oecd.org/gdp/gdp-long-term-forecast.htm.

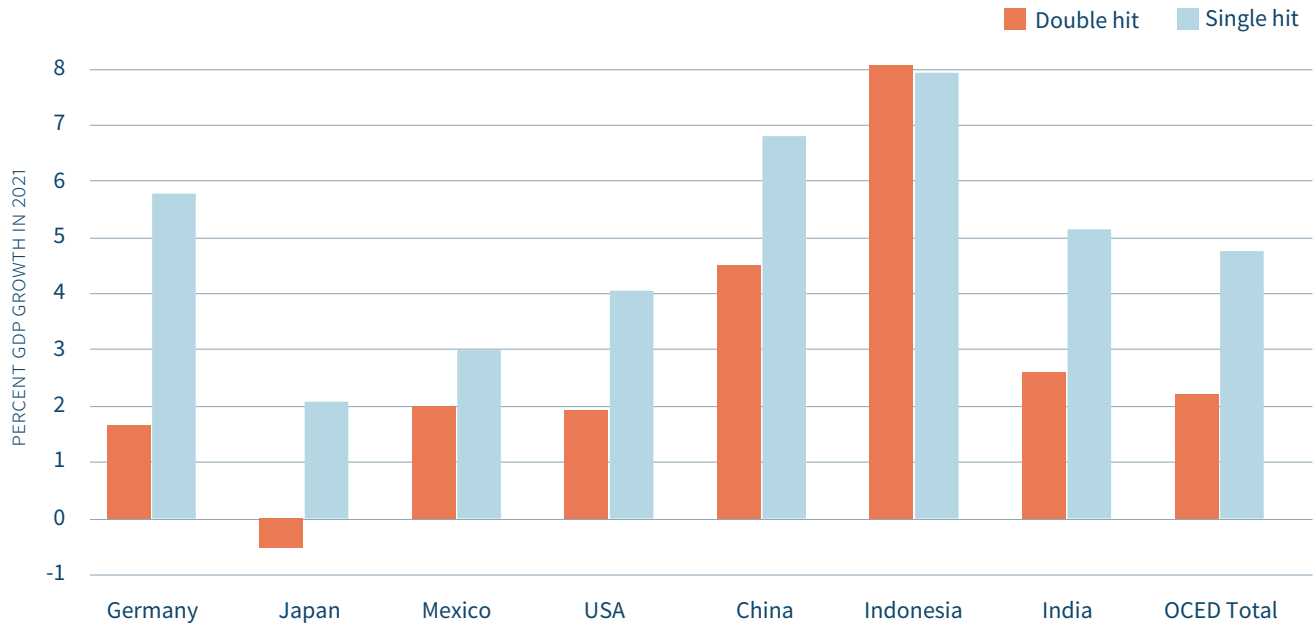
debt-to-GDP ratio is higher than the average for emerging markets. China is projected to experience a slowdown in GDP growth and fall in line with the OECD average around the mid-2030s, according to OECD projections.

Two additional significant variables in China's growth prospects are the role of the state in the economy and the outcome of U.S.-China trade tensions. The two issues are linked—the role of the state in China's economy is at the heart of U.S. complaints over Chinese economic policy—and therefore constitute both risks to Chinese growth and potentially an upside depending on how they are resolved. Entrenchment of the state in China's economy carries both internal and external risks for China. Internally, continued state intervention makes inefficient resource allocation more likely.[29] Externally, failure to embark on market reforms will make some further U.S.-China economic decoupling more likely, which would result in sustained tariffs, loss of access to U.S. technology, disruption of supply chains, weakened investment confidence, and less foreign demand. That would limit Chinese growth and could result in Beijing doubling down on state intervention.[30] China's current path risks endangering economic ties with other partners as well. While the European Union has not been as aggressive as the United States, it is beginning to formulate policies aimed at countering the effects of China's economic model, which may result in decoupling to some extent. Even countries heavily reliant on trade with China, such as Japan, Australia, and to a lesser extent India, are putting in place policies that would encourage businesses to shift supply chains outside of China.

That said, China still holds a relatively strong hand. Countries in China's immediate neighborhood will not be able to quickly shed their reliance on China. The economic and geopolitical costs of doing so are simply too high. The Belt and Road Initiative (BRI), while remaining amorphous and encountering some headwinds, remains a centerpiece of China's foreign and economic policy. As countries in Asia seek to haul their economies out of the Covid-19 slump, an infusion of capital from Beijing via BRI projects may be appealing. China's apparent ability to not only prop-up economically and geopolitically strategic companies but support firms to the point where they are internationally influential may also allow it to weather trade tensions, although state support may ultimately be a strategy destined for failure.

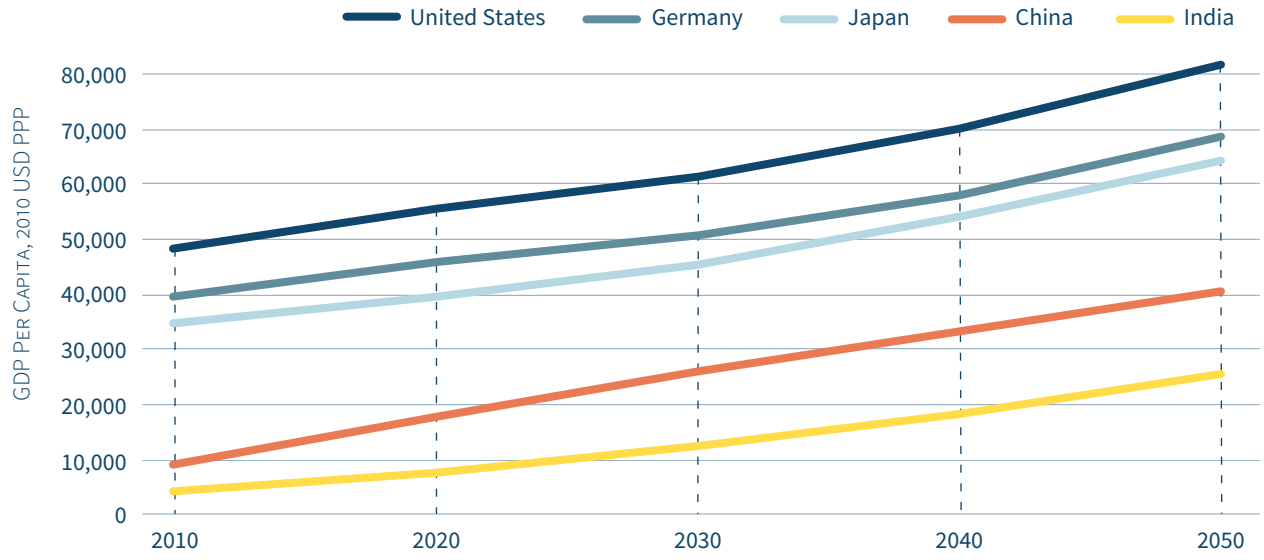
The IMF predicts the global economy will rebound in 2021 despite severe contraction in 2020 prompted by the Covid-19 pandemic. The OECD shares this view, although it sees restrained growth in 2021 under a "double-hit" scenario in which Covid-19 breaks out again in the second half of 2020.[31] It bears repeating that the economic implications of Covid-19 turn on a number of variables that are difficult to accurately assess: the timing of a vaccine or other effective treatment, government measures to limit the spread of the virus, policy interventions to prop up the economy, and society's willingness to resume normal economy activity, among countless other factors.

FIGURE 3 / **Percent GDP Growth in 2021, Single-hit vs. Double-hit**



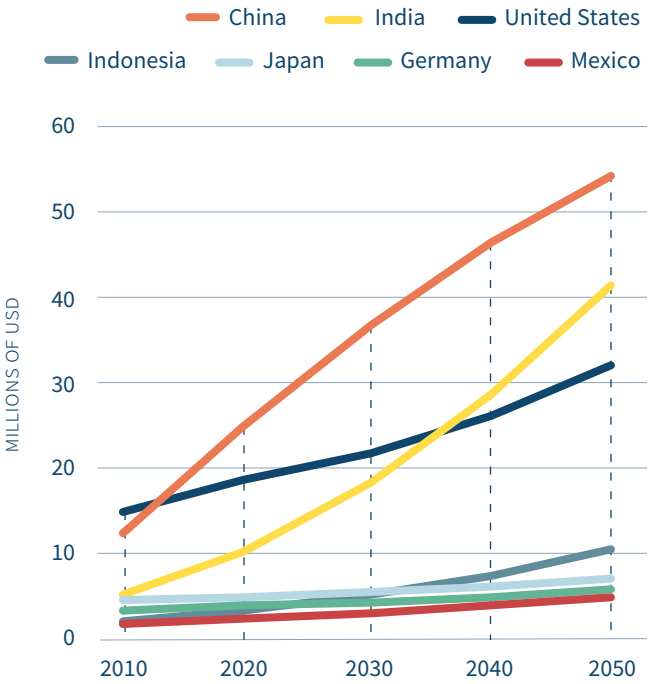
Source: "Real GDP Forecast," OECD, https://data.oecd.org/gdp/real-gdp-forecast.htm.

FIGURE 4 / **GDP per Capita, 2010 USD Purchasing Power Parity**



Noe: Data is pre-Covid-19. Source: Long-Term Forecast," OECD, https://data.oecd.org/gdp/gdp-long-term-forecast.htm.

FIGURE 5 / **GDP Projections, 2010 USD Purchasing Power Parity**



Noe: Data is pre-Covid-19. Source: Long-Term Forecast," OECD, https://data.oecd.org/gdp/gdp-long-term-forecast.htm.

Global Demographics

Global demographics will experience a tidal shift in the coming decades as many industrial economies confront aging populations and declining population growth.

Japan

Japan is the first advanced country to experience demographic decline, as its population ages and shrinks rapidly. While its current population sits at around 127 million, projections range from a 15 to 25 percent decrease by 2050.[32] Without a massive influx of immigration, which Japan has traditionally resisted, Japan's population could fall under 100 million before 2050. The government is attempting to relieve population strains by raising the age of eligibility to receive state pensions and automating elder care, but these solutions do not address the core demographic realities the country faces.

Other Manufacturing Leaders: Germany, South Korea, France, and Turkey

This predicament is not unique to Japan. Germany also faces demographic decline; its population is set to drop from 80 million to 78 million in 2030. Other advanced economies such as South Korea, France, and the United Kingdom will also see their populations level off, with less than 0.5 percent annual growth rates through 2030.[33] Turkey's population growth will level off in 2040, at which point its share of working age population compared to the elderly will begin to shrink.

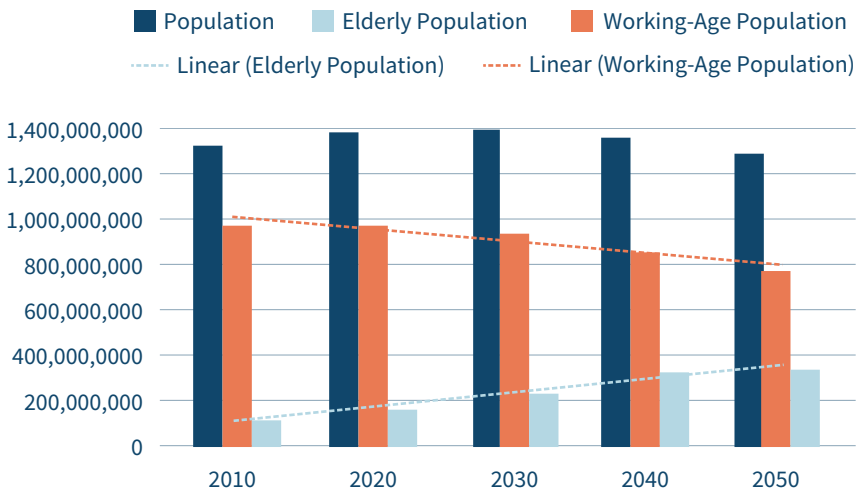
The United States

The United States does not face as severe a demographic threat as Japan or some other developed countries, but there are some troubling indicators. In 2018, it saw the fewest live births in 32 years, below the population replacement rate.[34] So far, immigration has offset the falling birth rate, but net immigration has slowed recently—a 70 percent year-on-year decrease in 2018—due to restrictive government policies.[35] If the United States cannot increase its birth rate, and if it continues its policies restricting immigration, it will ultimately face the same problems Japan and others are facing currently.

China

Though not yet an advanced country measured by per capita income, China also faces an extremely worrisome demographic picture, which could threaten the sustainability of its meteoric economic rise. Its total population will begin to decline in 2030. Its working age population will shrink by almost 20 percent between 2030 and 2050, and its elderly population will grow roughly 30 percent within the same period. Regardless, China's total population will remain large, between 1.3 and 1.4 billion through 2050, and its growing GDP will likely sustain its global economic and political influence.

FIGURE 6 / **China's Demographic Dilemma**



Source: U.S. Census Bureau.

Newly Emerging Economies: Ethiopia, Nigeria, Kenya, Mexico, India, and Indonesia

On the other hand, emerging economies in Africa and Asia can expect to compose a larger share of global consumption and the labor force. Ethiopia, Nigeria, Kenya, and Mexico all project rapidly growing working age populations through 2050. India's population will exceed 1.6 billion by 2050, but it will maintain a healthy ratio of 4.5 working age citizens per elderly citizen. Indonesia will remain a relatively high-population country in South Asia, reaching over 300 million by 2050, with over 3 working-age persons for every elderly person.

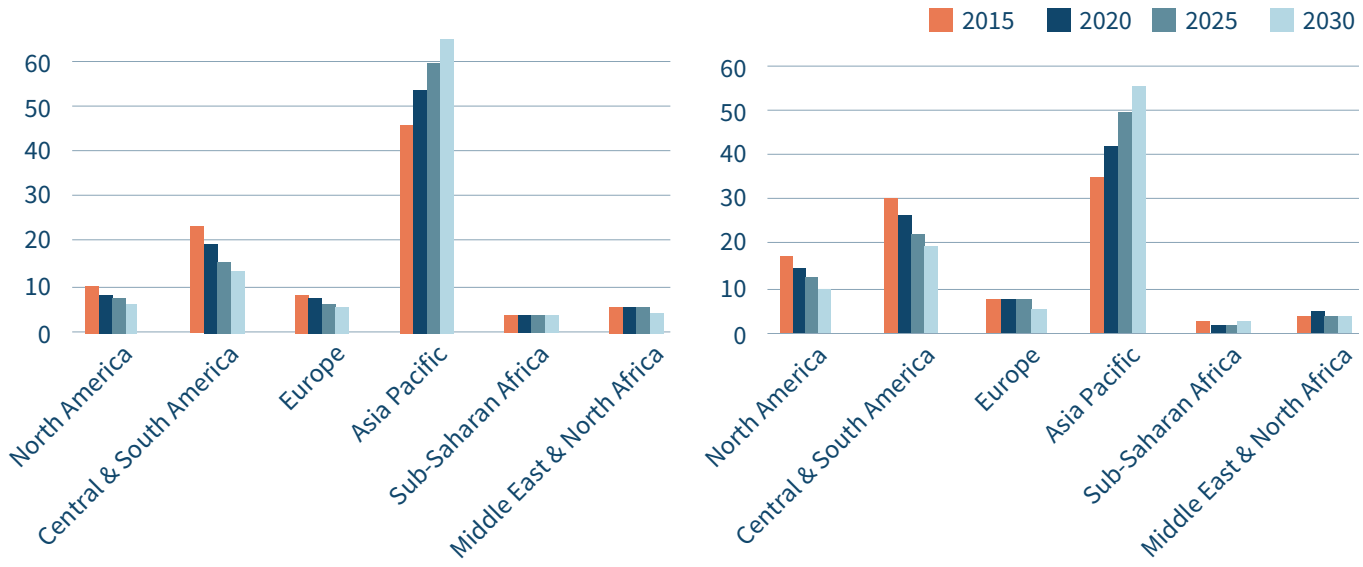
The New Middle Class

The global middle class will be driven by the Indo-Pacific region as Chinese consumers become wealthier and India's economy and population experience rapid growth. Population growth does not automatically equate to economic growth. Of course, demographic dividends will only be realized with sound policy across many areas, including economic policy, housing, education, health care, and so on. That said, many countries in the Indo-Pacific, some of which have massive populations, are poised to combine expanding workforces with economic growth to create a group of consumers that, while not as rich as Americans and Europeans, will outspend them as a region. The new, rapidly growing middle class in the developing world is set to join the old-money middle class in the developed world.

By 2030, dozens of countries in Europe and East Asia will have "post-mature" (over 45) median ages.[36] As the number of retirees bulges, the labor force will shrink in the absence of significant immigration inflows, and GDP growth will slow or stagnate. These societies will have to balance the pension health care needs of their aging population with support for their primary workforce. Along with greater demand for health care, aging populations in developed economies are likely to spend more on "experiences," which translates into more spending on leisure and recreation and less spending on durable goods.[37] This suggests that export powerhouses may see demand dampen in developed economies over the next 30 years. Demand for health care workers will also grow as health care costs rise, as aging populations typically require treatment for relatively complex and expensive health issues.[38] As governments are forced to care for a growing number of retirees, they will have to choose between two bad alternatives: defunding other priorities or taking on greater debt.[39]

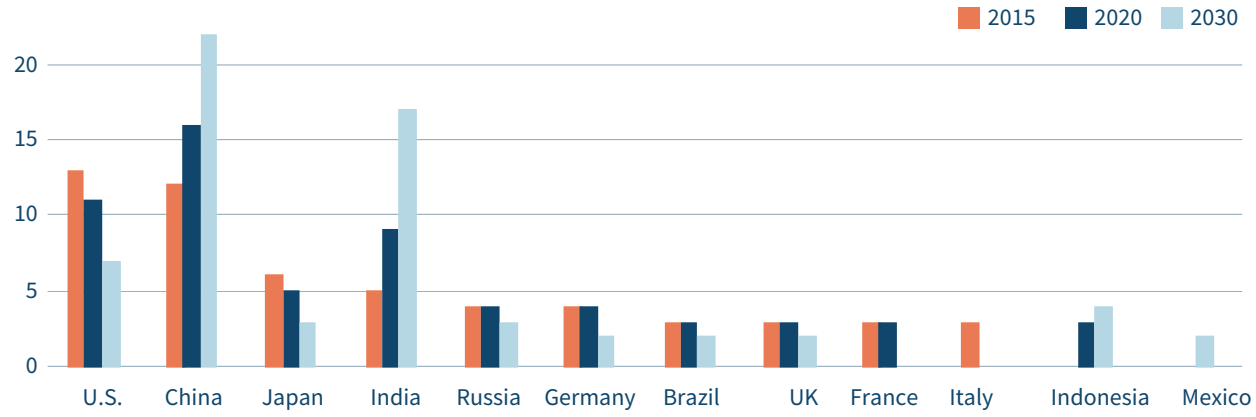
These countries will likely experience a slowdown in total factor productivity growth due to their aging workforces. After workers reach their peak productivity in their forties, their productivity declines due to health issues and skills gaps.[40] In order to stay competitive, countries with aging populations and shrinking workforces will need to attract more workers through immigration policies or take a riskier bet on automation enabling productivity gains that outpace losses from a smaller working-age population.

FIGURES 7 AND 8 / **Global Share of Middle Class and Middle-class Consumption**



Source: Homi Kharas, Brookings Institution (2019).

FIGURE 9 / **Global Share of Middle-class Consumption, Top 10 Countries**



Source: Homi Kharas, Brookings Institution (2019).

The Economic Impact of Climate Change

Climate change poses both a long-term and short-term threat to the global economy. For the United States, if greenhouse gas (GHG) emissions continue to grow at current record rates, a number of sectors will see annual losses in the hundreds of billions of dollars by the end of the century, and U.S. GDP per capita could experience a 10 percent hit by the end of the century.[41] The actual impact will depend on how aggressively the international community curtails the concentration of GHGs in the atmosphere.

There is a negative relationship between economic growth and climate change regardless of the level of development.[42] The costs of climate change rise with the concen-

tration of GHGs in the atmosphere. If emissions continue to grow at current record rates—a scenario referred to as Representative Concentration Pathway (RCP) 8.5, where CO2 parts per million (PPM) exceed 550 by 2040 and global temperatures are predicted to rise 2 degrees Celsius by mid-century—global economic growth will take a severe hit. RCP 8.5 will knock off 0.8 percent GDP per capita globally by 2030, 2.5 percent by 2050, and 7.2 percent by the end of the century. Under this pathway, the United States is projected to lose 1.2 percent of GDP per capita by 2030, 3.8 percent by 2050, and 10.5 percent by 2100. There are no winners in RCP 8.5. Canada would see a 13 percent hit to GDP per capita by 2100, and Japan, India, and New Zealand would see a 10 percent hit to GDP per capita over the same period. China is projected to experience slower growth starting in 2030, losing 0.6 percent of GDP per capita by that year and 4.35 percent by the end of the century.

A less damaging track, although increasingly unrealistic, is RCP 2.6, which would require GHG concentration to peak at 450 PPM by 2040 and a global emissions peak in 2020. Even under this best-case scenario, the global economy and individual economies will take a hit. The United States is projected to lose 0.2 percent of GDP per capita by 2030, 0.6 percent by 2050, and 1.9 percent by 2100. By 2050, RCP 2.6 will shave 0.1 percent off GDP per capita globally and 1.1 percent by 2100.

Climate change is a unique economic issue because it can spark unpredictable crises across social, economic, and geopolitical areas. The impact climate change can have on interconnected systems already under pressure often presents greater risks than combined risks to individual sectors. A 2-degree Celsius rise—which the current rate of emissions puts the planet on track for—will increase flood risks; reduce useable water supply; reduce crop yields; increase habitable zones for deadly plant, human, and animal diseases; permanently displace 200 million people; lead to the extinction of 15 to 40 percent of species; and erode fish stocks.[43] A number of conflict-driving "epicenters" are vulnerable to climate change, including water, food, human migration, sovereignty, and health security.[44]

Individually, each of these places stress on investment, consumption, trade, labor supply, and productivity; together, they could undermine global financial stability. This possibility of a "green swan"—a climate-driven financial crisis—has increasingly drawn the attention of central banks. They have begun to consider climate change in their economic models. However, modeling based on previous events is of limited value because of the unique scope of climate-related stresses and their potential for unpredictable economic, environmental, and geopolitical impacts. Thus, traditional risk management—where actions such as regulations or emergency measures are adopted based on past data—is ill-suited to deal with climate change.[45] Climate change has put central banks in uncharted waters.

Robust early action to mitigate climate change outweighs the costs; the earlier action is taken, the less costly that action will be and the less costly climate change will be. Managing to get below 500-550 PPM—the projected amount of GHGs in the atmosphere by 2050 if emissions continue to grow at current rates—and avoiding the worst consequences of climate change is estimated to cost 1 percent of annual global GDP by 2050—a significant cost but a minor expense compared to the costs and risks avoided.[46]

GHG emissions can be cut in four ways: reducing demand for emissions-intensive goods and services, increasing efficiency, taking action on non-energy emissions, and switching to lower-carbon energy sources. Complicating efforts to reduce emissions is the fact that most emissions growth will come from developing countries due to relatively rapid population and GDP growth and movement into energy-intensive industries. Markets for low-carbon products are expected to be worth at least $500 billion per year by 2050, creating an opportunity for the United States. Climate change mitigation can reduce costs in other areas, such as the health and environmental remediation costs associated with pollution. Other solutions serve dual purposes; for example, energy diversification is crucial to energy security, which undergirds economic and national security.[47]

The Regionalization of Supply Chains

Since the establishment of the GATT in October 1947, the value of global goods trade has skyrocketed from a mere $58.8 billion in 1948 to nearly $19 trillion in 2019.[48] Driving the explosion of trade were factors that encouraged companies to invest in global patterns of production, such as successive rounds of trade liberalization; containerization and other transportation and logistics improvements; the expansion of wage gaps between the developed and developing world; and more recently the widespread adoption of the internet. However, five factors have begun to weigh on globalization's unfettered expansion and will generally spur a regionalization of supply chains.

The first force for regionalization is the shift in the global middle class combined with the increased importance of services in trade and the reduced importance of labor costs in manufacturing. Firms will opt to locate production near expanding consumer markets in Asia to better respond to market trends and reduce time to market while likewise shifting production along regional lines to serve consumers in North America, South America, Europe, and Africa. Meanwhile, the importance of labor-cost arbitrage in trade will continue to decline, making it less costly for businesses to stratify operations and resume production in countries and regions previously considered to be high cost. As global consumption shifts toward emerging markets, those economies will produce more goods for their own consumption than for the rest of the world, reducing reliance on relatively cheap labor to supply products for developed markets.

Technology is a second factor driving regionalization. Automation and additive manufacturing will eventually make many labor-intensive jobs obsolete and reduce labor requirements for other tasks. Those technologies will further enable firms to demand quicker production timelines and encourage suppliers to locate closer to consumers to more quickly deliver new products. Those factors will incentivize the geographic consolidation of supply chains.

Third, more frequent and intense weather events due to climate change will encourage regionalization of supply chains to mitigate disruptions and other risks. Physical risks associated with climate change can impact shipping and production costs, delay the delivery of goods and services, and generate uncertainty that translates into business costs. As the effects of climate change grow, the uncertainty and magnitude of risks that businesses face will grow as well. As both a way to reduce their carbon footprint and minimize risk exposure, firms will opt to shorten supply chains.[49] Shorter, more localized supply chains will give manufacturers more insight and influence into the operations of their suppliers, which in turn will allow them to better reduce emissions throughout their entire value chain.[50]

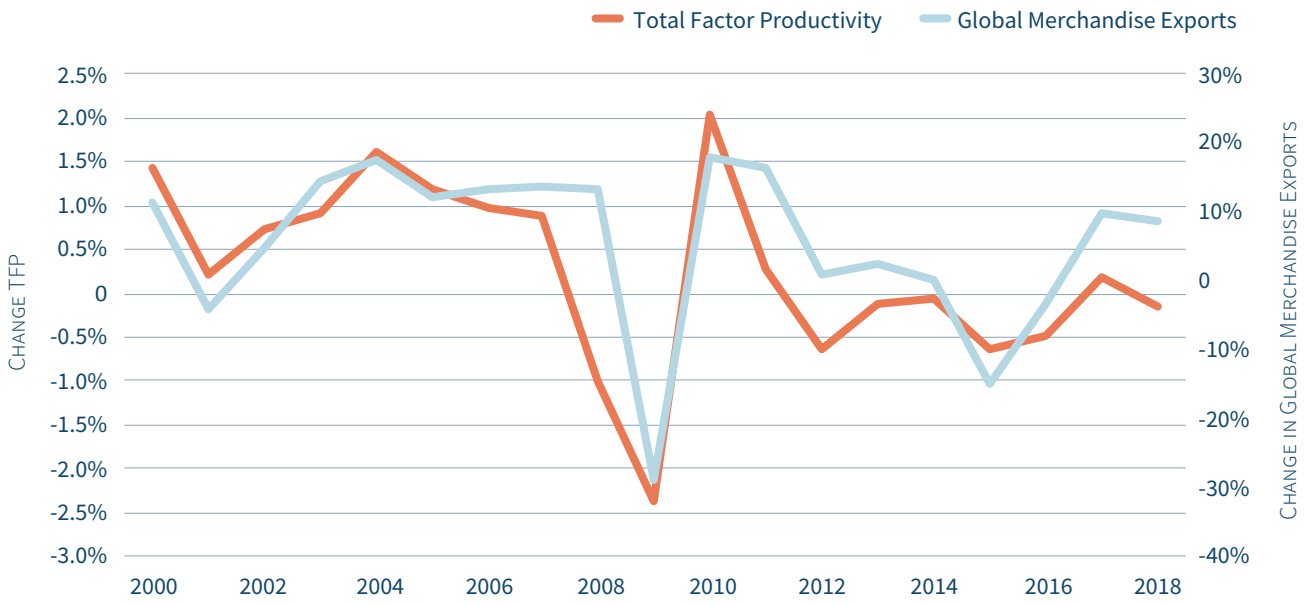
Fourth, the drive to build national champions in emerging industries in Europe, China, and India is more likely to result in various forms of protectionism than openness to trade. For China, this has been realized under Xi Jinping through various means, including instructions and support for Chinese state-owned enterprises to occupy the "commanding heights" of the Chinese economy; the drive for indigenous innovation and the acquisition of foreign intellectual property and knowhow in key sectors of the modern economy; and an approach to market access that favors domestic companies either through censorship, subsidies, or other means. In Europe, the European Union has embarked on a flurry of activity aimed at creating a playing field where European internet companies can compete against U.S. and Chinese giants. The European Union's heavy-handed approach to regulation, competition, and tax policy in this area is more likely to result in a walled garden than open competition featuring European innovators. India has undertaken a mix of approaches, favoring tariffs and other discriminatory indigenous innovation efforts in certain sectors while taking blunt action against Chinese tech companies by banning certain apps.

Covid-19 has added a fifth driver of regionalization, as governments and firms pursue supply chain resiliency. The pandemic led to shortages in medical equipment and drugs as manufacturing around the world slowed and countries simultaneously rushed to impose export controls and purchase those goods. The concurrent supply and demand shocks and subsequent supply chain chaos has led policymakers and businesses to reconsider the wisdom of supply chains built for maximum efficiency. A shift toward resilient supply chains can take a number of forms, some steeped in nationalism and calls for reshoring. However, the most likely form supply chain resiliency will take is a combination of supply chain regionalization and diversification. Regionalization reduces risks borne out of reliance on individual countries or drawn-out supply chains by compartmentalizing production between regions. Resilience can also take shape through diversification, which is not mutually exclusive with regionalization but complementary to it. A regionalized approach feeds resiliency by building capabilities across regions, which mitigates bottlenecks in times of crisis. Even while Covid-19 has led to a reconsideration of global supply chains, it has ushered in a broader acceptance of remote work. Remote work removes geography as a limitation on hiring, mitigating a significant friction in the labor market while opening new possibilities for companies to expand their reach across borders.

The regionalization of supply chains will not happen overnight and will not occur evenly across regions and industries. Some companies will choose to maintain a global footprint or, conversely, to produce in and for particular countries such as China. The pace and scope of regionalization, while driven by the fundamental aforementioned trends, will also be influenced by government policy and the cost and organizational complexities of reconfiguring global supply chains.

Global trade flows collapsed during the Great Recession, then growth resumed at a slower rate until Covid-19 caused another collapse, but volume should pick up in 2021. Regardless, the nature of global trade expansion will change due to regionalization. Regionalization will alter global trade patterns by reducing import and export diversification and simplifying supply chains. Global companies will continue to serve the global market but do so through multiple, shorter sup-

FIGURE 10 / **Exports and Productivity**



Source: WTO, The Conference Board Total Economy Database.

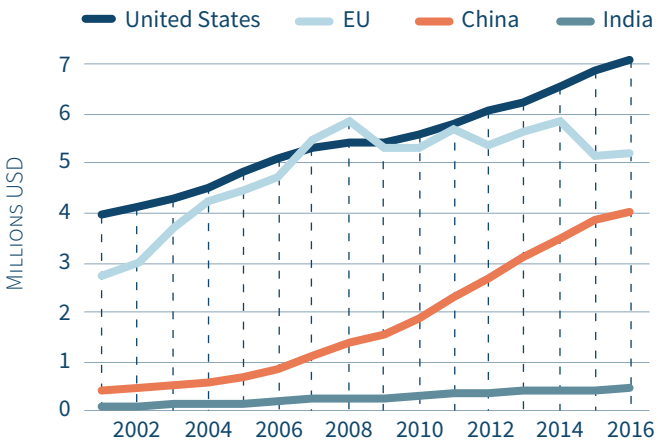
ply chains aimed at getting products to market as fast as possible. This may change which countries accrue the most benefits from trade. The causal link between international trade and productivity growth is well documented, as is the link between investment in foreign markets and productivity.[51] More global competition weeds out low-productivity firms that do not export, while high-productivity global firms are most likely to grow. Exporting firms accrue productivity gains from increasing scale, specializing products for certain destinations, and gaining know-how from operating in new markets. Trade barriers lower productivity growth. While new technology and processes such as additive manufacturing and AI may offset an expected decline in global trade and productivity, it is not clear that they will spur productivity gains out of their recent lethargy.

Innovative Capacity & Global Value Chains

Beyond the numbers, examining global value chains offers some insight into how competitive certain economies and regions will be in the future. Globalization has encouraged the formation of global value chains by enabling companies to provide goods and services made of inputs from multiple countries. Where those inputs are procured depends on a variety of factors subject to competition, such as cost, talent, and quality. Not all inputs are equal, however. Certain inputs, such as the core intellectual property behind a product or a specialized, high-tech component, may account for more value in a final product than what a few workers provide in assembling the final product, for example.

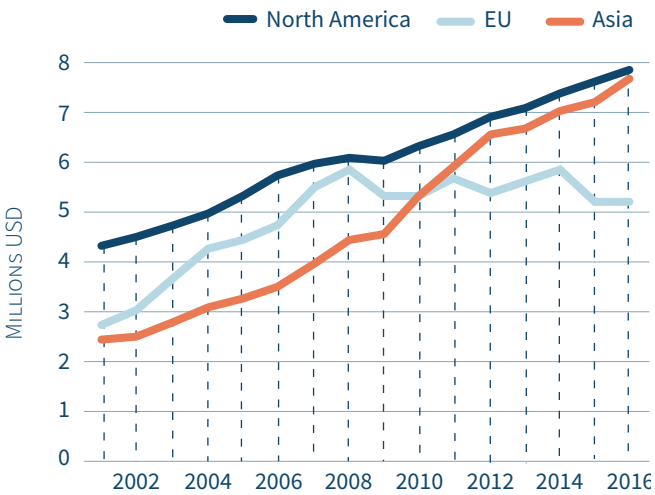
A higher share of foreign value added in a country's exports may indicate that the country has an open trade and investment policy. However, high foreign content in exports can also stem from other factors, such as geography, the size of an economy, and access to natural resources. Countries that specialize in upstream activities and services tend to have less foreign value added, and higher domestic content, in their exports. In certain segments, such as high-tech products and KTI industries, a country's share of value added suggests it occupies a competitive position in advanced industries. Success in KTI industries is generally driven by strong domestic foundations, including a relatively high rate

FIGURE 11 / Value Added in Knowledge-intensive Industries (KTIs)



Source: "Data," National Science Foundation Science & Engineering Indicators 2018, https://nsf.gov/statistics/2018/nsb20181/data/appendix?achapter1235.

FIGURE 12 / Value Added in Knowledge-intensive Industries (KTIs), Selected Regions



Source: "Data," National Science Foundation Science & Engineering Indicators 2018, https://nsf.gov/statistics/2018/nsb20181/data/appendix?achapter1235.

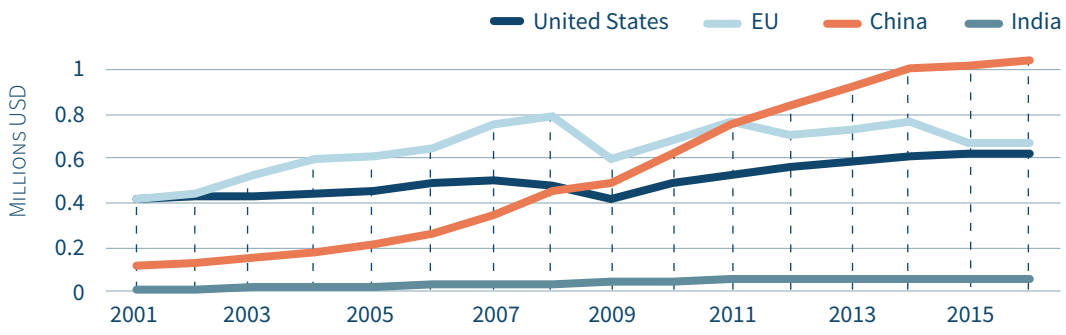
of STEM graduates, exemplary research and academic institutions, an open trade and investment policy, and robust intellectual property protections. These factors—essentially knowledge-based assets—contribute to an economy's innovative capacity, which drives high-value-added activities. It is no surprise, then, that the United States leads in value-added in KTI industries—at least for now.

China has significantly reduced foreign value added in its exports, by 10 percent between 2005 and 2015; however, it remains to be seen if it can continue that trend as it attempts to move further up the value chain while pursuing a state-driven economic policy. At the same time, China has begun to play a larger role in intra-regional trade in Asia as Japan and Korea's roles have declined. Additionally, East and Southeast Asia have increased their value added in exports to North America as intra-regional North American value added in trade has declined. That shift, however, has been relatively small, with intra-regional trade in North America still accounting for roughly 85 percent of value added for manufactured goods and business services in 2015.[52]

Shifts in demand and value added in computer, electronic, and optical products have occurred as well. From 2005 to 2015, North America's share of demand for those products dropped from 37 percent to 21 percent, China's share of demand grew from 6 percent to 20 percent, and the rest of the world's share grew from 11 percent to 19 percent. Meanwhile, North America's share of value added in those categories fell from 28 percent to 17 percent as China's grew from 10 percent to 28 percent.

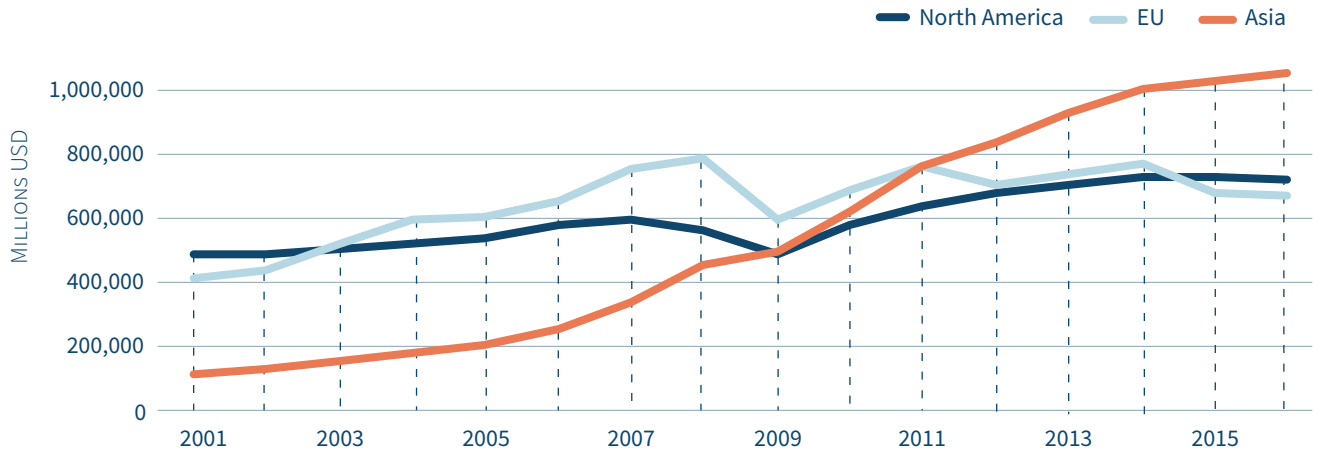
China currently is the world's top exporter of high-tech and medium-tech goods (24 percent and 20 percent of the global share, respectively). However, the pace of China's growth in exports in both of those categories has declined significantly since the Great Recession. Also, China's exports of medium- and high-tech goods remain reliant on inputs from the United States, the European Union, South Korea, and Taiwan.[53] As of 2015, over 30 percent of the value added in exports of computers and electronic products from China was foreign-sourced.[54] Overall, the top input providers to China in 2015 were Korea (11.4 percent), the United States (11.2 percent), and Japan (9.3 percent). Meanwhile, since the recession, the United States has held roughly 12 percent of the global share of high-tech exports, driven by aircraft exports. U.S. ICT exports have dropped from 6 percent to 4 percent of global exports, and its ICT products trade deficit with China has expanded. However, the United States primarily operates in a higher-value portion of global value chains in general.[55] The relatively high value added in U.S. exports and the highly integrated nature of ICT supply chains in Asia suggest that (1) the value of U.S. ICT exports is underestimated, and (2) its trade deficit in ICT products is exaggerated. While China has served as an assembly hub for ICT products since it joined the Information Technology Agreement, rising labor costs in China have pushed

FIGURE 13 / Value Added in Medium- and High-tech Manufacturing Industries, Selected Countries



Source: "Data," National Science Foundation Science & Engineering Indicators 2018, https://nsf.gov/statistics/2018/nsb20181/data/appendix?achapter1235.

FIGURE 15 / Value Added in Medium- and High-tech Manufacturing Industries, Selected Regions



Source: "Data," National Science Foundation Science & Engineering Indicators 2018, https://nsf.gov/statistics/2018/nsb20181/data/appendix?achapter1235.

some low-cost assembly activities to Vietnam, which has seen the fastest growth in high-tech exports since the recession.[56]

The United States has a number of advantages that position it to continue to operate in the top tier of global value chains. Though China will surpass the U.S. economy in terms of GDP in the coming years, U.S. consumers will remain those with the highest spending potential over the next 30 years. That will drive not only demand for innovative products for the American market but accelerate the development of economies of scale for those products, which will make them more affordable for other countries years later. Indeed, the innovative capacity of a country correlates positively to its GDP per capita.[57] However, the United States will need to maintain a strong level of STEM graduates (particularly in post-bachelor-level degrees), top-notch academic and research institutions, an open investment policy, and robust intellectual property protections to continue to lead in KTI industries and maintain its position atop high-tech global value chains.[58]

While KTIs in the European Union and Japan have struggled to recover since the recession, China is moving from assembly and low-value-added activities to R&D and higher-value-added activities within KTI industries. China's growth in KTI industries has outpaced developed economies since the recession.[59]

In the broader category of "information industries," which includes manufacturing and related ICT services, the world is shifting away from value added by the European Union, United States, and Japan and shifting toward China. Further, China has become better able to equip itself with domestic value added in this category, from providing 59 percent in 2005 to 70 percent in 2015. Despite growing global dependence on China for value added in information industries, the United States still provides roughly 85 percent of the value added in this category necessary to meet domestic demand. Data on value added in commercial knowledge-intensive services suggests a similar trend: the United States maintains pole position, but China is closing the gap. Again, trends appear to show a growing dependence on China to add value in general and in some high-tech sectors, which will put increasing pressure on the United States to pursue policies that will maintain U.S. leadership.[60]

03

The Digital Economy & Data Governance

Measuring the Digital Economy

The digital sector and proliferation of data are also reshaping the global economy, although the lack of a generally agreed-upon definition of the "digital sector" makes it hard to precisely measure its effect on the economy. The IMF defines the sector as including "the core activities of digitalization, ICT goods and services, online platforms, and platform-enabled activities such as the sharing economy."[61] According to the U.S. Bureau of Economic Analysis (BEA), the digital economy accounted for 6.9 percent of U.S. GDP and 3.3 percent of U.S. jobs in 2017.[62] The BEA includes three components of its digital economy: digital-enabling infrastructure, e-commerce transactions, and digital media content. Unlike the IMF, the BEA does not count jobs in the sharing economy (e.g., Uber drivers) in its calculations.

Regardless of measure—value added, income, or employment—the digital sector is no more than 10 percent of nearly all economies based on these definitions, according to the IMF and BEA. The IMF estimated that the digital sector accounted for 8.3 percent of U.S. GDP in 2015, while the BEA estimated that the digital economy accounted for just 6.9 percent of U.S. GDP in 2017. However, these estimates may undercount the spillover effects from the digital economy to the U.S. economy

at large, via both the consumer surplus of free digital goods and the channels through which technological investment spreads. First, traditional macroeconomic measures such as GDP fail to include the value consumers place on free goods—also known as "consumer surplus." In an experiment aimed at estimating consumer surplus in the digital sector, a representative sample of Facebook's U.S.-based users were asked how much money they would require as compensation for giving up Facebook for a month. The median compensation value was $48, implying that the consumer value generated from 2003 to 2017 was $231 billion (in 2017 dollars). If this additional value was included in economic measurements, real GDP growth would have increased by 0.05 to 0.11 percentage points on average per year over the time frame. [63]

Second, the internal dispersion of technological investments across a company's departments, the horizontal adoption of new innovations across competitors within a sector, and the vertical passing down of innovation through supply chains all illustrate why the digital economy has positive spillover effects that may be undercounted. Oxford Economics and Huawei recently published a report that aims to measure these indirect spillover effects. The report compares the private returns of investment (that is, economic growth assuming no spillover effects) to a new econometric model that measures total returns to technology investment (with spillovers). The model expands upon Mankiw, Romer, and Weil's foundational econometric model of economic growth to include the adoption of technological investments and knowledge diffusion.[64] The report finds that ICT capital's overall contribution to the economy is 3.5 times greater than the private returns to investment, implying that digital spillovers result in economic gains over 3 times larger than currently measured. Further analysis in the report estimates the global digital economy, including spillover effects, to be worth $11.5 trillion, with the United States contributing 35 percent of that value.[65] While the above analyses of consumer surplus and technological investment dispersion warrant future research, the preliminary findings suggest that the impacts of the digital sector on the U.S. economy are undercounted.

As data's role in the economy has grown, so has scrutiny over the nexus between the use of data and personal privacy and the conditions in which data can flow across borders and between actors. Concern over troves of personal data being collected, processed, and transferred between actors with little oversight, regulation, or accountability has sparked a global debate over personal data protection and data governance more broadly. As data collection and processing grows alongside computing power in the coming years, the potential for data-driven economics will grow as well.[66] A global data governance regime that allows predictable and stable access to data from around the world will fuel global growth by facilitating efficient trade in goods and services and by enabling AI-driven business activity. At the same time, a global data governance regime would protect the rights and interests of people when engaged in online activity.

While data-driven applications will become more ubiquitous across all sectors of the economy in the future, international data governance remains in its infancy. Existing international regimes are not fully interoperable and are filled with holes in coverage. National regimes widely vary, with some adopting policies that discourage the free flow of data across borders. The interplay between national and international rules can be inefficient at best, and incoherent at worst. For example, China has embraced cyberspace sovereignty and cemented government control into every layer of the internet ecosystem in China. On the other end of the spectrum, the European Union set a prescriptive international standard relatively favorable to consumer privacy in 2015 with its approval of the General Data Protection Regulation (GDPR), which governs the transfer of personal information of European citizens across borders.[67] The United States is a member of the APEC Cross Border Privacy Rules (CBPR) System, which—similar to GDPR—establishes an international regime for the transfer of personal data but—dissimilar to GDPR—

only requires that participants maintain a domestic data privacy regime that meets certain principles to participate in the international regime.[68] Further complicating the picture, some U.S. states believe federal data regulations are inadequate and have moved forward with their own state-level data protection regimes.[69] In the absence of a baseline global data governance regime, incompatible and disparate regimes will proliferate, and the digital economy, which functions best if it is global, will suffer as a result.

AI, Automation, the Economy, and the Workforce

Among its other uses, access to data is necessary for advances in all aspects and applications of AI, including machine learning, neural networks, and more advanced processes. AI and automation will transform the nature of economic growth and activity. AI-enabled technologies are expected to raise global GDP by 14 percent in 2030 (by $15.7 trillion), especially in the United States and China, and provide significant productivity growth over time.[70] While growth in general will create new opportunities and demand for trade, AI and automation will also impact trade in more specific ways. Both technologies will reduce the importance of labor supply and cost in goods production and therefore influence international trade. This will encourage regionalization of supply chains to get goods to consumers faster and will raise the importance of services in the global economy. At a more granular level, breakthroughs in natural language processing could eliminate barriers to trade in services and more easily allow small businesses to break into foreign markets. AI paired with robotics will improve logistics, supply chain management, and goods production across industries.

However, according to the McKinsey Global Institute, around half of all workplace activities in the United States have the potential to be conducted by an automated machine; jobs in industries such as hospitality and food services are most at risk of having their responsibilities reduced.[71] To remain competitive, workers will have to rely on leveraging "soft" skills, such as people management, more than they do today. Occupations that rely on critical thinking, decisionmaking, creativity, and leadership will likewise be difficult to replace with computers. Jobs that require physical adaptation and dexterity will also be tough to automate; however, additional human-machine interface at a minimum is likely in most goods-producing sectors. Widespread adoption of automation and AI, like most innovations in recent history, will eliminate some jobs and create others, both lower-skilled and higher-skilled, such as new demand for blue-collar workers to update, install, and repair robots alongside additional demand for engineers and software developers. As technology advances, the growing gap between manufacturing employment and output is likely to be replicated in other industries most suitable to automation.

Depending on choices made by governments and firms, new technology has the potential to make the existing skills gap more severe or provide new and better means to adapt the workforce to meet current and impending skills mismatches.[72] Similarly, new technology can help manufacturers attract and retain talent. Manufacturers consistently cite the negative perception workers have about manufacturing jobs—that they are dirty jobs that require workers to show up to a crowded, noisy factory—as a key challenge in attracting workers. While there is no silver bullet for the perception problem, showcasing twenty-first century factory floors that make use of advanced technology, including tools that allow for automation and enhanced human-machine interface, can be effective in changing workers' outdated perception of manufacturing jobs.[73] Once complemented by further automation, remaining workers should experience a rise in productivity and therefore wages, at least generally. This result is especially promising for advanced economies such as the United States, where labor productivity growth has stagnated in the last decade.[74]

Productivity gains derived from a decrease in low-skilled, time-intensive human labor will help drive macroeconomic growth through 2030, but employment outcomes are more uncertain. Some states, such as Indiana and Kentucky, and metro areas, such as Modesto, CA, and Tuscaloosa, AL, that have greater risk of job losses due to automation, will require nuanced and targeted policy responses to mitigate a potential surge in unemployment.[75] That said, AI, automation, and other new technologies are not the only factors that can displace workers. Accordingly, policymakers should craft policies to support displaced workers that are not conditioned on a particular reason for displacement. Whether federal and state governments successfully coordinate and advance policies to help adjust vulnerable workers to a fast-changing economy will have significant implications for the U.S. workforce and popular support for an ambitious U.S. trade policy.

Currently, executives do not plan to invest in their workforce at a level commensurate with their current and planned investments in automation and AI.[76] This carries significant implications for the future of the U.S. labor market. Absent a shift in policy that encourages investment in lifelong skills development and a reworked social safety net, the transitional costs of uptake in automation and AI will be extremely difficult for the American workforce to deal with, particularly those in low-wage, low-skilled occupations. That segment of the workforce is most exposed to automation and will require the largest investment to retrain and upskill, which makes them particularly vulnerable.[77] In that sense, while AI and automation promise to boost growth, they also threaten to expand already record-level inequality in the United States absent policies that smooth transitional costs. In response, the government will need to establish a comprehensive set of policies which incentivize companies to invest in the workforce, create means for workers to finance lifelong learning, and make a range of credentials more viable for workers to attain and more attractive for companies in the hiring process. These and other recommendations are laid out in greater detail in the commission's workforce report.

04

The Path Forward

The United States is likely to remain the world's wealthiest (per capita) and most innovative country in the world in 2030 if it pursues the right policies. However, significant changes in the global economy will pose challenges to U.S. competitiveness and global leadership. These trends include:

- The growing importance of services and digital commerce;
- Major changes in the nature of work driven by automation and AI that will render many jobs obsolete and create many new ones with different skill requirements;
- A shift toward regional supply chains, not only in the United States but in Asia as well;
- A declining importance of labor arbitrage as a driver of global supply chains;
- The demographic challenges of an aging workforce and declining birth rate; and
- The growing economic importance of the Indo-Pacific region along with the declining relative economic weight of Europe and South America.

In the papers that follow, the CSIS Trade Commission on Affirming American Leadership recommends a comprehensive response by the U.S. government to these anticipated developments, covering workforce development, innovation policy, and a revised international trade policy suited to the challenges ahead.

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