

# The Case for a National Industrial Strategy to Counter China's Technological Rise

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Further stimulus in response to the COVID-19 crisis should focus not just on short-term recovery, but also the long-term competitiveness of key technologically sophisticated, traded-sector industries. Now is the time to recognize America needs a robust industrial strategy.

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## KEY TAKEAWAYS

- China has long posed a stark techno-economic challenge in the advanced industries that are most critical to America's economic wellbeing and national security. To overcome that threat, policymakers must break free of conventional economic thinking.
- Trade and foreign policy measures are necessary, but not enough. America needs a robust domestic strategy, too—and it cannot be limited to generic policies to expand “factor inputs” like science, education, and infrastructure.
- America needs a national strategy that fortifies traded-sector tech industries that are “too critical to fail,” such as advanced machinery, aerospace, biopharma, electrical equipment, semiconductors and computing, software, transportation and more.
- To develop and implement a national industrial strategy, the federal government will need to significantly strengthen its institutional capabilities to conduct thorough sectoral analysis.
- Congress should act in four areas: support for R&D targeted to key technologies, tax incentives for key building blocks of advanced production, financing for domestic production scaleup, and adding a competitiveness screen for regulation.
- All these programs should be aligned with U.S. allies wherever possible.
- Without a robust industrial strategy to bolster its advanced industries, America will likely experience a steady erosion in its competitive position—akin to the UK's path in the 1960s and 70s—and a concurrent rise in populist fervor.

## OVERVIEW

Economic pundit Robert Reich once wrote that “industrial policy is one of those rare ideas that has moved swiftly from obscurity to meaninglessness without any intervening period of coherence.” But after 40 years of obscurity and meaninglessness, the concept is now gaining credence for one main reason: China. Elected officials and others from both sides of the political aisle have become increasingly concerned in recent years that China will overtake the United States as the world’s technology leader, with dire consequences for America’s prosperity and national security. And the COVID-19 pandemic, with its disruptions of supply chains, has put U.S. dependency on China in the news on an almost daily basis. Yet while efforts to push back against Chinese “innovation mercantilism” are needed, such steps, even if successful—which is increasingly doubtful—will not be enough. It is time for the federal government to put in place a national industrial strategy that focuses on supporting key industries critical to America’s economic vitality, public health, and national security: in other words, industries that are “too critical to fail.”

Unfortunately, when it comes to industrial strategy, our institutional structures are holdovers from the Cold War era while our thinking remains stuck in the 1990s’ free-market, globalist-based Washington Consensus. It is time for a new way of thinking about national security, economic competitiveness, and advanced technology, coupled with new institutions that can effectively develop and implement a national industrial strategy in conjunction with our allies. As such, as Congress considers further stimulus in response to the COVID-19 crisis, it should focus on actions that will not only spur short-term growth and recovery, but also ensure long-term competitive and economic resilience.

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**It is time for the U.S. government to put in place a proactive and targeted national industrial strategy, focused on supporting key industries critical to America’s economic and national security.**

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This report provides the “why, what, and how” of a national industrial strategy—explaining why advanced industrial competitiveness is important, particularly vis-à-vis China; what is the nature of the U.S. advanced industry competitiveness challenge and why markets acting alone are not enough to address the challenge; what a strategy should look like, both institutionally and substantively, and how policymakers should approach developing one; and finally, why common objections to such a strategy are misguided.

While trade and foreign policy responses need to play a key role in any overarching strategy to address the China challenge, this report focuses only on proactive, domestic measures the United States can take to have a better chance of retaining, expanding, and making advanced technology industries more resilient in the face of Chinese competition.<sup>1</sup> These recommendations include:

- Congress should task the administration with creating a national advanced industry strategy, as Sens. Chris Coons (D-DE), Jeff Merkley (D-OR), Marco Rubio (R-FL), and Todd Young (R-IN) have proposed.

- Congress should establish a unit within the National Institute of Standards and Technology (NIST) to monitor and analyze U.S. domestic production capabilities in advanced industry sectors and their supply chains.
- Congress should significantly expand funding for research related to key technologies, including, among others, artificial intelligence, biopharmaceuticals, robotic and autonomous systems, and semiconductors, and target it to maximize commercialization of these technologies in the United States.
- Congress should establish a Competitiveness Tax Credit, providing a tax credit of 45 percent of all business investments made in the United States in R&D, skills training, and global standards setting, and a 25 percent credit for expenditures on new equipment and software, with expenditures in excess of 75 percent of base-period expenditures qualifying for the credit.
- Congress should support the establishment of an industrial investment bank to drive advanced production scale-up in America, as well as a reshoring incentive fund to encourage relocation from China to the United States of production in critical industries.
- These efforts should be coordinated with our allies, and as such, the federal government should work to establish a joint U.S.-EU-Japan Technology Alliance.

## WHY ADVANCED INDUSTRY COMPETITIVENESS IS IMPORTANT

The competitiveness of advanced, traded-sector establishments is a key component of healthy economies, and why dozens of nations have implemented strategies to bolster advanced industry competitiveness. There are at least five reasons why policymakers should focus on these sectors.

First, advanced traded sectors are critical to America's trade performance, accounting for 60 percent of U.S. exports.<sup>2</sup> More competitive sectors mean a lower trade deficit and a higher value of the dollar relative to other currencies. The former is important because a lower trade deficit means less foreign debt owed by future generations. The latter matters because a stronger dollar means cheaper imports and a higher living standard now. Given the debate over the role of the value of the dollar in competitiveness, it is important to understand that the goal is not a weak dollar; the goal is globally competitive robust advanced traded sectors. If these sectors are competitive, and if the value of the dollar is determined by market forces rather than by foreign government policy, the dollar's value will be high because sectors are competitive and the U.S. is exporting as much as—or more—than it imports. As such, U.S. currency policy should be focused not on keeping the dollar high or low, but rather on letting the price reflect market conditions (including by fighting foreign currency manipulation). However, U.S. economic policy should work to ensure these market conditions include having the most globally competitive advanced industries.

Second, advanced traded sectors are a key source of high-wage jobs, including for non-college-educated workers. Workers in advanced industries earn 80 percent more than average, while workers without college degrees earn 57 percent more in high-tech industries.<sup>3</sup>

Third, a strong advanced technology sector is a source of growth and vitality for the macroeconomy. For example, 35 percent of U.S. economic growth came from 75 intellectual property (IP)-intensive industries.<sup>4</sup> In this sense, having healthy and growing advanced technology traded sectors is akin to the Fed cutting interest rates: They provide a stimulus for continued growth. When advanced industries decline, they generate a headwind for economic growth, in part because spending by their workers and non-traded-sector suppliers falls.

Fourth, these sectors give nations needed flexibility and resilience in the face of global challenges. Strength in a broad array of advanced technology sectors makes it easier to respond to external threats to supply chains, either from natural disasters like pandemics, or from actions by other nations to intentionally harm or exert leverage over the United States.

Finally, advanced traded sectors and many of the technologies associated with them are critical to America's ability to field a robust military force, particularly as China's technological capabilities and efforts at "civil-military fusion" advance.<sup>5</sup> As a recent Department of Defense (DOD) report on the defense industrial base stated, "To provide for our national security, America's manufacturing and defense industrial base must be secure, robust, resilient, and ready."<sup>6</sup> And while much of the U.S. defense capability could once be provided principally by defense contractors, today, advancements in technology require "spin on" from the commercial sector. This is why Mike Griffin, undersecretary of defense for research and engineering, wrote, "Superiority in these [commercial] technologies...is the key to deterring or winning future conflicts."<sup>7</sup> And with the loss of advanced manufacturing capabilities to overseas locations over the last two decades, this makes it harder not just to produce needed technologies, but even to develop them. As Bonvillian, Van Atta, and Windham wrote in a report on the Defense Advanced Research Projects Agency (DARPA), "For the DARPA model agencies to be cut off from these innovation system capabilities, and unable to rely on a strong U.S. manufacturing base for rapid prototyping and innovative production, spells a major potential challenge to their ability to develop and implement hard technologies."<sup>8</sup> This is one reason DOD launched its Defense Innovation Unit to work with the private sector, and is supporting 8 of the 14 Manufacturing USA institutes.<sup>9</sup> As such, the ability to defend the nation's interests comes not only from traditional defense firms in sectors such as aerospace, shipbuilding, and munitions, it also comes from firms in dual-use sectors such as software, materials, machine tools, industrial automation systems, semiconductors, and technology hardware. Moreover, even other sectors, such as consumer electronics and autos, while not directly defense related, contribute to the overall technical capabilities and production resilience of the U.S. economy, in part by supporting science, technology, engineering, and mathematics (STEM) workers and technologically sophisticated suppliers.

### **The Nature of the U.S. Competitiveness Challenge**

The United States faces an advanced industry competitiveness challenge, which can be seen in at least four key indicators.

First, despite widespread claims to the contrary, real U.S. manufacturing output has fallen as a share of gross domestic product (GDP) over the last decade. Real manufacturing value added declined 13 percent from 2007 to 2019 (from 13.2 percent of GDP to 11.5 percent).<sup>10</sup> And when controlling for the statistical overstatement of output growth in the computer industry, it

fell 20 percent (from 12.1 percent to 9.7 percent).<sup>11</sup> This is one reason Harvard Business School's Gary Pisano and Willy Shih noted, "Decades of outsourcing manufacturing have left U.S. industry without the means to invent the next generation of high-tech products that are crucial to rebuilding its economy."<sup>12</sup>

Second, the United States ran an all-time-high trade deficit of \$122 billion in advanced technology products in the first 11 months of 2019, down from a \$4.5 billion trade surplus in 2001.<sup>13</sup> With China, the trade deficit in electronic products was \$184 billion in 2017, with the United States exporting just \$21 billion to China.<sup>14</sup>

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Related, many once iconic U.S. advanced industry firms have lost significant global market share or even gone out of business. *Forbes* issues a list of the top 2,000 firms each year. To be sure, from 2006 to 2019, a number of U.S. technology firms increased their global rank significantly, particularly in software (e.g., Microsoft); semiconductors (e.g., Intel, Micron, and Nvidia); and Internet services (e.g., Facebook). But many hardware and related firms either lost ground or went out of business. Once-global leaders such as Lucent, Motorola, and Nortel (a Canadian firm that one time employed thousands of U.S. workers) are now defunct. And leaders such as IBM, Hewlett Packard, Agilent (formerly part of HP), and General Electric all fell significantly (see table 1).

**Table 1: Select U.S. technology firms rank on *Forbes 2000* list (\*unranked or no longer in business)<sup>15</sup>**

<b>Firm</b>	<b>2006</b>	<b>2019</b>	<b>Change in Rank</b>
Facebook	*	63	NA
Nvidia	1,494	529	965
Micron	1,148	206	942
Alphabet/Google	439	17	422
Apple	283	6	277
Oracle	240	92	148
Qualcomm	392	310	82
Boeing	93	49	44
Cisco	117	74	43
Microsoft	55	16	39
Applied Materials	472	435	37
Intel	74	44	30
United Technologies	108	78	30
Corning	617	591	26
eBay	524	533	-9
IBM	23	60	-37
Hewlett Packard	67	279	-212
General Electric	2	389	-387
Agilent	591	1,094	-503
Nortel	851	*	NA
Sun	808	*	NA
Lucent	484	*	NA
Motorola	124	*	NA

## Box A: Defining Terms

There is considerable confusion about industrial strategy and related concepts. To start with, an industrial strategy is focused on boosting U.S. competitiveness in particular key sectors and technologies. But to listen to many economists, pundits, and policymakers discuss the economics of growth it would be easy to be confused by the commonly used terms “competitiveness,” “innovation,” and “productivity.” These terms are often used interchangeably and with little precise meaning.

**Competitiveness:** At its core, competitiveness refers to favorable international terms of trade (e.g., relatively better trade balance or currency values). This is achieved by relatively stronger traded sectors: sectors wherein a significant share of output can easily be sold internationally, as opposed to local-serving sectors (e.g., grocery stores, barber shops, etc.). A variety of industries can generate competitiveness, including low value-added ones (e.g., call centers); natural-resource sectors that rely on extraction (e.g., natural gas, agriculture, mining, etc.); and high value-added, higher-wage sectors (e.g., autos, semiconductors, drugs, etc.) The latter do more to sustainably boost living standards than the former two and should be the focus of any competitiveness strategy. A competitiveness policy includes a wide array of policies and programs designed to boost a nation’s traded-sector competencies, many of which may be quite general in scope and application (such as better STEM education).

**Industrial Strategy:** An industrial strategy is the intentional set of policies focused on supporting key high-value-added, non-natural resource-based traded sectors identified as critical to a nation’s economic competitiveness and security. Enacting an industrial strategy enhances competitiveness. But the converse may not be true. Competitiveness can also be attained in ways that don’t include targeting sectors, and result in expanded output in non-key sectors such as natural resources and low-value-added exports.

**Industrial Policy:** While this term can mean both smart and strategic policies affecting particular industries, it is used to disparage government efforts to promote the health of particular economic sectors by characterizing the activity as a clunky, politicized amalgam of crony capitalism managed by inept bureaucrats that hurt the economy.<sup>16</sup>

**Productivity:** This refers to economic output per unit of input. Raising productivity in internationally traded sectors such as autos and software boosts competitiveness by enabling better price performance. But raising productivity in local-serving sectors such as electric utilities and health care services, while reducing input costs for traded sectors, does much less for overall competitiveness. At the same time, more-aggressively automating non-traded sectors (e.g., using robots to deliver restaurant meals or 3D printing machines to construct houses) could expand domestic markets that can help traded-sector firms compete globally (e.g., robots and 3D printers).

**Innovation:** This refers to “the implementation of a new or significantly improved product (that is, a physical good or service), process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations.”<sup>17</sup> While innovation is related to productivity and competitiveness, it is not synonymous. Many innovations have little to do with competitiveness. For example, smart electric grids will help boost electric utility productivity, but will do little to boost competitiveness, as electric utility services are not internationally traded.

## The Political Economy of Industrial Strategy

The U.S. federal government has long responded to techno-economic challenges, including the arming of the North in the Civil War, the creation of the “arsenal of democracy” to defeat the Axis powers in WWII, and the post-Sputnik push to out-innovate and out-produce our military adversary, the Soviet Union.<sup>18</sup> Indeed by the mid-1960s the federal government invested more in research and development (R&D) than the entire rest of the world—public and private—combined. In the 1980s and early 1990s there was a strong, bipartisan legislative and administrative push to respond to Japanese (and German) technological competition.<sup>19</sup> (In his 1987 State of the Union address, President Reagan said, “[We will guarantee] that government does everything possible to promote America's ability to compete.”<sup>20</sup>) Now, there is a growing realization that the federal government must step up once again, this time to respond to the greatest economic threat the United States has faced: China.

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It is anything but clear, however, whether America will effectively respond this time. For unlike before the 1990s, neoclassical economics now dominates U.S. policymaking. Indeed, it’s as if America drank its own Kool-Aid and turned to the neoliberal shock therapy we proposed for former communist states on ourselves. The result is that a broad and influential swath of economists are committed to an ideological framing composed of seven key aspects, which collectively lead to a marked passivity on the part of government:

- It doesn’t matter what a nation produces (“Potato chips, computer chips, what’s the difference?”);
- Only companies, not nations, compete;
- Maximizing global, not national, economic welfare, matters most;<sup>21</sup>
- America should focus on its natural comparative advantage as revealed by the market;<sup>22</sup>
- Market forces alone are adequate to ensure U.S. economic leadership;
- Any attempts at prioritizing sectors would result in either or both protectionism or inefficient “crony capitalism”; and
- The principal role of government is to be a “referee” among competing private interests, not a “coach” to support and guide those interests.

Thus, in the conventional framing, not only is an industrial strategy unnecessary, it is actively harmful. No wonder the federal government has yet to act this time around.

Some who eschew a hard-core, free-market perspective are willing to acknowledge some role for government, so as long as it doesn’t involve targeting key sectors. In this framing, if the United States just expanded public funding for science, K-12 education, worker training (it is



common to hear statements such as, “We need to equip American workers to succeed in the global economy”), and physical infrastructure, all, they assure us, would be well. But these “factor input” policies, while necessary and helpful, are woefully inadequate for building global competitive advantage in the most important industries powering America’s economic and military future.

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There is one industrial strategy that is increasingly accepted: a focus on “green industries,” with proposals such as the “Green New Deal” gaining adherents.<sup>23</sup> Advocates go so far as to argue that such an approach would solve overall U.S. industrial competitiveness woes by enabling America to export clean technology goods. But even if the United States could dominate this industry globally (a dubious proposition given most other advanced nations are also targeting the sector and China already leads on solar photovoltaic, wind, and batteries), the industry is likely not large enough to eliminate the U.S. trade deficit. Even more troubling, clean energy competitiveness, while a component in future U.S. defense capabilities, is not enough to ensure robust military capabilities: American can’t win wars with solar panels and wind turbines.<sup>24</sup> This is not to say America should not do more to support clean energy innovation, it should. But it’s a delusion to assume this can be a substitute for national industrial strategy.<sup>25</sup>

Coupled with this ideological bias against action is the fact that two decades of hyper-globalization have reduced the commitment of U.S. companies to a robust national competitiveness strategy. Prior to the rise of the last round of globalization in the 1990s, many business leaders, such as Hewlett Packard CEO John Young and Intel CEO Andy Grove, spent significant political capital encouraging Washington to act.<sup>26</sup> In fact, that leadership played a critical role in the array of effective advanced industry policies enacted in the 1980s and 1990s. An example is Robert Noyce of Intel, a developer of the first integrated circuit. His advocacy led to Sematech, a public-private consortium that helped support the restoration of U.S. semiconductor competitiveness. Today, that corporate leadership, while not gone, is certainly less active, if for no other reason than most large U.S. corporations are by now global in orientation. In addition, in the 1980s and 1990s, when U.S. business leaders spoke out against unfair Japanese industrial policies, they ran little risk of Japanese-government retaliation. Today, virtually every CEO of a major American company is well aware of that risk; just ask National Basketball Association (NBA) Commissioner Adam Silver about the league’s fortunes in China after a team official had the temerity to voice his support for the Hong Kong protestors.<sup>27</sup>

Third, the bitter partisan nature of U.S. politics, not just in Congress but in the body politic, means that not only is an inordinate amount of time and energy taken up on hot-button, divisive issues that have no effect on competitiveness (e.g., abortion, guns, identity, health care, low-skill immigration, income inequality, impeachment, etc.), but that finding common

ground on less partisan issues where their actually is considerable common ground, such as competitiveness, is difficult.<sup>28</sup>

Fourth, the explosive growth of the budget deficit, made significantly worse because of the required COVID-19 economic support package, coupled with the massive baby-boomer retirement wave, means the fiscal headroom afforded policymakers to make the needed direct and indirect investments to support a national industrial strategy is quite constrained.

Finally, any national industrial strategy will require a rebalancing of the current extreme focus on the rights of individuals and more to the responsibilities and loyalties of Americans. It was not actually all that bold a statement for John F. Kennedy to declare at his inauguration, “Ask not what your country, can do for you, ask what you can do for your country.” At that time, America, especially in the face of a Cold War with the Soviet Union and before the ascent of individualism in the 1960s—which has since morphed into something of a religion—was a society that balanced individual and community. To be sure, the rights of many individuals and groups were marginalized then. But as Michael Lind noted, “Today it is difficult for a rights-based philosophy to legitimize the nation-state as a community that can demand loyalty and sacrifice from its members.”<sup>29</sup> Yet better balancing rights and responsibilities are what is required for the politics of a national industrial strategy to be favorable.

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Despite these challenges, it is worth remembering Churchill’s aphorism that “you can always count on America to do the right thing, after it has exhausted all other possibilities.” A younger crop of economists, coupled with some prominent scholars, have recently been challenging the stifling neo-classical economics orthodoxy, arguing that the effect of Chinese competition has been worse than economists have led us to believe, and industrial strategy responses are warranted.<sup>30</sup>

Moreover, a growing number of firms and trade associations are calling for more active measures by the federal government to support competitiveness.<sup>31</sup> Given the growing populist backlash against businesses—and even capitalism itself—partly spurred by concerns that corporate interests are no longer aligned with national interests, even more companies may come out in support of a robust national industrial strategy, if only to lessen any backlash against the domestic policies that might come with it (e.g., trade protectionism, state-owned enterprises, regulations for worker-control of companies, new types of corporate charters, etc.).<sup>32</sup>

In addition, the COVID-19 crises has been a wake-up call to many Americans about just how dependent the United States is on China, especially for key medical supplies, prompting calls for action to increase U.S. production capabilities.

And finally, more and more elected officials from both parties are calling for more active federal policies to spur advanced industry competitiveness.<sup>33</sup> Much of this change of heart has been spurred by the realization that China is unlikely—at least anytime soon—to move toward

a democratic, market-based policy, and instead wants to extend its authoritarian and mercantilist model to challenge America’s global political, economic, and possibly military position.

### **A National Industrial Strategy Targets Particular Sectors and Technologies**

There is much confusion over the terms “industrial policy” and “industrial strategy,” in part because of a conflation of means versus ends (see box 1). “Industrial policy” is often used as a derogatory term to refer to heavy-handed and sometimes wasteful “picking of winners,” which disrupts the efficiency of the marketplace. But this conflates the “how” with the “what.” An industrial strategy is a set of policies and programs focused on a select group of industries (and technologies) to help assure national economic well-being. How this is implemented—with a lighter or heavier touch, with effectiveness or ineptness—is a separate issue.

A national industrial strategy focuses on particular sectors and technologies. As such, it is narrower than a competitiveness or innovation strategy, which might include measures for the right market conditions (encouraging entrepreneurship; light-touch regulation with federal preemption of state and local regulations, especially in emerging technology areas such as AI, drones, and fintech; effective bankruptcy laws; robust IP rules; and the right application of competition policy) and innovation inputs (e.g., STEM education, broadband and other digital infrastructures, and federal support for research). To be sure, a successful national industrial strategy requires the right market conditions and robust innovation inputs, but they don’t ensure robust competitive advantage in key sectors. For that, the nation needs a national industrial strategy that goes beyond these broad innovation and competitiveness measures to focus on specific sectors and technologies.

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Before we examine the “how” let’s look at the “what.” If the nation were to pursue an industrial strategy, what sectors should it focus on? Not all sectors are equal when it comes to competitiveness. An industrial strategy should focus on non-resource-based, technologically advanced traded sectors.

#### **Traded Sectors**

An industrial strategy should focus on globally traded sectors wherein the output could be provided by establishments in other nations. For example, the U.S. military needs medical services in order to field a healthy fighting force, but medical services are provided domestically and are not at risk of being lost to foreign competition. In contrast, drug production is traded, and in theory domestic production could be lost to foreign competition.<sup>34</sup> In other words, the health of a nation’s traded-sector industries such as advanced computing, automobiles, biopharmaceuticals, instruments, machine tools, semiconductors, and software cannot be taken for granted. So, any industrial strategy needs to focus on traded sectors, which include almost all manufacturing activity, information sectors (such as software and Internet firms, and entertainment content such as music, movies, and video games), and natural resource sectors (e.g., farming, mining, fisheries, forestry). Because of the importance of particular critical

materials inputs, such as rare earth minerals and active pharmaceutical ingredients, an industrial strategy should also focus on U.S. capabilities in critical material inputs.

### Advanced Technology Sectors

If competitiveness is defined as thriving in sectors that are either higher value added or critical to national defense, not all traded sectors are important. Some traded sectors, such as call center services and garment production, are not technologically sophisticated and play little role in supporting the defense industrial base. Moreover, if the United States lost all capacity in such sectors, and for some reason later needed to ramp up production, it easily could do so because the production “recipe” and skills for making them are not all that advanced. We see this currently for medical masks for health-care workers. There is a shortage, but it is one that is being solved by ramping up domestic production.

But gaining lost competitiveness in advanced technology sectors is vastly more difficult. As Samuel Hammond wrote, “The loss of America's dominance in precision tooling wasn't inevitable, but now that this dominance is gone, it will be exponentially harder to bring back.”<sup>35</sup> These complex industries usually involve a complex network that has developed over decades; what Pisano and Shih call an “industrial commons.”<sup>36</sup> For example, the U.S. aerospace industry encompasses original equipment makers (such as Boeing), which manufacture some of the most technologically complex products in history; a network of tens of thousands of specialized parts and component suppliers, including advanced jet engine makers; providers of specialized business services; educational institutions producing skilled workers, knowledge, and discoveries; and testing labs, standards, and other innovation infrastructure—all knit together by a complex system of interactions and relationships among the players. Losing a piece of this industrial commons due to global competition has externality costs borne by the whole system, but not factored in when firms make individual decisions. So, even if the competitor nations stopped their subsidies after they took U.S. market share, and the dollar fell significantly, these industries would not naturally return to America.

To remain with the aerospace example: To recreate domestic production, Boeing would have to recreate all the talent that was lost, not just the talent of individual workers, but also the collective knowledge embedded in Boeing and in the entire supply chain of parts suppliers. But many of the resources—e.g., the organizational knowledge embedded in the company—would have vanished. Moreover, the resources embedded in transferable factors of production (e.g., workers' skills, machines, buildings, etc.) may just as easily flow to new activities that are in lower value-added activities that pay lower wages. For example, many of the tens of thousands of Boeing workers who combine their knowledge to produce the world's most advanced passenger jet airplanes could easily end up working in organizations that produce much less value per worker, leading to a lower national standard of living.

Other traded sectors such as biotech-based farming and oil and gas fracking may be more technologically sophisticated but are fundamentally based on U.S. resources and therefore are at little risk of being lost permanently to global competition. For example, as Saudi Arabia and Russia flood the market with low-priced oil, thereby likely shutting down a considerable amount of U.S. production, it will be relatively easy to restart that production later when global prices increase, as they surely will. To be sure, these sectors involve technological competencies, but if

need be, natural-resource owners could hire foreign firms, such as oil drilling or mining companies, to extract and process the resources in America.

This leaves traded, non-resource-based, advanced technology sectors. To be sure, there is no hard and fast definition of what is and is not an advanced technology sector, but generally it is a sector that requires a moderate to significant amount of technological sophistication, including R&D and STEM workers, production engineers, and skilled front-line technicians, to develop and produce output. One working definition of “advanced industries” comes from the Brookings Institution, which comprises 50 industries, including foundries, semiconductors, motor vehicles, and architectural and engineering services.<sup>37</sup> However, only some of these are traded (e.g., semiconductors and motor vehicles), while some are mostly not (e.g., architectural and engineering services).

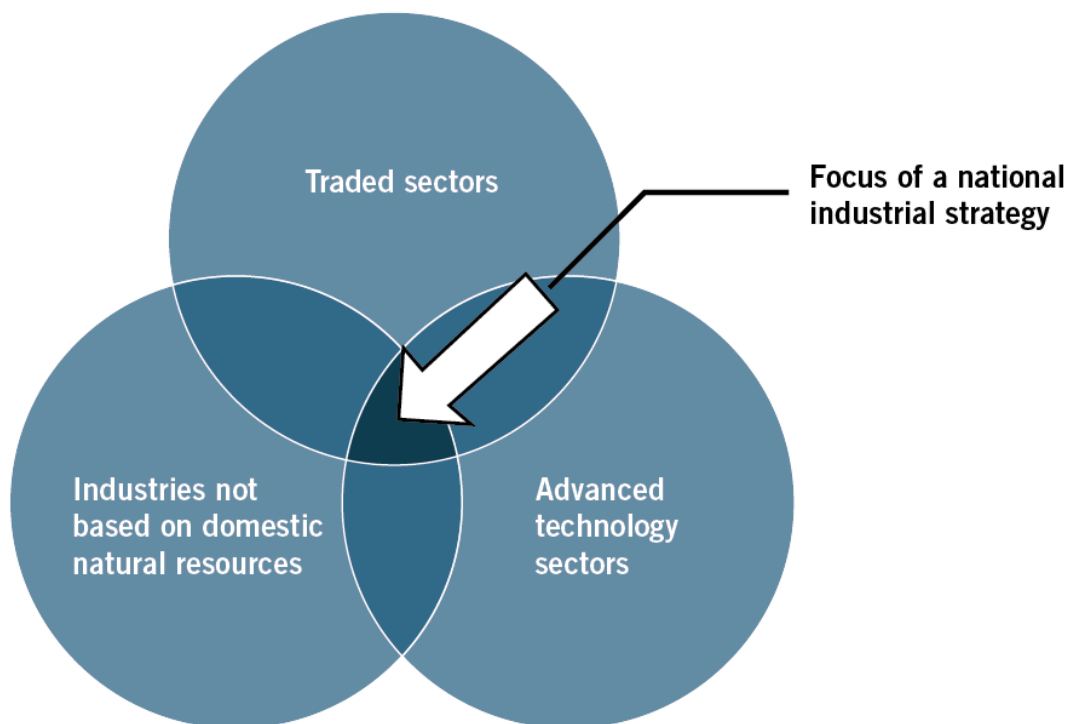
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**Sectors that are traded rather than based on domestic natural resources, and are technologically sophisticated, yield the target for an effective national industrial strategy.**

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Putting these three factors together: Sectors that are traded rather than based on domestic natural resources, and are technologically sophisticated, yield the target for an effective national industrial strategy (see figure 1 and table 2). This would include sectors such as aerospace; semiconductors and computers; transportation equipment; biopharmaceuticals and other chemicals; advanced machinery and automation; software; and instruments.

**Figure 1: National industrial strategy sector targets**



**Table 2: Industrial strategy typology of example industries**

Industry example	Traded?	Natural resource?	Advanced tech?	Potential target of national industrial strategy?
Dry cleaning	No	No	No	No
Engineering services	No	No	Yes	No
Sand and gravel mining	No	Yes	No	No
Recycling facilities	No	Yes	Yes	No
Call centers	Yes	No	No	No
Wastepaper	Yes	Yes	No	No
Oil and gas	Yes	Yes	Yes	No
Semiconductors	Yes	No	Yes	Yes

### Why Markets Acting Alone Are Not Enough to Effectively Address the Challenge

If we take seriously the importance of advanced industry competitiveness, and acknowledge that the United States is facing significant challenges, the next question is what, if anything, should the federal government do? Most conventional economists argue that only the market can respond, and any government action, particularly one focused on key sectors or technologies, is doomed to fail. For many, the only choice is between China’s command-and-control playbook and the market.<sup>38</sup> This is ideological framing of the first order, grounded in neither logic nor research.

Innovation-based industries are subject to a significant number of market failures, including externalities, network failures, system interdependencies, and the public-goods nature of technology platforms.<sup>39</sup> For example, companies investing in research, on average, capture less than half the returns from that research, even with robust intellectual property protection.<sup>40</sup> The other benefits go to consumers and competitors. This means, absent policies such as an R&D tax credit or pre-competitive R&D grants, companies will underinvest in research relative to the level that would maximize economy-wide returns.

Moreover, the divergence between public and private returns from investments in innovation means government are well-positioned to “pick winners.” Consider two technologies: one that provides business with a rate of return (ROR) of 20 percent and no spillovers to society, for a societal ROR of 20 percent; and another that provides business with a 10 percent return and spillovers that generate a societal ROR of 30 percent. Market forces will target capital to the former and business will underinvest in the latter, thereby reducing overall growth.

A second market failure extends to the time dimension. A firm may find it can maximize short-term profits by moving manufacturing overseas or cutting R&D, even if neither is in its long-term interests. As the Business Roundtable reported, “The obsession with short-term results by

investors, asset management firms, and corporate managers collectively leads to the unintended consequences of destroying long-term value, decreasing market efficiency, reducing investment returns, and impeding efforts to strengthen corporate governance.”<sup>41</sup>

Third, most innovation industries are subject to increasing returns to scale in imperfect markets. In these industries, a firm can outcompete its rivals if it gains even a modest advantage in price or performance. That advantage can grow into a massive one if increased market share enables the firm to more effectively boost innovation or efficiency than its rivals. As the term implies, the firm gets increasing returns to scale, because marginal costs go down and innovation goes up. As Michael Lind noted, “What is true of firms is also true of the nations in which the firms are based. In theory, a single country or trade bloc can monopolize all of the manufacturing in a particular industry.”<sup>42</sup> China could make all of the world’s telecom equipment; Europe could make all the commercial jets; and Korea and Taiwan could make all the semiconductors. Once achieved, such success is hard to challenge, especially if the competing nation is starting from a low base and is unwilling to institute an industrial strategy. And when a growing number of nations, especially China, are engaged in “innovation mercantilist” policies and practices, leaving it to the market runs the real risk of the United States specializing in low-value-added, commodity-based production. This is why, as Joe Studwell described in his book *How Asia Works*, the only way “Asian Tigers” such as Taiwan and South Korea could move up the industrial value chain was for them to embrace national industrial strategies.<sup>43</sup> Given that in some industries the United States is now more like an emerging market in that it has lost core production capabilities in certain areas, it too needs a national industrial strategy if it is to regain at least some of that needed production capability.

A fourth failure is that foreign nations can lead U.S. companies to act against U.S. economic interests. When foreign nations subsidize advanced production or require forced technology transfer or forced localization of production—practices China has mastered—it can and does lead American companies to make decisions that benefit foreign nations, some of them U.S. adversaries, often at the expense of U.S. interests. These decisions are made easier by the lack of support the U.S. government gives to its own corporations fighting in global markets.

Finally, national security is another long-recognized justification for a governmental role, and national competitiveness in many sectors is now increasingly tied to defense capabilities.

There is an additional reason for a national industrial strategy, and that is the national interest is not simply about maximizing economic returns, either for firms or the overall economy. The interests of firms and well-functioning markets can and do differ from the interests of the nation state in at least three key areas. The first is competitiveness in advanced technology products. Firms facing considerable risks and possibly low rates of return, at least in the interim, may choose not to “slug it out” in advanced technology segments, and instead simply cede production to firms in other nations and focus on other activities, such as providing business services or IP licensing. While such behavior may be rational for firms, especially those pressured to maximize short-term value, it can be harmful to the national interest.

Second, the widespread geographic distribution of advanced technology production is critical to ensuring widespread economic opportunity for more Americans.<sup>44</sup> Most advanced technology activities naturally cluster in already successful places—think information technology (IT) in Silicon Valley, or biopharma in Boston.<sup>45</sup> When successful technology firms decide where to



locate production, they often choose existing hubs, thereby reinforcing spatial divergence, leading to overcrowding in some areas and reduced economic opportunity in many others. This is why some policymakers are working to bring more advanced technology jobs to more places, such as U.K. Prime Minister Boris Johnson’s “one-nationism” vision.<sup>46</sup>

Finally, many firms, especially those with the ready availability of low-wage immigrant labor, a low minimum wage, and equity market constraints on capital investment, choose to compete on the basis of low wages rather than high productivity. Why risk investing in expensive equipment and training workers when a firm can just hire low-wage workers? Yet economies can be in perfect neoclassical equilibrium at either a high level of innovation and high skills or in a low level of innovation and low skills.<sup>47</sup> It is clearly in the interest of society for firms to organize work in the former way.

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**There is no inherent reason why firms acting on their own and driven by the logic of “market forces” will achieve these three national goals, especially in the face of robust and often unfair foreign industrial policies.**

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There is no inherent reason why firms acting on their own and driven by the logic of “market forces” will achieve these three national goals, especially in the face of robust and often unfair foreign industrial policies. So when market failures are low and the alignment between business actions and national priorities are high, there is perhaps a stronger case for relying solely on generic economic policies (e.g., strong macroeconomic management, good K-12 education, IP rights, etc.). But when it comes to advanced industries, market failures are not low, and the alignment between business and government is not necessarily high. This suggests, absent a national industrial strategy, the interests of firms, at least firms in globally traded markets, will often not fully align with the interests of the United States. Indeed, it is often only by chance that market forces and private investment decisions effectively address these three challenges.

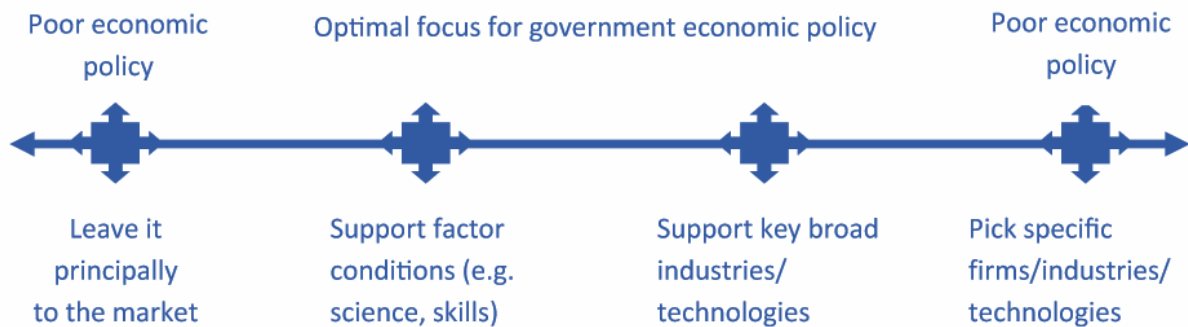
As such, the widespread belief that the U.S. recipe of free markets, property rights, and entrepreneurial spirit is enough to guarantee U.S. success—and the only valid recipe for innovation success—is ahistorical and naïve. These never the only—or even principal—ingredients in the U.S. competitiveness recipe; robust government funding of R&D, tax incentives, defense technology initiatives, and other policies have played a key role. But other nations, especially the Asian Tigers and China, have made it clear the U.S. recipe is not the only valid one for producing prosperity.

### **What a National Industrial Strategy Is and Is Not**

As previously noted, there is considerable confusion about what the term “industrial strategy” actually means. It is useful to envision a continuum of government-market engagement, increasing from left to right in four steps, from (1) a “laissez-faire, leave it to the market” approach to (2) “supporting factor conditions for innovation” to (3) “supporting key broad technologies/industries” to (4) “picking specific technologies/firms” (see figure 2). The debate is usually framed in terms of two choices: leave economic growth principally to the market, or engage in heavy-handed policies to pick specific technologies and firms, sometimes with state-owned enterprises.



**Figure 2: The continuum of industrial strategy**



The choice, however, should not be between these two extremes. Governments support advanced technology sector competitiveness best by supporting factor conditions (including tax policy designed to encourage innovation, and incentives to spur institutional innovations such as better technology transfer from universities) while also supporting potentially breakthrough technologies and critically important advanced technology industries. Governments usually should not, however, pick specific firms as national champions (unless the firm is the only player in a critical industry) or narrow technologies to support (e.g., lithium-ion batteries), in large part because of the risk of picking the wrong firms or specific technologies.

### **The Outlines of a National Advanced Industry Competitiveness Strategy**

There are two critical aspects of a U.S. industrial strategy: the institutional capabilities to analyze U.S. competitive capabilities in key sectors, and designing and implementing programs and substantive policies (e.g., funding programs, tax incentives, etc.).

#### **Institutional Capabilities**

Federal competitiveness policies should be guided by data and analyses. Unfortunately, the federal government no longer possesses the capabilities to effectively craft an industrial strategy, particularly sector- and technology-based policies. In part, this is because no federal entity is responsible for competitiveness analysis. Statistical agencies see their job as being to accumulate facts, not analyze them. Treasury, the Federal Reserve Bank, and other financial agencies are focused on the business cycle and finance, not competitiveness. The Defense Department has capabilities but they are mostly limited to the defense industrial base. As a result, the federal government lacks a sophisticated understanding of where the United States is and is not competitive globally in advanced industries and technologies.

To remedy this, **Congress should task the administration with creating a national advanced industry strategy, as proposed by Senators Coons (D-DE), Merkley (D-OR), Rubio (R-FL), and Young (R-IN).**<sup>48</sup> In addition, the White House should create a national industrial intelligence unit within the National Intelligence Council to better assess competitive challenges to the U.S. economy and coordinate responses across government. At the same time, Congress should charge the director of national intelligence to ensure the focus on Chinese economic competition and strategy becomes a higher priority within the intelligence community.

**Congress should also establish an advanced, traded-sector unit that prioritizes interpretation and analysis.**<sup>49</sup> That unit might be best housed within the National Institute of Standards and Technology within the U.S. Department of Commerce, and it would lead an interagency process including, within the Department of Commerce, the Bureau of Industry and Security and the Economics and Statistics Administration; and, outside of DOC, the International Trade Administration, the Bureau of Labor Statistics, and relevant parts of DOD focused on the defense industrial base. This unit should also generate an array of specific, sector-based strategic assessments based on understanding global industry structure and performance, and how the United States fares (including identifying key U.S. establishments, such as final producers and suppliers, and global-market-share trends), as well as understanding product/market segments and key internal competitive elements (e.g., cost structure, product attributes, flexibility, speed to market, and innovation) and external factors (e.g., R&D and training institutions, financial capital systems, and trade/professional organizations). To be effective, this unit should develop deep specialized expertise in the key industries and technologies America must be competitive in. It should also be involved with decisions to accept or block Chinese investment in the United States (through the Committee on Foreign Investment in the United States [CFIUS] process) and in decisions to impose export controls through the Bureau of Industry and Security. This capability should be supplemented by assessments of key competitiveness foundations, such as workforce skills, capital markets (including pressures toward investment short-termism), physical infrastructure, and the technology innovation and commercialization system. It should also establish a process whereby industry can inform it of the most important technical challenges industry faces as it relates to supporting critical industry and technology competitiveness. It should also work closely with the International Trade Commission's Office of Industries, which historically has done sophisticated industry analysis. Congress also should increase funding for this office.

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**Unfortunately, the federal government no longer possesses the capabilities to effectively craft an industrial strategy, particularly sector- and technology-based policies.**

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The unit should also, in partnership with other agencies—especially DOD—and industry, academic, and other experts, identify key sectors the United States cannot afford to lose competitiveness in, such as aerospace, biopharmaceuticals, instruments, semiconductors, and software, and identify key strategic initiatives to maintain competitiveness in each. And it should go beyond that to identify critical firms the United States cannot afford to lose. These “too-critical-to-fail” companies would clearly include many large U.S. technology firms producing critical technologies, but also smaller and mid-sized companies making unique and specialized technologies. However, if such a list were in place in the 2000s, the federal government might not have been so blasé about the preventable loss of North American telecom equipment providers Lucent and Nortel. Now the federal government is scrambling to consider how the United States can live in a world dominated by Chinese telecom equipment makers. In order to not send the wrong message to firms and the market, and so as to encourage excessive risk taking—since the company and investors might know the government would help out—this list should be classified.

This unit should also make a comprehensive analysis of the competitiveness strategies of peer and competitor nations used to support those nations' own advanced technology industries.<sup>50</sup> That analysis should both identify what the United States can learn from those nations' strategies, and to what extent they pose a threat to key U.S. traded-sector industries and how the United States should respond through effective industrial strategy interventions.

Finally, **Congress should establish a modestly sized congressional competitiveness office akin to the Congressional Budget Office (CBO) to evaluate legislative proposals through the lens of the impact on U.S. competitiveness.** Absent that, Congress could task CBO to develop and use that capability when analyzing legislative proposals.

### Substantive Policies

It is beyond the scope of this report to lay out a detailed roadmap for a national industrial strategy, although prior ITIF reports have proposed multiple actions.<sup>51</sup> There are, however, an array of policies that can constitute an advanced industry competitiveness strategy.

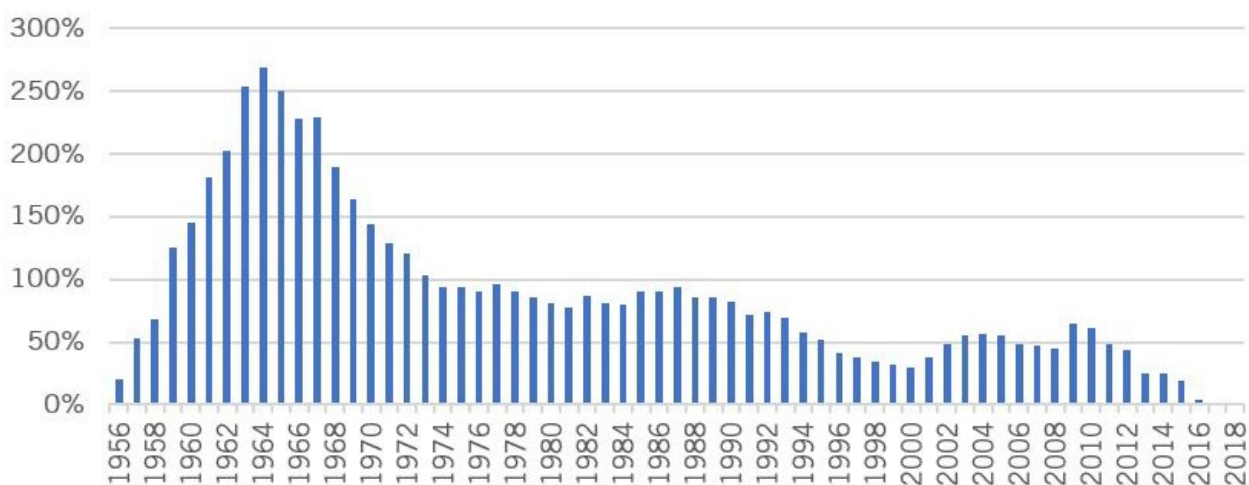
The key to any industrial strategy is to enable U.S. advanced industry production to gain—or at least maintain—global market share while continuing to innovate in process, product, and business models. The challenge is to balance the need to achieve national goals with the flexibility and innovation the private sector can provide. In this sense, neither laissez faire nor state ownership or control is the right approach. As noted, a laissez faire approach might produce the right results, but given the presence of significant market failures, differences between national goals and private interests, and aggressive, often destructive foreign industrial strategies, it is likely to not. In contrast, while government ownership—whether of 5G networks or other key technologies—or heavy-handed regulation would reduce the disjuncture between business and national interests, they would come with stultifying rigidities that would preclude competitive advantage.<sup>52</sup> So too would the current popularity of the “antimonopoly” movement, which holds that breaking up large companies into smaller ones would somehow spur innovation and competitiveness. Such an approach would only make it harder for U.S. firms to compete against large foreign competitors, many of which are generously backed by their states.

As such, substantive policies should be focused on encouraging and enabling companies in America (including the largest corporations and foreign companies from allied nations with significant investments in the U.S. economy) to boost their competitive position, particularly through increased U.S. domestic production.

There are a host of areas that could benefit from the right federal action, such as increasing the STEM workforce and ensuring regulations (such as privacy rules) don't limit innovation. More strategic trade policies, both to expand foreign market access and push back against foreign mercantilism, are also needed. But all too often the debate ends there: If we just had better generic innovation policies and more trade agreements, problem solved. But the reality is neither are enough to effectively address the challenge. Policymakers need to implement a national industrial strategy that is focused explicitly on spurring competitiveness of specific advanced technology traded sectors. This should include action in a number of areas.

**Significantly expand federal support for research related to key technologies, and target it to spur commercialization of technology in the United States.** Federal R&D has not kept up with GDP growth, and as a result is lower as a share of GDP than prior to Sputnik. To match the levels of the 1980s, funding would need to increase by over 80 percent, or about \$100 billion per year (see figure 3). But simply giving this money to federal labs and research universities would not be enough. The investments should be guided by a national advanced industry strategy, while funded in ways that support the right phase of the research.<sup>53</sup> If most of the money went to basic research, as opposed to applied or early-stage development, a significant share of the benefits would flow to competitors that can benefit just as well from scientific-journal articles and academic conferences as American researchers and companies can. Moreover, support should be linked to expectations, incentives, and requirements for commercialization and production domestically, regardless of where the company is headquartered.<sup>54</sup> This means, among other things, investing in agencies and programs such as DARPA and Advanced Research Projects Agency–Energy (ARPA-E), National Science Foundation’s (NSF) Industry/University Cooperative Research Centers program, and the Manufacturing USA network. In particular, the Manufacturing USA network should be expanded from 15 institutes to closer to 45. Congress should also increase funding for the Semiconductor Technology Advanced Research Network (STARnet)—which is a collaboration of universities providing exploratory research on semiconductor system and design technology—as well as establish at least 10 to 15 similar networks for other industries.

**Figure 3: Increase in federal R&D spending need to match past R&D/GDP levels**



It also means reinvigorating national labs as better engines of technology development and commercialization, as well as establishing new labs or repurposing existing ones to be oriented to commercial technology development. In addition, a moderate share of any increased research funding should be targeted to potential technology hubs in the heartland, as well as to support state-government-based advanced industry development programs.<sup>55</sup>

Finally, one reason the United States responded effectively to the Japanese technological challenge of the 1980s and 90s is that U.S. firms embrace software and the rise of the Internet—technologies enabled in large part by the federal government focusing on key missions, including space and defense. This means going forward, major new government missions should

be a big part of any industrial strategy. There are many that could qualify, including space exploration, addressing the aging challenge, cybersecurity, climate change, productivity, and of course, pandemic response.<sup>56</sup>

**Expand tax incentives for investing in the key building blocks of advanced technology production.**

Business investment in R&D, new equipment and software, global standards setting, and workforce training drives advanced industry competitiveness. However, United States has fallen behind other nations in investment in these key building blocks in the last decade. Moreover, unfair Chinese competition in innovation industries has and will continue to negatively impact U.S. business R&D investment, in part as Chinese companies competing unfairly drive down margins for companies in the United States.<sup>57</sup> As such, Congress should create a comprehensive tax credit for business investments made in the United States (by domestic or foreign firms) in these building blocks. This would mean a tax credit of 45 percent of business investments on R&D, front-line worker skills training, and expenditures for global standards activities and a 25 percent credit on new equipment and software. (Given the importance of the United States reducing the influence of China in the global technology standards setting process, there need to be tax incentives for companies to more actively participate in global standards processes.) This credit should be modeled on the current Alternative Simplified R&D Credit, but with expenditures in excess of 75 percent of base period expenditures (rather than the current 50 percent level) qualifying for the credit.

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**Establish a vehicle to support domestic investment in advanced technology industries.** It is not enough to support R&D; the nation also needs to ensure domestic production in advanced technology industries. As Intel's Andy Grove once noted, while the United States excels at inventing new technologies (e.g., microprocessors, solar cells, electric batteries, etc.), in many cases it has been less successful in scaling production of these technologies and capturing high levels of global market share.<sup>58</sup>

A principal reason is that in a number of industries the costs of establishing new production in the United States are much higher, in many cases because of labor costs. But in certain extremely capital-intensive factories, labor costs are less of a factor than capital costs and incentives. For example, the costs of building a semiconductor fab (a fabrication facility to produce chips) are in the range of multiple billions of dollars, and many foreign governments offer major investment incentives for building a fab. Absent meaningful financial incentives, it is unlikely companies will build significant fabs in the United States going forward.<sup>59</sup>

To address this, Congress should consider a number of steps. It should **repurpose the Small Business Administration financing programs to be more targeted to industrial strategy goals, as Senator Rubio has proposed.**<sup>60</sup> **Congress should provide funding for the proposed venture capital fund of DOD's Defense Innovation Unit.**<sup>61</sup> **It should provide tax incentives for the creation of private-sector industrial investment banks.** Or could create an EXIM-like bank to support domestic investment, perhaps modeled on KfW, a German government-owned development bank.<sup>62</sup> **Congress should**

**also create an industrial retention and recruitment fund—matched by state governments—to provide incentives for investments in production facilities in key industries and technologies in the United States.** For example, other nations have programs—such as Singapore’s Economic Development Board and the Irish Development Authority—that provide incentives to attract key forms of industrial activity to their borders. **Congress should significantly expand DOD’s loan and loan guarantee authority in Title 3 of the Defense Authorization Act.** Finally, **Congress should establish a reshoring incentive fund to provide financial support for firms in critical industries to relocate production now in China to the United States.** This could be modeled after a similar program recently introduced by Japan.

**Incorporate a competitiveness screen in regulatory activities, including antitrust.** Many governmental regulatory activities affect competitiveness, including consumer protection rules (e.g., privacy regulations), antitrust enforcement and review, rules governing foreign commercial practices, environmental regulations, and others. For the most part, regulators give little attention to competitiveness issues when considering adopting or implementing regulations. For example, antitrust review is often blind to the competitiveness implications of decisions, as was the case when the Federal Trade Commission made semiconductor maker NXP divest its radio-frequency power business as a condition of its \$11.8 billion acquisition of U.S.-based Freescale Semiconductor Ltd, which allowed Chinese competitors to acquire the business and gain key technological advantage.

This is not a call for a deregulatory agenda. There are cases wherein regulation protects companies from taking short-sighted actions that harm not only society but their own long-term prospects. However, regulation should be designed to accomplish regulatory goals in ways that limit harms to competitiveness.

As such, **Congress should require the Office of Management and Budget’s Office of Information and Regulatory Affairs (OIRA) to incorporate a “competitiveness screen” in its review of federal regulations.** OIRA should review any new, nontrivial regulations to assess their impact on first-order competitiveness, and place the highest priority on reviewing and reforming existing regulations that negatively affect traded sectors. For example, environmental regulations affecting sectors such as the semiconductor or aerospace industry (e.g., supersonic flight) should be reviewed to determine their impact on domestic-sector competitiveness, and whether regulations can be designed in ways to limit that impact. Moreover, **the national competitiveness unit should conduct reviews of key sectors to determine how regulation can be redesigned to better support competitiveness while also achieving public goals and should work with other agencies, such as the Environmental Protection Agency and DOJ’s Antitrust Division, to help them better understand the implications of their actions on competitiveness.**

Finally, all of these programs should, wherever possible, be aligned with our allies. Given the complexity of the existing and emerging technology system, even an economy as large as that of the United States cannot hope to be a global leader in all key technologies. But it can hope that, collectively, America and its allies are leaders. In this sense, the United States needs not just a national industrial strategy, but an allied industrial strategy to ensure, as a group, allied, democratic nations have the ability to produce innovative products at competitive prices in a set of key areas. To start with, **the U.S. government should seek to establish a joint U.S.-EU-Japan Technology Alliance.** Such an alliance would be especially important to help convince European



policymakers that any talk of “digital sovereignty” should not be focused on the United States, but rather on China.

## Responding to Arguments Against

As more voices have called for a national industrial strategy—in part based around the concept that a nation’s economic policies should promote its economic welfare as opposed to global economic efficiency—holders of the “Washington consensus” view have become more alarmed, lashing out against these new ideas with a host of arguments as to why an industrial strategy is not warranted. The following are six common arguments, and responses to them.

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**Holders of the “Washington consensus” view have become more alarmed, lashing out against these new ideas with a host of arguments as to why an industrial strategy is not warranted.**

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**Claim: The United States doesn’t need an industrial strategy in response to China. After all, it didn’t have one in response to Japan.** Given that in conventional economic cannon, industrial strategies not only don’t work but make economies worse, most conventional economists dismiss Japan’s industrial strategies of the 1980s and 1990s, and argue the U.S. economy did just fine in response. Therefore, the same should play out in response to the China challenge. But this ignores that fact that the United States did respond to the economic challenge of Japan with a slew of effectively industrial policies, including the R&D tax credit, the Small Business Innovation Research program, the repurposing of NIST, new industrially-oriented programs at NSF, Sematech, and many more. These and other policies helped the United States successfully compete against Japan. Moreover, today’s challenge from China is significantly greater than it was from Japan in part because China is much larger and is not an ally the federal government can successfully pressure to limit its mercantilist activities.

**Claim: A national industrial strategy will erode the gains from specialization and free trade.** Some scholars and pundits worry that “techno-nationalism” (a pejorative term for national industrial strategies) will erode the gains from trade.<sup>63</sup> The concept is if major nations each try to be largely self-sufficient in most advanced industries, it would reduce the gains from trade. To be sure, taken to an extreme—no imports or exports of such goods—global economic welfare would be diminished. But this fear is faulty on a number of bases. First, there are three main sources of economic efficiency: allocative, productive, and dynamic. By distorting where things are produced, a national industrial strategy might harm allocative efficiency (the United States might produce too much of one good and too little of another), but it would likely boost productive efficiency (productivity) and dynamic efficiency (innovation). Second, many nations and regions have long practiced techno-nationalism because they see it in their economic or national security interests to do so. For example, without massive EU subsidies to Airbus, while there would still be two major airline manufacturers globally, they would both be American firms (Boeing and McDonnell Douglas). And today, China has engaged in a level of techno-nationalism that is unprecedented in world history and clearly has harmed global innovation.<sup>64</sup> Absent successfully pressuring China to abandon this goal—something that is likely not possible to achieve—telling the federal government not to put in place national industrial strategies would mean sending its firms into economic combat with one arm tied behind their back. The key is for the allies to coordinate their strategies and recognize that their economic adversary is China, not each other.

**Claim: Government can't pick industries of the future.** As Samuel Gregg of the free-market Acton Institute wrote, “No one knows what technological innovation or entrepreneurial insight will upend the present economic landscape in America—or any other country. Nor can such developments be anticipated by economic nationalist policies.”<sup>65</sup> There are at least three things wrong with this view. First, federal investments over the past three-quarters of a century—particularly, but not exclusively, through DOD—have supported U.S. technology innovation in such sectors as aviation, space, nuclear power, computing, the Internet, farming technologies, and biotechnologies.<sup>66</sup> Second, because for many—if not most—advanced industries and technologies the societal rate of return is greater than the private-sector return, leaving it only up to the private sector would mean economic underperformance. Third, it is simply not very hard to correctly identify the most important technologies of the future America must be a leader in, as a review of business consulting reports, think-tank reports, and government commissions yields a strongly overlapping list of technologies such as genomics, nano-technology, AI, energy storage, quantum computing, semiconductors, aerospace, robotics, and autonomous systems. To be sure, it is difficult for government to determine exactly what specific types of technology or firms will succeed, and this is why governments should make a large array of investments.

**Claim: Targeting industries distorts the search for natural comparative advantage.** Neoclassical economists and their followers persist in believing in comparative advantage: the notion that there are things a country is preordained to be good at producing. But this 19th century concept emerged when economies mostly traded in natural resources and related products, which were in fact discovered, not created. A country might have wanted to specialize in steel, but if it didn't have coal and iron ore deposits, it couldn't. Unfortunately, while this concept has morphed into a “law,” economies have evolved. Now, in a world of advanced industries, comparative advantage is not discovered, it is made.<sup>67</sup> There is no reason a particular nation should have comparative advantage in industries such as AI or robotics. Assuming a skilled engineering and science base, that advantage can be created. Moreover, as Oren Cass noted, given most nations are working to generate comparative advantage in advanced industries, if the United States does not, it will be left with industries no one else wants, such as wastepaper—a key U.S. export.<sup>68</sup>

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**It is the lack of a well-designed national industrial strategy that poses the biggest risk of harmful economic policies.**

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**Claim: Even if we need an industrial strategy, it will devolve into protectionist industrial policy and crony capitalism.** Many point to some of the most problematic responses from the Trump administration, and argue that it is what an industrial strategy must be. Acknowledging that the United States need an industrial strategy does not, however, dictate how such a strategy should be implemented. One response might be to nationalize major industries and break up the rest, as some on the left might call for. Another might be to impose protective tariffs, as the Trump administration has done on steel and aluminum. Still another might be to provide massive subsidies to firms that give big donations to members of Congress. To be sure, there are a number of ways an industrial strategy could be poorly implemented. But that does not mean it will be. America has a long and distinguished history of doing this well, as programs such as DARPA, ARPA-E, NIST, EXIM Bank, and others have clearly demonstrated. If free-market advocates are worried about poor implementation, they should focus their efforts on ensuring legislation is designed properly, and that there is adequate oversight of administrative action.



Finally, it is in fact the lack of a well-designed national industrial strategy that poses the biggest risk of harmful economic policies. If the United States does not adequately back advanced industries, the political support for poor policies such as tariffs and aggressive antitrust enforcement will go up significantly as people struggle for solutions, as bad as they might be.

**Claim: We don't need a national industrial strategy to support the national defense industrial base.**

**Government can just buy defense goods.** When confronted with the argument that the United States needs a national industrial strategy to ensure a robust and vital defense industrial base, some free-market advocates respond that the government should simply spend more on defense goods. While this view that a strong defense base depends only a handful of defense firms has never made sense, it had somewhat more credibility a half a century ago when DOD was the major investor in and buyer of advanced technology products. This was an era when people spoke of “defense spin-off” wherein defense technologies powered private-sector innovation. While this was in large part the story of the semiconductor industry in the 1950s and early 1960s, it is much less true today. DOD is simply not big enough to be able to drive all the innovation and production it needs. This is why it created initiatives such as the Defense Innovation Unit, a group whose mission is to “accelerate commercial technology for national security,” and why it supports many of the Manufacturing USA centers. The harsh reality is if the United States loses even more advanced industry capabilities, the only way for DOD to assure domestic sources would be for Congress to appropriate hundreds of billions more annually for defense spending—to subsidize, for example, specialized semiconductor fabs. And even then, success would be far from assured because of the limits on innovation and economies of scale.

## CONCLUSION

The United States continues to have strengths in technology-based traded sectors, but much of those strengths stem from legacy conditions that no longer exist or are weakened; including the world's largest market, significant amounts of federal support as a lead customer (e.g. DOD) and funder of R&D, and a top attraction for the world's best talent. Moreover, while the United States engaged in cold war conflict with the Soviet Union, the latter was never an economic adversary, in large part because of inept economic policies and stifling economic organization. The same cannot be said of China, which is an adversary on both the national security and economic competitiveness fronts.

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**The only hope for ensuring the United States continues to lead in advanced technology industries is for Congress and the administration to embrace, develop, and effectively implement a robust industrial strategy that focuses on technologically advanced traded-sector industries.**

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With the efforts of the Trump administration in the last several years to press China to play more by the rules of the global trading system, some argue the United States does not need an industrial strategy. Rather, it would suffice to pressure China to roll back its innovation mercantilist practices, or, in the absence of that to try to kill its firms with export controls (which is unlikely to work) or erect a high tariff wall. But as much as the United States should work—especially in concert with our allies—to press China on its innovation mercantilist practices, a realistic assessment suggests pessimism is warranted.<sup>69</sup> Moreover, even if real progress were

forthcoming, China would still continue to progress its advanced technology capabilities, challenging U.S. leadership.

As such, the only hope for ensuring the United States continues to lead in advanced technology industries is for Congress and the administration to embrace, develop, and effectively implement a robust industrial strategy that focuses on technologically advanced traded-sector industries. The alternative would be a steady erosion of the country's competitive position—akin to the path the United Kingdom took in the 1960s and 1970s—and an emboldening of populist forces who claim protectionism and anti-corporate policies are the only way to preserve key economic capabilities.

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## About ITIF

The Information Technology and Innovation Foundation (ITIF) is a nonprofit, nonpartisan research and educational institute focusing on the intersection of technological innovation and public policy. Recognized as the world's leading science and technology think tank, ITIF's mission is to formulate and promote policy solutions that accelerate innovation and boost productivity to spur growth, opportunity, and progress.

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## ENDNOTES

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technology strategy to offset Russian advantage in numbers with a technology advantage, and pushed DOD toward much stronger def. tech efforts. This led directly to the “revolution in military affairs” and stealth, drones, precision strikes, and a host of dual-use technologies (see Bonvillian/Darpa book pp. 343–352).

Because increased competitive threats from Japan and Europe continued unabated, the Reagan administration also sought to identify policy tools to help boost U.S. competitiveness, especially through technological innovation. Toward that end, they supported a number of key initiatives. One was the passage of legislation in 1981 establishing a tax credit for business R&D expenditures. The administration also supported the establishment of the Small Business Innovation Research Program in 1982, and in 1984, the passage of the Cooperative Research and Development Act. In addition, the Reagan administration established a Commission on Industrial Competitiveness. Chaired by John Young, CEO of Silicon Valley company Hewlett Packard, the commission highlighted how the United States had lost its international competitive position and how innovation was a key to regaining it.

As a result of this attention, Congress passed a number of important laws, including the Federal Technology Transfer Act of 1986, National Defense Authorization Act for FY 1991, the Technology Transfer Improvements and Advancement Act, and the Technology Transfer Commercialization Act. Perhaps most important was the Omnibus Trade and Competitiveness Act of 1988. Among other things, the act created the Technology Administration in the Department of Commerce, reorganized the National Bureau of Standards into the National Institute of Standards and Technology, and created a number of programs to help industry with innovation, including the Malcolm Baldrige Quality Award, the Advanced Technology Program, and the Boehlert-Rockefeller State Technology Extension Program. At the same time, the former Congressional Office of Technology Assessment provided Congress with competitiveness analyses, including in a variety of industries, such as steel and electronics.

By the time Bill Clinton was elected in 1992, the nation’s competitiveness challenge appeared to be receding. Nevertheless, the Clinton administration took some steps to explicitly foster competitiveness. The administration supported some innovation-based competitiveness policies, including increasing funding for federal science agencies, such as NSF and the National Institutes of Health, and supported specific industrial technology programs at NIST, including the Manufacturing Extension Partnership and the Advanced Technology Program (a program to provide grants to companies to help them develop new technologies).

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