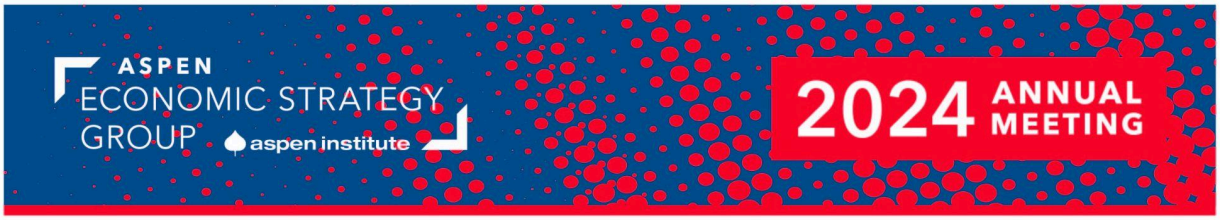

Reading Materials

Unless otherwise noted, these papers were commissioned for the Aspen Economic Strategy Group 2024 annual meeting. They will be published and circulated publicly in the fall; until then, we request that you do not cite or circulate them without permission.

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Strengthening America's Economic Dynamism

JULY 2024

AUTHORS

Melissa S. Kearney* **and Luke Pardue****

Global tensions and domestic discontent are driving a new era of economic policymaking. Leaders in both parties are turning away from free-market principles and endorsing an increase in protectionist trade policies and more active government-directed industrial policy. Further, these disruptions come at a time when the country's economic and political landscapes face systemic difficulties including mounting federal debt, diminished state capacity, and low trust in public institutions. The 2024 meeting of the Aspen Economic Strategy Group (AESG) will consider these topics and others, with a focus on strengthening America's economic dynamism. The immediate economic outlook for the US is generally positive. Following a period of high inflation and a historically tight labor market, economic policymakers have largely been able to navigate an economic cooldown without triggering a recession. Over the first half of 2024, the pace of employment growth has slowed but remains strong, and inflation is falling, though it is still above the Federal Reserve's target, even as warning signs are evident in the form of rising unemployment and slower consumer spending.[1]

However, geopolitical tensions with China, ongoing conflicts in Ukraine and Gaza, and a highly divisive presidential campaign in which both leading party candidates are mutually disliked by a quarter of Americans[2] have added to the country's political and economic uncertainty. The sense of national division and uncertainty are heightened by the horrific assassination attempt on

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[1] Nonfarm employment growth has fallen from a monthly average of 267,000 over the first quarter of 2024 to 177,000 in the second quarter, and the core Consumer Price Index has fallen from 3.9 percent in January to 3 percent in June (BLS 2024a; BLS 2024c). But the unemployment rate has risen from 3.7 percent in January to 4.1 percent in June, and personal consumptions expenditures have slowed from an average of 6.1 percent growth in 2023 to 4.9 percent over the first half of 2024 (BLS 2024c; BEA 2024).

[2] Per a Pew Research Center survey of 8,638 adults conducted May 13–19, 2024 (see Gracia and Copeland 2024).

President Trump and, as of the time of writing, calls from within the Democratic party for President Biden to step aside. One thing that seems fairly certain, however, is that whatever the outcome of the upcoming elections, the US appears poised to continue moving toward protectionist and nationalist economic policies. This movement has the potential to hinder economic growth and dynamism if not pursued wisely and cautiously.

Economic liberalization over the past two decades drove rising standards of living in the US and lifted millions around the globe out of poverty. But this transition also brought pain to certain workers and communities, fueling a bipartisan reaction against this decades-long consensus. In a 2022 speech, President Trump's US Trade Representative Robert Lighthizer noted that in the years since trade liberalization in the 1990s "we lost millions of good jobs and saw tens of thousands of factories close," driving "the stagnation of wages," and "economic division" across the country (Lighthizer 2022). President Biden's National Security Advisor Jake Sullivan, painted a similar picture in 2023 remarks at the Brookings Institution, noting that a "shifting global economy left many working Americans and their communities behind" (Sullivan 2023).

At the same time, national security concerns due to rising tensions with China have led to an increased focus on the need for US industrial and technical capacity. Disruptions to global supply chains during the COVID-19 pandemic have similarly thrust into light the perceived need for more domestic production. The convergence of economic and foreign policy concerns has fueled the view that we need a "new Washington consensus," as Sullivan put it—or a "New American System," in Lighthizer's words. "This strategy will," Sullivan says, "build a fairer, more durable global economic order." Manifestations of this new approach can be seen in policies enacted as China seeks to build a dominant role in sectors including clean energy and semiconductor manufacturing. The US has sought to restore its manufacturing capacity in these industries through high tariffs on Chinese electric vehicles, along with billions in semiconductor manufacturing incentives in the CHIPS and Science Act and electric battery production subsidies in the Inflation Reduction Act.

Is this march toward a new paradigm of economic policymaking justified and well-founded, or is it an overcorrection against the market-based principles that have generated decades of growth? More specifically, when is state-driven industrial policy likely to bolster innovation and improve economic outcomes, and when is it likely to hinder private-sector investment or be captured by political interests? When are national security concerns an appropriate justification for state-directed business activity and restricted trade? Are price-raising tariffs a reasonable response to trade-induced job loss, or can we commit to more effective ways of promoting widespread employment and higher wages? These and other related questions need serious consideration as our nation aims to chart an economic policy path forward that advances economic growth and shared prosperity.

A related challenge the nation faces is the skyrocketing federal debt. In 2024, the United States is set to run a deficit of 7 percent of GDP, the largest share it has ever known outside World War II, the global financial crisis, and the COVID-19 pandemic (CBO 2024). This debt burden is already crowding out spending on important investments in future prosperity and safety: the federal government now spends similar sums on interest payments on the debt and all federal spending on children, and by 2025 the federal government will spend more on interest payments than on all defense spending (CBO 2024; Kearney and Pardue 2023). Although it is hard to tell exactly when a debt crisis might unfold, the unsustainable path of the US debt represents a serious threat to our nation's economic security.

With the funds Congress has appropriated, the federal government today has a diminished capacity to achieve its goals, particularly when it comes to building the infrastructure necessary for industrial independence and clean energy production. The average time to prepare an environmental impact statement, a necessary step to permit large projects such as new semiconductor facilities, has risen from an average of 3.4 years in the 1990s to 4.8 years recently (Liscow 2024). Moreover, in contrast to historical projects like the construction of the interstate highways, little federal coordination or long-term planning exists across agencies or levels of governments—a need particularly glaring for renewable energy production, which requires long transmission lines that cross several states.

Of course, any consideration of US economic dynamism today must contend with the opportunities and challenges posed by new advances in artificial intelligence. AI yields the potential to fundamentally reshape the US economy, reducing employers' demand for certain skills and dramatically raising the need for others, across white- and blue-collar jobs alike. Experts have compared the scope of this impending change to that experienced after the introduction of electricity and the internal combustion engine (Brynjolfsson, Rock, and Syverson 2021). Our country needs to make investments to be prepared for the transformations that are likely to occur. For instance, the demands for new energy sources are growing exponentially amid these accelerating AI developments (Sisson 2024). In addition, equipping a workforce with the skills to thrive amid the changing technological landscape will require educational investments from early childhood through adulthood.

Building a consensus around economic policy goals and approaches, improving government capacity, and preparing the workforce for transformational change are all made harder by the deterioration of the American public's trust in our nation's institution, including the federal government, the media, and universities. Restoring this trust and engaging in bipartisan, evidence-based, forward-looking policymaking will be critical to the goal of strengthening US economic dynamism. These themes will carry through all sessions of the AESG 2024 annual meeting.

1. Industrial policy

Session I will consider the recent efforts to advance America's domestic manufacturing capacity, including semiconductor and clean energy manufacturing.[3]

The CHIPS and Science Act and Inflation Reduction Act (IRA) are both large-scale efforts to develop America's onshore production capacity in critical sectors. The CHIPS and Science Act was spurred by pandemic-induced semiconductor shortages, along with rising geopolitical tensions in the region where most chips are produced, leading policymakers to invest billions in the domestic production of this critical technology. The 2022 CHIPS and Science Act included $39 billion in grants and loans, along with $25.4 billion in tax credits, to incentivize semiconductor manufacturers such as Samsung, TSMC, and Intel to locate production facilities in the US.

The IRA is aimed largely at catalyzing the clean energy transition through consumer tax credits (on purchases such as electric vehicles) and incentives intended to develop US manufacturing capacity in critical green-energy sectors such as electric battery production. Goldman Sachs (2023) estimates the cost of the climate provisions in the IRA will reach $1.2 trillion through 2031.

Achieving the aims of these projects will require massive investments in transportation, energy, and manufacturing infrastructure. The US government's capacity to accomplish such tasks is not clear, given the high costs and long timelines that characterize infrastructure construction in the US today. **Zachary Liscow** addresses this topic in his paper for the AESG titled **"State Capacity for Building Infrastructure."** He notes that such low capacity is not inevitable but rather is a result of policy choices that have reduced the size and quality of the government workforce, set up an onerous process that has made the process slow and highly litigious, and left those directing these efforts long-term planning tools or efficient data systems.

Liscow identifies a few key issues that hinder government capacity. First, he observes that neither the wages nor the employment of government workers has kept pace with the private sector. For instance, employment of civil engineers across federal, state, and local governments has remained stagnant since 1997, even as private-sector employment of such engineers has more than doubled in that time. Furthermore, looking at broader measures of pay across the public and private sectors, we find that in the 1960s, there was virtually no difference between groups. By the mid-2010s, the public-private pay differential had risen to 35 percent, and it remains high at 24 percent as of 2022. Second, he points out that the current set of procedures can result in a lengthy and litigious process simply to gain approval for new construction. The

[3] AESG has previously taken up the issue of investing in America's infrastructure; see the 2021 AESG paper by Edward Glaeser and Jim Poterba.

process of environmental review for large projects can now take over four years for approval, and substantially longer if litigation is involved. Third, officials involved in building new infrastructure often lack access to clear data and long-term planning tools that would improve outcomes. Even simply comparing infrastructure costs across states is hampered by low availability and lack of consistency. Long-term planning across states, particularly for energy infrastructure, is also lacking.

Liscow recommends steps to improving each of these three aspects of state capacity: hiring more public employees with pay competitive with the private sector; streamlining the review process to gather public input, while making it harder for litigation to hold up projects; improving the consistency and transparency of infrastructure data systems; and increasing long-term planning, particularly for energy production and transmission.

Beyond the issue of how to effectively achieve the goals undertaken in recent legislation, these efforts raise more fundamental questions of the proper role of policies that advance specific domestic industries within a market-based economy. Proponents argue that such steps are necessary to address concerns including national security and climate change and to boost the country's economic competitiveness. Skeptics contend that these efforts are often misguided and expensive and that they involve counterproductive provisions that result from the political process.

Included in the meeting materials is a piece written by AESG member **Glenn Hubbard** for *National Affairs*, **"Markets for the People,"** in which he characterizes the bipartisan support for recent industrial policies as an overcorrection from the previous consensus that promoted free-market competition. He recognizes that many workers and communities were left behind in the wake of the globalization and rapid technological change of the 1990s and the first decade of the 2000s, but he contends that the answer is not state investment in expensive projects, which in his view often succumb to capture by powerful political and business interests and grow in scale as their missions expand as part of the political process. He advocates instead for investments in building opportunity and competition—through, for instance, worker training and public support for basic research—investments that retain, as he argues, "the enormous benefits of markets and openness while putting people first" (Hubbard 2024).

2. Trade policy

In Session II we will focus on US trade policy, which is closely related to the issue of industrial policy but has its own set of considerations.

President Trump withdrew the US from the Trans-Pacific Partnership Agreement (TPP) in January 2017 and initiated a series of escalating tariffs largely on goods imported from China,

ending with 25 percent tariff rates on a broad set of Chinese imports by 2019 (Bown 2019). The Biden administration has not only kept those tariffs in place, it has raised rates on Chinese electric vehicle imports to 100 percent and boosted tariffs on Chinese steel, aluminum, semiconductor, and green-energy imports (Tankersley and Rappeport 2024).

The AESG has considered the topic of US trade policy previously with a commissioned paper from Chad Bown (2021) that evaluates several factors motivating changes in trade policy, including Chinese noncooperation, new green-energy goals, and concerns around displaced workers. In that paper, Bown proposed ways the Biden administration might improve US trade policy, including strategies for building a "worker-centered" trade policy at home; adjusting unilateral US tariffs on China; solving disputes with allies; working with allies on China-centered issues; and working with allies and China to solve global challenges. In a 2023 paper written for the AESG, Mary Lovely evaluates policy options to build resilience in key global supply chains through (a) "onshoring" capacity in a small number of critical industries, (b) building strong trade ties to allies via "friendshoring," and (c) "derisking" America's economic relationship with China.

AESG member **Michael Strain** takes up the topic of the rising tide against international economic cooperation in his paper **"Protectionism Is Failing and Wrongheaded: An Evaluation of the Post-2017 Shift toward Trade Wars and Industrial Policy."** Strain observes that recent trade measures aimed at boosting domestic manufacturing have been ineffective in achieving their stated aims, but he also questions the premise of such efforts to move more economic activity onshore.

Strain considers the evidence on the employment effects of tariffs enacted under President Trump. (The more recent tariffs from the Biden administration are too recent to examine.) He notes that a growing body of rigorous research finds that the 2018–2019 tariffs enacted by President Trump either did not raise or slightly *reduced* US manufacturing employment. This effect comes as a result of retaliatory tariffs imposed by China on US produces and because US tariffs raised input costs for US producers, as many domestic manufacturers take imported goods as inputs to their own final products.

Moreover, Strain argues, the goals of reducing the trade deficit and boosting US manufacturing employment are themselves misguided. Free trade is not about the number of jobs—and indeed, in the aggregate, should not affect the total level of employment. It is instead about raising productivity, wages, and consumption by allowing any given country to focus on producing the goods and services where it has a comparative advantage—and then to benefit from the resulting gains from trade. Indeed, empirical evidence from the so-called China shock generated by China's ascension to the WTO in 2001 suggests that job losses in the US incurred in sectors

affected by rising Chinese imports were more than offset by job gains due to rising US exports (Feenstra, Ma, and Xu 2019).
Strain acknowledges that other considerations can justify policies that seek to reduce America's dependence on China, notably concerns about national security in critical technology sectors. Such concerns, however, do not immediately justify expensive subsidies to promote domestic industries. Policymakers can build resilience in those sectors by building production networks across US allies.

Finally, Strain acknowledges first that, while trade does not affect the overall level of employment, it will advantage workers in certain sectors (where the US has a comparative advantage or in areas that are complements to imports) and disadvantage others (where US workers are close substitutes for foreign workers). But, in this way, trade acts like other dynamic forces in the economy, raising national income but changing the composition of jobs in the labor market. Escalated tariffs and other protectionist measures are not the appropriate response to such developments, however. Instead, policymakers should look to support workers displaced by trade (and other labor market disruptions) by providing greater economic opportunities: investing in worker training programs, expanding policies such as reemployment bonuses that keep workers attached to the labor force, and reducing regulatory barriers to job transitions.

In a recent *Wall Street Journal* op-ed by AESG member **Robert Zoellick** (included in these materials), **"The Biden-Trump Economy of Nostalgia,"** Zoellick makes a similar case to Strain. s In aiming to restore manufacturing jobs, he argues, , the policies of both administration are built on outdated ideas of how to build a dynamic economy. America's economic growth has been based on moving jobs from low-tech, low-productivity sectors to high-value sectors—a movement that open trade allows. Instead of seeking to restore an economy of the past through high tariffs and restrictions on trade, Zoellick argues that policymakers should adapt a twenty-first-century trade agenda with low barriers and modern standards, as countries in Asian and the European Union have done.

Despite the protectionist rhetoric and policy action, **Brad Setser** begins his new AESG paper, **"The Surprising Resilience of Globalization: An Examination of Claims of Economic Fragmentation,"** by noting that recent measures of globalization have not retreated—and China's role in the global economy has in fact been accelerating. Current measures of global trade flows are at similar levels to those seen before the imposition of trade restrictions. Furthermore, even as US-China bilateral trade has fallen, this drop largely comes a result of Chinese goods now flowing through third countries such as Vietnam before making their way to the US—making supply chains longer and less transparent rather than creating any material independence from Chinese goods.

Such dynamics serve as a warning, Setser writes, that higher levels of integration do not necessarily reflect desirable outcomes, such as the elimination of arbitrary trade barriers. Integration can come in the form of what he refers to as an "unhealthy" globalization—one that is a product of distorted incentives.

The large global financial flows that result from corporate tax avoidance are an important example of global integration that is unrelated to any economically meaningful efficiencies. Even following domestic and international tax reforms, many large corporations have strong incentives to shift profits to low-tax jurisdiction such as Ireland and Singapore. US pharmaceutical firms, for example, often license intellectual property developed domestically to offshore subsidiaries where they then pay a lower tax rate on sales back to the US—and essentially zero US taxes. Similarly, Applied Materials, a strategically important American firm that builds machines needed to make semiconductors, has shifted its intellectual property and associated income to lightly taxed subsidiaries in Singapore.

As a second example of unhealthy globalization, Setser offers China's current export-led growth model. As China's domestic economy has weakened, leaders have turned to global trade to support its growth. Chinese companies that manufacture goods such as electric vehicles and semiconductors can rely on state support not only through formal subsidies but favorable debt and equity financing as well. China relies on exports because its households save too much. The imbalance between savings and consumption creates the need for export-based growth but also drives global imbalances. For example, the savings glut of the first decade of the 2000s drove the accumulation of toxic assets, which in turn fueled the US housing bubble.

Sester proposes several steps to maintain economic integration while fostering healthier forms of globalization. First, he proposes reforms to provisions of the US tax code that have encouraged US multinational firms to continue to move production of high-tech goods and profits abroad. Second, to counter China's large and potentially destabilizing state support of certain manufacturing sectors, Setser proposes stronger harmonization of trade policies among allies (for example, a subsidy sharing agreement between the US and European Union). Finally, he suggests that global leaders should pressure China to resolve internal economic imbalances. While he admits that policy options are limited here, he notes that leaders can make it clear that they will resist new forms of unbalanced integration.

(The broader topic of US-China relations is one we will return to in our current events session on Wednesday morning.)

3. The US fiscal situation

Session III takes up the topic of the US federal government's fiscal situation. In the years before the COVID-19 pandemic, low interest rates were widely considered to have made higher federal budget deficits more fiscally sustainable. However, in a 2019 AESG paper, Bill Gale argued that even during such a period, rising debt would eventually present a challenge to future economic growth and America's global leadership. Since then, higher spending levels during and after the COVID-19 pandemic and rising interest rates have resulted in a materially worse US fiscal outlook. As Dynan (2023) lays out, even under optimistic scenarios, the US debt will soon reach levels well above historical experience.

AESG member **Jason Furman** addresses America's worsening fiscal position in his new paper **"Eight Questions—and Some Answers—on the US Fiscal Situation."** Furman lays out the current fiscal landscape, with associated subjective levels of confidence in each aspect, and presents a framework for building fiscal sustainability over the next decade.

Furman begins by asserting with high confidence that the federal debt is on an unsustainable path. The CBO projects that the budget deficit will average 6 percent annually over the next decade, due to both a rising primary deficit (the deficit outside of interest payments on the debt) and rising interest payments (a result of higher current interest rates). With large deficits and high interest rates, the debt will continue to rise as a share of output under any plausible scenario. Indeed, Furman presents forecasts across a range of alternative scenarios. Even under the most favorable path, in which Congress does not extend the provisions from the 2017 Tax Cuts and Jobs Act (TCJA) and the US experiences substantially faster-than-expected productivity growth, the debt would grow steadily throughout the next decade, reaching 118 percent of GDP.

Although the federal debt must stabilize somewhere as a share of output—or else become impossible to roll over without explicit aid from the central bank—Furman is less confident about the level at which this stabilization needs to occur. Two lessons from recent experience have been instructive, however. First, he asserts that the US clearly has much more fiscal space than anticipated even 15 years ago, when certain experts were recommending that debt stabilize at 90 percent of GDP. Second, debt dynamics have been dominated by large, discrete events like COVID-19 and the global financial crisis, which increased the debt-to-GDP ratio by a combined 55 percentage points. Given such dynamics, Furman recommends stabilizing the debt by setting it on a downward slope in "normal" times and allowing it to then ratchet back up during emergencies.

Furman points out that the known harms of failing to stabilize the debt are likely economically small. Higher government debt can result in higher interest rates and can crowd out private investment in productive activities, reducing growth. But he says that the long-term effects of

these conventional channels are likely to be small: the CBO's longer-term forecasts, which put debt at 166 percent of GDP in 2045, also have economic growth barely below the current pace of growth.

Furman cautions that it is the "unknown unknowns" of an ever-increasing federal debt that could be quite large. Most notably, America's unsustainable current fiscal path carries the risk of a fiscal crisis in which investors lose faith in the country's ability to repay its debt, along the lines of Canada's fiscal crisis in 1994, which took a dramatic fiscal plan and two years to bring interest rates back down to prior levels. While forecasting such risks carries a high degree of uncertainty, the high costs associated with such an outcome is a strong reason, today, to take action that carries a relatively low cost.

Given these considerations, Furman offers a proposed framework for long-term fiscal sustainability. He recommends balancing the primary budget deficit by the end of the decade, which will see the debt reach 115 percent of GDP and set it on a slight downward path thereafter. Furman's framework includes reverting back to pre-TCJA tax rates unless policymakers can agree on a revenue-raising package of extensions; a requirement that each dollar of new spending increases or tax cuts be fully offset and include an additional $0.25 in deficit reduction (taking into account programs that are projected to pay for themselves, such as investments in children); restore solvency to Social Security and Medicare through tax and benefit changes; and allow limited exceptions for emergencies. Such a framework would set the US on a path toward much-needed fiscal responsibility while allowing for wise investments in sources of long-term growth.

4. Workers, firms, and communities

American economic dynamism ultimately relies on the ingenuity and productivity of workers and firms. Session IV will take up the question of policies to advance innovation in the US and spur the productivity of workers and firms, building on previous AESG discussions and papers.[4] In the years following the pandemic, the US has experienced growth in labor productivity that has mirrored that of earlier decades—a trend that an AESG report by Luke Pardue (2024) connects to renewed business dynamism and new business formation. Additionally, rapid technological advances in areas such as artificial intelligence hold long-term potential to substantially boost productivity, raising the importance of efforts to support such innovations.

[4] In their 2023 AESG paper, Ufuk Akcigit and Sina Ates note that, since 1980, annual US productivity growth has been 60 percent lower than it was in the 1960s and 1970s, a drop they connect to declining business dynamism and reduced competition across the economy. In a 2019 AESG paper, Chad Syverson outlines a package of policy recommendations to raise productive market competition, and a 2019 AESG paper by John Van Reenen proposes a ten-year, $1 trillion Grand Innovation Challenge to reinvigorate R&D investment and drive inclusive growth.

Questions abound about how these advancements will upend the labor market. In **"Technological Disruption in the US Labor Market," David Deming**, **Christopher Ong**, and **Lawrence Summers** offer a perspective on the impact of innovations in artificial intelligence on the labor market first by taking a broad view of these changes back to the 1800s. They note that general-purpose technologies (GPTs) such as electricity and steam power had profound effects on the labor market, moving workers from the farm to the manufacturing floor and then to the office, but each advancement took decades to transform the labor market.
Artificial intelligence, Deming, Ong, and Summers argue, is likely to be a GPT, and they present several data points demonstrating the early signs of potentially transformative effects. They follow Autor et al. (2024) in delineating between the *augmentative* effects of such innovations, through which productivity gains expand the set of tasks workers do and thus generate employment gains in those occupations, and *automation* inventions, which cause employment declines.

An occupation highly exposed to the automative effects of AI is retail sales, where prediction technologies in e-commerce have been used to optimize business operations. Indeed, Deming, Ong, and Summers note that as such advances have been implemented over the past decade, employment in retail sales has declined by 25 percent. On the other hand, the share of employment in STEM jobs has increased by more than 50 percent since 2010, fueled by explosive growth in software and computer-related occupations, as demand for these skilled workers increases.

These trends characterize the broader "occupational upgrading" underway in the labor market today, whereby employment in both low- and middle-paid occupations is declining and employment in high-paid occupations is growing. This trend is likely to play out even among professional and managerial workers: AI will likely commodify skills such as writing business plans and generating software code but will raise demands for skills such as cogent decision-making and analysis of complex counterfactual thought experiments. In this way, Deming, Ong, and Summers conclude, AI is more likely to ratchet up firms' expectations of knowledge workers than it is to replace those workers.

These labor market transformations come as a greater share of the US population ages out of their prime working years and overall labor-force participation remains below pre-pandemic levels (BLS 2024b; BLS 2023). Immigration, therefore, has become as important a path as ever to fostering long-term economic growth. But, as laid out in **Heidi Williams** and **Doug Elmendorf**'s recent paper (included in this binder) "**How Does Accounting for Population Change Affect Estimates of the Effect of Immigration Policies on the Federal Budget?**", conventional budget-analysis methods fail to account for the full benefits to boosting immigration. According to Williams and Elmendorf, when the full labor-market effects of greater immigration are taken into account, such policies would ultimately be predicted to *raise*

revenue—in contrast to current estimates from sources such as the CBO. (The economic impact of recent immigration trends is one we will consider during our Wednesday current-event session on the US macroeconomic outlook.)

These issues relate to a topic of long-standing interest to the AESG: higher education. America's colleges and universities will have a critical role to play in building a workforce equipped with the skills in demand in a rapidly evolving labor market. But these very institutions are facing declining public confidence, driven by ongoing concerns about the high cost of attending college, questions about the value of a degree, and high-profile controversies over free speech on college campuses. It remains to be seen whether US universities will respond to ongoing challenges in ways that preserve their critical role in advancing skill building, innovation, and opportunity in America. (These issues will be discussed in a current-events session on Tuesday afternoon.)

Though not directly related to the issue of innovation, this final section of the briefing binder includes a commissioned AESG paper on a topic of critical importance to communities around the country: crime. There was a sharp increase in crimes including homicides, shootings, and vehicle thefts after the pandemic, and at the same time, deaths of Black men at the hands of police led to an anti-police movement that further eroded trust in the police in many communities. In 2022, just 14 percent of Americans expressed a "great deal" or "quite a lot" of confidence in the criminal justice system, down 6 percentage points from the prior year and the fourth-lowest of the 16 institutions asked about (Saad 2023). Restoring community safety and reforming the criminal justice system are critical challenges to communities across the country.

In a new AESG paper, **"Why Crime Matters and What to Do about It," Jennifer Doleac** lays out the recent trends in criminal activity and evaluates evidence-based policies to reduce crime. She notes that, while crime did spike during the pandemic, it remained well below levels seen in the 1980s and 1990s, and most by most available measures it has continued to fall in recent months. Nevertheless, crime remains high in many urban areas and imposes large costs on communities. Combining the tangible costs of crime (such as medical expenses, lost earnings, and property damage) with intangible costs (such as pain and suffering), researchers estimate the cost of crime at $4.7–$5.8 trillion annually.

Doleac reviews three categories of evidence-based interventions to reduce crime: those aimed at preventing first interactions with criminal justice system, those aimed at deterring crime, and those aimed rehabilitating those who have been involved in the criminal justice system. Efforts focused on building economic opportunities for young people, particularly through investments in health and education, have strong evidence of success at preventing future criminal activity. Such interventions include teen job programs; investments in high-quality education programs; reduction of lead exposure among young children; and cognitive behavioral therapy programs,

such as Chicago's Becoming a Man program, that push young adults to think more critically about the costs and benefits of their actions.

Second, Doleac notes that efforts to increase policing and efforts to detect perpetrators by using technological tools are both evidence-based crime reduction measures. A large body of research has found that hiring more police officers and increasing police presence has a large deterrent effect on crime. Given ongoing concerns about the unnecessary escalation of incidents involving police, policymakers should prioritize finding ways to reduce these social costs through improved training and management practices. Additionally, researchers have found that broadening the use of technological tools such as surveillance cameras provides a way to deter crime through better detection of offenders at much lower cost than hiring more police officers.

To effectively rehabilitate criminal offenders, Doleac recommends the use of electronic monitoring instead of prison time as a means of keeping criminals out of the public (largely confined to their homes) while minimizing the negative effects of incarceration. Improving access to mental-health treatment is another means to rehabilitate offenders whose criminal activity is due to untreated mental illness. Research has also found that repealing state bans on public benefits among persons with criminal records significantly reduces recidivism. In addition, erring more generally toward leniency in prosecuting first-time defendants, particularly among nonviolent misdemeanor offenders, reduces recidivism by offering offenders a second chance to avoid a criminal record and the associated costs that often lead them to return to crime, including difficulty finding a job and housing.

In sum, policymakers should focus on efforts to help prevent someone's first criminal record and on increasing the probability that perpetrators are caught, rather than on making the punishment longer or harsher. More fundamentally, policymakers should be open to new approaches to reducing crime but ensure they follow evidence on whether such efforts have been effective. To effectively reduce pain caused by crime and rebuild trust in hardest-hit communities, we must invest in evidence-based solutions.

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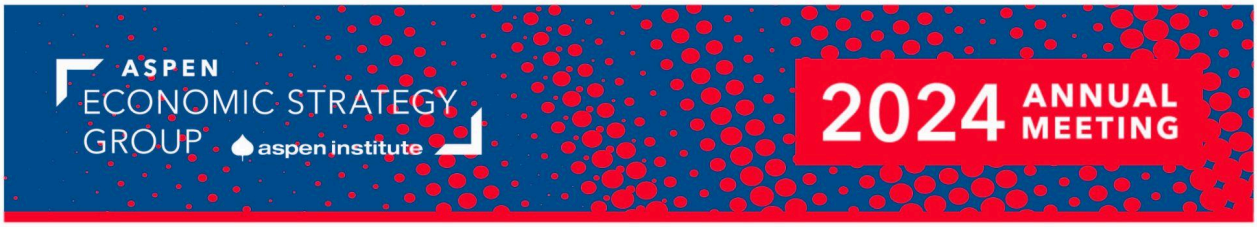

I. INDUSTRIAL POLICY

State Capacity for Building Infrastructure

Zachary Liscow

Markets for the People

(Published in *National Affairs)*

Glenn Hubbard

State Capacity for Building Infrastructure

JULY 2024

AUTHOR

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ABSTRACT

Recent legislation has brought the goal of getting the most out of public infrastructure funds to the fore. The high cost of building infrastructure in the US is a longstanding challenge, but it is not inevitable. This paper highlights three elements of state capacity that underlie the high costs and slow timelines the US faces. The first challenge is *personnel*: government pay has not kept up with private pay, and the public workforce has not kept up with the workload; the public sector is instead increasingly privatized, raising costs. The second challenge is *procedure*: government workers operate under onerous procedures and in a litigation environment that makes construction slow and expensive. The third challenge is a *lack of adequate tools*, including data systems and long-term planning abilities. This paper highlights reforms to deliver better, more cost-effective public infrastructure. Regarding personnel, hiring more government planners and managers, paying them in line with the private sector, and insourcing more planning could help. Regarding procedure, reducing permitting and procurement burdens, promoting faster but more representative public participation, improving coordination, and centralizing certain decisions at the federal level could help. Regarding tools, improving internal data systems and data availability would create a better evidence base, and better long-term planning could improve decision-making quality.

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Introduction

The Biden administration passed three historic bills in 2021 and 2022 to invest an estimated $1.6 trillion over a decade, largely on building infrastructure (*Politico* 2024). The Bipartisan Infrastructure Law (BIL), Inflation Reduction Act (IRA), and CHIPS and Science Act direct these funds to building transportation, energy, and manufacturing infrastructure.

The US move to build more infrastructure raises the questions: Does the US have the state capacity to build that infrastructure well? And what can be done to improve weaknesses?

State capacity is defined here as the ability of the government to attain its policy goals (Mann 1986). This concept includes the size and quality of the government workforce; the organization, management, and rules the workforce operates under; and the tools available to the workforce. These factors all impact the ability of the state to get the most effective use out of government funds. Capacity impacts all parts of government; one recent example is the effort, via a recent IRS personnel expansion, to build up the government's capacity to collect more unpaid taxes. Capacity issues were also at play in the failures of the FAFSA computer system, which delayed access to federal financial aid for millions of students. I focus here on the state capacity for building physical infrastructure, especially for transportation and energy. I also focus on effectiveness *per dollar*, rather than on the adequacy of overall spending. The possible goals here are multiple and also subjective, but they may include choosing an overall project and specific design that have high net benefits; minimizing cost; increasing speed of construction; mitigating harm to people and the environment; and using a participatory and consultative process.

After describing how state capacity matters for infrastructure construction, I begin by laying out the challenge: the US is an expensive place to build public infrastructure, both in international comparison and compared to past US construction, as laid out in a 2021 Aspen Economic Strategy Group policy paper by Edward Glaeser and Jim Poterba. I then describe what we know about issues with US state capacity for building infrastructure, organized into three sets of concerns. Overall, data are scarce, but some themes do come out.

Personnel is the first issue. Employment levels of some types of government workers important for state infrastructure capacity have barely increased or have declined over time, even as the scope of what government does has expanded greatly. And, based on newly collected data across dozens of government reports, the private-sector pay premium has increased over time, possibly drawing workers, especially higher-quality workers, away from government. As there are fewer government workers per dollar of work done, planning and management are increasingly outsourced. Experts (contractors and government officials) think that state capacity—in the form of the size of the workforce—is a problem that drives up costs, in part because outsourcing

planning and management is expensive. The very slow and expensive construction of the California High-Speed Rail project exemplifies the costs of this approach to personnel.

Cumbersome procedures are the second issue. One indication of weak state capacity is the long—and increasing—amount of time it takes to acquire infrastructure permits. Another is the substantial volume and slow speed of litigation around infrastructure permitting, even when the lawsuits fail. Indeed, one notable aspect of the US in international comparison is its level of litigiousness; among a sample of rich countries, the US has the second-highest number of lawyers. Extreme litigiousness can hamstring government capacity.

A lack of tools is the third issue. Data infrastructure and transparency are weak, making it hard for government and the public alike to even get a firm grasp of the challenges at hand. Coordinated long-term planning is also lacking, hampering the deployment of renewables and the development of transportation infrastructure, processes that both typically require coordination across multiple government entities.

The last part of the paper considers potential legislative and administrative solutions to these three sets of challenges at the federal, state, and local levels. Regarding personnel, several reforms could help, including hiring more government planners and managers, paying them in line with the private sector, and insourcing more planning. Regarding procedure, reducing permitting and procurement burdens, reducing litigation, promoting faster but more representative public participation, improving coordination within government, and centralizing certain kinds of decision-making at the federal level could help. And regarding tools, governments should improve their data infrastructure and transparency and do more long-term planning.

1. How state capacity matters for infrastructure construction

Building up state capacity has historically been important to the development of strong states (Scott 1998). For example, the ability to raise revenue through taxation and field a capable military has been essential to economic development. This section describes how state capacity is essential to another important aspect of economic development: building infrastructure.

Of course, more state capacity can threaten the public (Acemoglu and Robinson 2020). There's a long history of skepticism in the US in particular toward government power, and state capacity expands that power. State planning could crowd out private spending or otherwise empower bureaucrats or politicians who may lack the aggregate, decentralized information provided by price signals (Hayek 1945). So bureaucrats could have nonrepresentative views that edge out the demands of other groups. Finally, to the extent that increasing state capacity is about increasing *federal* state capacity, disempowering state and local governments—who may be more

responsive to local constituencies and have more localized knowledge—could be costly, notwithstanding efficiency benefits from greater interstate coordination. This skepticism has been reflected in recent decades through calls on the political right to shrink the size of government,[1] and on the left to introduce procedures to constrain civil servants and ensure citizens' ability to object to the executive branch through courts (Lindsey 2021; Sabin 2021).

But if having good public infrastructure is the goal, then strong state capacity is essential for choosing good projects, permitting them expeditiously and carefully, designing projects well, and contracting with and monitoring builders. State capacity is especially important for infrastructure, which requires tremendous technical sophistication. Presumably, more capacity can lead to faster planning by increasing agencies' ability to perform technical tasks. More capacity can result in better information about public preferences too. Capacity can also solve another issue: namely, that markets tend to be a poor source of information when it comes to infrastructure. For example, most roads are free to drive on and therefore do not provide price signals; for clean energy infrastructure, the complex web of regulatory structures gives good reasons to think that price signals will be distorted and that some sort of government activity will be required. Accordingly, more capacity can supplement and even partially replace the market as a source of information, via the systematic collection of data on costs, benefits, and public preferences.

The importance of state capacity is borne out by the economic evidence. For example, Best, Hjort, and Szakonyi (2023) estimate that improving the performance of Russian procurement officers by one standard deviation would lower prices paid for off-the-shelf goods by 30.2 percent. And Decarolis et al. (2020) look at procurement in the US context and examine competency across specific offices of federal agencies. They find that an increase in competence reduces time delays, cost overruns, and the number of renegotiations for federal works and services contracts.

For building infrastructure, strong state capacity is important at each stage of the process.

First, there must be adequate money to fund infrastructure projects and maintenance. In the US, transportation infrastructure, for example, is funded jointly by the federal, state, and local governments. In 2021, the federal government funded approximately 31 percent of all government transportation-related expenditures, with state and local governments funding the remaining 69 percent (Bureau of Transportation Statistics 2024). Energy infrastructure, in contrast, is usually privately financed and owned by utilities and other developers. Especially after the IRA, however, the federal government is playing an increasing role in indirectly financing energy projects through tax credits and other means like loan guarantees. While

[1] For example, Grover Norquist famously said that he wanted to make the government so small it could be drowned in a bathtub (Thorndike 2020).

funding levels are obviously extremely important, they are not the focus of this piece, which focuses on the effectiveness per dollar. I focus on effectiveness because determining the optimal spending level requires a different set of considerations, and because Glaeser and Poterba's 2021 AESG policy paper, "Economic Perspectives on Infrastructure Investment," already takes up that question. A key point in that paper is that the optimal level of infrastructure investment should be determined via a project-by-project consideration of the costs of acquiring infrastructure capital and the benefits of using it. This approach contrasts with the typical engineering approach, which defines infrastructure needs without reference to the costs of meeting them.

Second, there must be a process for deciding what to pursue building—for example, a new rail line in the Upper East Side of Manhattan or a new highway between city A and city B. For transportation, this decision is typically made by state or local governments, sometimes subject to discretionary federal grantmaking (Schleicher and Bagley 2024). Again, for energy infrastructure, decisions about what projects to pursue are typically private.

Third, projects must go through a permitting process. For example, since 1970, major projects with federal funding, on federal land, or subject to other federal regulations (like the Endangered Species Act) have gone through National Environmental Policy Act (NEPA) review. The NEPA review for major projects produces a document that discusses the project's impacts on the "human environment," including both people and the natural environment. This document is then subject to judicial review to ensure that the proper process was carried out. Essentially all major transportation projects go through NEPA, as do many energy projects. In addition to the procedural requirements of NEPA, other federal statutes may lead to permit requirements, such as the Clean Water Act if wetlands are being filled in. There are also state and local permits—for example, local ordinances for siting solar farms.

Fourth, the project must be designed at a nuanced level, with precise locations, materials, and methods specified. For energy infrastructure, this design work is typically done privately. For transportation, in-house design teams typically work with external consultants. They outsource this work because of a lack of internal capacity to handle it; capacity is low partly because big projects may only arise sporadically and partly because it may be challenging for public-sector employers to keep up with private-sector pay. Importantly, this transportation design work is almost entirely done by state and local governments, rather than by the federal government, even if the federal government is funding a large share of the project (Schleicher and Bagley 2024).

Fifth, the project must be built, typically via a state or local government contracting with the private sector. This contracting process involves a set of procurement rules. For example, "Made in America" rules have become more important for transportation projects since the passage of

the BIL.[2] After choosing a bidder, the government must then monitor its construction contractors; it may renegotiate the contract as project needs change or unexpected issues arise.

2. The problem of US infrastructure construction

This section describes the problematic state of infrastructure construction: US costs are high in international context; costs have gone up over the course of decades; construction timelines are slow; and input prices have recently shot up.

2.1 Building infrastructure in the US costs much more than it does abroad

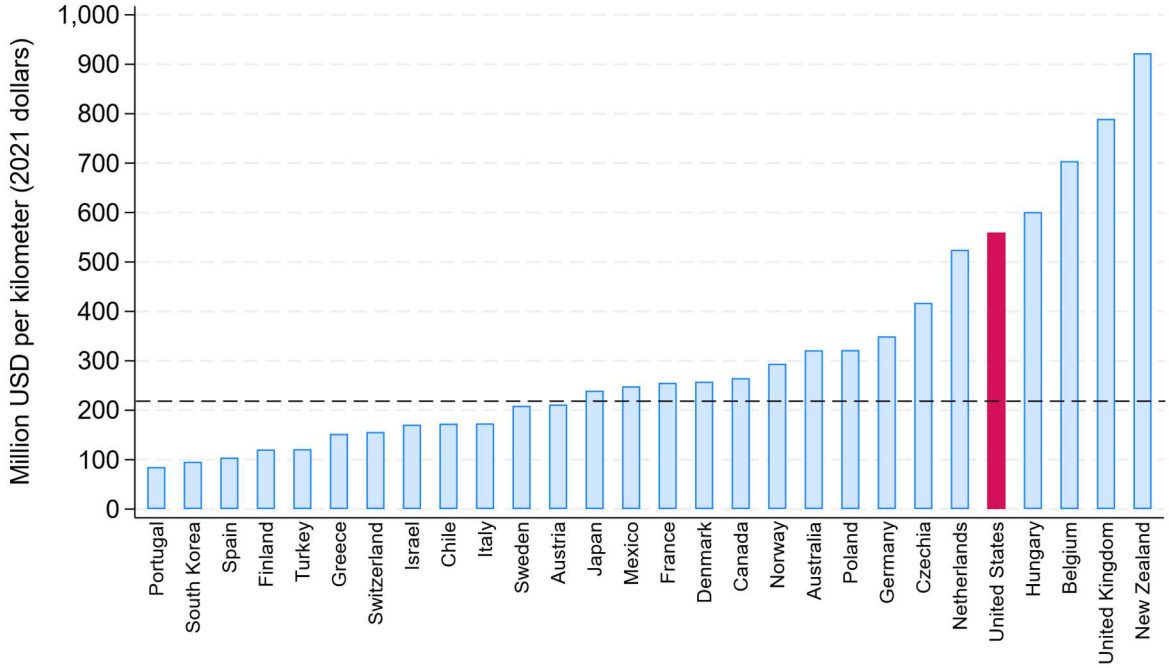
Construction costs in the US, at least for its urban transit megaprojects, are among the highest—if not *the* highest—in the world. Figure 1 shows per-kilometer spending (in 2021 dollars, adjusted for purchase price parity) on new urban transit across countries. It costs approximately $560 million to build a kilometer of urban transit infrastructure in the US, the fifth-highest rate in a sample of 28 OECD countries. Adjusting for the fact that infrastructure in the US requires relatively little tunneling, US costs may be higher than those of all the other countries in the sample. US costs are two-and-a-half times as high as the OECD average of $218 million per kilometer (represented by the horizontal dashed line in figure 1). (This OECD average is very close to the average of all 59 countries for which data are available.) Building urban transit in the United States is about six times as expensive as building urban transit in Portugal, South Korea, or Spain.

These divergent costs are not limited to transit; they also apply to highway construction. Based on available data, US highways built since 2010 are far more expensive than highway projects elsewhere in the world at any time (Liscow 2024).

These high costs in international comparison suggest distinctive issues with the US that should be addressed.

[2] For example, the BIL includes the Build America, Buy America Act (BABAA), which mandates that federally funded infrastructure projects use American-made iron, steel, manufactured products, and construction materials (US Department of Commerce n.d.).

Figure 1: Average spending per kilometer on urban transit, across countries

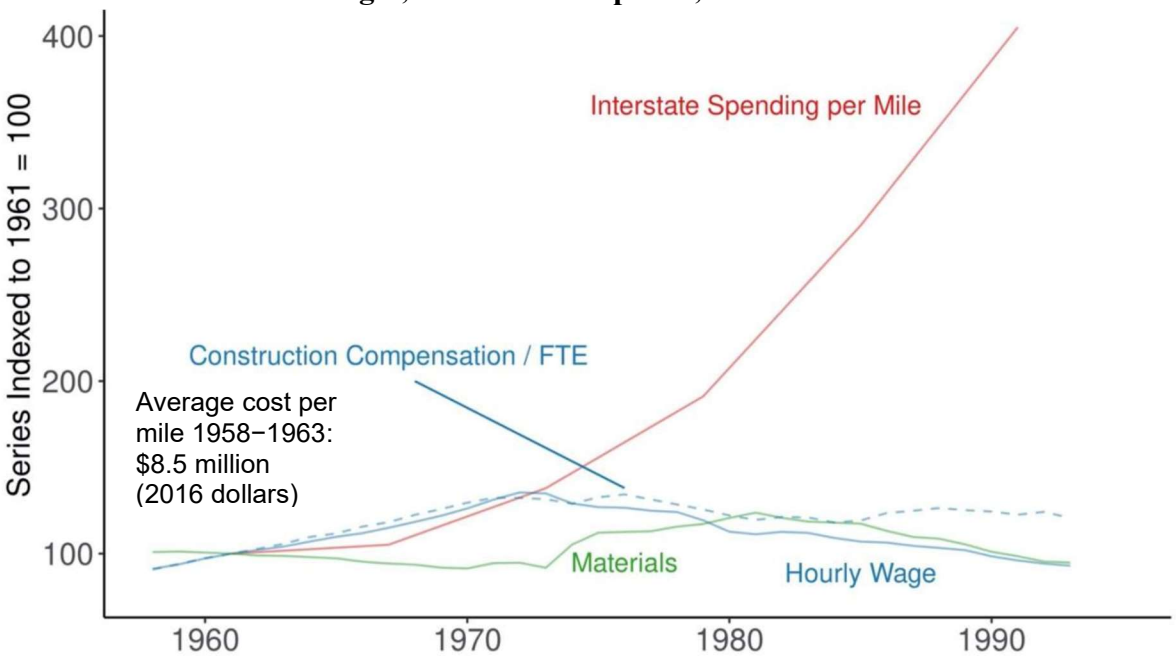


Source: Author calculations using data from NYU Transit Costs Project 2020
Notes: The Y-axis displays mean cost per kilometer for each country using a purchase-price-parity adjustment. This mean is weighted by project length. The dashed horizontal line displays the overall kilometer-weighted mean for all countries in the figure. There are 237 projects in total. The sample includes all OECD countries with available data.

2.2 Infrastructure construction has gotten more expensive over time

In the US, the real costs of interstate highway construction more than tripled between the 1960s and 1980s (Brooks and Liscow 2023). Highway construction costs continued going up after that (Liscow 2024). As figure 2 shows, changes in construction wages and material prices do not explain this increase. Brooks and Liscow (2023) also show that building in more expensive places over time does not drive the increase. Costs started skyrocketing around 1970, the same year that the National Environmental Policy Act passed. Notably, Brooks and Liscow (2023) show that, before 1970, there was no relationship between the median family income of a community and the cost of its highways; after 1970, there was a strong positive relationship. This divergence suggests that some institutional change allowed richer communities to demand more expensive highways, whereas lower-income communities lacked the resources to take advantage of these new tools.

Figure 2: Average spending per mile to build new US interstate highways, construction wages, and materials prices, over time



Source: Brooks and Liscow 2023

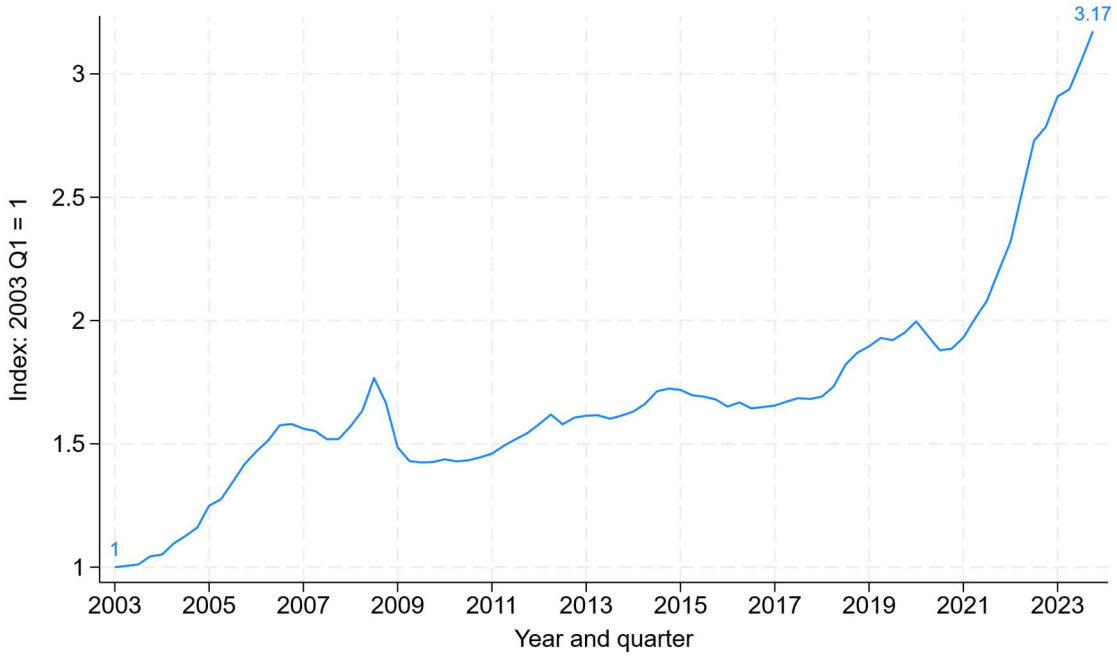
2.3 Timelines for building energy infrastructure are slow

Crucially for the green transition, the timelines for building energy infrastructure are slow. The International Energy Agency (2022) reports that the typical deployment timeline for offshore wind in the US is between three and five years. For extra-high-voltage power lines, which are essential to transport electricity from the often-remote areas where renewables are abundant to cities where they are needed, the typical timeline is between five and 13 years. Given the Biden administration's aggressive 2030 decarbonization goals of reducing emissions to half their 2005 levels, such long timelines would likely prevent the US from achieving those goals.

2.4 The new era of industrial policy has coincided with skyrocketing input prices

At least judging by the inputs into highways, the price of inputs into infrastructure has dramatically increased, with an index of these prices going up a remarkable 57 percent between the end of 2019 and the third quarter of 2023 (much greater than the 19 percent inflation for the overall economy over that period). Figure 3 shows an index of these prices over time; the price increases continue unabated through the third quarter of 2023 (the latest available data). Largely due to the inflation, US real spending on infrastructure was actually considerably lower in 2023 than in 2020 (*Economist* 2023). The supply chain challenges brought on by COVID-19 helped

Figure 3: National highway construction cost index



Source: US Department of Transportation, Federal Highway Administration 2023b.

lead to these price spikes. And the increase in funding for infrastructure presumably then increased prices further.

3. Issues with US state capacity and infrastructure

This section describes what is known about issues with state capacity for building infrastructure.

First, on personnel: state-government highway employment has declined over time; civil-engineering employment by governments has not nearly kept up with that by the private sector; and government wages have not kept up with the private sector. Relatedly, private contractors and state officials alike report that state capacity is a problem and drives up costs, and both groups agree that consultant use drives up overall costs.

Second, on procedural requirements for building: environmental review is lengthy and getting lengthier; litigation is a significant risk and is time-consuming; and the US is characterized internationally by a very high concentration of lawyers.

Third, there are challenges with the *tools* that the government can use, in particular its data infrastructure and its long-term planning abilities.

3.1 Personnel

Personnel in adequate number and quality are essential for good policy implementation. Otherwise, projects will be badly chosen, designed, and contracted for. Yet while these personnel expenditures are not small in absolute terms, they are small relative to the cost of construction. For example, estimates of planning, research, and administrative costs as the interstate system was being constructed in 1975 were at less than 3 percent of total costs (Comptroller General of the US 1976); in 1991, after most of the construction was complete, planning, engineering, research, and other miscellaneous expenses ended up at less than 10 percent of total costs (Brooks and Liscow 2023). In absolute terms, the Federal Highway Administration's personnel expenses totaled $350 million in 2022 (US Department of Transportation, Federal Highway Administration 2023a). Yet, while modest in cost, government personnel are essential. This subsection reviews what we know about the status of personnel.

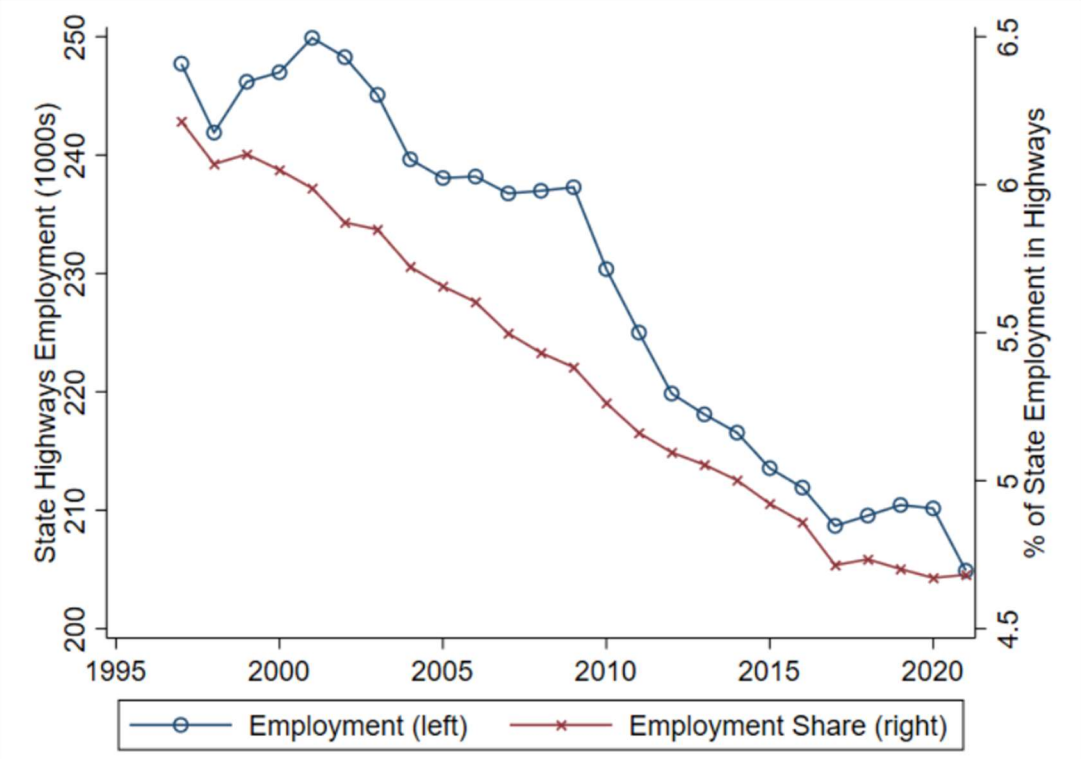
3.1.1 State-government highway employment has declined over time; contractors and state officials agree that state DOTs are understaffed; and lower state capacity correlates with higher overall costs

State department of transportation (DOT) highway employment has declined substantially over the last quarter-century, as shown by Liscow, Nober, and Slattery (2023). Between 1997 and 2020, the number of people employed in state DOT highway divisions shrank by 40,000, or about 20 percent, while total state public-sector employment grew. Figure 4 shows that that the share of state public-sector employees working at state DOT highway divisions shrank from over 6 percent to about 4.5 percent. Notably, states that experienced the largest losses in employment over this time period were most likely to report being understaffed (Liscow, Nober, and Slattery 2023).

Liscow, Nober, and Slattery (2023) also surveyed state DOT officials and construction contractors. They find wide agreement about weak state capacity: 89 percent of state officials and 59 percent of contractors reported that state DOTs were understaffed.

Evidence suggests that increasing capacity—as measured by state DOT employment—reduces construction costs. Recall that contractors, rather than government employees, actually perform the construction work; the government workers are designing the project, putting it out to bid, and managing the contractor. Hiring more government workers could thus enable better project management. Liscow, Nober, and Slattery (2023) find that there is a significant negative correlation between per-capita state DOT employment in transportation and the per-mile

Figure 4: State-government highway employees, total and as a share of all state public-sector employment



Note: Data on state-government highway employment in both absolute numbers (left) and as a share of public-sector employment) comes from the US Census Bureau See Liscow, Nober, and Slattery (2023) for details.

construction cost of highways: increasing employment by one person per thousand in a population reduces costs by 26 percent.

Similarly, specific aspects of capacity correlate with costs. In particular, "change orders," (changes to a contract after the beginning of the contract) and concerns about administrative processes are both significantly correlated with costs. And it seems likely that lower capacity leads to both worse contract-writing (and thus to more change orders) and more onerous administrative processes. Notably, 57 percent of highway contractors state that cost overruns are caused by problems in state DOT planning (state DOTs disagree).

The decline in employment may have a variety of potential causes. State governments have been under particular stress since the Great Recession; gradual debt accumulation may lead some governments to skimp on hiring, sometimes not even filling open positions (Gordon 2012; Phaneuf 2022). Cumbersome hiring practices may also make it challenging to fill open positions; for example, the Greater Cleveland Regional Transit Authority's hiring process recently had 86 steps and averaged five months, leading it to lose applicants (American Public Transportation

Association 2023). Workforce shortages can also snowball. To cover staffing shortfalls, remaining employees may have to take on extra responsibilities or work longer hours, leading to even more workforce attrition (TransitCenter 2022).

Figure 5 plots civil-engineering employment between 1997 and 2022, and it tells a story similar to that for state government highway employment: Even as the amount spent on public-infrastructure construction has increased dramatically since the late 1990s, rising from about $597 billion in 1997 to $857 billion in 2022 (in 2022 dollars),[3] the number of civil engineers (who tend to be in charge of planning infrastructure projects) has barely budged (Perez and Ardaman 1988). In fact, based on the data, it appears that federal-government civil-engineering employment has even declined somewhat, falling from 11,550 in 1997 to 9,880 in 2022. At the same time, private-sector employment of civil engineers has more than doubled. Assuming that there has not been a large expansion of civil-engineering work done for the private sector relative to the public sector, these numbers suggest that more and more civil engineering for public-sector projects has been outsourced to the private sector. Such outsourcing is not necessarily a bad thing, but it does suggest that state capacity, at least relative to the private sector—and likely absolutely, given the expansion of public construction—has declined over time. That supposition—of declining government capacity—does not follow directly from the data, as outsourcing often works well; but the employment trends do raise at least the possibility that government has insufficient staff to manage its contracts.

3.1.2 Civil-engineering employment has grown little in government, while it has grown a large amount in the private sector

Figure 5 also shows the importance of state and local governments relative to the federal government: In 2022, the federal government employed 9,880 civil engineers, while state and local governments combined employed far more: 70,330.

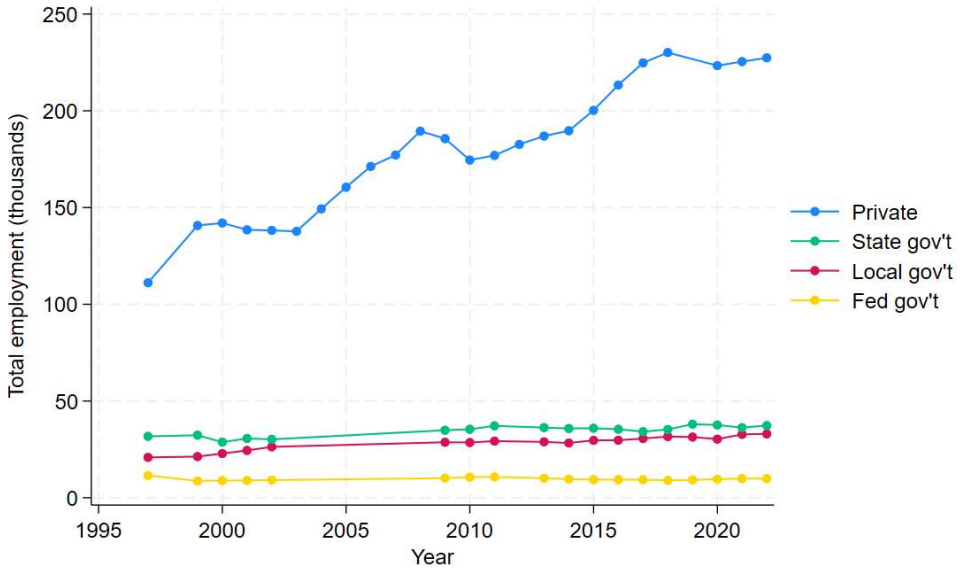
This phenomenon is part of a larger phenomenon: the total number of federal executive-branch civilian employees has changed little since 1960, even as federal spending more than quadrupled between 1960 and 2019 in inflation-adjusted dollars and as the number of pages in the federal register (a measure of regulatory activity) similarly quadrupled (Lindsey 2021).

3.1.3 The private-public wage gap has increased over time

Another way of understanding the capacity of the public sector is to compare the pay in the public and private sectors. When pay is higher in the private sector than in the public sector, it tends to

[3] The figures include the total infrastructure spending by federal, state, and local governments (US Bureau of Economic Analysis 2023).

Figure 5: Civil-engineering employment, by sector



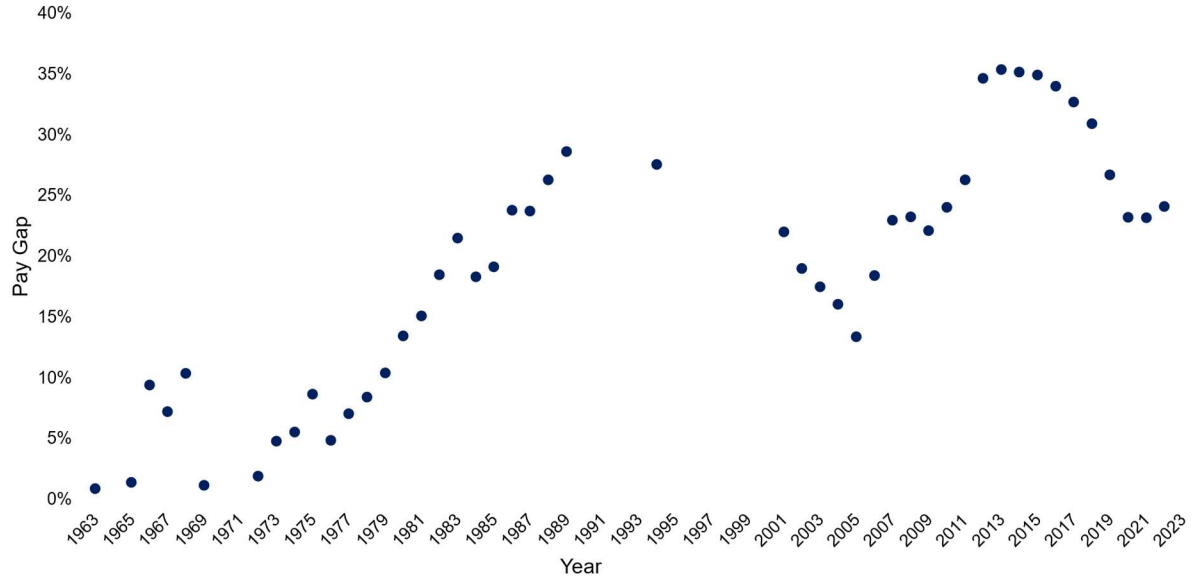
Note: See the online data appendix for the exact data sources from the Bureau of Labor Statistics' (BLS) Occupational Employment and Wage Statistics. Note that BLS generally cautions against using these data to compare employment over time because of definitional changes in the classification systems and changes to survey methodology. But a close examination of definitions and methodologies, described in further detail in the data appendix, does not reveal major definitional changes, providing some reassurance that the comparison here has no major errors. Note as well that the BLS did not separate public-sector employment into local, state, and federal government categories between 2003 and 2008.

draw away talent from the public sector and weaken state capacity (unless outsourcing can make up the difference)—and the greater the pay difference, the more talent will likely move into the private sector.

Figure 6 measures the private-public wage gap over time for the federal government. (This measure excludes fringes like retirement benefits.) I hand-collected the data, which was mostly produced by the President's Pay Agent, who compares pay for federal workers with average private-sector rates for the same levels of work (US General Accounting Office 1987). There have been changes in methodology over time—such as refinements to more comprehensively cover the private sector and reweighting to make the composition of the public and private sectors more comparable—and statistical agencies caution against over-time comparisons. (See the data appendix for full details.) But, with those caveats in mind, so far as the data say, there has been a large increase in the private-public pay differential over time, from almost no difference in the early 1960s with a difference as high as 35 percent in the mid-2010s.[4] And, as of 2022, the private-

[4] Reassuringly, the Office of Management and Budget (2023) produces a series going back to 1990, which shows broadly similar trends.

Figure 6: Pay-gap percentage between private sector and federal government, 1963–2023



Note: See the data appendix for the exact sources, which are usually Annual Reports of the President's Pay Agent. The appendix also describes methodological changes over time that make the figures not perfectly comparable.

public wage difference is still remarkably large, at 24 percent. This finding raises concerns about the ability to attract a high-quality federal workforce.

Note a final implication as well: While infrastructure construction costs have gone up, public-sector wages have not kept up with private-sector wages. So it is not the high wages of public-sector workers (at least from the federal government) that have driven the increasing construction costs.

3.1.4 Contractors and state officials report that consultants drive up costs, and data show that consultants do correlate with higher costs

In Liscow, Nober, and Slattery's 2023 survey, the consensus among procurement officials and contractors alike is that the use of consultants increases costs, as shown in figure 7: 77 percent of state DOT officials and 82 percent of contractors think that consultant use increases costs at least moderately. Moreover, among all survey responses, the strongest correlation with costs is consultant use.

Costly as it may be (perhaps partly because of consultants' incentives to have larger projects), some use of consultants may be unavoidable because state DOTs are understaffed and do not have the capacity to complete the work in-house. Even taking this inevitability into account, DOTs may currently be far from their ideal state of affairs.

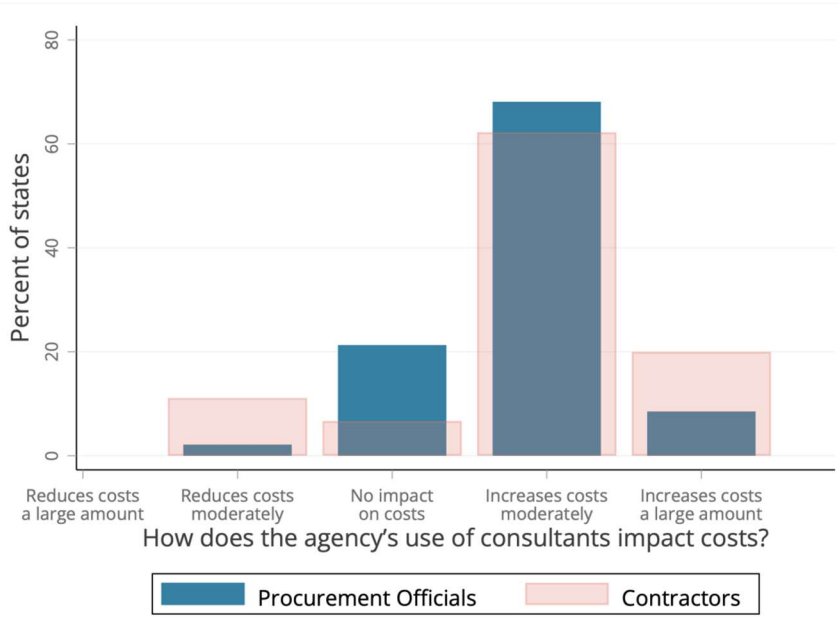
Issues with outsourcing extend beyond infrastructure. For example, in the 2013 Healthcare.gov rollout debacle, the 3:1 ratio of contractors to employees at the Center for Medicare and Medicaid Services (CMS) helped lead to the website breakdown (Verkuil 2017). The Government Accountability Office said that CMS had operated "without effective planning or oversight practices," including by trying to direct contractors "when key technical requirements were unknown" (Government Accountability Office 2014).

In the context of infrastructure, countries comparable to the US often have relatively higher planning capacity in local transit agencies. In Italy, for example, a country with low construction costs (and one not usually known for excellent government), Milan's transit agency has built up so much planning and design capacity that it consults on not only other Italian projects but also projects abroad (Goldwyn et al. 2023). By contrast, Boston's transit agency had only four to six full-time employees managing its Green Line extension—"the largest capital project in the agency's history" (Goldwyn et al. 2023, 24)—leading to poor design choices, reliance on consultants, and higher costs. In countries like France, with greater in-house capacity for planning, "the typical range" of project management and design contracts as a percentage of construction costs "is 5-10%, with 7-8 percent most common, and in Italy and Istanbul, it is typically 10%" (Goldwyn et al. 2023, 25). "In New York, where consultants largely designed and managed construction for Phase 1 of the Second Avenue Subway," on the other hand, management and design contracts totaled 21 percent of construction costs.

3.1.5 An example of the costs of weak personnel

One example of weak personnel driving up project costs and causing delays, partly through excessive outsourcing of planning, is California High-Speed Rail. A 2018 audit of that project highlighted poor contract management (Howle 2018). For example, one mistake was that construction began before essential pre-construction tasks—such as acquiring necessary land, relocating utility systems, and securing agreements with external stakeholders—had been completed. This decision led to over $600 million in cost overruns. The audit linked decisions like this one to the fact that that many contract managers did not serve in full-time roles and that oversight was often delegated to outside consultants, whose priorities might not have aligned with the state's interests. The audit found that the consultants were not subjected to the same level of scrutiny as state workers, potentially leading to conflicts of interest and less effective oversight. An *LA Times* investigation further showed the significant role of private consultants in managing the project, handling tasks that would typically be managed by state employees (Vartabedian 2019). Indeed, the article noted, "in some cases, they said, state employees report[ed] to consultants, rather than the other way around."

Figure 7: Cost impact of consultant use, as assessed by procurement officials and contractors, across states



Source: Liscow, Nober, and Slattery 2023.

3.2 Procedure

There are many reasons for government agencies overseeing infrastructure projects to have detailed procedures. For example, procurement rules requiring the lowest-cost bidder, or the bidder meeting some combination of technical and cost-based criteria, to win the bid help prevent bribes to government officials by worse bidders. "Hard-look" judicial review of environmental permitting helps ensure that government officials consider various impacts of construction by creating the threat that judges will send projects back to the drawing board if they find any stones left unturned. It helps prevent the kind of situation that was common in the 1950s, when Robert Moses could bulldoze neighborhoods of New York with little consultation and substantial harm to local communities (Caro 1974). At the same time, the resulting thicket of procedures may have substantially slowed construction and made it more expensive—if building anything is even still feasible at all. So building state capacity by creating rules that provide appropriate requirements for government officials is important, especially amid concerns about "over-proceduralization" (Bagley 2019; Pahlka 2023).

Here is some of what we know about procedure for infrastructure, using the example of the permitting process.

3.2.1 Permitting projects is slow and has gotten slower over time

Permitting projects is slow and has gotten slower over time. As described earlier, the National Environmental Policy Act has required since 1970 that any proposal for a large project with significant impacts on people or the environment (roughly 100–200 per year) must include an environmental impact statement (EIS). Figure 8 shows how preparation time has increased since the late 1990s—from around 3.4 years in the late 1990s to around 4.8 years in the past several years. That is an increase of about 25 days per year. The past couple of years have seen a decline in duration, coming back down to 4.2 years in 2022.

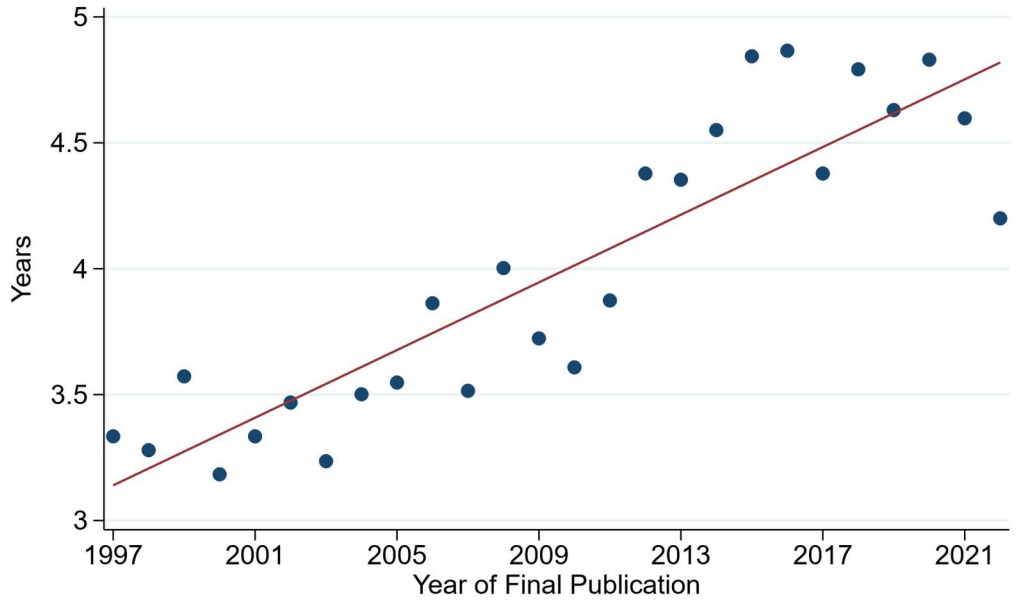
Part of why environmental review is lengthy is that the reviews themselves are long. Final environmental impact statements released between 2013 and 2017 had an average length of 668 pages and a median length of 445 pages, excluding appendices, and an average of 1,703 pages and median of 962 pages, including appendices (Council on Environmental Quality [CEQ] 2019). This tally reflects a big change from a random sample of 50 environmental impact statements I collected from 1977 and 1978, which had an average length of 270 pages without the appendix and 414 pages with the appendix. So, between the late 1970s and the 2010s, page length without the appendix increased two-and-a-half fold, and with the appendix increased four-fold, perhaps reflecting a ratchet in which, once an issue is litigated or otherwise become part of ordinary practice, subsequent environmental impact statements include that issue.

These permitting challenges relate to the personnel challenges discussed earlier. As in other construction-related areas, the US lacks institutional capacity when it comes to federal permitting coordination. The Federal Permitting Improvement Steering Council, charged with coordinating multi-agency permitting processes, has only sixteen permanent staff members; the head of said council has emphasized the constraints that having such a small staff imposes (Siegel 2023). Concerns have been raised about permitting for projects using CHIPS funding, among other parts of the Biden ramp-up in spending (Singerman and Kersten 2023). For example, construction on Micron's planned memory chip facility in Manassas, Virginia, has been slowed by the permit process and the need to navigate complex regulations (Valerio 2024).

3.2.2 There is substantial and lengthy litigation around infrastructure projects

Infrastructure projects are subject to substantial and lengthy litigation, as judged by litigation under the National Environmental Policy Act. Though many projects are not litigated, according to a sample collected by Bennon and Wilson (2023), the absence of litigation does not imply that the threat of litigation had no impact. Projects can easily become more costly and slower as proposing agencies try to preempt litigation. Or projects can be cancelled—or not even contemplated—altogether. Because it is difficult to measure how often litigation is avoided via

Figure 8: Environmental impact statement preparation time



*Source: DeWitt and DeWitt (2008), extended courtesy of the authors. There are 5,165 EISs in the sample. The line of best fit with year-level data is: preparation time (in years) = 0.0672 * year – 131.017.*

an agency's preemptive efforts, the real cost of litigation threats is not reflected in the statistics on the amount of litigation.

When there is litigation, it can add substantial time to the permitting process. Studying a sample of about two hundred National Environmental Policy Act cases from the George W. Bush administration, Adelman and Glicksman (2018) found that the median length of litigation was 23 months, with 75 percent of cases resolved in 39 months and 90 percent in five years. When the government prevailed (as it did in about 62 percent of cases between 2001 and 2013, according to my analysis of CEQ [n.d.] data), the median duration was 18 months, with 75 percent of cases resolved in 36 months. When the plaintiff prevailed "on at least one claim, 50 percent of the cases are resolved within 2.5 years; 75 percent resolved within about 4.3 years; and 90 percent of the cases are resolved within 6.2 years." These lawsuits therefore constitute long additions to project timelines, especially given the amount of time it takes for a lawsuit to fail.

This large amount of litigation is consistent with the uniquely large role lawyers play in both processes of adjudication and the political culture of the US. Ours has been called a system of "adversarial legalism," in which policy is often made through decentralized litigation (Kagan 2019). As Alexis de Tocqueville wrote in 1835, "There is hardly any political question in the United States that sooner or later does not turn into a judicial question" (de Tocqueville 1835). The lawyer-intensive nature of the US has, if anything, increased over time: between 1960 and 1987, the share of GNP going to legal services almost tripled (Sander and Williams 1989). This

trend is particularly reflected in the amount of private litigation to enforce federal statutes (defined as number of cases per 100,000 people), which increased from 3 in 1967 to 13 in 1976, 21 in 1986, 29 in 1996, and 40 in 2014 (Burbank and Farhang 2017).

Compared with a sample of European countries, the US has the second-highest number of lawyers per capita, at 400 lawyers per 100,000 people—much higher than countries at the bottom of the distribution, which have between 40 and 83 lawyers per 100,000 people (Liscow 2024). Ramseyer and Rasmusen (2010) find that the US has significantly more suits filed per capita than each of Australia, Canada, France, Japan, and England, and far more judges than the other countries excepting France. Reportedly, "European and Japanese multinational corporations generally maintain larger staffs of in-house attorneys in their U.S. subsidiaries than in their corporate headquarters and other subsidiaries combined, and they spend more in the United States for reporting, testing, and certifying to regulators that their companies are complying with the law" (Kagan 2019, 36).

The saga of Cape Wind illustrates the combination of permitting challenges and litigation that can slow infrastructure development, if development happens at all. In 2001, the developer Cape Wind proposed building the United States's first offshore wind-energy project in federal waters in the Nantucket Sound and commenced environmental review under the National Environmental Policy Act and the Massachusetts Environmental Policy Act (Kimmell and Stalenhoef 2011). After opposition from parties including those (like Senator Edward Kennedy) who would see the turbines from their homes, Cape Wind received state permits in 2009 and federal permits in 2010, almost ten years into the project. Even after that, multiple lawsuits continued. Partly because of the long delay, Cape Wind failed to meet a construction deadline and lost several contracts; the project was shuttered after costing Cape Wind $100 million (Seelye 2017). Cape Wind led a former Massachusetts environment and energy secretary (and Cape Wind supporter) to say, "The project unfortunately demonstrated that well-funded opposition groups can effectively use the American court system to stop even a project with no material adverse environmental impacts" (Seelye 2017).

3.3 Tools

In operating under a sensible set of procedures, personnel must also have good tools for infrastructure development. This subsection discusses two areas of concern: data infrastructure and long-term planning.

3.3.1 Data infrastructure and transparency are weak

US data and transparency on infrastructure construction are weak. The situation for infrastructure construction is part of a larger weakness in US government information technology—including,

for example, the old computer systems, sometimes written in old and now rarely used computer languages, that helped undermine the rollout of pandemic unemployment insurance (Lindsey 2021). The costs of weak data infrastructure to effective infrastructure construction may be less visible than the issues with unemployment insurance, but they are similarly corrosive. Consider three examples.

First and most basically, little data is systematically available on what transportation infrastructure costs overall—or what the components of those costs are. For example, Brooks and Liscow (2023) had to spend years finding, digitizing, and cleaning data on spending on the half-trillion-dollar interstate highways. Goldwyn et al. (2023) had to hand-collect data on recent transit projects. Some states make some construction cost data available on their websites, but many do not. This state of affairs is not conducive to public accountability or to analysis of cost drivers.

Second, when data are available, measures of costs are often not consistent across states. Even something as simple as reports to the federal government about the amount of money spent on maintenance are not consistent across states (Liscow, Nober, and Slattery 2023). As a result, it's difficult for states to learn from each other or for researchers to help states learn. Since the national data were not helpful, Liscow, Nober, and Slattery (2023)—in order to see how procurement practices relate to construction costs across states—had to go state-by-state to collect data on five repaving projects, often through state Freedom of Information Act requests. These kinds of high barriers to entry deter much good analysis.

A third example is permit tracking. There have been advances in this area; a federal dashboard now tracks the status of major projects. And the Council on Environmental Quality at the White House now tracks the timing on environmental impact statements written for the one hundred to two hundred biggest projects each year. However, a far greater number of projects—an estimated 12,000—are not expected to have a significant environmental impact; rather than including environmental impact statements, proposals for these project merely include "environmental assessments" (CEQ 2016). Little is known about these latter projects.

3.3.2 There is a lack of coordinated long-term planning

Coordinated long-term planning for infrastructure is often lacking, despite the fact that infrastructure assets are very long-lived and often involve the cooperation of multiple levels of government and multiple jurisdictions. The issues that arise from the tendency not to plan can be seen through two examples.

First, experts agree broadly that the slow construction of new electricity transmission is the "Achilles' heel of the transition to cleaner energy," since renewables are often produced far from

population centers (Plumer 2024). New transmission often needs to cross multiple states, requiring signoff from many state and local governments. Putting aside the question of whether federal law could preempt state law in allowing this construction, it is also remarkable that there is no plan for this construction, despite the need to coordinate generation, transmission, and consumption across wide spaces and substantial time. The US Department of Energy (2023) has produced reports on the need for more transmission. But no national plan exists for this large rollout on which the clean transition depends. This contrast with the case of the interstate highways, for which the federal government produced a detailed plan in consultation with the states, is notable because interstate electricity transmission is in a sense the interstate highway system of the twenty-first century, with big networks needed across state lines. The consequence is that it is harder for producers to know where to site electricity generation, since they don't know if there will be transmission, and for potential builders of transmission to know where to site transmission lines, since they don't know if there will be generation—or if other competing lines will also be built (National Academies of Sciences 2021).

Similarly, for transportation infrastructure, a lack of long-term planning creates challenges for transit construction partially funded by the federal government. Without having more sense today of what the federal government will fund down the road, it is hard to know what to plan for (National Academies of Sciences 2022). Federal funding uncertainty therefore leads local transit agencies to delay projects until that uncertainty is resolved, even though they fund substantial chunks of transit themselves (Kline 2018). As well, returning to the issue of personnel, when grants are intermittent, it is problematic for local agencies to hire permanent staff when the funding may dry up, leading to the weaker staffing described above; many agencies instead have turned to consultants (Goldwyn et al. 2023). Finally, without a clear pipeline, local agencies have an incentive to layer into the projects that actually are funded a host of other amenities, like parks and housing. This state of affairs contrasts with a system in which agencies know that they have access to a stream of money for a particular infrastructure program and that, if they spend less on the current project and built it more quickly, they can move onto the next project with federal funding, providing more transit infrastructure to their constituents sooner.

4. Potential solutions to state capacity challenges

This section links the problems highlighted above with potential solutions.

4.1 Personnel

4.1.1 Hire more government infrastructure experts as employees

Governments at all levels may simply have too few infrastructure experts as employees to optimally decide what to build, permit the project, design the project, put the contract out to bid,

and monitor construction contractors. Counterintuitively, hiring more workers may *reduce* overall costs.

Recall the evidence that more state DOT employment is strongly correlated with lower construction costs, as found by Liscow, Nober, and Slattery (2023), perhaps a result of better project management. This finding is not a surprise, as the benefits of adequate staffing have been shown in a variety of settings, from IRS agents paying for themselves twice over (Swagel 2021) to the number of municipality-level bureaucrats causing higher municipality public-utilities coverage in Colombia (Acemoglu, García-Jimeno, and Robinson 2015).

Most basically, Congress and state legislatures could simply appropriate more money to hire more planning and management staff. Doing so is particularly challenging at the federal level because domestic appropriations for staffing often face a squeeze, since they (unlike the big social-insurance programs) must be appropriated annually. For permitting, the federal government has increased funding in the BIL and IRA, which may have resulted in quicker permitting. But various levels of government could increase their hiring yet more, including in the other stages of the process, like project design and contract management.

Needless to say, such hiring increases are all the more important with all the new spending in the BIL, the IRA, and the CHIPS Act. One small illustration is the ramp-up of formal benefit-cost analysis at the US Department of Transportation (DOT) for its discretionary grant funding. The department is now doing vastly more benefit-cost analysis because BIL dramatically increased the funds that USDOT allocates subject to benefit-cost analysis. But the DOT's staff size for conducting these reviews has not changed greatly, despite its now having to review a vastly expanded number of grant applications. In addition, benefit-cost analysis is hard, and with ever more variables to consider (for example, those on climate mitigation), the need for skilled personnel is even higher.

Finally, to help fill the personnel gap, the federal government could offer fellowships to strengthen the pipeline of talented planners, designers, and engineers. One such government program, the Dwight David Eisenhower Transportation Fellowship Program, supports students who are pursuing transportation-related degrees (US Department of Transportation, Federal Highway Administration 2024). A fellowship focused on government service, such as one modeled on the successful US Digital Corps program for early career technologists, could also improve capacity. Universities can help as well; for example, Yale places roughly a dozen people per year in Connecticut state government in technical and policy roles (Yale University n.d.).

4.1.2 Bring public workers' pay in line with that of their private-sector counterparts

A second reform is paying workers in line with their private-sector counterparts, especially given the apparently rising gap between private-sector and public-sector pay. Evidence suggests that paying public-sector workers more produces better output. For instance, Krueger (1988) documents an improvement in the average quality of federal workers when the ratio of government pay to private-sector pay is increased. Mas (2006) documents that when New Jersey police officers lose in final arbitration and receive a lower wage than requested, arrest rates decline and crime reports rise, as compared to when they win.

Higher pay would also help employers to fill empty slots, which is increasingly a problem at state departments of transportation and local transit agencies (Curry 2024; Kobin 2023). It would especially help with recruiting high-skilled employees, like engineers. Being able to hire more high-skill employees would aid governments in finding the right mix of insourcing and outsourcing design, which they plausibly do not have now in light of challenges in competing with private-sector employers—especially for higher-skilled employees above the top of the government pay scale (Kobin 2023).[5]

4.1.3 Insource more planning

As described earlier, surveys of state transportation officials and the contractors point to consultant use as a cost driver (Liscow, Nober, and Slattery 2023). And concern about consultant use strongly correlates with higher construction costs. Case studies comparing lower-cost transit construction to higher-cost US construction also point to the importance of in-house expertise. These findings are not surprises, given a long economics literature showing that, where outputs can be clearly contracted over (as in the case of repaving or construction more generally), outsourcing works well, whereas where they cannot (as in the case of deciding what to build and in managing contracts), outsourcing often does not work well (Hart, Schleifer, and Vishny 1997; Andersson, Jordahl, and Josephson 2019).[6] External metrics of design quality and contract management are quite hard to contract over, partly because so many factors intervene between the stage of design and the final product, including a myriad of construction contractors and, often, many government-induced design changes. Likewise, Mazzucato and Collington (2023) note that "the use of consultants to develop or deliver a core function . . . assumes learning in the

[5] There is a long literature on revising *how* workers are paid, with conflicting evidence about how pay structure affects performance. For that reason, my proposal is about the level of pay—for which evidence is stronger—and I do not attempt to propose a revision in pay structure.

[6] For example, Knutsson and Björn (2022) find that quasi-randomized private ambulances in Sweden reduce costs and perform better on contracted measures such as response time, but perform worse on non-contracted measures such as mortality. They frame the issue as a moral hazard problem—outsourced firms have strong incentives to comply with contracted measures and neglect unmeasured responsibilities.

contracting organization is not an incremental and collective process, but a transaction," leaving organizations lacking the capacity to plan well over the long term.

"Insourcing" more workers on project design could help solve incentive problems in which consultants have an incentive to design more complicated projects because they then get paid more. This issue has come up repeatedly in American transit development, given that few, if any, American transit agencies have adequate in-house expertise in building rail projects (Goldwyn et al. 2023, 24). For example, the MBTA only had a handful of full-time employees assigned to manage its first attempt at the Green Line Extension. Forced to rely on consultants for the bulk of planning, design, and construction, "project scope ballooned and consultants studied project alternatives that were obviously unviable" because "there was no one at the [MBTA] to rein in the consultants" (Goldwyn et al. 2023, 24–25). Similarly, consultants hired by the MTA for the Second Avenue subway extension "stud[ied] every challenge that emerged multiple times" and even studied "basic problems that should have been determined prior to hiring a consultant," in large part because the agency lacked in-house expertise to effectively direct them (Goldwyn et al. 2023, 364–65). In any case, the government itself presumably should be able to exert greater control over consultants via increasing its staffing.

Several possible reforms exist, beyond simply choosing to insource rather than outsource planning and management where possible. First, as noted, outsourcing occurs partly because—especially in highly-paid professions—government wages cannot compete with those in the private sector. Thus, allowing a higher pay scale for at least some employees would help. Recall: compared to the costs of construction, the personnel costs of planning and managing are typically relatively small.

Second, the often-cumbersome process for hiring government employees could be streamlined, which would generally help agencies to hire more and better employees.

Third, federal rules could be changed to make insourcing planning at the state and local levels easier. The current rules typically provide federal funding for projects rather than permanent overhead, making it easier for employers to pay for consultants to plan than to build up their own long-term internal capacity (Kirk 2022; Mallett 2024). Federal funds could therefore come with fewer strings attached, particularly with regards to state and local government capacity-building. Doing so would build on funding in the 2021 American Rescue Plan and BIL that has been directed toward building up state and local personnel (Ross et al. 2023). Especially as project-based funds from the recent spate of legislation expire, it will be all the more important to add flexibility to allow the retention of government capacity to implement government funding programs.

4.2 Procedure

4.2.1 Reduce procedural requirements for procurement and permitting, and reduce litigation

Another set of reforms could help modify the internal administrative procedures and rules of judicial review to enhance the ability of government to do its job well. These reforms would respond to the claim that the government has become over-proceduralized (Bagley 2019; Pahlka 2023). There are many possibilities—and I won't attempt to do a comprehensive review.

Regarding administrative rules, Glaeser and Poterba (2021) point to procurement rules as a promising place of reform. These rules often have an admiral goal of reducing corruption and generally shepherding public resources. But many critics think that the balance between, on the one hand, constraining civil servants to prevent them from doing bad things and, on the other, giving them flexibility to allow them to do good things is not currently set right. For example, rules typically require that the lowest-cost bid be taken, even when the company with the bid has a history of poor performance. Rules could be changed to focus more on past performance.

Indeed, evidence suggests that allowing government actors in the US more discretion could improve outcomes. Bosio et al. (2022) find that, across countries, regulation of procurement is effective in countries with low educational levels (a proxy for the quality of government workers), whereas it is not as effective in high-education countries, arguably because the rules stop the use of discretion that could produce better outcomes. The US is a high-education country, suggesting that more flexible procurement rules would be good.

Similarly, the various forms of environmental review have the admirable goal of preserving the environment and ensuring public participation. But many experts think that the current rules achieve neither of these goals but do considerably slow development and increase costs. As Liscow (2024) explains, a wide variety of potential reforms exist. Many of these reforms would empower the executive branch relative to the judiciary by making it harder for litigation to hold up projects or send them back to the drawing board by invalidating environmental reviews. For example, courts could be directed to invalidate an environmental review only if a consideration that was not adequately discussed would likely have changed the decision in a project, compared to now, when the likely "materiality" of such considerations to an ultimate decision has little bearing on courts' verdicts. Similarly, the power of courts to stop projects from proceeding during litigation could be curtailed.

Proposals to reign in the judiciary raise the question of how the executive branch would stay accountable. The proposals might be attractive only insofar as other mechanisms can hold the executive branch accountable. Kagan (2019, 249) describes the "administrative supervision and political oversight" that in "most democratic countries" holds decision-makers accountable—

particular when they are forced to defend decisions in front of political leaders (who wish to be reelected), federal agency funders, legislative appropriation committees, public meeting attendees, and the press.

Finally, it is worth emphasizing that sometimes the US can get things done. For example, after an Interstate 95 bridge in Philadelphia collapsed in June 2023, the governor declared a state of emergency, under which any statutes and rules were suspended that "would in any way prevent, hinder, or delay necessary action in coping with this emergency event." Procurement rules that would have taken a while to comply with were waived and contractors who could do the work quickly were hired without the regular bidding process. Remarkably, the road was rebuilt and reopened in just 12 days. This experience raises the question whether there are lessons here that could be applied elsewhere. Those sometimes-lengthy procurement rules are designed to prevent corruption and ensure that the lowest-cost bidder is chosen. But the savings from reduced corruption might be outweighed by the increased monetary cost and the delay imposed by the rules.

4.2.2 Improve coordination within the government

More coordination within the government—even within one level of government—would improve state capacity for infrastructure building. Take the example of permitting by the federal government. New Zealand, for example, issues permits through a "one-stop shopping" process (Schumacher 2019). The US system, reflecting the American penchant for fragmenting power (Kagan 2019), gives each federal agency its own distinct grant of jurisdiction and authority. However, agency jurisdictions often overlap—with the result that US federal-agency administration is liable both to coordination failures and agency procedure duplication. For example, when projects require multiple permits (as almost every significant project does), agencies often have a policy not to begin permitting until other permitting authorities complete their own processes, which causes delay. These problems, endemic to the structure of the American administrative state, have remained persistent despite attempts to mitigate them. Recent changes, such as the establishment of the Federal Permitting Improvement Steering Council and of coordination requirements that could in principle unify multi-agency projects under a common procedural framework, have helped. But this deep structural problem likely requires a statutory fix alongside changes to normal practice.

4.2.3 Promote public participation that captures more representative views more efficiently

An important part of state capacity is public participation, both to discern the preferences of the public and, more broadly, to legitimate the state. Yet the tools used in the name of promoting better public participation often bog things down. Can reforms accomplish the seemingly

conflicting goals of both capturing more representative public views and speeding construction? Perhaps so.

The tools for getting public feedback today are often cumbersome. For example, surveying the public requires going through the ironically named "Paperwork Reduction Act," which many argue actually increases paperwork (Rahman 2024, 41; Bourns, Nou, and Shapiro 2018). Producing a survey would require following a lengthy intra-government process to write the survey, putting the survey out for public review, responding to comments from the public review, then likely undergoing another intra-government review process—all before fielding it (Bourns, Nou, and Shapiro 2018).

Another example is the way that environmental review functions for getting public input under NEPA. Many practitioners argue that environmental reviews are more oriented around litigation-proofing a project by saying something about every possible concern than they are invested in legitimately soliciting public feedback and getting better outcomes (CEQ 1997). For example, former EPA general counsel E. Donald Elliott says that he thinks that about 90 percent of the detail in a typical environmental review is driven by the desire to litigation-proof a project (Howard 2015). The current structure actually creates incentives to not get good public feedback because doing so would yield more comments to address and possibly open up more avenues of litigation. In any case, practitioners say that the design of projects is typically already largely set before environmental review begins, meaning that the environmental review can often just be window dressing (CEQ 1997; Liscow 2024).

Both of these issues could be partially addressed by simultaneously (a) loosening the procedural requirements driven by regulation and litigation, and (b) setting up procedures to legitimately solicit good public feedback, especially at early stages before the decisions are made. This strategy raises the question of how proposal-writers might facilitate more public participation in project development without adding more time-consuming procedures and litigation to the process. One way would be to develop procedures that seek out representative participation at an early stage—but then not make them judicially enforceable. Rules could instead depend on the combination of bureaucratic practice and political incentives to do what the public wants, as tends to be the case in European countries (Kagan 2019).

None of this is to say that changes here would be easy. For example, who is to say what is "good" versus "bad" feedback? A bike lane might be a godsend to some and a hindrance to others. So we can't speak here to substantive policy outcomes. But on grounds of social welfare and democratic theory, it is valuable for public participation in the development of any project to be broad and meaningful—and then for project planners to be able to expeditiously make a decision and proceed accordingly. And it is plausible that the current situation is bad enough—

privileging well-heeled parties, taking a long time, and driving up costs—that reforms to public-participation processes could improve both participation *and* efficiency.

4.2.4 Centralize certain kinds of decision-making at federal level

In some cases, centralizing decision-making in the federal government could minimize the number of hoops that project planners must jump through. Whether such an approach is appropriate must be determined on a case-by-case basis, but in some situations, basic economic principles do point toward centralization.

Take the example of interstate electricity transmission, which is essential if we are to make the green transition. Currently, the Federal Energy Regulatory Commission (FERC) approves interstate natural-gas pipelines in a process that preempts local permitting. For building electricity transmission projects, however, FERC only categorically preempts state and local regulations for hydropower; other transmission projects, including transport electricity produced by wind or solar power, are subject to state and local permitting requirements (with some limited exceptions). Extending federal preemption to more or all transmission projects would enhance the ability of the federal government to approve interstate clean-energy transmission lines. Such an expansion of centralized decision-making power could be modeled after, for example, the Federal Communications Commission's permitting process for cell towers. Since the Telecommunications Act of 1996, local governments have had the authority to regulate cell towers but not to ban them entirely (Dodge 2023); furthermore, decisions have to be made within a reasonable amount of time and with "substantial evidence" in writing, with expedited court proceedings offered as a remedy. Centralization could also help create economies of scale in decision-making, thereby improving efficiency.

4.3 Tools

4.3.1 Improve data systems and make them more transparent

Government data systems for tracking and analyzing timelines and costs could be dramatically improved. To solve a problem, one must understand it, and it is hard to understand a problem without good data. As described above, the data now are quite poor. Data-systems performance matters for multiple reasons. First, any individual federal, state, or local agency will best be able to understand how to build effectively if it has a good grasp of its own projects. Second, state and local agencies will learn from each other if they share data, an external benefit that no individual agency captures. Third, with better data that is also transparently available to the public, researchers can better analyze it and advise all agencies. Fourth, with better data and transparency, the public will be better positioned to push for effective spending.

One solution is for state DOTs to band together to agree on standard-setting. Another solution would be for the federal government to condition their large transfer payments on greater data uniformity and transparency to state and local governments. Finally, the 2026 reauthorization of the surface transportation bill could be a good opportunity to require more public accounting, at all levels of government, of how the public's funds are spent; doing so would require funding, but that funding would constitute only a tiny portion of what is spent on construction, and it would have huge potential payoffs given the potential for reducing costs.

4.3.2 Increase government planning where appropriate

The US has a longstanding skepticism of government power, going back to the American Revolution to oust a despotic king. This skepticism manifests itself in a variety of efforts to reduce government capacity, and it includes a distrust of government planning. To be sure, mid-twentieth-century US urban planning is widely regarded as having been disastrous, ripping out the hearts of cities at great expense and harm to the largely disadvantaged communities who were displaced with little apparent gain in economic vitality. But the US has long engaged in planning and continues to do so. The US military engages in a great deal of planning, which is important when we are building aircraft carriers that are expected to be part of the fleet until year 2105 (Thompson 2022). As described earlier, even as it is doing little planning today for the interstate electricity transmission crucial for the green transition, the federal government did a great deal of planning for an earlier, large cross-state network: the interstate highways, which were planned to a quite detailed level before the act authorizing most funding for them passed in 1956—and which were then largely implemented as planned. The federal government could do that planning again today for interstate electricity transmission.

For permitting, the federal government could engage in more so-called programmatic reviews, in which one review approves activity for a large class of activities. For example, the Department of the Interior has developed such a plan for developing solar-power infrastructure in the western US (US Department of the Interior 2024). Broader planning could not only cut down on litigation but also allow consideration of a broader range of interests, possibly diminishing the power of NIMBYs—but in any case allowing rational planning. Doing so would follow recent EU moves (European Parliament and Council of the European Union 2023).

Similarly, regarding transit planning, it would be helpful to have long-term visions for what infrastructure is part of any given plan. That way, local agencies would know what funding they are likely to get and where they can get started planning. They could hire the appropriate personnel for the long-term vision. And they could reduce costs and increase speed for each project with more assurance that, the less expensively and more quickly they finish one project, the sooner they can move onto the next, creating better incentives.

Of course, many kinds of planning exist. Urban redevelopment came with coercion (eminent domain) and funding, greatly increasing state capacity but also increasing the risk of harm. The coordinating function of planning is helped by coercion and funding, but need not have any coercion and need not have much funding. For example, the Department of Energy is leveraging a few billion dollars for transmission deployment (Grid Deployment Office 2024). It would be helpful to have a national plan to best deploy it.

5. Conclusion

State capacity is essential to the effective use of government infrastructure-construction dollars. Unfortunately, some warning signs are flashing about US state capacity. It increasingly appears that the US has too few government planning and management personnel—and pays too little. Relying on outsourcing of planning and management is a risky strategy. Likewise, government personnel are burdened by procedures for things like procurement and permitting—and then subsequent litigation—that are arguably excessive. And government often lacks needed data and planning tools.

The stakes are high. The US spends far more than similar countries do on infrastructure construction. Building state capacity is very cheap by comparison; improving it could yield big returns.

State capacity is not just an issue for infrastructure. Other high-profile failures of state capacity abound, like the Healthcare.gov meltdown and the IRS's failure to collect revenue from tax cheats. So, in infrastructure construction and elsewhere too, hiring enough government personnel, paying enough to attract talent, having an appropriate number of procedural rules, and giving personnel the tools to succeed can help make government work better, producing better outcomes for the public and building trust in government.

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Markets for the People

Glenn Hubbard

The advent of "bidenomics" has resurrected decades-old debates about the merits of markets versus industrial policy. When President Joe Biden announced his eponymous strategy in June 2023, he blasted what he described as "40 years of Republican trickle-down economics" and insisted that he would seek instead to build "an economy from the middle out and the bottom up, not the top down." This he would achieve through "targeted investments" in technologies like semiconductors, batteries, and electric cars — all of which featured heavily in initiatives like the CHIPS and Science Act and the Inflation Reduction Act. Yet despite the president's professed support for a "middle out" economics, Bidenomics has thus far proven to be less of an intellectual framework than a set of well-intended yet ill-fated industrial-policy interventions implemented from the top down.

Some conservatives have joined Biden in embracing industrial policy. Writing recently in these pages, Republican senator Marco Rubio of Florida asserted that while it is difficult to "get industrial policy right, conservatives can and must take ownership of this space to keep the American economy strong and free." Former president Donald Trump, for his part, staunchly advocates heavy tariffs to promote domestic manufacturing.

Conservatives who adopt their own version of protectionist tinkering with markets are missing an important opportunity. As mercantilism's decline did for classical liberalism in the 19th century and Keynesianism's misadventures did for neoliberalism in the 20th, Bidenomics' failures offer an opening for the right to champion a new type of economics — one

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that puts opportunity for the people ahead of the economic rules of the game.

Rapid globalization and technological change *have* left too many Americans behind. But the answer is not for the state to invest in costly projects with dubious prospects, nor is it to adopt a strictly laissez-faire approach to the economy. By reviving classically liberal ideas about competition and opportunity in the face of change, conservatives can promote an alternative economics that retains the enormous benefits of markets and openness while putting people first.

liberalism's rise and fall

Before "Bidenomics" became a popular term, national-security advisor Jake Sullivan hinted at the president's economic priorities in an April 2023 speech at the Brookings Institution. There, he declared that a "new Washington consensus" had formed around a "modern industrial and innovation strategy," which would correct for the excesses of the free-market orthodoxy propagated by the likes of Adam Smith, Friedrich Hayek, and Milton Friedman.

This orthodoxy, according to Sullivan, "championed tax cutting and deregulation, privatization over public action, and trade liberalization as an end in itself," all of which eroded the nation's industrial and social foundations. Finally, after nearly three decades of such policies, two "shocks" — the global financial crisis of 2007-2009 and the Covid-19 pandemic — "laid bare the limits" of liberalism. The time had come, Sullivan concluded, to dispense with decades of policies touting the benefits of markets and free trade — and economists would just have to get over it.

The Biden administration's assault on open markets and free trade is odd in some respects. Scholars at the Peterson Institute for International Economics — located just across the street from Brookings — concluded in a 2022 report that, thanks to America's openness to globalization, trillions of dollars in economic benefits have flowed to U.S. households. Moreover, the United Nations estimates that integrating China, India, and other economies into the world trading order has brought one billion individuals out of poverty since the 1980s. The impact of technological change as a driver of growth and incomes is larger still. Juxtaposing such outcomes with the administration's grievances calls to mind the popular outcry in Monty Python's *Life of Brian*: "What have

the Romans ever done for us?" Quite a lot, in fact.

Proponents of free markets have clashed with advocates of government intervention before, most notably at the dawn of classical liberalism toward the end of the 18th century and the advent of neoliberalism during the first half of the 20th. These contests were not so much battles of ideas as they were intellectual critiques of real-life policy failures.

In 1776, Adam Smith's *Inquiry into the Nature and Causes of the Wealth of Nations* threw down the gauntlet. The book was radical, offering a sharp rebuke of the economic-policy order of the day. Mercantilism — or the "mercantile system," as Smith called it — assumed that the world's wealth is fixed, and that a state wishing to improve its relative financial strength would have to do so at the expense of others by maintaining a favorable balance of trade — typically by restricting imports while encouraging exports. Recognizing merchants' role in generating domestic wealth, mercantilist states also developed government-controlled monopolies that they protected from domestic and foreign competition through regulations, subsidies, and even military force.

Predictably, this system enriched the merchant class. But it did so at the expense of the poor, who were subject to trade restrictions and import taxes that drove up the price of goods. It also stunted business growth, expanded the slave trade, and triggered inflation in regions with little gold and silver bullion on hand.

Smith turned the mercantilist view on its head, insisting that the real touchstone of "the wealth of a nation" was not the amount of gold and silver held in its treasury, but the value of the goods and services it produced for its citizens to consume. To maximize a nation's wealth, he argued that the state should unleash its population's productive capacity by liberating markets and trade. Setting markets free, he observed, would enable firms to specialize in generating the goods they produced most efficiently, and to exchange surpluses of those goods for specialized goods produced by others. This approach would spread the benefits of free trade throughout the population.

While sometimes caricatured as a full-throated endorsement of laissez-faire economics, *Wealth of Nations* also recognized that government played an important role in sustaining an environment that would allow free markets to flourish. This included protecting property rights, building and maintaining infrastructure, upholding law and order,

promoting education, providing for national security, and ensuring competition among firms. Smith cautioned, however, that government officials should be careful not to distort markets unnecessarily through such mechanisms as taxation and overregulation, and should avoid accumulating large public debts that would drain capital from future productive activities.

Mercantilism did not suddenly fall away after Smith's critique; it continued to dominate much of the world's economic order for another half-century. But eventually, Smith's arguments in favor of market liberalization carried the day. For much of the 19th and early 20th centuries, free markets and free trade facilitated unprecedented prosperity in the West.

A parallel series of events occurred during the 1930s and '40s, when Friedrich Hayek and John Maynard Keynes famously (and nastily) debated economic theory in the pages of the *Economic Journal*. That contest, too, revolved around what was happening on the ground: the Great Depression and increasing government investment in industry. Keynes contended that market economies experience booms and busts based on fluctuations in aggregate demand, and that the government could mitigate the harms of recessions by stimulating that demand through increased spending. Hayek disagreed, arguing that such large-scale public spending programs as those Keynes proposed would prompt not just market inefficiency and inflation, but tyranny.

During the 1950s and '60s, Milton Friedman took on Keynes's theories, asserting instead that the key to stimulating and maintaining economic growth was to control the money supply. He also expanded on Hayek's case for free markets as necessary elements of free societies: As he wrote in *Capitalism and Freedom*, economic freedom serves as both "a component of freedom broadly understood" and "an indispensable means toward the achievement of political freedom."

Of course Hayek and Friedman, like Smith before them, did not immediately win the debate; Keynesianism dominated America's economic policy for decades after the Second World War. But by the mid-1970s, rising inflation and slowed economic growth pressured policymakers to consider a different approach. Hayek and Friedman's arguments — now often referred to collectively as "neoliberalism" — ultimately won over important political figures like Ronald Reagan and Bill Clinton in the United States and Margaret Thatcher and Tony Blair in Britain. It had a

major impact on each of their economic-policy initiatives, which typically combined tax cuts and deregulation with reduced government spending and liberalized international trade.

The upshot of that liberal market order is reflected in the 2022 findings of the Peterson Institute outlined above — namely the trillions of dollars in economic benefits that have flowed to American households. In a similar vein, the institute found in a 2017 report that between 1950 and 2016, trade liberalization combined with cheaper transportation and communication owing to technological change increased per-household GDP in the United States by about $18,000. The benefits of economic liberalism have thus been and continue to be massive.

NEOLIBERAL OVERCORRECTION

For all the prosperity it brought to the world, market-induced change in an era of globalization and rapid technological advance also entailed significant costs. Leaders across the political spectrum celebrated the former but paid little attention to the latter, which hit low- and medium-skilled American workers particularly hard. As global competition intensified and technological change mounted, tens of thousands of Americans in the manufacturing industry lost their jobs. Meanwhile, state benefits programs and occupational-licensing requirements made it difficult, if not impossible, for these individuals to move in search of better opportunities.

Neoliberal economic logic asserts that maintaining the labor market's dynamism will right the ship in response to economic change — that new jobs will be created to replace the old. While true in most respects, for individuals and communities buffeted by structural market forces beyond their control, "just let the market work" is neither an economically correct answer nor a response likely to win political favor.

Proponents of neoliberalism tend to overlook the politically salient pressures generated by the speed, irreversibility, and geographic concentration of market-induced changes. Their lack of empathy for working-class communities hollowed out by the competitive and technological disruption that took place between the 1980s and the early 2010s ceded the political lane to proponents of industrial policy, enabling Trump to ride the wave of working-class grievances to the White House in 2016.

The ensuing tariffs, along with President Biden's protectionist

activity, invited retaliation from America's trading partners. A Federal Reserve study by economists Aaron Flaaen and Justin Pierce concluded that, contrary to protectionists' claims, employment losses triggered by trade retaliation were significantly greater than the number of jobs garnered through protectionism. The subsidy game tells a similar story: The Inflation Reduction Act's large incentives for domestic clean-energy projects put America's trading partners engaged in battery and electric-vehicle manufacturing at a disadvantage, which in turn pushed greater subsidization efforts overseas and prompted political grumbling among our trading partners.

It is policy failure, not a grand new economic strategy, that the Biden and Trump administrations' industrial policies have teed up. Market liberalism must rise once again to counter the muddled mercantilism of both. But instead of repeating the cycle of neoliberalism overcorrecting for central planning and vice versa, today's free-market and free-trade proponents will need to update their theories to address the challenges of our contemporary economy. By recovering insights from classical liberalism while keeping people in mind, economic policymakers can once again facilitate an open economy that ensures mass opportunity and flourishing.

Muddled Mercantilism

An intellectual path forward for today's economic liberals must begin by highlighting the practical failures of Sullivan's "new Washington consensus." To that end, it will be useful to revisit the lack of intellectual foundation in today's mercantilist industrial policy.

Skepticism of industrial policy revolves around two major problems inherent to the strategy. The first is ensuring that capital is allocated to "winners" and not "losers." The second is protecting industrial policy from mission creep and rent seeking.

Hayek addressed the first problem in his classic 1945 article, "The Use of Knowledge in Society." As he observed there, "the knowledge of the particular circumstances of time and place" necessary to rationally plan an economy is distributed among innumerable individuals. No single person has access to all of this localized knowledge, which is not only infinite, but also constantly in flux. Statistical aggregates cannot account for it all, either. Thus, even the most earnest and sophisticated government planners could not amass the knowledge required to allocate

capital to the right firms based on ever-changing circumstances on the ground. Recent examples of the government's misfires — from the bankruptcy of the federally subsidized solar-panel startup Solyndra to the billions in Covid-19 relief aid lost to fraud and waste — speak to the truth of Hayek's argument.

The free market, by contrast, transmits relevant information — that "knowledge of the particular circumstances of time and place" — in real time to everyone who needs it. It does so in large part via the price system. Friedman famously illustrated this process using the humble No. 2 pencil:

> Suppose that, for whatever reason, there is an increased demand for lead pencils — perhaps because a baby boom increases school enrollment. Retail stores will find that they are selling more pencils. They will order more pencils from their wholesalers. The wholesalers will order more pencils from the manufacturers. The manufacturers will order more wood, more brass, more graphite — all the varied products used to make a pencil. In order to induce their suppliers to produce more of these items, they will have to offer higher prices for them. The higher prices will induce the suppliers to increase their work force to be able to meet the higher demand. To get more workers they will have to offer higher wages or better working conditions. In this way ripples spread out over ever widening circles, transmitting the information to people all over the world that there is a greater demand for pencils — or, to be more precise, for some product they are engaged in producing, for reasons they may not and need not know.

In this way, free markets ensure that capital is allocated to the right place at the right time based on the laws of supply and demand.

The second problem that plagues industrial policy arises when policies that are nominally targeted at a single goal end up serving the interests of government actors and individual firms. This problem comes in two flavors: mission creep and rent seeking.

Mission creep is the tendency of government actors to gradually expand the goal of a given policy beyond its original scope. One illustrative example comes from the CHIPS and Science Act, a bill designed to encourage semiconductor manufacturing in the United States. The

act tasked the Commerce Department with drafting the conditions that manufacturers must meet to qualify for the program's $39 billion in subsidies. In addition to manufacturing semiconductors domestically, those rules now require subsidy recipients to offer workers affordable housing and child care, develop plans for hiring disadvantaged workers, and encourage mass-transit use among their workforces. While arguably laudable (and certainly attractive to various interest groups), these goals distract from the original purpose of the law and may even detract from it.

Rent seeking — another problem characteristic of industrial policy — is a strategy that firms employ to increase their profits without creating anything of value. They do so by attempting to influence public policy or manipulate economic conditions in their favor.

Rent seeking often arises when firms devote lobbying resources to garnering funds from new government largesse. For the CHIPS and Science Act, firms' scramble for subsidies replaces a focus on basic research. For the Inflation Reduction Act, firms' hiring consultants to help them gain access to agricultural-conservation spending and technical assistance replaces a focus on researching market trends.

Industrial unions — whose goals might not be consistent with market outcomes or the new industrial policy — are a second source of rent seeking. Today, both the left and right have slouched away from liberalism's emphasis on maintaining an open and dynamic labor market, pledging instead to create and protect "good jobs" — primarily in the manufacturing sector. This new thrust is yet another example of Washington picking "winners" and "losers" among industries and firms.

Concerns about this new approach to labor policy extend well beyond neoliberal critiques of limiting labor-market dynamism. Practically speaking, who decides what a "good job" is, or that manufacturing jobs are the ones to be prized and protected? Many of today's most desired jobs for labor-market entrants did not exist decades ago when manufacturing employment was at its peak. Why should industrial policy's goal be to cement the past as opposed to preparing individuals and locales for the work of the future?

A Path Forward

Bidenomics' policy failures offer an opening for leaders on the right to champion a new type of liberal economics that avoids the pitfalls of

both markets-only neoliberalism and industrial policy's central planning. In doing so, they will need to keep three things in mind.

The first is obvious but bears repeating: Markets don't always work well, and calls for intervention are not necessarily calls for industrial policy.

Critiques of neoliberalism often focus on the stark observation from Friedman's famous 1970 *New York Times* piece on the purpose of the corporation, which he asserted is to maximize its profits — full stop. While the article has now generated more than five decades of criticism, Friedman's argument is quite sensible as a starting point under the assumptions he had in mind: perfect competition in product and labor markets, and a government that does its job well — namely by providing public goods like education and defense, and correcting for externalities.

Put this way, the problem with neoliberalism is less that it is laissez-faire and more that it assumes away important questions about the state's role in the market economy. As a prominent example, national-security concerns raise questions about the boundaries between markets and the state. Export controls and certain supply-chain restrictions *can* be a legitimate way to deny sensitive technologies to adversaries (principally China in the present context). But they also raise several thorny questions. For instance, which technologies should be subject to controls and restrictions? What if those technologies are also employed for non-sensitive purposes? How do we defend sensitive technologies while avoiding blatant protectionism? (The Trump administration's invocation of "national security" in levying steel tariffs against Canada was less than convincing.) Economists should invite scientists and technology experts into these discussions rather than ceding all ground to politicians and Commerce Department officials.

A second lesson relates to competition — the linchpin of both neoliberalism and classical-liberal economics dating back to Adam Smith. Is the pursuit of competition, though a worthy goal, sufficient to ensure widespread flourishing?

Contemporary economic models assign value to economic growth, openness to globalization, and technological advance. But as noted above, with that growth, openness, and advance comes disruption, often in the form of a diminished ability to compete for new jobs and business opportunities. It's not a stretch to argue that a classical-liberal

focus on free markets should also recognize the ability to compete as an important component to advancing competition. Competition might increase the size of the economic pie, but some will have easier access to a larger slice than others. Thus, in addition to promoting competition, today's free-market advocates need to focus on preparing individuals to reconnect to opportunity in a changing economy.

To that end, neoliberals would do well to increase public investment in education and skill training. This includes greater support for community colleges — a locus of much of the training and retraining efforts required to reconnect workers to the job market. The demand for such training is rising among young workers skeptical of the value of a four-year college degree: The *Wall Street Journal* recently reported that the "number of students enrolled in vocational-focused community colleges rose 16% last year to its highest level since the National Student Clearinghouse began tracking such data in 2018." Returning to Hayek's "Use of Knowledge" essay, these interventions are likely to be successful because they decentralize training programs, divvying them up to the educational institutions that are in the best position to prepare workers for the jobs of today and tomorrow.

A third lesson for today's neoliberals relates to the goals of the market. Smith, the father of modern economics, was also a student of moral philosophy — a discipline studiously avoided by most contemporary economists. To win the war of policy ideas, Smith understood that the goal could not simply be for the market to function. Today, demands to "let the market work" clearly do not meet the moment.

Market and trade liberalization are not ends in themselves; they are tools for organizing and promoting economic activity. Channeling Smith's thoughts in his other classic work emphasizing shared purpose, *The Theory of Moral Sentiments*, Columbia professor and Nobel laureate Edmund Phelps argued that economic policies should pursue freedom not for its own sake, but to facilitate "mass flourishing." In this vein, markets should promote, not prevent, innovation and productivity. They should aid, not hinder, the formation of strong families, communities, and religious and civic institutions.

Just as neoliberals need to be more cognizant of the human element in economics, proponents of industrial policy need to rethink the mercantilist strand present in their proposals.

To minimize the problems endemic to industrial policy — mission

creep, rent seeking, and the risk of backing the wrong firms and industries — policy architects need to be both more general and more specific in their proposed interventions. By more *general*, I mean they must emphasize broad mechanisms to counter market failures. In the technology industry, for instance, expanding federal funding for basic scientific research can lead to useful applications for technologies and industries without picking winners and losers. Likewise, adopting a carbon tax would provide more neutral incentives for firms to develop low-carbon fuels and technologies without the need to pick winners and spend taxpayer dollars on costly subsidies. And again, as workers' skills are an important policy concern, increases in general public investment in education and training should be front and center in any industrial policy.

By more *specific*, I mean the proposed policy interventions must have more specific goals. The Trump administration's Operation Warp Speed succeeded without picking winners or over-relying on bureaucracy largely because its goals — developing and deploying a vaccine against Covid-19 as quickly as possible — were narrowly defined. Similarly, the Apollo program — which Senator Rubio rightly pointed to as an effective example of industrial policy — succeeded in part because it focused on a single, concrete, time-bound goal: putting a man on the moon within the decade.

Targeting and customizing aid is another way of making industrial-policy goals more specific. Economist Timothy Bartik has pushed for reforms to current place-based jobs policies, which typically consist of business-related tax and cash incentives. Such incentives, he argues, should be "more geographically targeted to distressed places," "more targeted at high-multiplier industries" like technology, more favorable to small businesses, and more "attuned to local conditions." Different local economies have different needs, from infrastructure to land development to job training. Funding customized services and inputs is more cost effective, more directly targeted at local shortcomings, and more likely to raise employment and productivity than one-size-fits-all tax and cash incentives.

While much of this analysis has been applied to the manufacturing context, such approaches can also be applied to the services sector. Customized input support would focus on developing partnerships between businesses and local educational institutions to develop

job-specific training. Public support for applied research centers could help disseminate technological and organizational improvements to firms across the country. As with the general improvements to current industrial policy outlined above, these methods harness market mechanisms while recognizing and responding to underlying market failures.

a right to opportunity

The neoliberal notion that markets should focus on allocation and growth alone cannot be an endpoint; updating classical-liberal ideas with a deliberate focus on adaptation and the ability to compete is the place to start. Recognizing a right to opportunity in addition to property rights could provide a liberal counterweight to the temptation to reach for industrial policy to help distressed communities.

This right to opportunity — for today and tomorrow — should lead a conservative pushback to Bidenomics. Voters might not have much of a choice between Biden and Trump's economic populism in the election this fall, but economists and policymakers can begin to advance a new market economics that leaves no Americans behind in the hope that future administrations will take notice.

II. TRADE POLICY

Protectionism is Failing and Wrongheaded: An Evaluation of the Post-2017 Shift toward Trade Wars and Industrial Policy

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ABSTRACT

The Trump and Biden administrations have enthusiastically embraced protectionism. Each administration has explicitly argued for a break from the bipartisan consensus of recent decades that have been generally supportive of trade liberalization and of allowing markets to shape US industrial and employment composition. But the protectionism of the Trump and Biden administrations has not succeeded and likely will not succeed at meeting its goals: they have caused manufacturing employment to decline, not to increase; they have not reduced the overall trade deficit; they have not led to a substantial decoupling of the US and Chinese economies. More fundamentally, the goals that have not been met are wrongheaded: policymakers should not pay inordinate attention to manufacturing employment, and the trade deficit is a poor guide to economic policy. Finally, these wrongheaded goals often rest on fundamental economic misperceptions: free trade is not a policy to create good jobs; it is a policy to increase productivity, wages, and consumption. The balance of the evidence suggests that free trade, including trade with China, has not reduced employment. Of course, trade and technological advances have been disruptive. But populist policies adopted in response will hurt workers, not help them.

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Introduction

The protectionism, trade wars, and industrial policies of the Trump and Biden administrations have provided an argument in favor of free trade and of allowing markets to determine industrial and employment composition: Protectionism has not succeeded, even when measured against its own goals. Moreover, it often works against those same (misguided) goals.

Free trade offers substantial economic benefits. But the case for open trade does not only rest on those benefits. It is also the case that the alternative to free trade imposes substantial costs on US workers, households, and businesses. The resurgence of protectionism in the United States has created a body of evidence showing not only that trade helps but that protectionism harms.

Does free trade—and, more importantly, technological change—cause labor market disruption? Of course. But populist solutions will hurt workers, not help them.

President Trump's trade war was sold to the American people as a case of concentrated benefits and diffuse costs. For instance, Commerce Secretary Wilbur Ross went on television and, holding up cans of soup and soda, argued that they would cost a fraction of a cent more due to the Trump administration's tariffs (Ross 2018). In exchange, the US would see a revitalized manufacturing sector and a substantial increase in manufacturing employment.

In reality, the Trump tariffs increased consumer prices and *decreased* manufacturing employment. They were not a case of concentrated benefits and diffuse costs—they were a case of costs and costs. A lose-lose.

Both protectionist administrations seek to reduce US imports, particularly from China. Protectionism is largely failing at this goal, as well. Despite substantial tariffs, the US was importing slightly more from China in 2020 than in 2017, on a value-added basis.
The protectionist policies of the past eight years have largely failed to achieve their goals. But their goals are wrongheaded. Manufacturing's share of employment has been falling since the end of the Second World War because technological advances have increased the productivity of workers. More-productive workers have commanded higher wages, and their families have enjoyed higher incomes. We should not wish to roll back the clock on rising living standards. We do not need to do so in order to have an economy with pathways to the middle class.
Though manufacturing's share of employment is falling, recent decades have seen significant growth in newer, middle-wage occupations. Economic policy should be focused on connecting workers to the jobs of the future rather than trying in vain to recreate the jobs of the past. Relatedly, addressing legitimate national security threats does not require broad tariffs and sweeping industrial policies.

Much of the rise in protectionism owes to the view that free trade has led to substantial employment reductions. This conclusion is incorrect. It is also predicated on the wrongheaded assumption held by many elected officials and commentators that free trade is about jobs. It is not. Economic theory suggests that trade liberalization should have no effect on the level of employment. And the evidence from the "China shock," taken as a whole, suggests that trade with China did not affect the aggregate number of jobs in the United States.

Trade is not about jobs. It is about wages and consumption. Leveraging comparative advantage allows nations to specialize their productive activities. Specialization makes their workers more productive, putting upward pressure on their wages and incomes. Specialization increases world output, raising the level of consumption and the quality and variety of consumer goods and services.

Industrial policy—which is broader than, and can be separate from, trade policy—can be effective when its goals are clearly defined, *a priori* plausibly achievable, and nonpartisan. It can be effective if there are existing US businesses in place with the technological capability and human capital necessary to meet the goal at the time it is implemented, and when it is not trying to balance a variety of competing goals.

Operation Warp Speed—the 2020 program to develop a COVID-19 vaccine—is an example of successful industrial policy that met these criteria. But as with tariffs and trade wars, the Biden administration's semiconductor and green-energy industrial policies will likely not pass a reasonable cost-benefit test, providing evidence not only that allowing market forces to determine industrial composition leads to good outcomes, but also that not doing so leads to subsidy wars and high bills for taxpayers with limited returns.

None of this is to say that economists and policymakers do not have valuable lessons to learn from recent decades. From the disruption of the China shock, economists have learned that the labor market is less fluid than many had thought. It is harder than was widely expected for workers specialized in one sector with declining opportunities—in the case of trade, in import-competing sectors—to reallocate to other sectors with expanding opportunities. We have also learned that workers may be less willing than many economists had thought to relocate from regions with declining opportunities to regions with expanding ones.

These lessons are generalizable and apply to labor market disruptions broadly. Given the geographic concentration of traditional domestic-energy production, economists and policymakers should keep them front of mind as they contemplate the energy transition away from fossil fuels. The development of generative artificial-intelligence capabilities portends substantial labor market disruption, as well.

The right policy response to disruption—regardless of its cause—is to provide more economic opportunity to workers who need it. As the evidence from the past eight years clearly implies, the wrong response is protectionism, which hurts the workers it seeks to help.

In some ways, this new evidence merely reinforces findings from previous eras of protectionism. The Smoot-Hawley tariff of 1930, for example, failed to meet its objective of raising agricultural prices to help farmers. Because it led other nations to retaliate against the United States with their own protectionist measures, Smoot-Hawley also led to a large reduction in exports, which hurt export-intensive businesses (Irwin 2011).

Evidence from a policy enacted in 1930 is not dispositive in current policy debates, of course. In November 1993, Vice President Al Gore and former presidential candidate Ross Perot debated the North American Free Trade Agreement (NAFTA). Mr. Gore supported NAFTA, and Mr. Perot opposed it. President Clinton had yet to sign NAFTA into law. Mr. Perot suggested that the US impose a tariff on Mexican imports to counter the relatively lower wages of Mexican workers.

Mr. Gore responded: "We've had a test of his theory." The vice president theatrically produced a framed picture of Senator Smoot and Representative Hawley, arguing that the Smoot-Hawley tariff was an economic calamity. Mr. Gore handed the picture to Mr. Perot, saying, "Now I framed this so you can put it on your wall if you want to." Mr. Perot took the picture from the vice president without making eye contact and placed it face-down on the desk, responding: "We are talking [about] two totally different, unrelated situations."[1]

Vice President Gore won the debate. But Mr. Perot's point about the applicability of Smoot-Hawley is well taken. Arguments about the effect of policies enacted decades ago can often be less persuasive when applied to current policy debates because the economic effects of a policy depend on the economic and geopolitical context in which that policy is enacted. Standing in 1993, a lot had changed since 1930. In 2024, nearly a century after Smoot-Hawley, the world is even more different.

But evidence from the protectionist experiment of recent years is certainly relevant for whether the experiment should continue. This article will highlight evidence and arguments that are particularly relevant to current policy debates. Like Smoot-Hawley, protectionist policies from the post-2017 years have had disappointing results, even when measured against their own misguided goals.

[1] This episode is recounted in economist Douglas A. Irwin's excellent 2011 history of Smoot-Hawley, *Peddling Protectionism: Smoot-Hawley and the Great Depression*. CNN (2016) presents video of the Gore-Perot debate.

1. The Post-2017 Shift

President Trump argued in his inaugural address that his administration would offer a decisive break from the economic policies of previous administrations. "For too long," Mr. Trump declared, "the establishment protected itself, but not the citizens of our country." Trump described an America of "rusted-out factories scattered like tombstones across the landscape of our nation" and spoke of "American carnage."

"For many decades," President Trump said, "we've enriched foreign industry at the expense of American industry"; "we've made other countries rich while the wealth, strength, and confidence of our country has disappeared." "One by one," in Mr. Trump's telling, "the factories shuttered and left our shores, with not even a thought about the millions upon millions of American workers left behind." Trump promised to "protect our borders from the ravages of other countries making our products, stealing our companies, and destroying our jobs. Protection will lead to great prosperity and strength" (Trump 2017a).

Trump's US trade representative, Robert E. Lighthizer, has championed what he calls "the New American System: Trade for Workers in the 21st Century." In a 2022 speech, Ambassador Lighthizer argued that the pursuit of trade liberalization in the 1990s—the North American Free Trade Agreement, the creation of the World Trade Organization (WTO), and China's accession to the WTO—led to the loss of "millions of good jobs," "saw tens of thousands of factories close," and led to wage stagnation economic, division, growing inequality, large trade deficits, and the transfer of wealth that "made our children poorer" and China wealthier. Ambassador Lighthizer argued that "this economic upheaval" contributed to the destruction of communities, the rise of opioid addiction, and "deaths of despair."

Mr. Lighthizer argued that "free traders" are wrong to focus on lower prices and that trade policy should care more about US production than US consumption: "Our primary objective should be policies that will build strong American families and communities and create productive high-paying jobs. That should be our goal, not cheap stuff" (Lighthizer 2022).

President Biden's public statements point in the same direction as Mr. Trump's and Mr. Lighthizer's. In a speech in June 2023 on "Bidenomics," the president declared his intention to reverse "40 years of Republican trickle-down economics that helped few but hurt the middle class" (Biden 2023).

The sitting US trade representative, Katherine Tai, said last year that the Biden administration was working to create a "new economic world order," centered on protecting workers[2]. In her

[2] Gavin Bade, "Joe Biden Wants a 'New Economic World Order.'" *Politico*, May 25, 2023. https://www.politico.com/news/2023/05/25/joe-bidens-economy-trade-china-00096781.

confirmation hearing, Ambassador Tai echoed her predecessor, arguing that the US should pursue trade policies "that recognize that people are workers and wage earners, not just consumers" (Tai 2021).

Jake Sullivan, the US National Security Advisor, offered last spring the clearest articulation of the Biden administration's goal of breaking with the economic liberalism of previous administrations. Speaking at the Brookings Institution, Mr. Sullivan noted that the post-World War II international economic order was initially successful, but added that "the last few decades" have seen "a shifting global economy [that has] left many working Americans and their communities behind," a financial crisis, "a pandemic [that has] exposed the fragility of our supply chains," and climate change.

Mr. Sullivan's conclusion was sweeping: "This moment demands that we forge a new consensus. That's why the United States, under President Biden, is pursuing a modern industrial and innovation strategy."

Mr. Sullivan referred to this approach as a "new Washington consensus," drawing a contrast to the Washington consensus that promotes trade liberalization, a reliance on free markets to determine industrial composition, deregulation, and fiscal responsibility (Sullivan 2023).

1.1 Post-2017 policies

More than just rhetoric accompanied this shift. President Trump launched a trade war to advance his goals of increasing manufacturing employment, reducing the trade deficit, and reducing economic ties with China. President Biden largely kept in place the Trump administration's tariff regime, and he expanded Trump's trade war with China. In addition, President Biden embraced industrial policy to advance his goals of reviving domestic manufacturing employment and establishing the US as a leader in semiconductor and clean-energy manufacturing.
President Trump officially withdrew the United States from the Trans-Pacific Partnership Agreement (TPP) in January 2017. The Trump administration renegotiated the North American Free Trade Agreement (NAFTA), replacing it with the United States-Mexico-Canada Agreement (USMCA), which took effect in 2020.

The Trump trade war began in January 2018, when the administration announced new tariffs on washing machines and solar panels. In March, the US announced section 232 tariffs on steel and aluminum imports, including those from the European Union, Canada, and Mexico. Many nations retaliated by imposing tariffs on US exports. The Trump administration announced in July 2018 that it would use a Depression-era law to subsidize American farmers for lost export sales due to retaliatory tariffs imposed on the US. Later in 2018, the US imposed a 10 percent

tariff on a wide swath of Chinese imports. China retaliated. A year later, the US applied tariffs to a broader set of Chinese imports and increased tariff rates to 25 percent. China again retaliated.[3]

President Biden kept in place the Trump administration's tariffs on more than $300 billion of Chinese imports. Moreover, the Biden administration announced in May 2024 that it would impose a 100 percent tariff on Chinese electric-vehicle imports and increase tariff rates on imports of steel, aluminum, solar cells, semiconductors, and larger storage batteries. The Biden administration announced new duties on $18 billion of Chinese imports, including on shipping cranes, medical products, and natural graphite.[4] In October 2022, the administration announced export controls to China. In October 2023, the administration tightened the controls, further limiting the types of semiconductors US firms would be able to sell to China, with a focus on chips used for military purposes.

President Biden signed the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act into law in August 2022. The CHIPS Act appropriates $39 billion in direct-payment subsidies for expanding domestic semiconductor manufacturing and includes incentives for downstream materials and equipment suppliers. The act also includes incentives to build new semiconductor fabrication plants—authorizing a 25 percent tax credit toward the purchase, construction, manufacture, or utilization of equipment or property for the purpose of operating an advanced semiconductor manufacturing facility—that are estimated to cost $24 billion over the next five years. The act includes billions of dollars for research, development, and workforce training (Kersten *et al*. 2022).

The Inflation Reduction Act (IRA) of 2022 creates around two dozen tax credits to encourage domestic clean-energy innovation and manufacturing, including credits for clean electricity generation and storage, carbon capture and sequestration, nuclear power production, clean fuels, clean energy and efficiency incentives for individuals, and a $7,500 credit for individual purchases of new electric or hydrogen-fuel-cell vehicles under certain conditions. The IRA also includes direct expenditures for agriculture and forestry conservation programs, energy loans, energy efficiency programs, and programs for industrial decarbonization.[5]

Because most of the tax credits are uncapped, their fiscal cost will be determined by the extent to which they are used. Estimates of the fiscal costs of the IRA's climate provisions vary. Bistline, Mehrotra, and Wolfram (2023) estimate that the tax credits will cost $781 billion through 2031, with a total fiscal cost over that period of $902 billion. Goldman Sachs estimates that the fiscal cost of the IRA's climate provisions will be $1.2 trillion through 2031 (Goldman Sachs 2024).

[3] For greater detail, see Bown and Kolb (2023).
[4] Andrew Duehren and Andrew Restuccia. "Biden Levies Sweeping Tariffs on China, Intensifying Trade Fight with Trump." *Wall Street Journal*, May 14, 2024. https://www.wsj.com/politics/elections/biden-trump-tariffs-d405cbca.
[5] Bistline, Mehrotra, and Wolfram 2023 includes an excellent discussion of the provisions of the IRA and their economic implications.

2. Protectionism has not met its own goals

The protectionism of recent years has been designed to advance three economic goals. Presidents Trump and Biden share the goal of reviving manufacturing employment and reducing the US's economic ties with China. In addition, a major goal of President Trump was to shrink the overall trade deficit.

These goals have not been met. The evidence from recent years shows that President Trump's 2018–2019 trade war failed to revive domestic manufacturing. Even worse for supporters of protectionism, the Trump trade war worked against that goal—it reduced manufacturing employment. The tariff regime of recent years has failed to reduce the US trade deficit. Finally, on a value-added basis, protectionist measures have largely failed at reducing imports from China.[6]

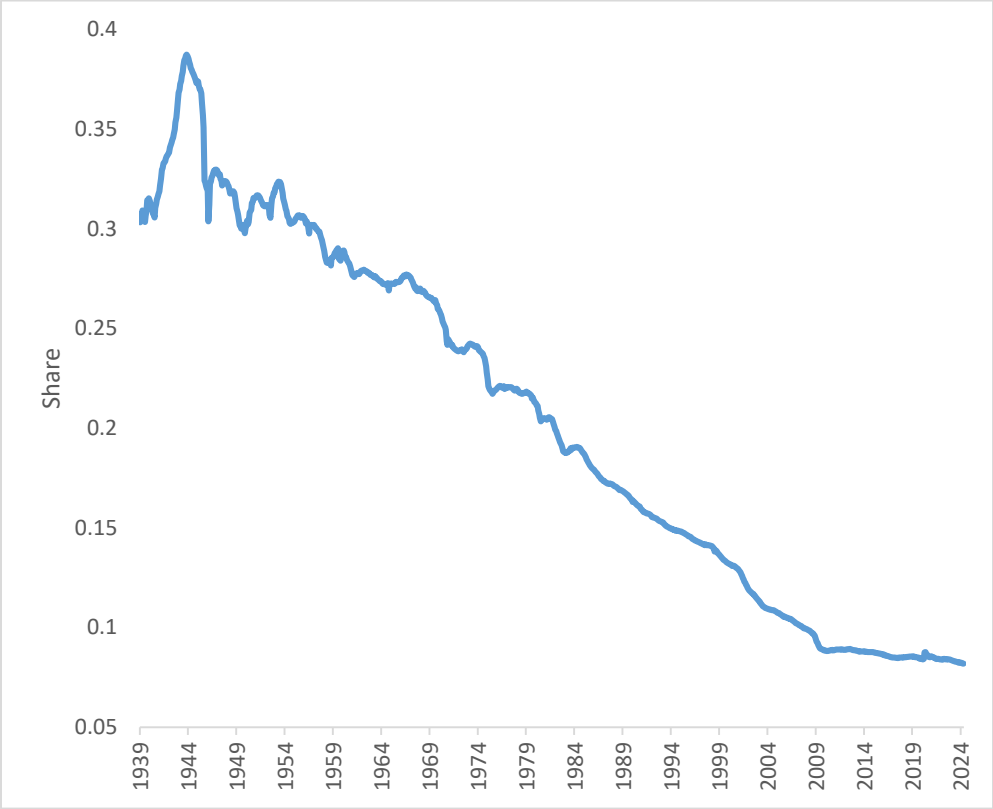
2.1 The 2018–2019 tariffs likely reduced manufacturing employment

Presidents Trump and Biden have stressed that increasing manufacturing employment is among their top priorities, and they have implemented a number of programs to advance that goal. An examination of aggregate manufacturing employment demonstrates that, at least so far, efforts to increase manufacturing jobs have not succeeded at putting manufacturing employment on an upward trend.

Indeed, manufacturing's share of employment has fallen consistently since the end of the Second World War, as displayed in figure 1. There is no obvious change in the rate at which manufacturing's employment share declined during the decade following China's accession to the World Trade Organization in 2001 or during the post-2017 period, when the US adopted protectionist policies. The slope of the trend line does change following the 2008 global financial crisis and Great Recession. This change roughly corresponds with the slowdown in aggregate US productivity growth, which is generally thought to have begun around 2005 (see, for example, Syverson 2017), and with the slowdown in manufacturing productivity growth. Labor productivity (output per hour for all workers) in the manufacturing sector has not grown since the 2008 financial crisis. Taken as a whole, this is suggestive evidence that advances in technology—robotics, automation—are primarily responsible for longer-term trends in manufacturing employment.

[6] In what follows, I focus on evidence of the effect of recent protectionist policies on employment, the current account deficit, and the bilateral US-China trade deficit. Amiti, Redding, and Weinstein (2019) consider the welfare effects of the 2018 tariffs and conclude that their full incidence fell on US consumers and importers, with a reduction in aggregate US real income of $1.4 billion per month by the end of 2018. For additional papers on welfare effects, see Fajgelbaum *et al*. 2020; Amiti, Gomez, Kong, and Weinstein 2024; Caliendo and Parro 2023; and Handley, Kamal, and Monarch forthcoming.

Figure 1. Manufacturing employment as a share of total nonfarm employment, 1939–2024



Source: Author's calculations from BLS 2024a.

In section 5, I will discuss President Biden's policies to boost manufacturing employment, which have not succeeded but which were enacted in 2022, too recently to render any firm judgment. In this section, I will focus on the Trump trade war, the employment effects of which have been rigorously evaluated by economists.

Flaaen and Pierce (forthcoming) study the effects of the 2018–2019 Trump tariffs on the US manufacturing sector and labor market. Noting that the Trump tariff regime was unprecedented for a large, advanced economy in the modern era of international commerce and complex global-supply chains, Flaaen and Pierce carefully account for different channels through which import tariffs might affect the manufacturing sector and the labor market.

Specifically, they consider three channels. First, tariffs might protect US-based manufacturers from competition from imports, allowing them to gain market share over foreign competitors. Second, because many domestic manufacturers import intermediate inputs to production, tariffs might raise the cost of production for US-based manufacturers, reducing their competitiveness in both domestic and export markets. Finally, America's trading partners imposed retaliatory tariffs of their own, reducing the competitiveness of US exports.

The first channel—protection from import competition—should, considered in isolation, boost the US manufacturing sector, including manufacturing employment. The second two channels should weaken domestic manufacturing and employment. The size of the three separate effects is an empirical question, driven in part by the relative importance of intermediate inputs for domestic manufacturers and the degree of retaliation. Flaaen and Pierce construct detailed (four-digit NAICS) industry-level measures of exposure to each of those three channels, and they relate those exposure measures to production, prices, and employment.

They find little evidence that the Trump tariffs affected industrial production. They show that this lack of effect may have been due to the historically high orders backlog in place at the time the tariffs were enacted. They find that the tariffs led to an increase in producer prices due to their effect on input prices.

Flaaen and Pierce conclude that the Trump tariffs reduced US manufacturing employment. They find that shifting a detailed industry from the 25th to the 75th percentile of exposure to the Trump tariffs led to a 0.4 percent increase in employment due to the import-protection channel, a 2.0 percent decrease in employment due to the rising-input-costs channel, and a 1.1 percent decrease in employment due to the retaliation channel. On net, moving from the 25th to the 75th percentile of exposure reduced employment by 2.7 percent. They provide evidence that this employment response occurs mostly through lower rates of job creation. Outside the manufacturing sector, they estimate that counties with higher exposure to the Trump tariffs experienced higher unemployment rates.

Autor *et al*. (2024) study the effect of the Trump trade war on employment in local labor markets (specifically, commuting zones). Like Flaaen and Pierce, their specification separately considers the employment effects of exposure to US import tariffs and of foreign retaliatory tariffs. In some specifications, they also consider the employment effect of the US agriculture subsidies put in place to counteract the negative effects of foreign retaliatory tariffs.

Autor *et al*. do not find evidence that US import tariffs, considered in isolation, led to employment increases.[7] Across the specifications they consider, they consistently find that retaliatory tariffs imposed against the United States led to declines in the employment rate in local labor markets. They also find that agricultural subsidies offset a minor part of the adverse employment effects of retaliatory tariffs.[8] Autor *et al*. do not find evidence that import tariffs boosted manufacturing employment in local labor markets.

[7] When studying aggregate commuting-zone-level employment effects, Autor *et a*l. (2024) estimate a positive coefficient for US import tariffs in specifications with standard control variables, but that coefficient is not statistically significant at conventional levels.

[8] Carter and Steinbach (2020) analyze the effects of retaliatory tariffs against US agriculture and food exports and find substantial declines. After accounting for changes in trade patterns, they find net export-related losses of more than $14.4 billion.

Additional evidence on the labor market effects of the Trump trade war comes from Javorcik *et al*. (2022), who study the effect of the war's first year (2018) on a measure of labor demand. Specifically, Javorcik *et al*. find that a local labor market's exposure to tariff-driven higher intermediate-input costs and foreign-export tariffs both led to declines in online job postings, and that relative declines were larger for postings for lesser-skilled jobs. They do not find evidence that exposure to import protection increased job openings. Finally, Waugh (2019) studies a county level dataset with the universe of new auto sales and finds that exposure to retaliatory tariffs led to declines in tradeable and retail employment.

2.2 Post-2017 protectionism did not reduce the US trade deficit

Substantially reducing the US trade deficit was a major priority of the Trump administration.[9] President Trump would frequently characterize the US trade deficit as money "lost" to other countries because we were buying goods and services from foreign businesses that (in his view) domestic businesses could and should have been producing. Mr. Trump vowed to reduce the deficit to stop what he (incorrectly) viewed as a major economic problem.[10]

President Trump's protectionist policies did not succeed at reducing the trade deficit. The current-account deficit reflects the balances on trades in goods and in services, as shown in figure 2, along with income flows between domestic and foreign residents. When President Trump took office in the first quarter of 2017, the current-account deficit stood at $85.5 billion. When he left office, the deficit was around $180 billion.

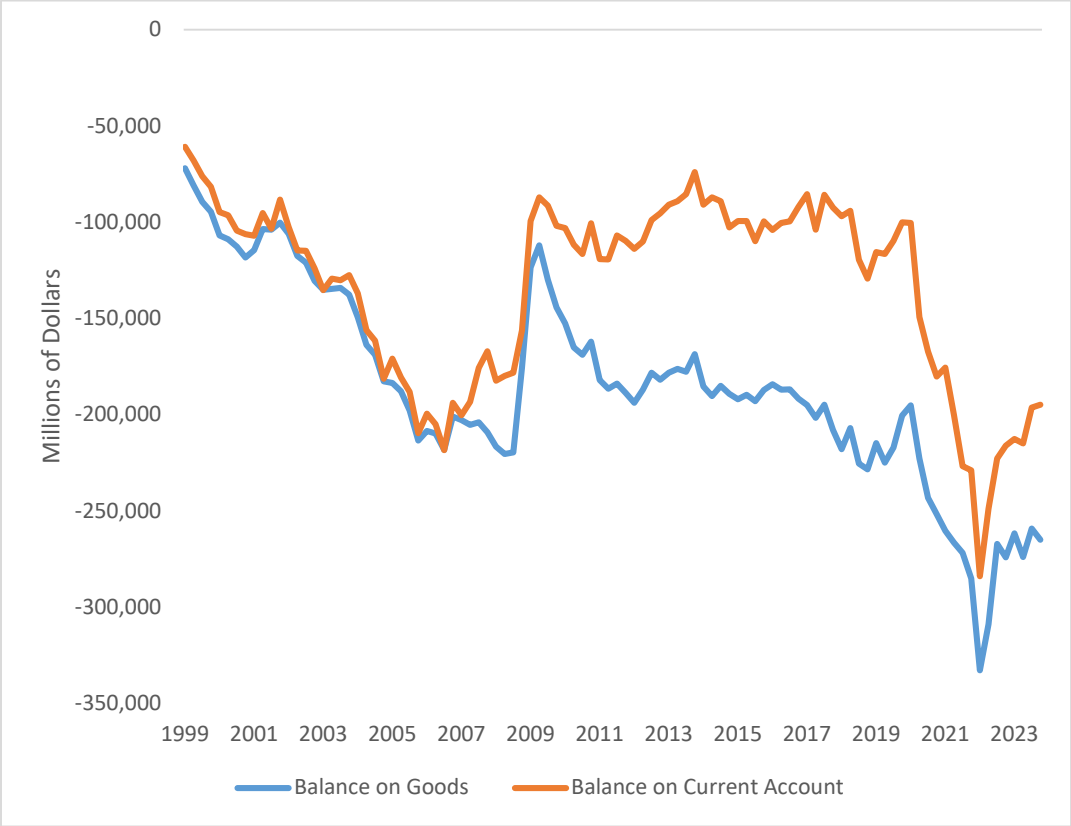
President Trump frequently ignored services trade and focused on goods trade. After deepening over the course of his administration, the trade deficit in goods was largely unchanged when he left office. Both deficits are larger today than they were in the first quarter of 2017.

Of course, the trade deficit might have been even larger in the absence of Mr. Trump's protectionist policies. But for reasons I will discuss in section 3.4, basic economics refutes this

[9] For example, in remarks at the White House on November 15, 2017, President Trump said: "Fair and reciprocal trade—so important. These two words—fairness and reciprocity—are an open invitation to every country that seeks to do business with the United States, and they are a firm warning to every country that cheats, breaks the rules, and engages in economic aggression—like they've been doing in the past, especially in the recent past. That is why we have almost an $800-billion-a-year trade deficit with other nations. Unacceptable. We are going to start whittling that down, and as fast as possible" (Trump 2017b).

[10] For example, in remarks at the White House on March 5, 2018, President Trump said: "So we may have friends, but remember this: We lost, over the last number of years, $800 billion a year. Not a half a million dollars, not 12 cents. We lost $800 billion a year on trade. Not going to happen. We got to get it back. And, of course, the biggest problem—the biggest problem is China. We lost $500 billion. How previous Presidents allowed that to happen is disgraceful. But we're going to take care of it" (Trump 2018).

Figure 2. US trade balance on goods and current account balance, 1999–2024



Source Author's calculations from BEA 2024.

view. And when evaluating the success of President Trump's protectionist policies against their stated goal, the chart above makes it clear that those policies failed.

2.3 Post-2017 protectionism did not reduce value-added imports from China

Although the current account and goods trade deficit did not respond to the Trump administration's protectionist policies, the bilateral US-China trade deficit did. In 2017, the US ran a $375.2 billion trade in goods deficit with China. The bilateral deficit had fallen by 17.9 percent in 2020. President Biden largely kept in place the Trump-era China tariffs, and the 2023 bilateral deficit was lower than it had been since 2011. In May 2024, Mr. Biden announced plans to substantially increase tariff rates on many Chinese imports, including electric vehicles, solar cells, cranes, storage batteries, natural graphite, and steel and aluminum.

This bilateral deficit with China fell in large part because US trade with other nations surged over this period. The share of US manufactured-goods imports coming from China fell from 22 percent to 14 percent between 2017 and 2023. Over this period, imports from Mexico, Vietnam, and other Asian economies increased. Vietnam's import share has nearly doubled over this period. In 2023, Mexico surpassed China as the largest exporter to the United States.

In an economic sense, the shift may not be as dramatic as the bilateral trade deficit makes it appear.[11] The United States is still importing goods to which Chinese companies contributed value. Foreign value added in domestic final demand is the amount of foreign value added present in final goods or services purchased by US households, business, or governments. It can be thought of as imports of value added.

As figure 3 shows, China's share of foreign value added in US manufacturing domestic final demand rose steadily throughout the 1990s and the first decade of the 2000s, from 4 percent in 1995 to 26.5 percent in 2014. It has remained roughly at that level through 2020, the last year for which OECD data are available.

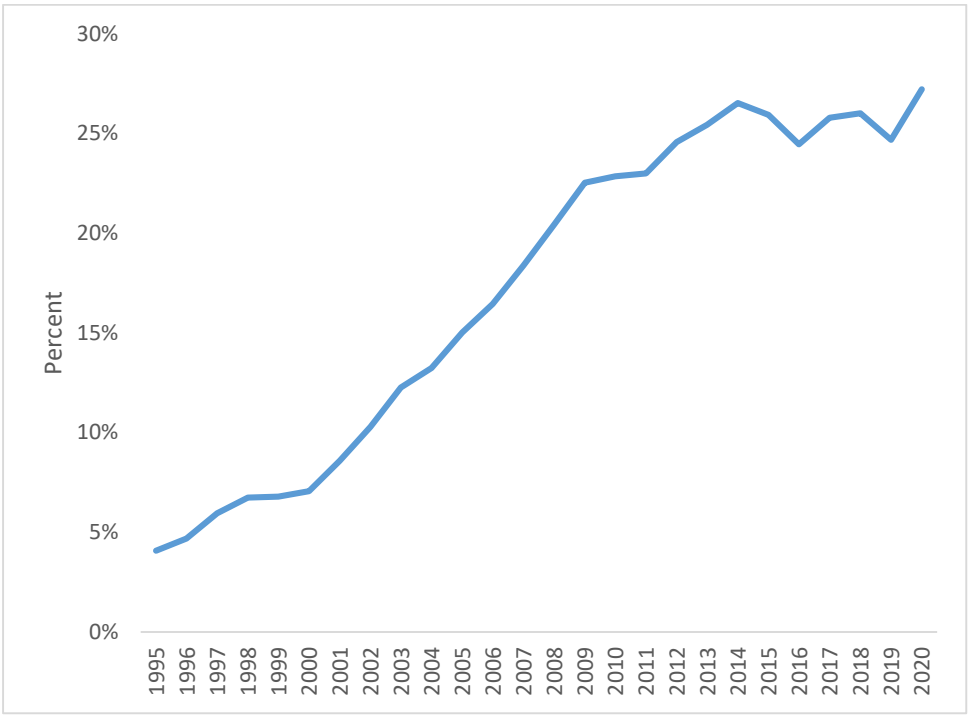
China's value-added import share was higher in 2020 than in 2017, the year before the Trump trade war began. Even as China's gross import share fell (by 3 percentage points), its value-added import share increased (by 1.4 percentage points). This pattern could occur if the US imported goods that were largely produced in China but were rerouted to a third country that contributed a small amount to the final value of the good. Despite longer supply chains, value-added relationships are qualitatively similar (WTO 2023).

President Biden is rightly concerned that his 100 percent tariff on Chinese electric vehicles could be circumvented by Chinese manufacturers moving production to Mexico. At the time of this writing, the Biden administration has floated the possibility of additional penalties to discourage such circumvention.[12] But there is little reason to be confident that the administration will be able to outmaneuver foreign manufacturers in this game of whack-a-mole. For example, between 2017 and 2022, US imports of laptops from Vietnam increased by about $800 million. Over the same period, Vietnam's imports from China of laptop parts also increased by about $800 million (Seong *et al*. 2024).

A goal of protectionist policies toward China—shared by the Trump and Biden administrations—is to reduce the economic linkages between China and the US. Judging by value-added imports, that effort has not been nearly as successful as the declining trade in goods deficit with China suggests.

[11] Setser notes in a briefing paper in this binder that the fall in bilateral U.S.US-China trade is neither good evidence of deglobalization nor a sign of true "derisking." (Setser 2024).
[12] Josh Boak. "US Suggests Possibility of Penalties If Production of Chinese Electric Vehicles Moves to Mexico." *Hill* (blog), May 14, 2024. https://thehill.com/homenews/ap/ap-business/ap-us-suggests-additional-tariffs-if-production-of-chinese-electric-vehicles-moves-to-mexico/.

Figure 3. China's share of foreign value added of US manufacturing domestic final demand, 1995–2024



Source: Author's calculations from OECD 2024.

2.4 Wrongheaded goals

Presidents Trump and Biden share the goal of substantially increasing manufacturing employment. This goal is wrongheaded. As demonstrated above, the government can do little to meaningfully reverse the declining manufacturing employment share. Goals that cannot be achieved are by definition wrongheaded.

Even if reversing this trend were achievable, we should not wish to reverse it because the long, downward trend in manufacturing employment is a consequence of productivity increases that have lifted and will continue to lift living standards for typical workers and households. Those productivity increases have been accompanied by disruption—and this disruption has been the focus of politicians, public intellectuals, and economists.

But creative destruction creates as well as destroys. Strain (2020) examines employment dynamics for middle-wage occupations from 2000 to 2018 and finds substantial increases in the employment share of "new middle" occupations, including sales representatives, truck drivers, heating and air conditioning mechanics and installers, computer support specialists, event

planners, health technologists and technicians, social workers, audiovisual technicians, and food service managers.[13]

These occupations (among many others) offer a pathway to the middle class in today's economy, in the same way that manufacturing employment offered a middle-class life to workers decades ago. Policymakers should stop trying to turn back the clock and should instead focus on doing more to help workers access the opportunities presented by these growing occupations.[14]

Some argue that the US needs a revival of domestic manufacturing for national security purposes. This argument is used particularly often to justify the CHIPS Act. These arguments are unpersuasive. Of course, a narrow set of specific goods exists that warrants special attention by the government, including semiconductors. And of course there is legitimate reason to be concerned about the production of those goods being located in nations with whom the US has an increasingly adversarial relationship (for example, China) or in places where their supply could be disrupted due to geopolitical developments (for example, Taiwan). But it is a long leap from those rather obvious observations to the conclusion that their production should be located in the United States. Resilience would be better served if their production were diversified across a number of nations that are allies with the United States.

Moreover, talk of the importance of resilience and the need for "friendshoring" often seems to be little more than a fig leaf for rank protectionism rather than being based on legitimate concern about national security. Presidents Trump and Biden have both publicly opposed the acquisition of US Steel by Nippon Steel, a Japanese steelmaker, despite the fact that this acquisition would benefit manufacturing workers—both in US Steel and more broadly—by increasing their productivity and putting upward pressure on their wages. US Steel's facilities and workers would remain in the United States, so any concerns about national security seem implausible.[15]

There are six reasons why the Trump administration's goal of eliminating the US trade deficit is wrongheaded. First, it misunderstands the ultimate cause of the trade deficit. The US trade deficit is not driven by foreign governments blocking US exports or subsidizing their own exports. Instead, the trade deficit is driven by the savings and investment decisions of American households and businesses and by the taxing and spending decisions of the US government.

[13] Deming and Summers analyze shifts in occupational structure in a briefing paper in this binder (Deming, Ong, and Summers 2024).
[14] A similar argument can be made about struggling geographic areas. Of the counties with a disproportionately large share of manufacturing jobs in 1970, 6 in 10 have successfully transitioned to new industries, and 23 percent exhibit solid economic performance while still having a large manufacturing sector (Strain 2020). Policymakers should focus on drawing policy lessons from the places that have transitioned rather than trying to turn back the clock in struggling areas.
[15] I develop this argument more fully in Strain 2024a.

The US spends more than it produces. The US invests more than it can finance through national savings. Simple national income accounting demonstrates that this state of affairs requires that the US also run a trade deficit. Trade policy can affect bilateral trade flows, but it cannot counter these broad macroeconomic aggregates.[16]

The second reason: If your goal is to reduce the trade deficit, then your goal must also be reducing flows of foreign investment into the United States. When the US consumes and invests more than it produces, it must be running a current account deficit. To finance the deficit, the US sells assets to the rest of the world, and capital flows into the US from abroad. It is also helpful to consider an intertemporal context. Today, the US wants to invest more than it saves, so it must attract foreign capital. For that foreign capital to exist, the rest of the world must be saving some of its output and income. So some of the output of foreign nations flows into US markets.

Foreign direct and portfolio investments are votes of confidence from other nations in the US economy and, more broadly, in the United States as a whole. These investments make workers more productive—increasing their wages and incomes—and make US firms more competitive. Because the trade deficit and foreign investment in the US are linked, waging war on the former is waging war on the latter. The consequence of that war is to reduce the wages of US workers and the incomes of US households.

Because President Trump frequently cited the (supposed) job-destroying effects of the trade deficit, the third reason that eliminating the trade deficit is a wrongheaded goal is that wiping out the trade deficit would not increase employment in the United States. I will develop this argument in section 4.

In addition, eliminating the trade deficit would be a partial retreat from economic engagement with other nations. But the post–World War II liberal international order—of which free trade is a major component—has been a bedrock of peace and prosperity on both sides of the Atlantic for seven decades.

The fifth reason relates to the role the US plays in providing liquidity to the global economy. This liquidity provision makes the trade deficit central to global economic stability. Demand for US financial assets is driven in part by the dollar's role as the global reserve currency and as the currency in which many global transactions occur. This reduces the cost of foreign borrowing, allowing the US to consume and invest more than it produces at relatively low cost.

Finally, an assault on the trade deficit is an assault on economic liberty. Free exchange is good. As a general matter, two parties should be left to their own judgment as to whether a voluntary

[16] President Trump's signature tax cuts, the 2017 Tax Cuts and Jobs Act, expanded the trade deficit by increasing domestic demand and decreasing national savings.

transaction makes each better off, free from the interference of government. I run a substantial trade deficit with my grocery store, which makes both my family and the store better off. Similarly, free trade between individuals and businesses in different nations makes those parties better off.

Economic liberty is not an absolute good, and of course there are times when it should be curtailed. But in the absence of strong reasons for curtailing it, in a free society it should be the default position of economic policy. Indeed, a free society has little choice but to accept free trade. The economic police state required to eliminate the trade deficit would be so intrusive as to substantially reduce not just economic liberty but political liberty as well.

A legitimate concern about the trade deficit is the debt levels required to finance it, particularly since much of US borrowing goes to finance consumption and not investment (Gagnon 2017). In addition, the larger the deficit grows, the more moving back toward balance risks exchange-rate instability and, potentially, financial-market instability (Obstfeld and Rogoff 2005).[17]

The best ways to address these concerns through trade policy are not with protectionism, tariffs, and industrial policy. Instead, negotiating better access to export markets would be a good step, as would applying prudently calibrated pressure to nations with current account surpluses not to manipulate their currencies. Beyond trade policy, increasing national savings, especially through reducing the federal budget deficit, would reduce the trade deficit. Long-term productivity and incomes will rise if greater national savings (through a smaller budget deficit or higher household savings) leads to additional investment. Importantly, these are sound economic policies even if one is not concerned about the trade deficit.

Similarly, focusing on the bilateral US-China trade deficit is wrongheaded. The relationship between China and the United States is increasingly adversarial, and for national security and geopolitical reasons it is reasonable for policymakers to want to reduce US reliance on China for a small number of strategically important items. But the size of the bilateral US-China trade deficit is an imprecise metric for that goal. It is easy to imagine scenarios in which the bilateral deficit decreases while China continues to provide a large share of value added to sensitive domestic imports.

[17] Bernstein and Baker (2016) argue that trade deficits are harmful during periods of persistent and high unemployment because domestic consumer spending would be flowing to foreign businesses at a time of labor market underutilization. This is a coherent concern, but it is the responsibility of the central bank to ensure maximum sustainable employment (along with price stability). And as discussed in this article, trade policy would be ineffective at reducing the trade deficit.

2.5 Conclusion

The case for open trade rests not only on its benefits but also on the damage wrought by its protectionist alternative. Evidence from the post-2017 protectionist era in the US confirms this point. That evidence shows that the Trump trade war failed at its goal of substantially increasing manufacturing employment by protecting domestic manufacturing from import competition. More than that, the evidence suggests that the 2018–2019 tariff regime likely reduced manufacturing employment by increasing the cost of intermediate inputs to production and because other nations retaliated against US exporters.

Major goals of protectionists have been to reduce the US trade deficit and to reduce economic ties with China. To date, neither goal has been met.

As shown in figure 4, global trade was growing ever more open until the 2008 global financial crisis. Since then, its growth has stopped. But the retreat from globalization has been exaggerated: trade's share of global economic output remains roughly as high as it has ever been, in part because protectionist policies designed to roll it back have failed.

3. Free trade is not about jobs

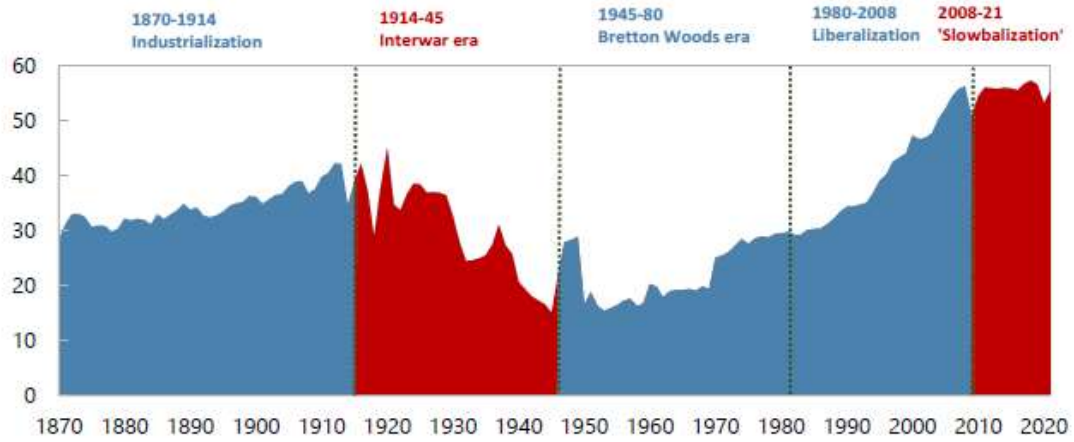
Elected officials often present trade policy as a means to increase the number or quality of jobs in the United States. Leaders who support free trade claim that it will have positive employment effects. For instance, at a signing ceremony in 1993 for the North American Free Trade Agreement, President Clinton declared: "First of all, because NAFTA means jobs. American jobs, and good-paying American jobs. If I didn't believe that, I wouldn't support this agreement" (Clinton 1993).

Leaders who oppose free trade claim that it has negative employment effects—not just presidents but rank-and-file elected officials as well. For example, in defending President Biden's decision to increase and expand tariffs on Chinese imports this spring, Representative John Moolenaar, a Republican from Michigan and chairman of the China Select Committee, said: "We want to encourage jobs here in the United States."[18] Presidents Trump and Biden themselves often motivate their own trade policies with appeals to employment, as well.

Both sides of this debate are making specious arguments. Free trade is not about jobs, and as a first-order approximation we should expect that trade volumes and barriers have no effect on the level of employment in the United States. Instead of affecting jobs, trade affects productivity, wages, and consumption.

[18] Rep. Moolenaar made this comment on CNBC's Squawk Box (2024).

Figure 4: Trade openness: sum of exports and imports as a share of GDP, 1870–2021



Source: Aiyar *et al*. 2023.

3.1 Trade and employment: Theory

In a world without trade between nations, each nation must produce all the goods and services its citizens consume. But nations differ in terms of their levels of technological progress and human capital, and with respect to the amounts of land, labor, and capital they possess. Those differences give rise to comparative advantages between nations in the production of certain goods and services. Trade between nations allows a given nation to specialize in the production of those goods and services for which that nation has comparative advantage, and to trade in order to receive and consume other goods and services. Trade and specialization would not reduce a nation's level of employment, but they would allow for world output—and, therefore, for world consumption—to increase.

Increased openness will increase both export and import volumes. As exports increase, the demand for workers in export-intensive sectors will increase, putting upward pressure on the wages of workers in those sectors and increasing their employment opportunities. At the same time, increased import volumes can reduce the demand for workers in sectors competing with imports, putting downward pressure on their wages and reducing employment opportunities.

In addition, by capitalizing on and encouraging specialization in production, increased trade will increase domestic income and wealth. This outcome will in turn increase consumer demand for goods and services, including those produced in sectors with little or no exposure to trade. Stronger consumer demand will increase the demand for labor, wages, and employment opportunities throughout the economy.

Because trade increases both exports and imports, to a first approximation it is reasonable to expect that its employment effects will be a wash. Moreover, with inelastic labor supply, the wage effects of shifts in labor demand will be larger than any employment effects. Increased

wealth and income should boost labor demand. But from a macroeconomic perspective, the Federal Reserve's mandate to achieve maximum stable employment (along with price stability) is inconsistent with sustained increases in trade-driven labor market overheating or slack.

For sectors heavily exposed to offshoring and import competition—like manufacturing—we must also consider the effects of competition between relatively lower-paid foreign workers and relatively higher-paid domestic workers. Here again, there are offsetting effects that, to a first approximation, suggest that trade will not affect the level of employment. Lower-cost foreign labor may be a substitute in production for domestic workers, pushing down their wages and reducing their employment opportunities.

But this reduction in production costs will reduce the price of the good, increasing the demand for it and, therefore, increasing the demand for labor, including domestic labor. Perhaps more importantly, demand for domestic labor that produces complementary goods will increase. And, again, trade-driven unemployment should be reduced by looser monetary policy, as would unemployment arising from any macroeconomic imbalance.

While trade should not affect the level of employment, it will affect the composition of jobs in the US labor market, and increased trade will disadvantage some workers and benefit others. Domestic workers who are close substitutes in production to foreign workers and those in sectors that shrink as trade expands are relatively more likely to be displaced. Domestic workers who are in jobs that are complements in production to foreign workers and those in export-intensive sectors or in sectors for which the US has a comparative advantage are relatively more likely to benefit from increased trade. But trade should not be expected to affect the aggregate level of employment or of employment opportunities.

In this way, free trade is like any other dynamic force in the economy. Technological advances affect the production functions of firms and increase national income. Changes in tastes and preferences and the introduction of new products and services are similarly disruptive and can cause similar compositional changes in the occupation distribution of the labor market.

But as with trade, there is little theoretical reason to be concerned that this disruption would systematically reduce aggregate employment, particularly over longer periods of time and in the presence of policies designed to assist workers with transitioning to new occupations and industries.

3.2 Trade and employment: evidence from the "China shock"

The effect of trade liberalization on employment is ultimately an empirical question. The best evidence suggests that the expansion of trade in recent decades—including trade with China—did not reduce the level of employment in the United States.

Autor, Dorn, and Hanson (2013) study how local labor markets in the United States adjusted to the surge of imports from China. Specifically, they study the relationship between the decadal change (1990–2000 and 2000–2007) in the manufacturing employment share of the working-age population and exposure to Chinese imports from 1990 to 2007 within 722 commuting zones, which vary in the importance of different manufacturing industries for local employment.

Autor, Dorn, and Hanson conclude that rising exposure to Chinese import competition was responsible for 16 percent of the decline in overall US manufacturing employment between 1990 and 2000 and for 26 percent of the decline between 2000 and 2007. This decline translates into a net reduction in US manufacturing employment of 1.53 million jobs over the full sample period.

In a 2016 paper, Autor, Dorn, and Hanson, in joint work with Acemoglu and Price, estimate the relationship between employment in (four-digit) manufacturing industries to industry-level exposure to Chinese imports, from 1991 to 2011. Acemoglu *et al*. (2016) also find manufacturing employment losses. They estimate that increased import competition from China led to a net reduction of 560,000 manufacturing jobs from 1999 to 2011, or around 10 percent of the total decline in manufacturing employment over this period.

Economic linkages between sectors mean that rising import competition that reduces domestic production will have effects on the suppliers of domestic producers. Including these indirect employment effects increases Acemoglu *et al*.'s estimate of a net employment reduction due to Chinese imports to 1.98 million jobs, including 985,000 manufacturing jobs.[19]
In addition, Acemoglu *et al*. complement their industry analysis with an analysis of commuting zones in order to estimate the local general-equilibrium effect of exposure to import competition from China. They jointly estimate labor reallocation effects and aggregate demand effects within local labor markets and conclude that import growth from China led to 2.4 million fewer jobs between 1999 and 2011.[20]

[19] Additional studies of this episode include Pierce and Schott 2016, which explores how China's 2001 World Trade Organization accession affected US manufacturing employment using variation in the growth in China trade that resulted from the post-2001 removal of uncertainty surrounding tariff rates applied to Chinese imports to the United States. They conclude that competition with Chinese imports (through this channel) contributed to the post-2000 reduction in US manufacturing employment. Caliendo and Parro (2023) survey the literature on the "China shock," including the papers discussed in this article, and conclude that its effects on US manufacturing employment are economically relevant but not the main cause of the overall observed decline.

[20] Jaravel and Sager (2019) estimate the distributional effects of the "China shock" by benchmarking their estimates of the effect of increased trade with China on consumer prices against estimates from the literature of job losses

Placing those estimates in the broader context of US labor market dynamism helps to anchor your view on the degree to which import competition during those years was disruptive. Autor, Dorn, and Hanson (2013) find an average reduction in manufacturing employment of 90,000 jobs per year from 1990 to 2007. Acemoglu *et al*. (2016) find an average reduction in manufacturing employment of 200,000 per year from 1999 to 2011. But see figure 5. In a typical *month*, five million workers separate from their employers. In the manufacturing sector, typical monthly separations are 350,000.[21]

Moreover, Autor, Dorn, and Hanson and Acemoglu *et al*. focus on half the story of increased trade openness. As discussed previously, trade liberalization is associated with increased imports *and exports*. Economic theory suggests that employment reductions in sectors exposed to import competition should be roughly balanced by employment increases in export-intensive sectors and in other sectors. While Autor, Dorn, and Hanson present some results using net imports, they focus on import competition—one side of the ledger. Acemoglu *et al*. attempt to estimate general equilibrium effects in (and, importantly, not across) local labor markets, but the focus of their study is also employment reductions due to import competition.

Feenstra, Ma, and Xu (2019) note that the literature on the "China shock" focused on the role that surging imports from China have had on job losses, with little attention paid to the job gains from growing exports.[22] They expand the Acemoglu *et al*. framework to incorporate not only US imports from China but also imports from the rest of the world, exports to China, and exports to the rest of the world.[23]

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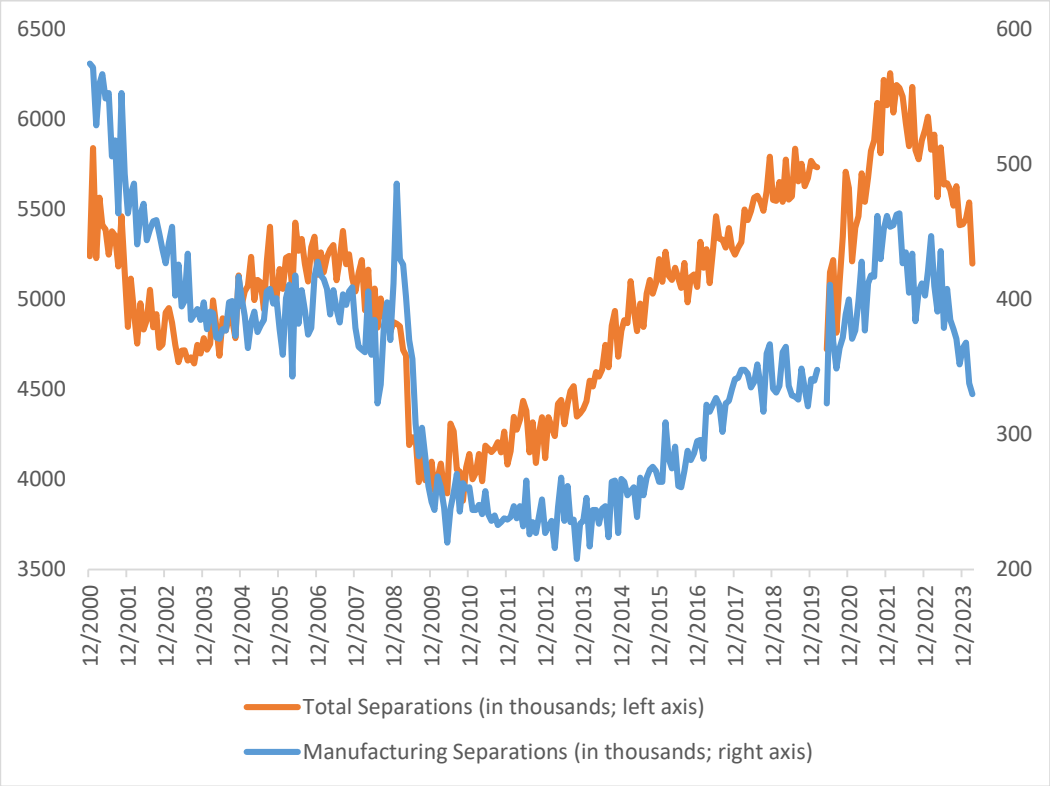
from Chinese import competition. They find that falling product prices create $411,464 of consumer surplus per displaced job.

[21] These calculations (and the associated chart) exclude March 2020 and April 2020, when total and manufacturing separations spiked due to the COVID-19 pandemic. Separations include voluntary quits, involuntary layoffs and discharges, and separations due to retirement, disability, and other reasons. Bureau of Labor Statistics data on separations begin in December 2000, later than the starting years in the Autor, Dorn, and Hanson (2013) and Acemoglu *et al*. (2016) studies. Through 2007, average monthly manufacturing separations were 425,000; through 2011, they were 381,000.

[22] Feenstra and Sasahara (2018) note the same. Using global input-output analysis, they study the impact of imports and exports on labor demand in the United States from 1995 to 2011. They find that US imports from China led to reduced demand of 1.4 million jobs in manufacturing and 0.6 million in services—findings quite similar to those of Acemoglu *et al*. (2016). Over the same period, they find that the growth of US exports led to increased labor demand of 2 million manufacturing jobs, 0.5 million jobs in resource industries, and 4.1 million jobs in services. Focusing only on goods exports, labor demand increased by 3.7 million jobs in total, for an increase in net labor demand of 1.7 million jobs. Factoring in imports from the rest of the world and services exports, they conclude that labor demand increased on net over this period.

[23] To deal with the endogeneity of trade volumes and employment, Feenstra, Ma, and Xu use two instruments. The first is the Autor, Dorn, and Hanson instrument of trade flows to other nations. The second is a model-based prediction of trade flows, including the effect of changes in tariff rates.

Figure 5. Monthly separations: total US economy and manufacturing sector, 2000–2023



Note: Data for March and April 2020 are omitted.
Source: Author's calculations from BLS (2024b).

In their preferred specification, Feenstra, Ma, and Xu estimate that, at the industry level, a 1 percentage point rise in import penetration from China reduces industry employment by 0.81 percentage points. This estimate is very similar in magnitude to the findings of Acemoglu *et al*.

But when they study the effects of trade more broadly, Feenstra, Ma, and Xu find that the job losses identified by Acemoglu *et al*. and Autor, Dorn, and Hanson are fully offset by job gains due to US exports.

Specifically, in their preferred specification they find job losses of 533,000 due to import competition between 1999 and 2011. These losses were offset by job gains of 411,000 due to exports. Since export-driven gains were greater than import-driven losses during the 1990s, over the entire 1991–2011 period they find a net gain of 379,000 jobs.[24] As robustness checks, Feenstra, Ma, and Xu examine specifications using only Autor, Dorn, and Hanson-style

[24] Feenstra, Ma, and Xu (2019) also provide estimates of job changes driven by trade between the US and China. Exports to China are substantially smaller than imports from China. Over the full 1991–2011 period, they find that trading with China led to 322,000 job losses.

instruments and ending their time period in 2007. They find job losses from Chinese import competition totaling 671,000 alongside export-driven job gains of 1.2 million.

Feenstra, Ma, and Xu's industry-level results use variation in exposure to import penetration and export expansion to predict changes in manufacturing-sector employment. This methodology does not address the geographic effects of trade liberalization. To study the effects of both import competition and export expansion on local labor markets, they follow Autor, Dorn, and Hanson and Acemoglu *et al*. in examining 722 commuting zones.

Feenstra, Ma, and Xu confirm the result that import competition at the commuting-zone level caused employment losses. Over the 1991–2011 period, they estimate 1.9 million job losses due to import penetration. These losses are balanced out by export-driven gains. They estimate an additional 830,000 jobs lost due to competition with imports from the rest of the world (on top of the 1.9 million jobs lost from Chinese imports) and 2.6 million job gains due to export expansion.

3.3 Learning from the "China shock"

There are two important lessons for economists and policymakers from the "China shock" literature. First, the labor market is less fluid than many economists had thought, and it is harder for workers specialized in one sector with declining opportunities—in the case of trade, in import-competing sectors — to reallocate to other sectors with expanding opportunities. The second lesson is that workers may be less willing to relocate from regions with declining opportunities to regions with expanding opportunities than many economists had thought.

These are generalizable lessons that apply to labor market disruptions broadly, regardless of the source of the disruption. For example, the development of generative artificial intelligence raced forward in 2023 and portends substantial labor market disruption (Strain 2024b). The energy transition away from fossil fuels could create a situation similar in kind to the China shock, given the geographic concentration of that industry. These lessons from the China shock will apply to AI and the energy transition.

Other lessons from the China shock are important for understanding that episode but may be of limited generalizability. China's export growth was explosive, with its share of world manufacturing exports rising from 3 percent in 1995 to 18 percent in 2014, to 21 percent in 2020.[25] And the reallocation of workers across sectors was likely severely adversely affected by the 2008 global financial crisis and Great Recession, in which the US unemployment rate peaked at 10 percent and there were as many as six unemployed workers for every one job opening in

[25] These statistics are based on my calculations using data from the OECD. Baldwin (2024) has similar calculations.

the labor market. To the extent that adverse effects on import-competing workers created Keynesian aggregate-demand reductions, post-2007 economic slack was a major contributor.

3.4 Conclusion: trade is about productivity, wages, and consumption—not jobs

Prior to the China shock, economists generally believed that trade was not a major factor in declining manufacturing employment. The research reviewed here demonstrates that the surge in imports from China two decades ago was much more disruptive than many economists would have expected. But trade liberalization increases both import and export volumes. Taken as a whole, the China-shock literature supports the pre–China shock consensus: Trade creates winners and losers, and trade reduces some employment opportunities and expands other employment opportunities. But trade does not reduce aggregate employment.

Trade is about productivity. By leveraging a nation's comparative advantage and increasing specialization in production, trade increases the productivity of workers. Because workers are more productive, they are more valuable to employers, who will compete more aggressively to retain and attract them. This competition will put upward pressure on workers' wages and incomes.

Trade is about consumption. By leveraging a nation's comparative advantage and increasing specialization in production, trade increases world output and national consumption. Trade also increases the quality and variety of goods and services available to consumers.

The wrong lesson from the import surge from China at the turn of the century is to increase tariffs and advance protectionist measures and industrial policy. Instead, the lesson should be to provide more economic opportunity to workers who are displaced by trade—or, for that matter, by any source of labor market disruption.

Among many ideas to consider, recent advances in job training hold out promise that workers who are displaced can transition into new jobs and industries with more success than occurred two decades ago (Holzer 2023). Increasing the productivity of workers should increase their compensation (Strain 2019). Reemployment bonuses could encourage unemployed workers to find new jobs and remain attached to the labor force following shocks to labor demand (Hobbs and Strain 2024). Expansion of earnings subsidies could encourage labor force participation among workers who have lost their jobs (Schanzenbach and Strain 2021). Regulatory barriers to worker reallocation, such as occupational licensing and high minimum wages (Clemens and Strain 2023), should be scaled back.

Government subsidies for long-term unemployed workers to move from regions with declining opportunity to regions with expanding opportunity is a promising policy to explore, both to help

those workers maintain employment and earnings and to help localities recover from high unemployment following local shocks to labor demand (Strain 2014). The US should also encourage entrepreneurship so that new jobs can be created to absorb displaced workers and to help localities recover from regional shocks. Greater immigration flows could help regions recover from shocks to their local economies.

But tariffs and protectionism will hurt the very workers their advocates hope to help.

4. Industrial policy is (almost) always bad policy

Industrial policy is a term without a clear and widely accepted definition. I prefer a simple and clear definition: Industrial policy is government intervention to override market outcomes with the goal of promoting a politically favored industry. This definition encompasses the tariff regimes discussed earlier in this article. In this section, I will focus on recent government spending programs.

Operation Warp Speed was a public-private partnership announced by President Trump on May 15, 2020, with the goal of developing, manufacturing, and distributing COVID-19 vaccines. The US government committed in advance to large purchases of any vaccines that would be developed, subsidized inputs to avoid bottlenecks during production, and used the Defense Production Act to give priority access to components of the vaccine supply chain. The cost of the program was $18 billion, mostly spent on vaccine purchase agreements and research and development grants to pharmaceutical companies (Hufbauer and Jung 2021).

Operation Warp Speed was remarkably successful. By December 2020, four new COVID-19 vaccines were authorized for use. The GDP gains from faster vaccine development were an order of magnitude larger than the cost of the program (Gagnon, Kamin, and Kearns 2021).

Operation Warp Speed had five attributes that contributed to its success. First, it had a clearly defined goal. Second, the program was not trying to balance competing goals. Third, although success was far from certain, the goal of the program was *a priori* plausibly achievable. Fourth, the goal was not part of a partisan political agenda. Finally, there were US businesses in place with the technological capability and human capital necessary to meet the goal at the time the goal was implemented.

It is too early to offer strong, evidence-based judgments on President Biden's two signature industrial-policy programs, the CHIPS and Science Act of 2022 and the Inflation Reduction Act of 2022. Not enough time has passed since those policies were enacted to enable economists to rigorously evaluate their effects. But the structure of the programs does not inspire confidence

that they will succeed. Consider the programs through the framework for success described above.

The CHIPS Act and the IRA do not have clearly defined goals. Together, their goals include revitalizing domestic manufacturing, establishing the US as a leading producer of semiconductors, spurring development in green technology, slowing the pace of climate change, and advancing economic and national security. What does success look like? How do we know when we have "revitalized" domestic manufacturing? How will taxpayers know if their investment in slowing the pace of climate change has paid off? How do we know when the US is producing enough of the world's chips? What would pass the cost-benefit test? What would fail that test?

These programs are trying to balance competing goals in a way that will likely mitigate their success. For example, supporters of the CHIPS Act wanted to waive environmental regulations that lengthened the time it would take to construct fabs, pitting the goals of boosting domestic manufacturing and addressing climate change against each other. Commerce Secretary Gina Raimondo has warned that requiring companies to go through standard environmental reviews could delay CHIPS Act projects by years.[26]

President Biden's decision to impose a 100 percent tariff rate on imports of Chinese electric vehicles protects domestic automakers at the expense of addressing climate change.[27] The Biden administration's goal of expanding access to affordable childcare has arguably slowed the development and approval of CHIPS Act–funded projects.[28]

In my view, the goals of these programs are not *a priori* plausibly achievable when factoring in costs as well as benefits. In an episode of protectionism similar in scope but vanishingly smaller in scale, President Obama in 2009 sought to protect domestic tire manufacturers from competition with Chinese imports. His initiative protected a maximum of 1,200 jobs at a cost to American consumers (in the form of higher prices) of $1.1 billion (Hufbauer and Lowry 2012). A policy that costs $900,000 per job saved is not successful.

The CHIPS Act and IRA will likely cost more than $1 trillion over the next ten years.[29] It would be surprising if that spending did not lead to a reallocation of jobs into manufacturing from other

[26] Mackenzie Hawkins. "Raimondo Warns US Chips Push Faces Long Delays in Permit Process." *Bloomberg*, December 12, 2023. https://www.bloomberg.com/news/articles/2023-12-12/raimondo-warns-us-chips-push-faces-long-delays-in-permit-process?sref=1pnqJ0TR.
[27] Alan Rappeport and Jim Tankersley. "U.S. to Announce New Tariffs on Chinese Electric Vehicles." *New York Times*, May 10, 2024. https://www.nytimes.com/2024/05/10/us/politics/us-biden-china-tariffs-electric-vehicles.html.
[28] Jim Tankersley. "To Tap Federal Funds, Chip Makers Will Need to Provide Child Care." *New York Times*, February 27. https://www.nytimes.com/2023/02/27/us/politics/child-care-chip-makers-biden.html.
[29] See section 2.1 for more discussion of the fiscal costs of these programs.

sectors.[30] But these subsidies have yet to generate noticeable manufacturing employment gains, and they will not meaningfully change the long trend in manufacturing employment. Even if these subsidies increased manufacturing employment by 50 percent—a huge increase—that would merely return the manufacturing employment share to its level from two decades ago, far from the golden era of manufacturing in the decades following the Second World War.

Unlike revitalizing domestic manufacturing, there is a chance that offering massive subsidies for green energy development will lead to innovation that causes an inflection point in the pace of climate change. But a carbon tax—which would change the relative price of alternative sources of energy without requiring the government to pick winners and losers—or public funding for basic scientific research and innovation would be much more effective at developing new energy technologies. Moreover, these approaches would have a much higher chance at succeeding, and they would succeed at much less expense to taxpayers.

Given the importance of semiconductors to a wide variety of products and the large share of their production located in Taiwan, the CHIPS Act is much more defensible than the IRA. It is also expected to have a fiscal cost two orders of magnitude less than the IRA's. The CHIPS Act will likely see more semiconductor manufacturing in the US than would otherwise have been the case. But for resilience and national-security purposes, there is little reason to conclude that this activity needed to be moved to the United States at great expense to taxpayers.

The US produced 12 percent of the world's chips in 2020. A study commissioned by the Semiconductor Industry Association concludes that the CHIPS Act will lift this share to 14 percent in 2032. The study also finds that the US's production share of cutting-edge chips would rise from zero to 28 percent.[31] Even if these optimistic forecasts come to pass, it is not clear whether these projected increases in US production would materially advance either resilience or security.

Instead of industrial policy, safeguarding national security should involve identifying a narrow set of specific inputs and goods that genuinely warrant special attention by the government, and working with allies to ensure that their supply is diversified away from adversarial nations or geopolitical hotspots. Coordinating with allies would allow production to be relocated to nations that are best situated to produce. It is a large leap from arguing that the supply of certain, select critical inputs and goods not be exposed to adversarial nations to arguing that their production should be located in the United States. Countering China with a coordinated coalition of allied trading partners would be much more productive than bursts of bilateral protectionism.

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[30] Inflation-adjusted manufacturing construction spending has more than doubled since the end of 2021. This surge is likely due in large part to the Inflation Reduction Act and CHIPS and Science Act's manufacturing subsidies.
[31] I relied on the summary of these results provided by The Wall Street Journal: Asa Fitch. "The U.S. Gave Chip Makers Billions. Now Comes the Hard Part." *Wall Street Journal*, June 4, 2024. https://www.wsj.com/tech/chips-act-funding-semiconductor-investments-us-22cc1ea8?mod=hp_lead_pos9.

When an industrial policy becomes a partisan football, its odds of success decline substantially. The CHIPS Act was passed with bipartisan support and is on relatively stable footing. The IRA was not, passing the Senate with all Republicans voting against it and Vice President Harris breaking the tie. At the time of this writing, Mr. Trump and Mr. Biden are competing against each other in the 2024 presidential election. President Trump has made his opposition to the IRA clear, and many progressives are concerned that a second Trump administration would successfully hobble and undermine the law.

Finally, unlike Operation Warp Speed, the CHIPS Act and the IRA require technological capability and human capital—and an ecosystem that can deploy them—that the US does not currently possess, putting at risk the latter's success. For example, the Taiwan Semiconductor Manufacturing Company announced in August 2023 that it was required to delay production at an Arizona fab due to a lack of workers with the right training and experience.[32] Deloitte estimates that the domestic semiconductor industry will face a shortfall of up to 90,000 workers over the next several years (Deloitte 2022).

Like Mr. Trump's trade war, Mr. Biden's IRA has also (predictably) provoked an international response. Its subsidies for clean-energy projects have so dramatically tilted the playing field toward the United States that French president Emmanuel Macron warned that the IRA could "fragment the West."[33] This, at a time when geopolitical challenges with respect to Russia, China, and Iran make Western cooperation and coordination more important than at any time since the end of the Cold War.

The US's embrace of industrial policy has created a permission structure for other nations to do the same. Unsurprisingly, South Korea and the European Union have responded to the IRA with their own subsidies. A tit-for-tat subsidy war distorts relative prices, reduces economic efficiency by prioritizing political ambition over comparative advantage, and reduces the ability of any one nation's subsidies to achieve their own self-defined goals.

Industrial policy works better in theory than in practice. It often fails because real-world factors, limits on state capacity, and competing political objectives often prove to be insurmountable obstacles. All the old questions about industrial policy are worth repeating in light of its revival: Why should we expect the government to do a good job of picking winners and losers or to

[32] Kristina Partsinevelos. "Growing Talent Gap in U.S. Chip Space Emerges as Makers Spend Billions." *CNBC*, August 9, 2023. https://www.cnbc.com/2023/08/09/us-chip-sector-talent-gap-emerges-as-makers-spend-billions.html.
[33] Yasmeen Abutaleb, Rick Noack, and Toluse Olorunnipa. "Biden Says He Might Meet with Putin—but Not Now." *Washington Post*, December 1, 2022. https://www.washingtonpost.com/politics/2022/12/01/macron-biden-warning-western-alliance/.

allocate scarce resources better than the market? If the government intervenes in markets, how will it avoid mission creep, cronyism, and corruption?

The Biden administration will likely spend over $1 trillion on its industrial policies. That money has an opportunity cost. The Biden administration has awarded grants of $8.5 billion to Intel.[34] On a fundamental level, policymakers should ask themselves: Why does Intel need $8.5 billion of taxpayer money? The CEO of Intel is already worried that the CHIPS Act was insufficient; he is now arguing for a "CHIPS 2.0."[35] How do we know whether additional subsidies are needed? Where does taxpayer support for this industry stop?

To advance American innovation, the government should invest public funds in basic research and infrastructure. The goal of this investment should not be to create manufacturing jobs and should not be targeted at specific products (like semiconductors) or target specific goals for sections (like clean energy). Instead, the goal should be to increase innovation and dynamism more broadly, which in turn will increase productivity and wage growth.

Public support for basic research is not industrial policy—it is not designed to override market forces to advance a politically favored industry. But industrial policy can be used to advance scientific research with a clear, specific, and achievable goal. Again, Operation Warp Speed is a good example.

So is the Defense Advanced Research Projects Agency (DARPA), frequently lauded as a gold standard for successful industrial policy. Following the Soviet Union's 1957 Sputnik launch, President Eisenhower established this research agency within the Department of Defense. DARPA awards research and development grants to researchers and institutions (universities and industry) studying high-risk, high-reward projects advancing breakthrough technologies for national security.

DARPA-funded projects have made important contributions in computer science, materials sciences, and information and communication. The agency is insulated from partisan politics and is staffed by managers with scientific training. Its projects are classified, but many have commercial spillovers (Gallo 2021).

DARPA-funded projects have contributed to the creation and development of weather satellites, global satellite navigation, the computer mouse, explosive metal forming, the internet, semiconductor chips, miniaturized GDS receivers, high-definition television, and wafer-scale

[34] Kif Leswing. "Intel Awarded up to $8.5 Billion in CHIPS Act Grants, with Billions More in Loans Available." *CNBC*, March 20, 2024. https://www.cnbc.com/2024/03/20/intel-awarded-up-to-8point5-billion-from-chips-act-with-loans-available.html.
[35] Christine Mui. "Biden Needs a Win from Intel. Can the Company Deliver?" *Politico*, March 29, 2024. https://www.politico.com/news/2024/03/29/biden-intel-chips-00149636.

semiconductor integration, among others (Hufbauer and Jung 2021). These contributions have created wealth (and jobs) far in excess of the agency's $3.5 billion annual budget.

Public investment in basic research can pay enormous dividends. Narrow, specific, achievable industrial policy with clear, nonpartisan goals can succeed. But government efforts along the lines of the Biden administration will very likely not pass a reasonable cost-benefit test.

5. Conclusion

The protectionism, trade wars, and industrial policies of the Trump and Biden administrations have not succeeded at meeting their goals and likely will not succeed at meeting their goals. They have caused manufacturing employment to decline, not to increase. They have not reduced the overall trade deficit, and they have not led to a substantial or definitive decoupling of the US and Chinese economies. They will likely not pass a reasonable cost-benefit test with respect to semiconductor and clean-energy innovation and manufacturing. Moreover, the goals that have not been met are wrongheaded.

These policies have arisen from a combination of nostalgia for an imagined past, fundamentally unsound economic analysis, and legitimate concerns regarding the US's strategic competition with China. Misplaced nostalgia and unsound economics are bad guides to economic policy. And spasms of protectionism do not make for a coherent approach to strategic competition.

The conversation around that strategic competition often seems to assume that the United States is "lagging" China, and that the US must "catch up" to Chinese manufacturing using protectionist measures.[36]

But why should the US wish our economic policy to be more like China's? China's central planning will not be remembered as a long-term success. It has led to overinvestment in many sectors, a deeply imbalanced economy with too little consumption spending, a growth model struggling to transition away from exports, massive overbuilding of real estate, and an inadequate safety net. State policies have led to demographic problems that will have enormous economic ramifications.[37] Moreover, to the limited extent that China's model is working, it only

[36] As one example of many, consider the headline and subheading on a *New York Times* article: "How China Pulled So Far Ahead on Industrial Policy: The United States and Europe are trying to catch up to a rival skilled in using all the levers of government and banking to dominate global manufacturing." By Patricial Cohen, Keith Bradsher, and Jim Tankersley. May 27, 2024. https://www.nytimes.com/2024/05/27/business/economy/china-us-tariffs.html.
[37] Krugman (1997) provides a general argument against the fighting-fire-with-fire approach to international economic policy: "The economist's case for free trade is essentially a unilateral case: a country serves its own interests by pursuing free trade regardless of what other countries may do. Or, as Frederic Bastiat put it, it makes no more sense to be protectionist because other countries have tariffs than it would to block up our harbors because other countries have rocky coasts."

works because their economy is embedded in an authoritarian state with a compliant industrial sector.

Rather than uniting our allies, the protectionist policies of the Trump and Biden administrations have antagonized allies and called into question whether the US is a reliable partner. Rather than pursuing narrow and clear objectives, the US's goals are broad, muddled, and in conflict with each other.

A better strategy would clearly acknowledge that China is a bad actor while taking a judicious approach; targeting a narrow set of practices, products, and technologies that clearly warrant intervention on economic security grounds; and pursuing that intervention in concert with as broad a coalition of allies as possible. It would not conflate economic security goals with domestic economic considerations, like trends in manufacturing employment. It would involve strengthening—and certainly not continuing to weaken—international institutions like the World Trade Organization.

Finally, it would proceed with confidence in the American system of democratic capitalism. Over the past three decades, the real wages of typical workers have grown substantially, and after-tax real median household income has grown even more. The process of creative destruction has led to new opportunities in expanding middle-wage occupations. For over a decade, broadly measured income inequality has stagnated. America remains an upwardly mobile society. Rising tides may not lift all boats at the same speed, but the hot economy of recent years shows that macroeconomic gains diffuse throughout the economy and are not captured by the elite.[38]

Globally, the free-enterprise system has delivered astonishing results. Over the past three decades, hundreds of millions of people have been lifted out of abject poverty due to the spread of capitalism. Infant mortality has plunged. The world became more peaceful and secure.

The 2008 global financial crisis, Great Recession, and COVID-19 pandemic each led to great economic and human hardship. They led to and sustained the rise of populist politics. But as traumatic as those events were, they should inspire confidence in the American system of democratic capitalism. That system has created the remarkably resilient and innovative workforce, economy, and society that were able to meet these challenges—and to overcome them.

The populist focus on the working class has been a welcome development, and the right response to populism is to take seriously the need to increase economic opportunity and advance

[38] For more detail, see Strain 2020 and Strain (forthcoming).

participation in economic life, including by focusing on overall economic growth. The wrong response is to advance policies that will hurt the working class and threaten long-term prosperity.

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OPINION COMMENTARY Follow

The Biden-Trump Economy of Nostalgia

Rather than prepare the U.S. for the challenges of the 21st century, they want to bring back the 20th.

By Robert B. Zoellick

April 1, 2024 12:29 pm ET

A mid-20th-century IBM typewriter factory. PHOTO: BETTMANN ARCHIVE

America's elderly presidential candidates want to return the country to a fantasy mid-20th-century past. Their mantra is to restore manufacturing. But neither understands modern manufacturing or how America can forge a dynamic and secure future.

The Cato Institute has reported that—contrary to conventional belief—U.S. manufacturing accounts for a larger share of global output than Japan, Germany, South Korea and India combined. America's productivity is far ahead, too. In 2019, the value added by the average American manufacturing worker was $141,000, exceeding second-place South Korea by more than $44,000 a worker and China by more than $120,000.

Global markets reflect this strength. Between 2002 and 2021, U.S. manufacturing exports more than doubled, with sales second only to China, which dominated

low-end production. Foreigners understand American industry better than Joe Biden or Donald Trump does; they invested $2.1 trillion in U.S. manufacturing, including $121 billion in 2021, before Mr. Biden's subsidies.

America's success is thanks to its ability to move from low-tech, less-productive sectors to higher-value ones such as computers, pharmaceuticals, medical and scientific instruments, aerospace, and electrical machinery. The U.S. even understates its performance because our definition of manufacturing is as old as our presidential candidates. The late George Shultz said Washington could solve a political problem by treating software as a manufactured good. Software now accounts for about half the value of a new car. Politicians who see manufacturing only as bending metal are out of touch.

The Biden-Trump mindset ignores the links between productivity, growth and higher incomes. The 21st-century economy, including modern manufacturing, will depend on innovation in artificial intelligence, quantum computing and general-purpose technologies. American manufacturing is productive, requiring fewer workers. Consider even the much-protected steel industry. U.S. steel output increased 8% between 1980 and 2017, despite a workforce less than a quarter its prior size. America isn't the only country moving to higher-productivity manufacturing with fewer workers. From 1976 to 2016, manufacturing employment fell by almost half in Germany and two-thirds in Australia.

Americans have adapted to huge economic transitions before. In 1900, some 40% of Americans toiled in agriculture. Today farmers account for 1% or 2% of workers, but they grow much more food. Between 1948 and 2017, U.S. agricultural output tripled while the number of hours worked plunged more than 80%.

The U.S. economy's evolution from agriculture to manufacturing and now to services reflects changes in what Americans buy. Today, that means spending on healthcare, entertainment, sophisticated equipment and education.

The Biden-Trump economy of nostalgia won't lead to higher wages. Research by the Bureau of Labor Statistics and the Federal Reserve Bank of St. Louis shows that manufacturing workers earn less than the average private-sector worker. Manufacturing workers in higher-tech sectors, with greater productivity, fare better. These jobs benefit from trade, but Messrs. Biden and Trump fail to

understand how a modern trade agenda can serve America's interests and promote our values.

Growth in the services trade has been exceeding that in merchandise. Commercial services now account for about a quarter of all exports, with computers, research and development, and health activities in the forefront. America should be leading a digital trade agenda that takes advantage of our strengths.

Yet in the face of change, America's two protectionist presidents retreated. Their formula has been to tax trade through higher tariffs, restrict the use of foreign inputs for American businesses, and bust the budget with hundreds of billions of dollars in subsidies. By directing patronage to favored causes and protecting others from competition, they are adding costs, limiting the country's adaptability, and eroding U.S. financial resilience.

Meanwhile, other countries are adapting to 21st-century trade by negotiating lower barriers and establishing rules and standards for economic activity. Asia has a Regional Comprehensive Economic Partnership of 15 countries. Africans launched a continental free-trade agreement. When Mr. Trump pulled the U.S. out of the Trans-Pacific Partnership, other nations moved ahead. The European Union and China have negotiated arrangements that account for about 40% of their trade. In this arena, the U.S. government has placed American workers and businesses at a competitive disadvantage.

The Biden administration recently compounded its mistakes by pulling back from negotiations in the World Trade Organization and the Indo-Pacific Economic Framework for Prosperity to define the rules of the future digital economy. Rather than encourage American innovation, the Biden team fears technologies it can't direct and is leery of big, successful companies. The administration has hamstrung big and small businesses that want to use data to improve their services.

Polls by the Chicago Council on Global Affairs show that the vast majority of Americans favor more trade and openness. For now, the best hope is putting the brakes on the Biden-Trump race toward obsolescence. Someday a younger politician will tap America's spirit of embracing science, technology, innovation and opportunity.

Mr. Zoellick served as U.S. trade representative (2001-05), deputy U.S. secretary of state (2005-06) and World Bank president (2007-12). He is author of "America

in the World."

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The Surprising Resilience of Globalization: An Examination of Claims of Economic Fragmentation

JULY 2024

AUTHOR

Brad Setser*

ABSTRACT

The current bipartisan doubts about the value of liberal trade in the US are shared by many populist European parties, who also question the value of deeper international economic integration. Yet for all the skeptical rhetoric—and very real steps from the US and other advanced economies—globalization is not in retreat. Global trade, in fact, continues to rise alongside global economic growth. If anything, it has picked up since the pandemic. Widespread expectations that the global economy would fragment have not yet come to pass. China still relies on the world's big democracies for demand, and those democracies still rely on China for supply. Global flows related to corporate tax avoidance remain significant, cutting into US fiscal revenues while artificially diminishing the US industrial base. China's increasingly troubled domestic economy and its large-scale industrial policies risk leaving the US and its allies more, not less, reliant on Chinese supply in key sectors. The recent surge in China's trade surplus is evidence of ongoing globalization, but it emerges more from China's own economic imbalances than from a healthy global division of labor. There is thus scope for policy reforms that support a healthier form of integration; notably, we might end the perverse incentives in the US tax codes that undermine US production and revenues, while harmonizing clean industrial policies and deepening trade among allies.

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Introduction

Deglobalization and fragmentation have become new buzzwords. The *Economist* (2024) posits that fragmentation is "visible in the economic data, as investors reprice assets and redirect capital in a less integrated world." *Bloomberg* columnist Andreas Kluth (2024) is even more blunt: "Global trade and finance are fragmenting into rival and increasingly hostile blocs, one centered on China and extending into the global South and another around the United States and other Western countries."

The International Monetary Fund (IMF) research team is bit more careful, acknowledging that "the extent of fragmentation is still relatively small," while worrying that "the decoupling between the rival geopolitical blocs during the Cold War suggests [fragmentation] could worsen considerably should geopolitical tensions persist and trade restrictive policies intensify" (Gopinath et al. 2024, abstract). The IMF paper's title, "Changing Global Linkages: A New Cold War?" captures the current mood.

The Trump tariffs, the interruption of global trade during the COVID-19 pandemic, the disruption to energy markets following Russia's 2022 invasion of Ukraine, and America's turn toward industrial policy in the Inflation Reduction Act (IRA) all marked the end of an era. The world, to use the famous Tom Friedman phrase, is no longer flat. Expectations of increasing interdependence have given way to the imperatives of strategic competition; the end of new trade liberalization has ushered in an era of industrial policy.

The now-standard tale of deglobalization certainly contains a kernel of truth. Policies meant to accelerate economic integration across borders no longer command a clear political majority, certainly not in the United States.

But as a description of the current global economy, this paper will argue that that narrative is incomplete at best and in many ways simply inaccurate. As significant as the political forces pushing for a less integrated world are, there are also strong forces pushing for further integration—even when further integration isn't necessarily healthy.

One important example is the US corporate tax code, which continues to strongly incentivize offshoring in key sectors of the economy, notably in advanced pharmaceuticals. The resulting pattern of trade and investment is a function of tax avoidance rather than a reflection of a healthy international division of labor.
More significantly, China's own domestic downturn—and Chinese president Xi's resistance to consumer-focused stimulus—is pushing China's economy to rely more on exports, even as its trading partners express growing concerns about dependence on Chinese supply. Unbalanced integration is still a form of integration—measures of globalization grew rapidly during the run-

up to the global financial crisis. But large countries that need to export without importing—to make up for an internal shortage of demand—will generate more sources of supply dependence without allowing for a reciprocal expansion of trade. The resulting pattern of trade and financial flows is thus not really a sign of a healthy global economy.

This paper focuses on thorough description rather than grand theory. A close examination of the data shows that the world economy remains far from truly fragmented along political lines. In some ways, that lack of fragmentation is a risk, as the global economy is more integrated than it should be according to the political consensus in any major part of the global economy. The IMF and others are right to warn of the risks of a sudden stop to trade and financial flows across different political blocs. Yet recognition of the ongoing risk of a sudden "deglobalization" shock should not lead to the conclusion that all forms of current global integration are healthy.

This paper also highlights three areas in which reform could generate a healthier pattern of integration: reform of the pro-offshoring elements in the current US corporate tax code; the introduction of subsidies-sharing agreements and other measures to harmonize industrial policies in clean energy sectors among allies; and a renewed focus on the external spillovers from China's unbalanced domestic economy. The overarching theme, though, is that the immediate risk facing the global economy is perhaps better described as unhealthy integration than fragmentation.

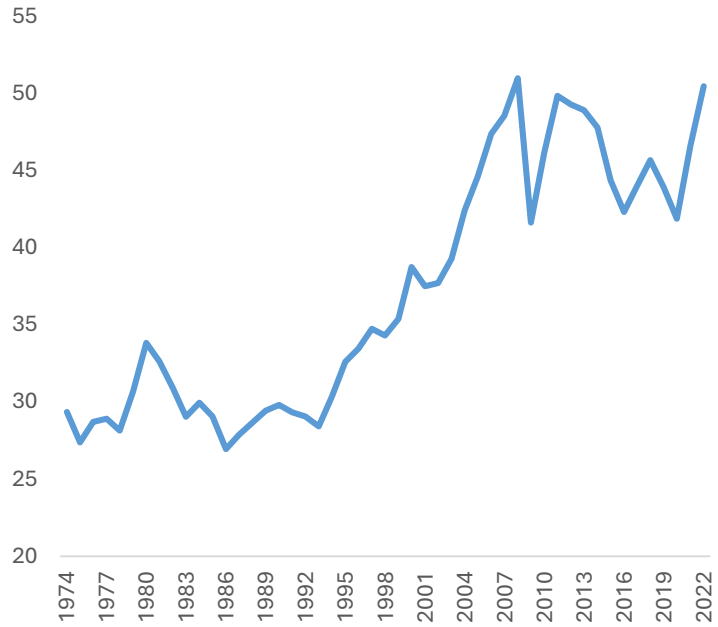
1. Deglobalization or resilient globalization?

The standard method by which to measure globalization is to look at a host of global trade and financial flows relative to world GDP. Increased integration shows up as increased trade and increased cross-border finance relative to world output. Another oft-cited measure is the degree of balance between trade-liberalizing and trade-restricting measures. The IMF (2024) has noted a tripling of trade restrictions over the last five years.

It is important, however, not to assume that the political shifts against globalization have reduced measured global trade, as figure 1 demonstrates. After Donald Trump forcefully rejected the Trans-Pacific Partnership (TPP), US trade with Asian members of the TPP actually accelerated. US imports from Southeast Asia grew much more rapidly in the six years after the TPP was rejected than they had in the prior six years.

Why? After 2014, the dollar was strong, encouraging imports. US demand growth recovered from the post-global financial-crisis doldrums, also boosting imports. Moreover, assembly operations in Southeast Asian countries also achieved critical mass. US trade with Vietnam, displayed in figure 2, is illustrative.

Figure 1: World trade in goods (percentage of GDP), 1975–2022

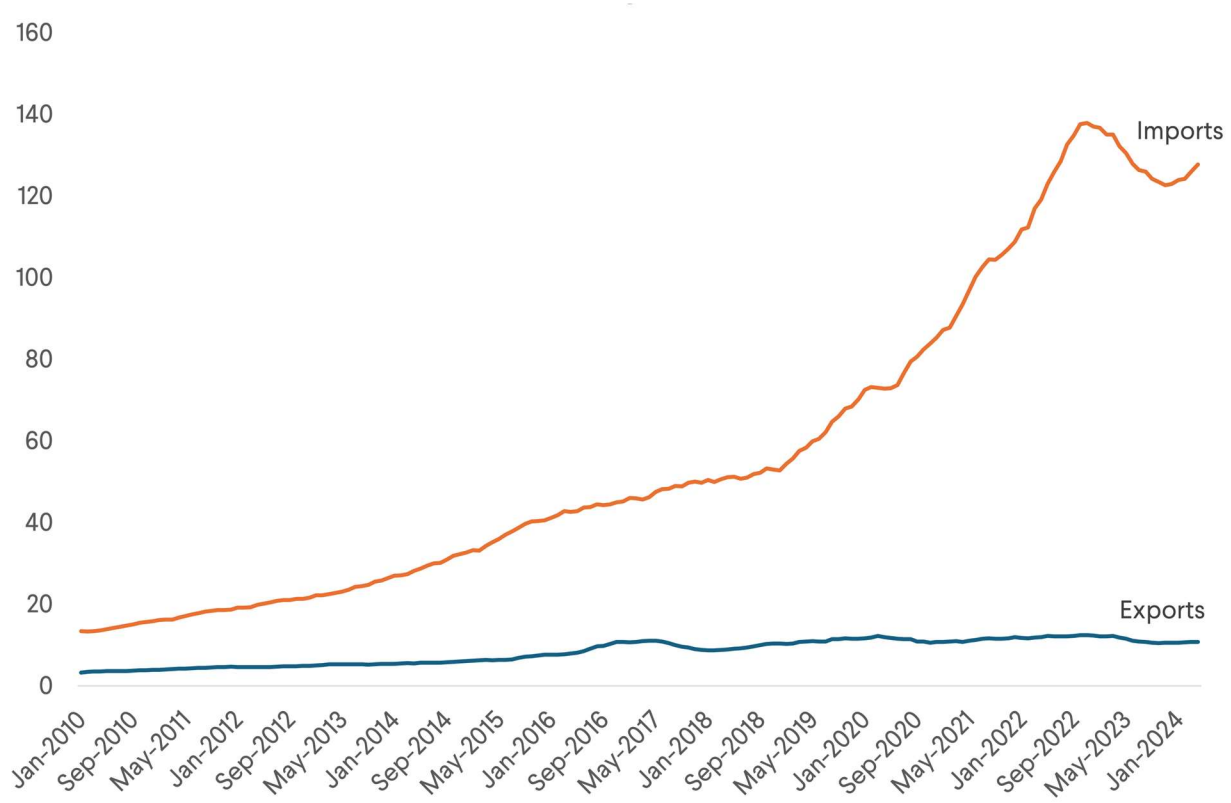


Note: GDP data in current USDs.
Source: Calculations by Richard Baldwin, World Bank (2024).

As Chad Bown (2024) and others have noted, actual US tariffs are generally low for all members of the WTO, so in many important sectors, the true impact of a preferential free trade agreement is modest. Finally, US trade with Southeast Asia—and many of the Asian newly industrializing economies (NIEs)—was also boosted by the tariffs on roughly $350 billion of Chinese imports introduced by the Trump administration's section 301 trade action.

These observations raise an important, broader point: the net effect of the Trump Section 301 tariffs on China, which now have been extended and, in clean energy sectors, expanded by the Biden Administration, has not been a reduction in global trade. The tariffs resulted in only a modest substitution of US goods for Chinese goods (Fajgelbaum and Khandelwal 2021). In many sectors, US firms simply paid the tariffs and, in some cases, absorbed the costs (Cavallo et al. 2019). In other sectors, the main effect was the substitution of Southeast Asian assembly for Chinese final assembly (Baldwin et al. 2023). Freund et al. (2023) has shown that countries that saw a large increase in exports to the United States also increased their imports from China. A strong argument can be made that the tariffs reduced supply chain concentration in China and thus increased measured trade. Michael Strain makes similar points in his AESG paper in this volume (Strain 2024).

Figure 2: United States trade with Vietnam, 2010–2024
(USD billions, trailing 12-month sums)



Source: US Census Bureau (2023a) and US Census Bureau (2023b) via Haver Analytics.

In some ways, this result should not have been a surprise. Standard trade remedies against Chinese photovoltaic panels produced a similar result: Chinese solar firms set up assembly operations in Southeast Asia that used imported Chinese solar wafers and cells to produce panels for the export market. Subsequent across-the-board safeguards on all solar panel imports were also ineffective, both because of exemptions (for so-called bifacial panels) and because of the relatively modest (14.25 percent) tariff compared to the efficiencies of Chinese cell and panel production.

In these cases, one might argue that the persistence of global trade flows is evidence of ongoing distortions in global trade, which impeded the efficient direct flow of Chinese-assembled consumer goods—and Chinese components for US production—into the US market.
But more generally, we should make no across-the-board assumption that higher levels of globalization necessarily reflect more perfect markets and/or the elimination of arbitrary restrictions on cross-border flows. Certain forms of integration stem from distorted incentives, and thus a fall in measured integration actually can be a sign of a healthier and more balanced global economy.

Consider two data points tied to the evolution of cross-border capital flows, which are plotted in figure 3.

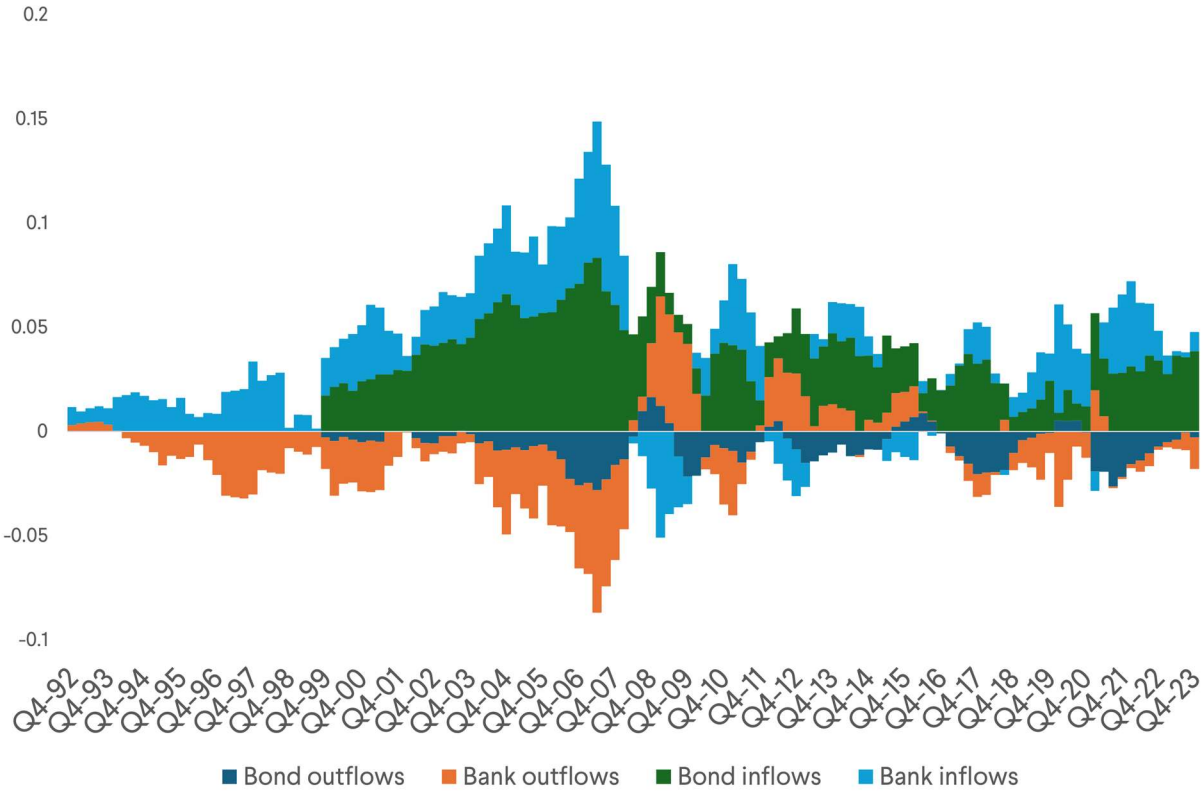
The years prior to the global financial crisis were clearly associated with a large fall in cross-border capital flows, specifically bank and bond flows into and out of the US. Prior to the global financial crisis, this rise in cross-border flows was generally interpreted positively. Alan Greenspan famously argued that increased financial flows had allowed for the geographic separation of savings and investment, and thus he initially welcomed rising trade and payment imbalances as evidence that globalization had reduced the importance of borders and allowed a higher level of dispersion between national savings and national investments (Greenspan 2004). Many regulators, as well as the IMF, expressed a similar view: they argued that financial innovation had allowed the risks tied to the rise in US housing prices to be dispersed globally, leaving the core of the US financial system sound.

We now know better. The acceleration in cross-border bank flows prior to the global financial crisis was in fact the product of a dangerous cocktail of loose regulation, increased leverage among the world's big banks, and the indirect strains on global finance created by unprecedented global reserve accumulation and the associated payment imbalances. Brender and Pisani (2010) note in an underappreciated book that a world marked by a large deficit in the US household sector on one side and a large accumulation of foreign-exchange reserves on the other required long "chains of financial intermediation" to transform the underlying exposure to the US residential housing market into a form that central banks were willing to hold as reserves. The oft-celebrated increases in measures of financial globalization were in fact leading indicators of the risk of a crisis among the great financial institutions of the North Atlantic (Tooze 2018; Geithner 2014).

The persistence of foreign direct investment (FDI) following the global financial crisis is another example of how simply looking at the scale of total financial flows can paint a misleading picture of economic health.

All analysis of financial flows after the global financial crisis have found that FDI flows continued to increase while bank and bond flows slowed (Lane and Milesi-Ferretti 2017). But there is an important catch: a very large fraction of that FDI flowed through centers of corporate tax avoidance Analysts started to talk about "phantom" FDI: large paper investments in corporate tax centers that shifted profits out of high-tax jurisdictions to low-tax jurisdictions (Damgaard, Elkjaer, and Johannesen 2019). This phenomenon is apparent in the geographic distribution of US foreign direct investment, as there is an obvious concentration of foreign direct investment in the world's major centers of tax avoidance.

Figure 3: Cross-border bank and bond flows to the United States, 1992–2023 (Percentage of US GDP)

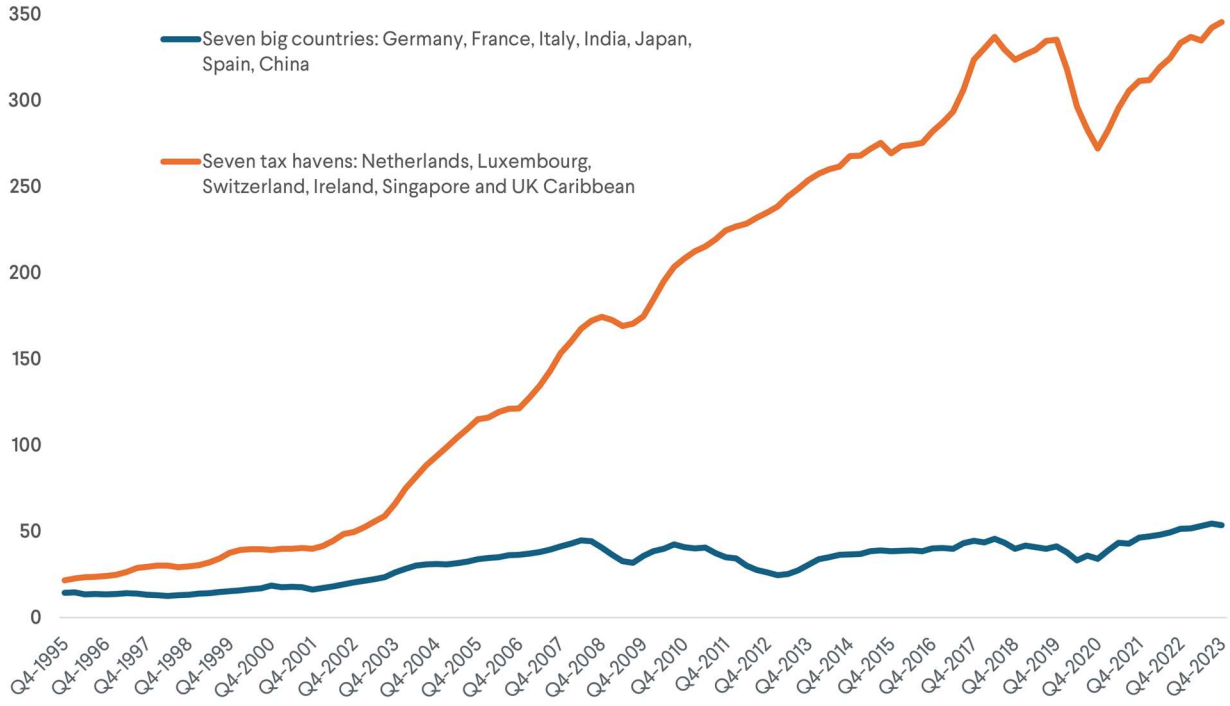


Source: US Bureau of Economic Analysis (2024) via Haver Analytics.

It is therefore especially important to be cautious in interpreting recent swings in FDI flows, displayed in figure 4, as evidence of unhealthy deglobalization. The 2017–2018 fall in FDI flows into the US is sometimes attributed to the uncertainties created by Donald Trump's populist economic policies (Posen 2018). In fact, this fall was tied to the end of a surge in FDI linked to inversions; that is, nominally Irish companies acquiring US companies as a means of changing their notional headquarters to Ireland.

The broader 2018 fall in the global FDI data has also sometimes been interpreted as a leading sign of economic fragmentation. However, careful work from Di Nino, Habib, Schmitz, (2020) and Lane (2024) showed that this fall was due to a simplification of the tax structure of many multinational companies, which resulted in an enormous fall in reported FDI through shell companies in the Netherlands and Luxembourg. The broader point, of course, is that in a world where a large share of FDI is tied to profit-shifting, many big swings in FDI flows are linked to changes in tax policy and not to changes in the broader fundamentals of the global economy. In some ways, the unhealthy forms of globalization—those driven by corporate tax avoidance strategies as well as large and persistent trade and payment imbalances—have been too resilient.

Figure 4: US FDI income, seven tax havens vs. seven large countries, 1995–2023 ($USD billions)



Source: Bureau of Economic Analysis (2023) via Haver Analytics.

2. The large impact of tax avoidance on global trade and FDI flows

2.1. BEPS and the 2017 tax reform

It is worth taking a moment to review how the OECD's initial effort to reform aspects of global taxation (base erosion and profit shifting, or BEPS) and the 2017 US tax reform have impacted the global and US data, and thus the balance between health and unhealthy forms of global integration.

Before both reforms, US firms could, in theory and sometimes in practice, report the bulk of their offshore profits in zero-tax jurisdictions (typically the Cayman Islands, Bermuda, and/or Jersey) and avoid paying any US tax on this income, so long as the profit legally remained offshore. Firms found creative ways to access these funds nonetheless, notably by borrowing onshore against the legally offshore profits.

The net result was a set of obvious distortions. Many globally profitable US firms accumulated large sums of offshore funds and significant onshore debts. This buildup led to an artificial increase in measures of globalization, as the non-repatriated profits of US companies inflated

measures of US direct investment abroad and their purchases of US bonds with their offshore funds inflated measures of foreign holdings of US bonds. For example, during this period the US data showed that Ireland became a large holder of US bonds.

Reform was obviously needed. But the impact of the first round of changes from the OECD and the new US corporate tax structure introduced by the Tax Cuts and Jobs Act (TCJA) was mixed at best. There was a reduction in the complexity of certain tax strategies that reduced overall global FDI, as, as noted earlier, fewer shell companies were needed to implement the central tax strategies of major US multinational firms. But in many sectors, the underlying incentive to shift profits to low-tax jurisdictions abroad remained.

2.2. The end of the "Double Irish"

The key reform in the initial OECD base erosion and profit shifting process was an agreement to end stateless income or income in zero-tax jurisdictions. Apple was, thanks to the work of Carl Levin's Senate Investigative Committee, the best-documented example of a firm that had large stateless income prior to 2014. Before its international tax reorganization, Apple's Irish subsidiary was considered American by the Irish tax authorities and therefore was not taxed in Ireland, while also being considered Irish by the US authorities and thus not taxed in the United States (technically, the US tax liability was simply deferred, but so long as the profit remained legally offshore it was untaxed).

Microsoft, Alphabet (Google), and Facebook/Meta used a more conventional "double Irish" structure, with sales channeled through an Irish company that was a tax resident of Ireland while the profit accrued to another Irish company that was a tax resident of either Bermuda or the Caymans. The net effect was similar.

As part of the BEPS process, Ireland committed to eliminating Irish-registered companies that were not also tax residents of Ireland. But this reform did not mean that all profits flowing though the Dublin subsidiaries of major US companies would be taxed at 12.5 percent. Rather, firms developed tax strategies to take advantage of provisions in Ireland's tax law that allowed for the depreciation of investment-intangible intellectual property. An Irish shell company set up by a US multinational could notionally purchase the intellectual property held by a subsidiary in Bermuda, the Caymans, or Jersey and amortize the notional purchase price against their newly Irish profit, significantly reducing the firm's effective tax rate.

The results were obvious both in the Irish balance of payments and the bottom line of many US firms: there were noticeable surges in Ireland's reported imports of intellectual property, which materially changed the overall European balance of payments data. The reorganized Irish

subsidiaries of US multinational companies generally achieved tax rates in the low single digits (Coffey 2024).

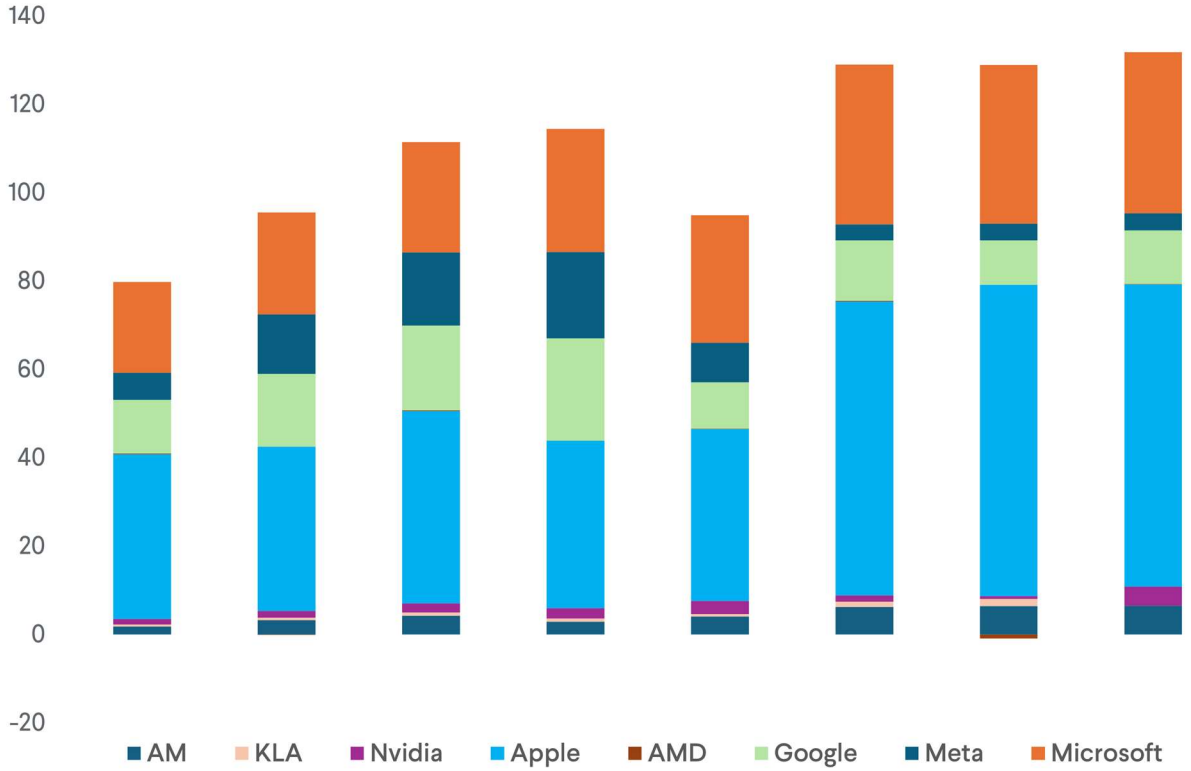
The *New York Times* (2017) and others have publicly reported the key details of Apple's pioneering transaction: Apple's Irish subsidiary bought intellectual property from Apple's Jersey subsidiary for over €200 billion. That notional cost could be depreciated against Apple's reported Irish profit over ten years, reducing Apple Ireland's taxable profit by as much as €20 billion per year. These results of this scheme became significant in recent years: as Apple's non-US profit increased in the last five years, the taxable Irish profit of Apple's Irish subsidiary also increased—raising Apple Ireland's effective tax rate and generating a very visible windfall for Ireland's Treasury (Hubert and Setser 2023). The rise in foreign profits booked in Ireland from €40 billion in 2014 to €160 billion translated into at least €15 billion a year in extra tax revenue for the Irish government and, of course, a bounty for the shareholders of the firms who achieved a lower effective tax rate in the process.

The very visible and easy-to-track surge in the Irish-shoring of the world's most highly valued intellectual property was consistent with the agreed OECD BEPS reforms—and, as importantly, fit well within the reforms to the US corporate tax code in the 2017 Tax Cuts and Jobs Act (TCJA). The TJCA reduced the headline corporate tax rate from 35 percent to 21 percent, ended deferment (legacy profits were deemed to be repatriated, and offshore cash faced a one-time levy of 15.5 percent), and created two new special tax rates—the 13.125 percent tax rate for Foreign Derived Intangible Income (FDII) and the 10.5 percent tax rate for Global Intangible Low Tax Income (GILTI).

The 10.5 percent rate is particularly important as it created an incentive for US firms operating in low-tax jurisdictions abroad to maintain their offshore structures. As shown in figure 5, the annual reports of US firms usually make it clear which of the two international tax rates large, internationally active firms are using: Alphabet (Google), Meta, and Qualcomm have all repatriated intellectual property to the US and pay the FDII rate on their non-US profit; Apple, Microsoft, Oracle, and the major US pharmaceutical firms have retained offshore-based tax structures and generally pay tax on their offshore income at the GILTI rate (Clausing 2020).[1]

[1] 85 percent of foreign tax paid abroad can be deducted against the 10.5 percent GILTI rate. Firms also aren't liable for US tax on a 10 percent deemed return on their tangible assets abroad.

Figure 5: Big Tech: reported foreign income, 2016–2023 ($USD billions)



Source: Author's calculations from company 10-Ks: Applied Materials (2023), KLA Corporation (2023), NVIDIA (2023), Apple (2023), Alphabet (2023), Meta (2023), Microsoft (2023).

2.3 The persistent but unhealthy globalization of pharmaceutical Firms

In many ways, the persistence of transfer pricing and tax avoidance games is now most obvious in the pharmaceuticals sector.

Four data points are worth highlighting:

1) US imports of pharmaceuticals are large and growing; they have more than doubled since the 2017 Tax Cuts and Jobs Act. The biggest sources of US pharmaceutical imports by value are Ireland, Singapore, and Switzerland—not the low-cost generics producers of India and China (Kosloff 2024). An additional $40 billion by value is imported from Puerto Rico, which is offshore for US corporate tax purposes.

2) US pharmaceutical firms have announced several new greenfield investments in Ireland linked to the production of new patent-protected drugs; the Conefrey and McLaughlin (2023) of Ireland's Central Bank have even warned about the resulting concentration of Ireland's exports in a narrow set of products.

3) US pharmaceutical firms consistently report losing large sums on their US operations in their annual 10-K SEC disclosures even though US patent-protected drug prices are roughly three times higher than the global norm. Those same firms consistently report earning large profits outside the US even though said earnings are smaller than their US revenues.

4) As plotted in figure 6, many pharmaceutical firms pay essentially zero in actual tax in the US, despite significant global profits. Their global tax rate is typically reported to be in the low double digits—but that doesn't imply that they are paying 10.5 percent of their global profit to the US Treasury.

The pharmaceutical sector thus provides unambiguous evidence that neither the initial BEPS reforms nor the 2017 TCJA ended the incentives to offshore jobs and profits in the pharmaceutical industry (Setser 2023).

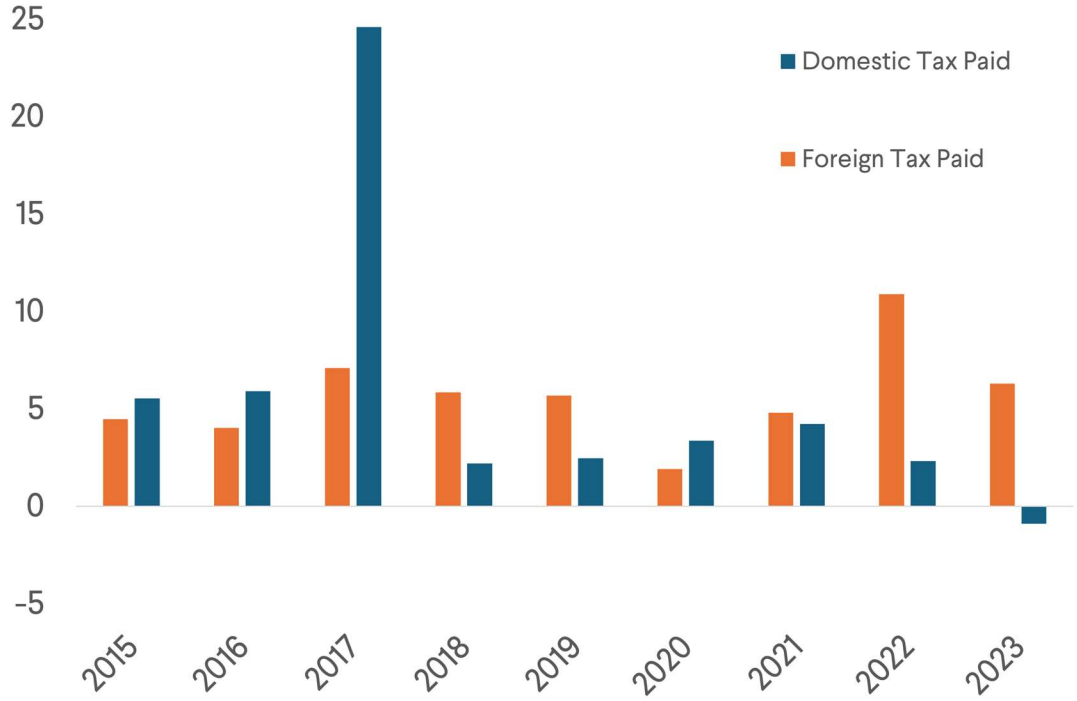
The absence of reported profits in the US translates directly into a loss of federal tax revenues. In 2022, the major pharmaceuticals paid about $3 billion in US tax on their $105 billion in global profit—an effective tax rate in the US of less than 3 percent. In 2023, the same set of companies, in aggregate, paid zero US tax on their $60 billion in combined global profits. In 2023, AbbVie, which generates almost all its profit in its zero-tax Bermuda subsidiary (that holds the intellectual property for its blockbuster drug Humira) and thus paid the GILTI tax, was the only one of the four largest US pharmaceutical companies to report paying any US tax. Johnson and Johnson, Pfizer, and Merck all did not pay any 2023 income tax to the federal government.

In some other strategically important sectors as well, the tax code appears to have acted as a de-industrializing policy in the US. Perhaps the most significant of these sectors is the industry that makes the machines used in the manufacturing of semiconductors. The leading company in this industry, ASML, is Dutch. But the US is home to several large companies in this space, including Applied Materials and Lam Research. Both companies now report earning the bulk of their profit abroad—and both increasingly manufacture abroad as well.

As figure 7 displays, Applied Materials' 10-K reports show that it has shifted from reporting almost all its income in the US to reporting almost no income in the US. Its 10-K reports highlight the importance of Singapore to its low tax rate.[2] It seems likely that by increasing its manufacturing in Singapore and other jurisdictions, it was able to move much of its intellectual property to its lightly taxed offshore subsidies.

[2] "The foreign operations with the most significant effective tax rate impact are in Singapore. The statutory tax rate for fiscal 2023 for Singapore is 17%. We have been granted conditional reduced tax rates that expire beginning in fiscal 2025 excluding potential renewal and subject to certain conditions with which we expect to comply" (Applied Materials 2023, 93).

Figure 6: US Big Pharma, foreign vs. domestic tax paid, 2015–2023 ($USD billions)



Note: Firms include Pfizer, Johnson & Johnson, Bristol Meyers Squibb, Amgen, and Gilead.
Source: Author's calculations from company 10-Ks: Pfizer (2023), Johnson & Johnson (2023), Bristol Meyers Squibb (2023), Amgen (2023), and Gilead (2023).

offshore subsidiaries. Lam Research's 10-K disclosures also show large rises in its foreign income, and it too has shifted its manufacturing to Southeast Asia.[3]

The unhealthiest form of globalization therefore persists. The large trade and investment flows in pharmaceuticals and certain other advanced manufacturing sectors are in no way evidence of increased economic efficiency, only of efficient tax planning.

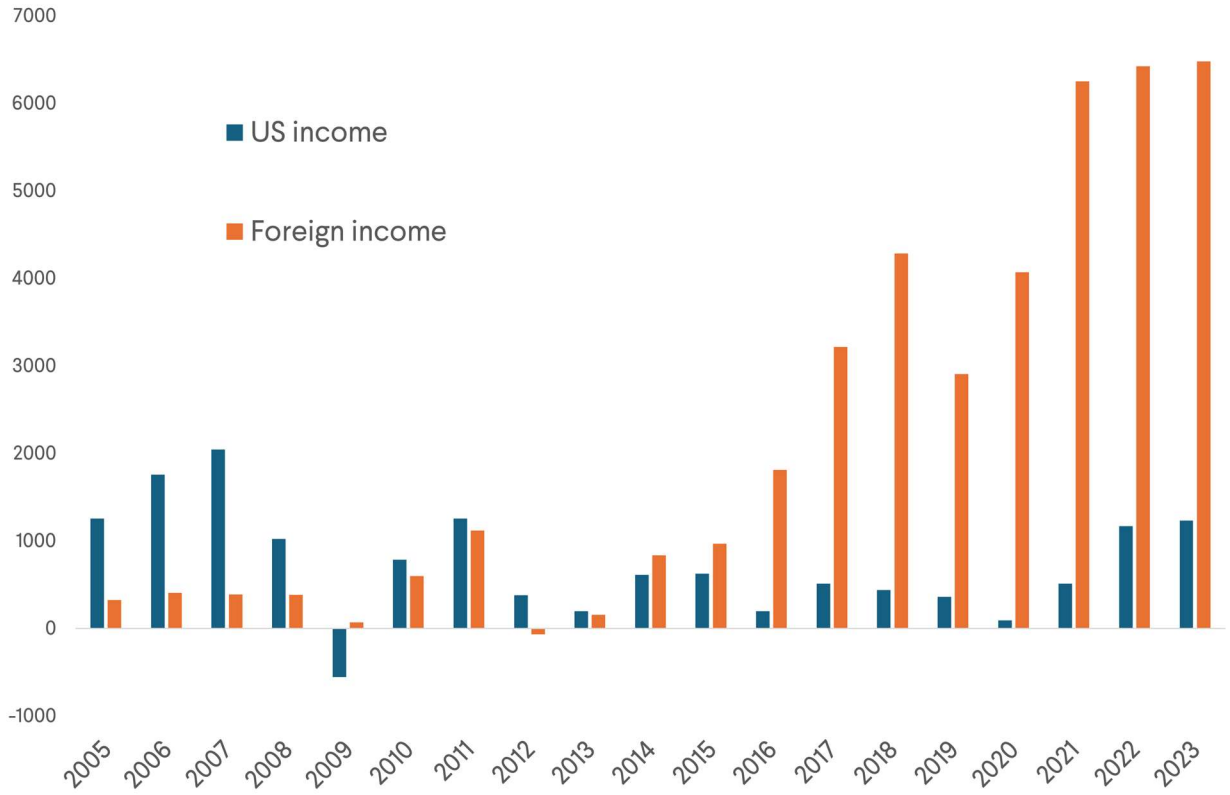
3. China's surprising impact on the data on global integration

Any discussion of globalization ultimately leads to China.

China is the second-largest economy in the world and by far its biggest exporter of manufactured goods. For most of the period after the global financial crisis, China was the fastest-growing

[3] Many companies' tax structures can be deduced from countries whose tax provisions are cited as risk factors in the firms' 10-K disclosures. Most pharmaceutical companies cite some combination of Ireland, Switzerland, Singapore, and Puerto Rico. Both AM and Lam Research mention Singapore. Apple, of course, mentions Ireland.

Figure 7: Applied Materials: US vs. foreign income, 2005–2023 ($USD millions)



Source: Applied Materials (2023).

economy in the world, so changes in its export- and import-to-GDP ratios have had large impacts on global aggregates.

Perhaps surprisingly given the impact of trade with China on the US political debate, China actually drove most measures of *deglobalization* in the ten years after the global financial crisis. This result is surprising yet obvious. Following the global crisis, China's exports generally grew faster than world GDP and world imports of goods, as shown in figure 8.

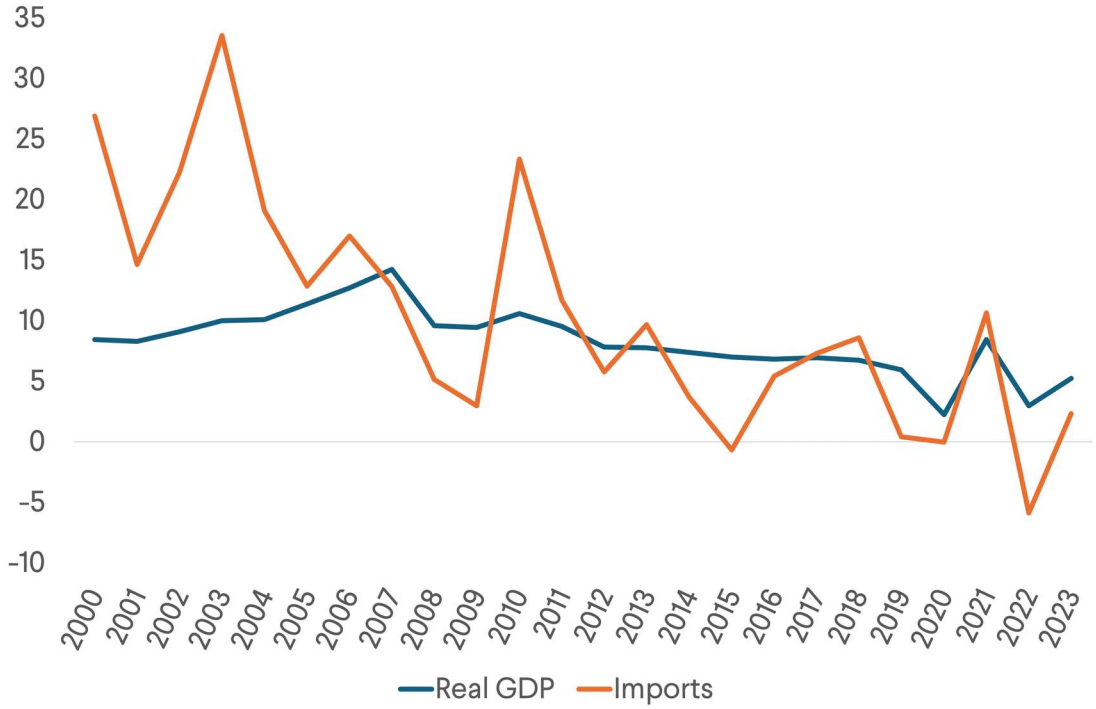
But exports grew more slowly than China's own GDP did, so the ratio of exports to GDP fell. Exports were an inordinately large share of Chinese output back in 2007 (Fang 2023), so this swing was, in fact, quite healthy; any rebalancing of the global economy back in 2007 needed China's economy to rely less on exports and net exports for growth.

However, China's imports also grew more slowly than Chinese GDP, as displayed in figure 9. This outcome was unusual; even in the "slowbalization" era, imports of most countries generally have grown in line with GDP.

Figure 8: Trade in goods: China and the rest of the world, 2000–2024 (percentage change)

Source: IMF 2023.

Figure 9: China: real GDP vs. imports, 2000–2023 (% change, year-over-year)



Source: IMF 2023.

As a result, careful economic analysis has shown that the fall in global trade relative to global output after the global financial crisis is almost entirely explained by China. This outcome holds even when imports of parts tied to exports are netted out; Chinese imports simply have not kept up with the country's rapid output growth (Al-Hashimi et al. 2016; Wolf 2022; Baldwin 2022).

The Chinese data is also important for a second reason: there recently has been a clear inflection point in the data, and China's economy is now re-globalizing.

This trend is obvious in the data above. Exports have recently grown much faster than China's own economy and are now up about 3 percentage points of the Chinese GDP from their post–global financial crisis low.

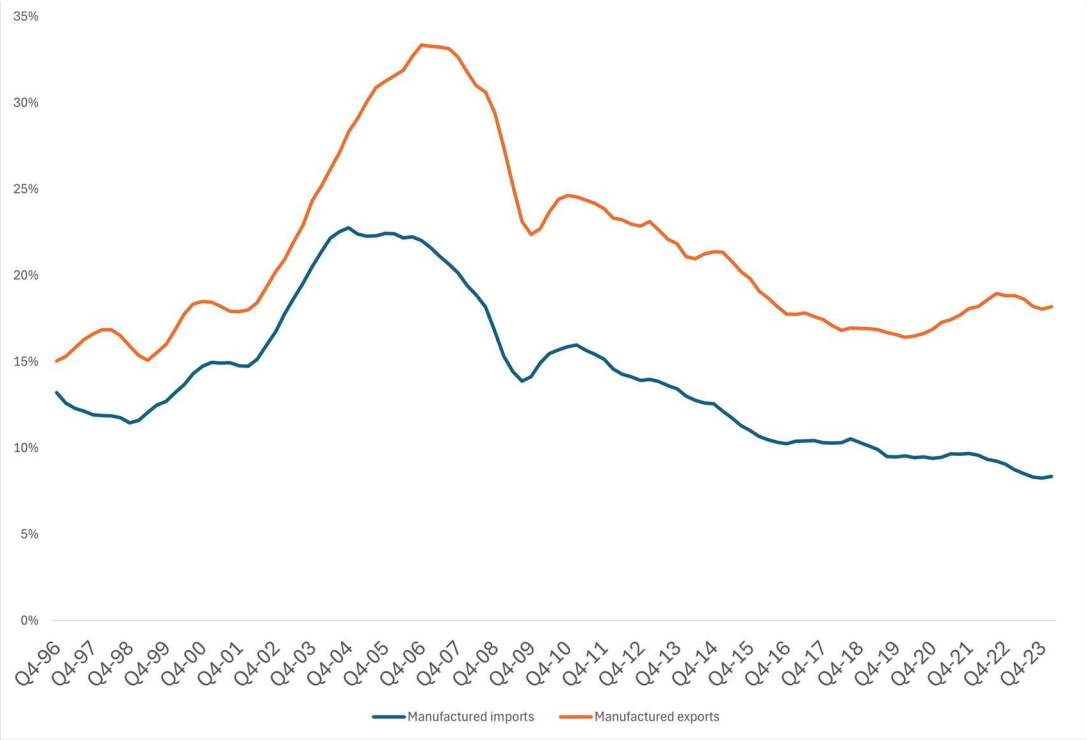
The close-to-a-trillion-dollar surge in China's exports over the last four years stands in opposition to any narrative of a fracturing and deglobalizing world economy. In fact, measured relative to the GDP of its trading partners, China's surplus in manufactured goods, plotted in figure 10, has increased by about three-quarters of a percentage point of world GDP and is now at a record high (Baur, Setser, and Weilandt 2024).

The fall in Sino-American bilateral trade thus misleads, as the broader global economy remains deeply integrated across economic blocs and China's own economy remains very dependent on exports. Indeed, the increased importance of Chinese supply to the global economy complicates any effort to "derisk" global supply chains (Lovely 2023). Sending Chinese components to Southeast Asia for assembly avoids the bilateral tariffs but has no real impact on the United States' underlying exposure to a shock emanating from China.

These data points highlight the surprising yet unambiguous conclusion that, in years after the pandemic and after the imposition of Trump's tariffs, China's economy has become more integrated, not less integrated, into the structure of global trade.

The recent surge in China's exports and surplus stems primarily from China's sharp domestic slowdown and its still-unresolved property market crisis. China's internal demand growth has faltered, and it has instead relied again on global trade to support its growth. This form of globalization is unhealthy to be sure, as it stems from unresolved imbalances inside China's economy, but it is nonetheless globalization.

Figure 10: Trade in manufactures as a percentage of China's GDP, 1996–2023



Source: Author's Calculations based on General Administration of Customs of the People's Republic of China (2023).

3.1 Microeconomic distortions

One oft-noted irony: over the past twenty years, the liberalization of trade seems to have led to the concentration of production in the most state-directed major economy, namely China. In other words, free markets appear to favor a country that hasn't freed its own market.

China's immense strength in global manufacturing has many sources, not least the fact that countries that import commodities generally do need to export other goods to cover their import bill. China also provides extensive government support to favored sectors in both in the old and the new economies. Those subsidies have tilted the playing field to China's advantage in several specific cases.

A key point in all the studies that have examined Chinese subsidies carefully is that a large share of state support comes from the provision of cheap equity and cheap debt financing. Central direction leads provincial governments to direct their own efforts to support favored sectors (DiPippo et al. 2022; Bickenbach et al. 2024) and favored firms and sectors can tap China's immense state-banking system for cheap long-term funding. Looking only at the formal subsidies provided out of the central government's budget thus misses much of the story.

Three examples help illustrate the breadth and complexity of China's sectoral support.

Zhidou, a Chinese EV producer, was recently recapitalized after experiencing deep financial difficulties that might well have forced it out of the market; the company is now expanding production and looking to start exports. It recapitalized itself with equity from the China Three Gorges Corporation (a major state-owned enterprise), the City of Zhengzhou, and Geely, a private Chinese company that bought Volvo with substantial support from the state banks (Kubota and Leong 2024).

Huawei's efforts to develop "indigenous" chip-production equipment have received hefty support from Shengzhen, and its efforts to produce leading-edge chips are backed by Shanghai and no doubt others ("China Secretly Transforms Huawei" 2023; Pan 2024). Huawei's global exports of telecommunication equipment, of course, also receive substantial backing from China's policy banks, who themselves received large scale support from China's State Administration of Foreign Exchange (SAFE).

The equity capital for the development of the COMAC C919, China's indigenous competitor to the Boeing 737 and Airbus 320, came from the Aviation Industry Corporation of China (AVIC, China's military aircraft producer), the Aluminum Corporation of China (Chinalco), Baosteel Group Corporation, Sinochem Group, Shanghai Guosheng Corporation Limited, and the State-Owned Assets Supervision and Administration Commission (SASAC). But most of the development costs of this aircraft were covered by loans from a host of state banks. The fact that such a risky project was substantially debt-financed (even without a government guarantee) is itself a form of subsidy. Finally, COMAC was able to build a significant order book thanks to support from main state airlines and the aircraft leasing arms of the big state banks.

These tight, complex, and at times opaque interlinkages between firms, the government, the banks, and the party are all part of what Mark Wu (2016) called the "China, Inc." challenge to global-trade governance.

China of course also provides more direct forms of policy support to priority sectors. The early development of its electric-vehicle sector stemmed both from very substantial subsidies for battery production and significant restrictions on the ability of imports to supply its internal market. Access to China's consumer EV subsidies was regulated by lists of qualifying vehicles. No imported car ever qualified. And initially, only domestically-made EVs with batteries made by a Chinese battery firm qualified (batteries made by Korean firms in China originally didn't pass muster). China is now a world leader in EVs, and its domestic market is highly competitive—but its success started with heavy-handed government intervention.

3.2 Oversaving

The sectoral distortions created by the combination of China's scale and its at-times-innovative forms of state capitalism are very real. Yet the full challenge China poses to the global economy is far broader—and much harder to solve.

China, put simply, saves far too much and thus relies too heavily on exports. As shown in figure 11, while high savings rates are common throughout East Asia, China is squarely in a league of its own, with a national savings rate of close to 45 percent of its GDP. This level of unusually high savings has thus been unusually persistent, as figure 11 highlights.

Such a high level of savings and low level of household consumption in a major economy has global consequences. Over the last twenty-plus years, China has essentially traded off between export-led growth and debt-fueled growth:

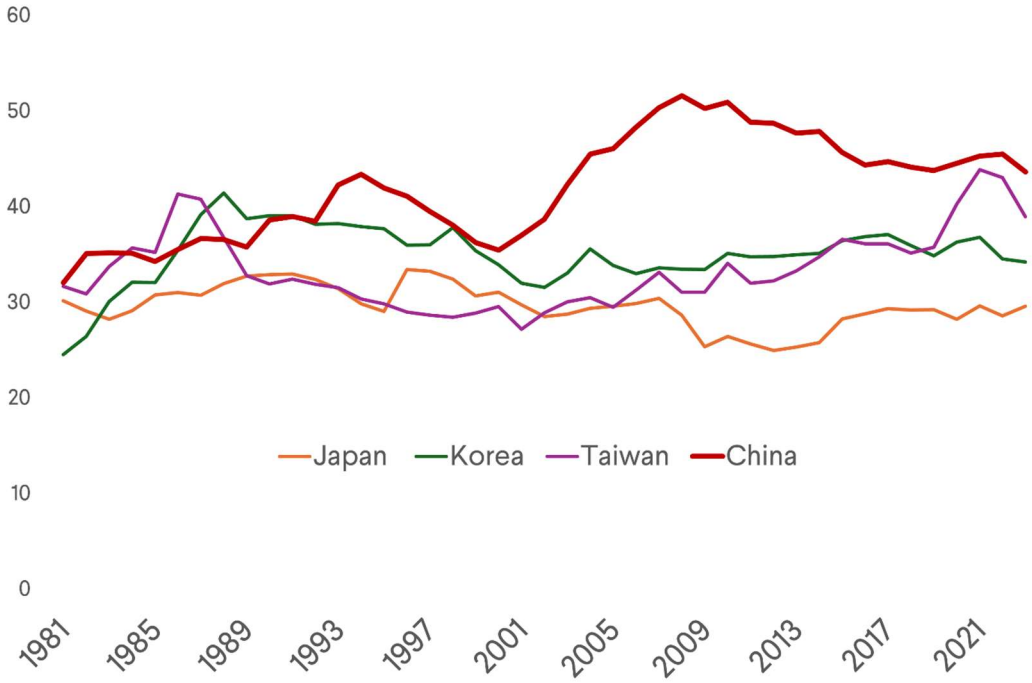
> Before the financial crisis, excess East Asian savings stoked the US housing bubble and helped to create internal imbalances in the United States and the eurozone, which were sustained only through the accumulation of toxic risks in the US and European banking systems. Since the crisis, they have contributed to bubbles and bad debts within the region, notably in China. Throughout, the need to rely on exports to offset the weakness in demand that often comes with high levels of savings has put pressure on trade-exposed manufacturing communities in other regions, with political consequences that have been underappreciated until recently. (Setser 2016)

The challenge posed by China's high level of savings is particularly acute now.

The property sector has long absorbed a large share of China's excess savings. But according to the IMF, property construction is expected to normalize at about 5 percent of GDP, about half of its level during the boom. The ability of China's heavily indebted local governments to sustain their current high rates of infrastructure investment is also in question. The IMF estimates suggest that a reduction of at least 5 percent of GDP is needed in the infrastructure investment financed by off-balance-sheet, local government-financing vehicles (LGFVs). This imbalance therefore increases pressure on China to create an even larger trade surplus, as seen, for instance in figure 13; without the growth driver from property and infrastructure investment, China needs to export even more.

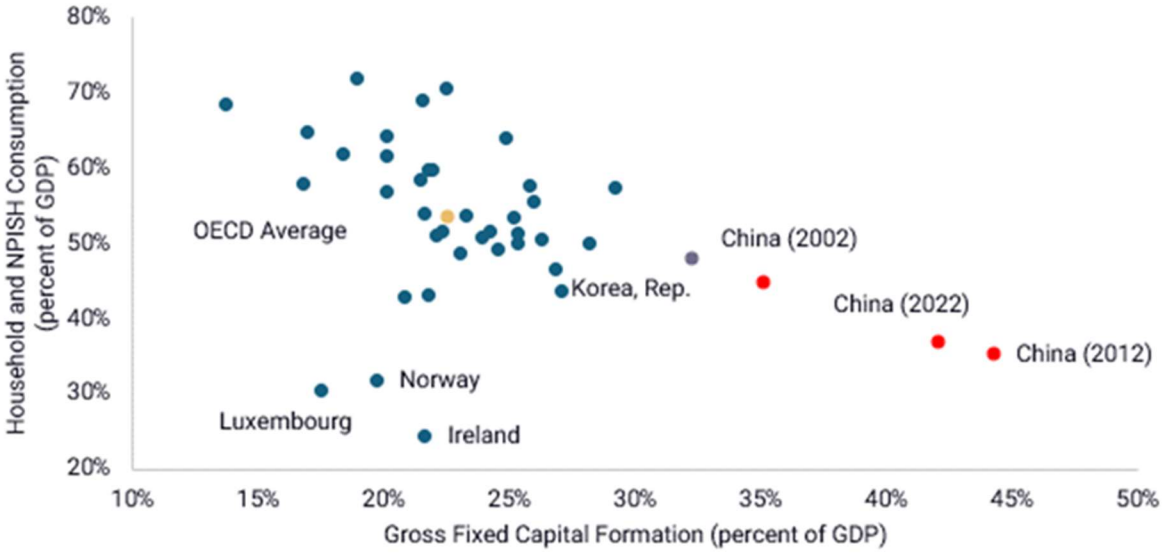
This concern isn't just theoretical. China has generated around a percentage point of growth from net exports in three of the last four years and looks set to do the same in 2024. President Xi's policy of encouraging investment in "new quality productive forces" rather than stimulating household demand creates a real risk that the policy-induced overcapacity now manifest in the steel and solar-PV-cell sectors will extend to other areas, including autos.

Figure 11: Savings rates: China vs. other Asian economies, 1981–2024 (percentage of GDP)



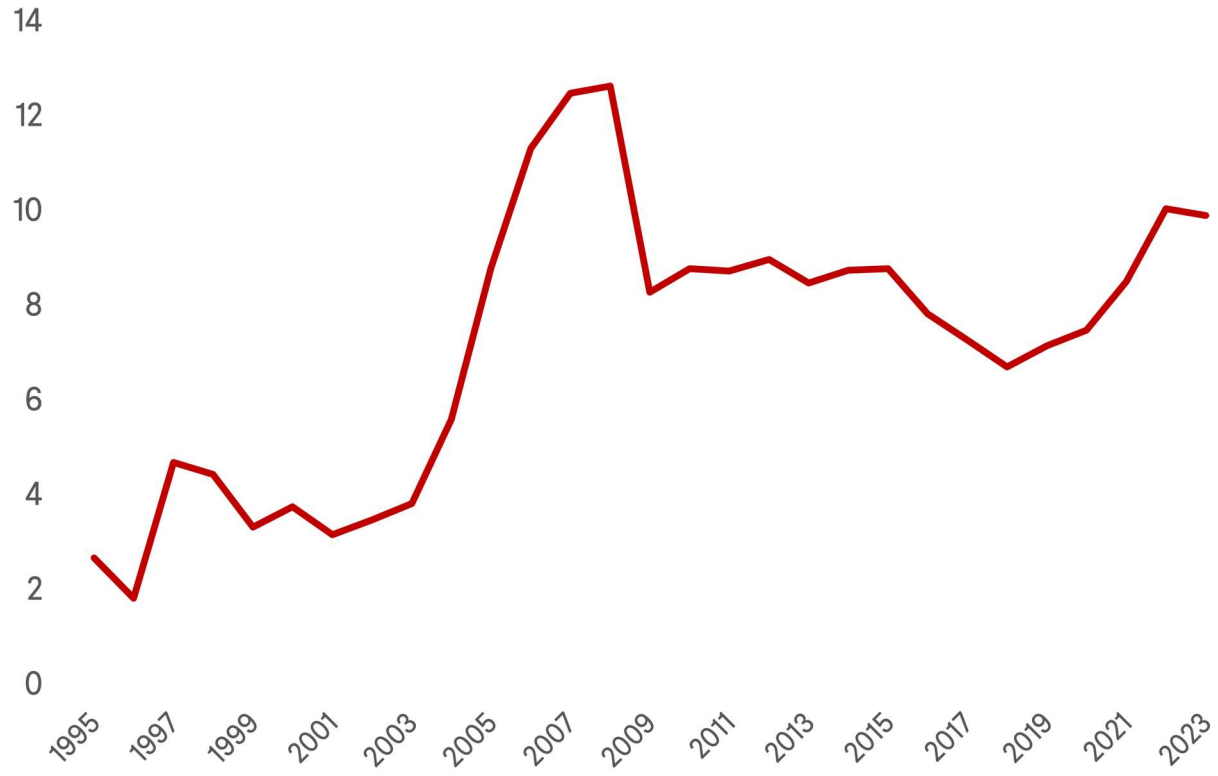
Source: IMF (2023).

Figure 12: Household and NPISH consumption (percentage of GDP)



Note NPISH are non-profit institutions serving households.
Source: Wright (2024).

Figure 13: China: manufactured goods surplus (percentage of GDP)



Source: UN Comtrade (2023).

In other words, China's structural propensity to oversaving is directly tied to its tendency to generate overcapacity in priority sectors. Treasury Secretary Yellen and National Economic Council director Lael Brainard have both highlighted the connection between China's macroeconomic imbalances and structural overcapacity across a range of industries. In April, Yellen said:

> I am particularly worried about how China's enduring macroeconomic imbalances—namely its weak household consumption and business overinvestment, aggravated by large-scale government support in specific industrial sectors—will lead to significant risk to workers and businesses in the United States and the rest of the world. China has long had excess savings, but investment in the real estate sector and government-funded infrastructure had absorbed much of it. Now, we are seeing an increase in business investment in a number of "new" industries targeted by the PRC's industrial policy. That includes electric vehicles, lithium-ion batteries, and solar. (Yellen 2024)

A final point: the global economy cannot truly fracture along geopolitical lines into a "democratic" bloc (led by the United States) and an autocratic bloc (led economically by China) so long as the autocratic world collectively runs an enormous surplus that only balances with a

large deficit across the democratic bloc. This persistent imbalance, of course, also implies a net flow of capital from the autocracies to the democracies, even if that flow is now well-disguised.[4]

3.3 Policy Issues

In previous AESG papers, Lovely (2023) and Bown (2021) have made the case for narrowing the section 301 tariffs on China. However, such a shift appears unlikely in the near term. President Biden expanded the tariffs on clean-energy sectors without any substantial tariff rollback. Former president Trump is campaigning on a platform that includes raising tariffs on China to 60 percent, well in excess of the average "list B" non-WTO tariff level of 45 percent.

The final section 301 tariff list was not especially well-targeted, as it was designed to prove that the US had the capacity to impose tariffs on a larger amount of trade than China could. Yet any current adjustment appears to reward China at a time when China's economic and security policies are a growing source of concern.

President Xi responded to the property slump by directing credit and other support toward the expansion of China's leading edge in manufacturing sectors rather than by taking policy action to support household consumption (Rosen and Wright 2024). Chinese expanded exports of parts and machine tools have also indirectly supported Russia's military manufacturing, helping to sustain the war against Ukraine (Snegovaya et al. 2024).

So even as the economic case for a somewhat narrower US tariff list remains sound, the political case for rewarding Chinese policy decisions that appear to double down on an export-focused growth model is hard to make.

However, it would be a mistake for US policy toward globalization to be defined entirely by the nature of the tariffs on China. Several other concrete steps offer the prospect of starting to define a path toward a healthier form of globalization.

3.4 US corporate tax reform

Substantial scope exists to reform the provisions of the US tax code that have encouraged US multinational firms to continue to move production of high-end components and profits abroad.

[4] Technically, the US financial system could absorb all the Treasury bonds the US needs to issue, and the US external deficit could be financed by selling other financial assets to the world (equity, corporate bonds, shares in money-market funds, etc.). Right now, the data on US international capital flows still show significant net inflows to the Treasury market from the rest of the world. However, the bulk of the flow is coming from financial centers like the UK. Of course, the UK runs its own current account deficit; it registers in the US data because large financial institutions in London act as global intermediaries.

The tax avoidance of large US multinational firms appears to have reduced US manufacturing output in certain advanced industrial sectors. While the US continues to be home to many leading-edge biomedical companies, US industrial production in pharmaceuticals peaked in 2005, and it is currently 20 percent below its 2005 levels. Had US pharmaceutical production continued to expand at its 1990-to-2005 pace, US industrial output in this sector would be roughly 50 percent larger than it is now.

The loss of tax revenues is, if anything, larger than the loss of employment. In 2022, the foreign profit of seven of America's largest pharmaceutical companies amounted to over $90 billion, six times their reported US profit. In 2023, those companies reported losing a combined $14 billion on their US operations while earning $60 billion abroad. Eli Lilly is less forthcoming with its earnings data, so the total foreign profit of America's leading pharmaceutical companies is likely even larger than these calculations suggest.

The reforms to the US tax code needed to limit the offshoring of these profits can be done unilaterally; they are not dependent on US ratification of the OECD two-pillar global tax reform. The core case for reforms is that they are in the United States' direct self-interest, not that they are needed to bring the US into compliance with a more cooperative global tax regime.

A range of potential reforms would help:

a) The US should raise the global intangible low-taxed income (GILTI) rate from 10.5 percent to at least 15 percent and apply it on a country-by-country basis.

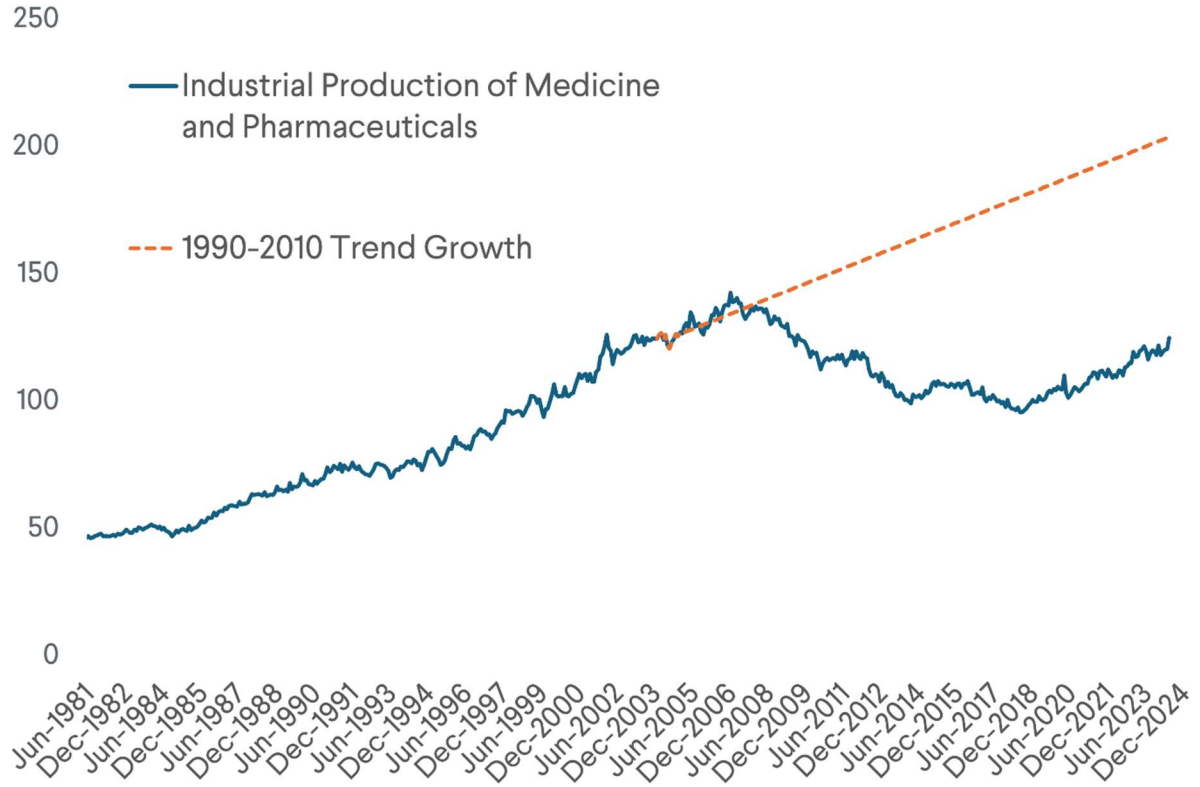
b) The US should limit the ability of US firms to deduct US R&D from their taxes if they shift intellectual property supported by the R&D tax deductions to their offshore subsidiaries.

c) The US should reinvigorate subpart F, which was designed to limit firms' ability to shift profits on US sales abroad.

d) The US should make the proceeds from the sale of a firm's intellectual property from one international subsidiary to another international subsidy a taxable event in the US, making it harder for companies to shift intellectual property around on a stepped-up basis that limits their global tax liability.

It is worth noting that none of these reform hinges on the level of the headline US corporate tax rate. Key firms are currently using transfer pricing games to achieve tax rates well below the current headline 21 percent rate.

Figure 14: US industrial production: pharmaceuticals and medicine, NAICS 3254, 1981–2024



Source: Author's Calculations based on Federal Reserve Board (2024).

The potential revenue gains are substantial—the US is currently collecting essentially no corporate income tax on the roughly $70 billion of annual profits generated by America's large pharmaceutical firms in a typical year, and it collects only modest tax on the $125 billion of foreign income generated by Apple and Microsoft (in its 10-K disclosure, Apple reports paying more tax on its $70 billion in offshore profit in Ireland than it does in the United States). Finding ways to effectively tax these easily identifiable profit streams that are currently only lightly taxed in the United States could generate up to $30 billion a year in new tax revenue a year with no loss of economic efficiency. Alstadsæter et al. (2024) note that in 2022, US firms reported around $370 billion in annual profits in the major centers of corporate tax avoidance, so the potential tax base that could be taxed at 15 percent (or more) in the US is even more substantial—$30 billion a year and $300 billion over ten years is a very low-end estimate based on picking only the lowest-hanging fruit among the big pharmaceutical and tech companies.

3.5 Harmonizing trade and industrial policies among allies

Another area of potential reform is through a new effort to harmonize the clean-energy transition policies of the US and its major allies, maximizing opportunities for healthy trade among

security partners while continuing to restrict trade with China. Two specific sectors offer immediate opportunities for a new approach that would strengthen ties among allies and increase competition in the US market.

3.5.1 Subsidies sharing for electric vehicles

Both the United States and many of the member states of the EU have introduced subsidies for the purchases of EVs. Yet these broadly similar policies have not been coordinated, and the IRA's "Buy North American" requirements have been a particular point of transatlantic friction. French president Macron (2022), for example, initially called the IRA "super aggressive."
Current US subsidies are explicitly discriminatory.

The EV battery subsidy is only available when a car uses a battery made in North America or by a "free trade agreement" partner. The lowercasing of *free trade agreement* is important as the term isn't defined, and thus relatively narrow trade agreements may allow a country to access this subsidy. The EV subsidies themselves are limited to electric vehicles made in North America. However, these subsidies provide a significant exception for commercial leases (Bown 2024).

Europe's subsidies are, by contrast, not overtly discriminatory. Any qualifying vehicle, including an imported vehicle (for example, a Chinese-made Tesla sold in Europe) benefits from national EV subsidy programs. These subsidies are thus WTO consistent, but they now suffer from another form of policy incoherence. Notably, the consumer subsidies encourage the import of Chinese EVs that, separately, are now subject to countervailing duties meant to offset the impact of China's own production subsidies.[5]

In the other words, the US subsidies discriminate against EVs produced by friends; while the EU subsidies—when available—don't discriminate against cars produced in countries that gained a competitive edge through their own discriminatory policies.

A "subsidies-sharing" agreement would offer a straightforward way to integrate the US and EU markets—and the same basic principles could be extended to other allies. To make the agreement symmetrical, the EU would need to introduce a "buy European" provision into its national subsidies. The EU and the US then could enter into a subsidies-sharing agreement in which European-made EVs would get full access to US EV subsidies and American-made EVs would get full access to EU subsidies. The effective market size for American and European EVs would

[5] This incoherence stems from the EU's interpretation of its WTO commitments; countervailing duties are a remedy allowed by the WTO, while consumer subsidies should, in principle, be provided on a nondiscriminatory basis.

increase, helping to lower costs. Instituting such an agreement would require amending the IRA and, therefore, congressional approval.[6]

Subsidies-sharing is likely be easier than harmonizing current EV tariffs. The US tariffs against China stem from the original section 301 case, and thus they are formally part of a case intended to prompt China to change its policies on the protection of intellectual property and "forced" technology transfer. The EU tariffs, by contrast, are the outcome of a standard, WTO-consistent case against China's EV subsidies.[7]

A subsidies-sharing agreement need not reconcile the substantive differences between the US and EU tariffs on Chinese EVs; it need not even harmonize tariff levels. It must simply allow European-made cars to qualify for US subsidies and US-made cars to qualify for European subsidies. It may be thought of as a precursor to a broader negotiation that aims to create a common North Atlantic auto market with a common external tariff between the United States–Mexico–Canada Agreement (USMCA) countries (Deese 2024).

3.5.2 Steel

Both the US and the EU have restrictions on steel trade. In the US, this restriction is the result of both standard dumping and countervailing duty-trade remedies and the 25 percent tariff on all imported steel introduced by the section 232 (National Security) case. The EU has supplemented its standard trade remedies with a special safeguard against all imported steel.[8]

China's enormous steel-production capacity does truly pose a unique challenge to the global market. China produces over a billion tons of steel each year (well over 50 percent of the total global supply), and it is exporting about one hundred million tons of steel. Thus, China now exports substantially more than the US produces and exports— a sum not far from the EU's 126.3 million tons in total production. China's steel is also unusually dirty, as the majority of it is produced from coal-fired blast furnaces.

The US and EU are therefore both interested in preserving their domestic steel industries in the face of the undeniable distortions to global markets created by China's massive production scale.

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[6] Any amendment would need to set out local content requirements for what constitutes an "EU car"—a Chinese EV kit assembled in Europe, for example, should not qualify—but the basic principle is clear. Tesla, GM, Ford, and potentially Hyundai would gain the opportunity to qualify for European subsidies even with North American production, and BMW, Mercedes, VW, Stellantis, and Renault would be able to qualify small European-made cars for the US subsidies.

[7] The European CVDs are the result of sector- and company-specific investigations, and the tariffs are theoretically tailored to the level of support provided to a specific company.

[8] That safeguard, incidentally, is technically intended to protect the EU from trade diversion introduced by the US section 232 national security tariffs. Its underlying legal justification isn't tied to the threat posed by China's enormous steel-production capacity.

They both also wish to shift toward cleaner sources of supply. However, attempts to negotiate a more coherent North Atlantic policy toward this sector (the Global Arrangement on Sustainable Steel and Aluminum) have floundered.

In this case, a more coordinated framework should be built on the European model, which is based on both internal carbon pricing and its Carbon Border Adjustment Mechanism (CBAM). While replicating Europe's domestic carbon price in the United States requires unlikely-to-pass legislation, a plausible legal path exists for introducing a carbon-based border adjustment through amending the remedy in the existing 232 national security case.[9] Rather than imposing a 25 percent tariff on the value of imported steel, the US could set a fee on the embedded carbon in a ton of steel imports.[10]

The EU would, of course, prefer that the US fully emulate its approach to carbon pricing, but that outcome isn't currently realistic. A compromise in which the US moves its regime closer to that of the EU should still offer substantial advantages to the latter.

Such an approach would provide substantial benefits to European steel producers going forward, as European producers of low-carbon steel would have unfettered access to the US market. An American move toward a carbon-based import charge is a move toward eventual convergence with the EU's more elegant approach to carbon-pricing—a convergence that will be optimal during the transition to a future world of clean steel production (hydrogen reduction for non-recycled steel).[11]

Such policies are a step back from past dreams of a fully integrated global trading regime but, largely as a result of excluding China, they are also potentially realistic ways to maintain the benefits of healthy trade in the world.

3.6 Pressuring China not to export its internal imbalances

A final imperative for US policy: finding effective ways to pressure China to change its current growth model and move toward policies that effectively support household consumption demand. China's unbalanced external trade is a direct reflection of the country's internal imbalances, notably its structurally high savings rate, low level of household consumption

[9] The case requires that the US take action to assure sufficient domestic-steel production to meet national security needs but doesn't require that the action take the form of an ad valorem tariff. A tariff on every ton of carbon embedded in imported steel would achieve the overall national security goal.
[10] The carbon import levy could even be set at the same rate as the EU's CBAM.
[11] A carbon levy in the absence of a domestic carbon price isn't obviously WTO compliant, but the US would still be able to argue that it falls within the WTO's national security exemption as it does now. The US could then expand the argument to include climate change as a security threat.

relative to GDP (Fang 2023) and resulting reliance on either overinvestment or a hefty external surplus for full employment and strong growth.

Yet it is intrinsically difficult for others to prompt changes to the very domestic policies that lead to structurally high savings and low levels of household consumption. China's systems for taxation and the design of its system of social insurance are directly related to its unusual pattern of saving but aren't typically the subject of international negotiations (*People's Republic of China* 2018).

Yet the negative global spillovers from China's internal imbalances are again increasing. A China that needs to export to make up for internal demand shortfalls will intrinsically create sectoral-supply dependencies even in the absence of sector-specific government intervention. The negative externalities from China's low level of consumption have been recognized for the last twenty years but still haven't given rise to significant policy shifts. Creativity is needed, including increased coordination across the G7. European policymakers share American concerns about Chinese sectoral overcapacity but haven't been as forceful in linking overcapacity to oversaving.

A simple first step would be to put pressure on the IMF to again take issues around global trade imbalances seriously. The IMF's current policy advice to China—lower interest rates (price-based monetary policy transmission) and a weaker currency (currency flexibility right now would lead to a weaker yuan)—needs reconsideration. The predictable impact of the proposed policy shifts would be an increase in China's already-large trade surplus in goods, hardly an outcome that would lower trade tensions.

The IMF, by contrast, should much more forcefully encourage China to make use of the substantial fiscal space available to China's central government to clean up the property sector and provide more substantial support for household demand. Central government debt is only 25 percent of GDP, and intriguing research from the IMF itself suggests that the net worth of the central government—which has substantial domestic assets through its ownership of SASAC and Huijin—is positive (Badia and Lam 2023).

Advice from the IMF is, of course, not decisive inside China. But the IMF's current advice is indicative of the ways in which the global discussion remains focused on the illusion of deglobalization. It often ignores the pressure that China's internal imbalances create for unhealthy reliance on exports for growth and the resulting return of unbalanced globalization. Ultimately, pressure for China to change has to come from within. But China's trading partners can help accelerate the needed internal shift by making it clear to China's leaders that they will resist new forms of unbalanced integration, and thus that drawing on net exports for yet more growth isn't ultimately a viable strategy for an economy as large as China's. It is easier to

challenge Chinese policies in sectors like aircraft and vehicles, where the emergence of new export sectors risks creating new forms of dependence, than it is to directly challenge the underlying reasons why China is once again looking toward exports for growth. China's manufacturing surplus is already bigger than the largest combined surplus run by past Exportweltmeisters Germany and Japan.

4. Conclusion

China's weakness is creating pressure globally for further but ultimately unhealthy globalization. The auto industry is a powerful example. China has gone from being a modest net importer of autos to being the world's largest vehicle exporter—with a substantial lead over Germany and Japan—in just three years. Unbalanced interdependence with an economy as large as China's will inherently create new forms of supply chain dependence; it also risks undermining investment in leading-edge sectors that are hoped-for sources of future growth and productivity. Common policy approaches among allies are the best response to these pressures, even if they are difficult to introduce in practice. Reform of the US corporate tax code is of course also not easy, but it offers a clear strategy to address concerns that the actual economic outcomes from the era of unfettered globalization generated outsized gains for the few while leaving many behind.

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III. THE US FISCAL SITUATION

Eight Questions—and Some Answers—On the U.S. Fiscal Situation

Jason Furman

Eight Questions – and Some Answers – on the US Fiscal Situation

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ABSTRACT

This paper examines the current US fiscal situation and outlook through eight key questions. It finds that the fiscal trajectory is unsustainable, with deficits and debt projected to rise indefinitely. An adjustment of 0.7 to 5.3 percent of GDP in higher taxes or lower spending is likely needed to stabilize the debt. The consequences of inaction are potentially severe but highly uncertain. The paper reviews possible catalysts for fiscal reform, including shifts in public opinion, legal/accounting events like trust fund exhaustion, or economic pressures. The paper emphasizes that fiscal projections and their economic impacts are highly uncertain. This uncertainty argues for taking some precautionary action soon, while retaining options to adjust course as the outlook evolves. Based on this analysis, the paper recommends targeting primary budget balance (i.e., the budget excluding interest) by 2030. The four elements of a framework to achieve this goal are: (1) let the tax cuts expire or replace them with revenue-increasing reform; (2) establish PAYGO so that each law slightly reduces the deficit; (3) reform Social Security and Medicare to eliminate their actuarial deficits; and (4) allow limited exceptions for economic and other emergencies.

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Introduction

The United States has near record debt relative to its economy. Deficits are currently larger than they have been during any period except World War II; the financial crisis and COVID are adding more to that debt; and debt is liable soon to reach record levels as a share of the economy—and looks poised to continue increasing indefinitely.

This paper takes stock of the US fiscal situation by going through eight questions that are relevant for understanding the US fiscal outlook, the options for reform, and the consequences of not reforming. Many of these issues are highly uncertain—the fiscal outlook often defies projections, and it is hard to be certain about the economic consequences of something that operates very differently in different times and places. This uncertainty is not necessarily a cause for inaction—but it should shape how we think about acting.

The eight questions and answers are proposed in a spirit of neutral, broad agreement, a table setting of facts and analysis that will allow different readers to draw their own conclusions. In my conclusion to this paper, I provide a sketch of a fiscal-policy framework that I personally would recommend adopting based on the facts and analysis—but presumably different readers will have their own ideas. Specifically, I propose that—based on a reasonable economic outlook—policymakers establish a limiting principle of balancing the primary budget deficit within a decade by taking a number of smaller and more incremental steps. All these steps will be deficit reducing, with a limited set of exceptions for emergencies.

Ultimately, however, some of the most important issues are in the details. What additional investments are needed? Which spending is pared back? How exactly are taxes reformed? These issues are beyond the scope of this short paper—but they can fit within the overall numerical-deficit frame I propose here.

1. Is the US fiscal situation sustainable? <u>No, with high confidence.</u>

On average, in the 2022 and 2023 fiscal years, the United States ran a deficit of 6 percent of GDP despite having a very strong economy, with an unemployment rate that averaged 3.7 percent and real GDP growth of 2.3 percent annually.[1] The primary deficit, which excludes interest payments, was 4 percent of GDP over this period. These deficits are larger than those in any years except during World War II, the global financial crisis, and COVID. 2023 ended with the debt at 97 percent of GDP, higher than it had been in any years except 1945 and 1946 (CBO 2024d).

[1] The average is more meaningful than the individual numbers for FY 2022 and 2023 which are distorted by timing shifts related to capital-gains revenue and student loan forgiveness. Henceforth, all years mentioned are fiscal years unless otherwise specified.

The Congressional Budget Office's (CBO) latest June 2024 projection predicts that the primary deficit will improve from the last two years, falling to an average of 2.5 percent of GDP over the next decade (CBO 2024d). Even if this favorable development occurs, the CBO still projects that the deficit will average 6 percent of GDP as interest rises as a share of GDP—because of both the increase in debt and the fact that more debt is expected to be refinanced at higher interest rates. With a deficit of 6 percent of GDP, the debt would continue to rise as a share of GDP under any plausible forecast for nominal GDP growth.[2] Under the CBO's forecast, the debt is expected to rise by about 2 percentage points of GDP per year.

Moreover, the entire improvement in the primary deficit in the CBO's forecast comes from higher tax rates and other tax changes scheduled to go into effect mostly in 2026, as most of the individual tax provisions in the Tax Cuts and Jobs Act (TCJA) of 2017 expire. In total, expiring tax provisions raise revenue by about 1.5 percent of GDP.[3] If this assumption about adherence to current law by allowing tax rates to rise is violated, the debt would rise even faster as a share of GDP.[4] (In addition, the CBO's discretionary-spending assumptions are arguably an unreasonable benchmark, but the latest baseline includes roughly offsetting errors, so it is not altered in this analysis.)[5]

Finally, the CBO economic forecast will be wrong but exactly how is unknown. Some economists have argued that generative AI and other technological developments may increase productivity growth going forward, although others are skeptical (Acemoglu 2024). The more likely risk is that deficits will be higher than forecast because interest rates come in above CBO's forecast. The federal-funds rate has been above 5 percent since the spring of 2023. The CBO projects that the federal-funds rate will eventually fall back to 3.0 percent. That number is well above the rates in effect immediately before COVID and slightly higher than the median long-run forecast by members of the Federal Open Market Committee (FOMC 2024), but it is still

[2] The debt rises as a share of GDP if: *(deficit / GDP) > nominal GDP growth * (debt / GDP)*.
[3] The tax-cut extension estimates are from CBO 2024b and include the expiring 2017 individual, estate, and business tax cuts, premium tax credits, trade promotion programs, and other expiring tax provisions. Three-quarters of the cost of the extension is from the individual and estate provisions.
[4] The tax-cut extension estimates are from CBO 2024b and include the expiring 2017 individual, estate and business tax cuts, premium tax credits, trade promotion programs and other expiring tax provisions. Three quarters of the cost of the extension are from the individual and estate provisions.
[5] The CBO baseline builds in the cost of the $62 billion emergency-defense law for Ukraine, Israel, and other purposes—effectively making the unrealistic prediction that something of this scale plus inflation will be passed annually. On the other hand, the CBO baseline fails to reflect the fact that current policy would require discretionary spending to grow with population. It also fails to reflect "side deals" for discretionary spending that restored some of the reductions legislated in the Fiscal Responsibility Act (FRA) of 2023. Adjusting for all three of these factors results in a discretionary path very similar to CBO's latest discretionary baseline. As a result this paper uses CBO's discretionary numbers for both the current-law and current-policy baselines.

about 75 basis points above the forward market forecast.[6] But even plausibly optimistic economic forecasts show rising debt relative to GDP.

Figures 1a to 1d[7] show the deficit, primary deficit, debt, and real net interest—all as a share of GDP over the next decade—under six scenarios that vary along two dimensions:

- **Policy assumptions: (a) Current law or (b) current policy.** Current law uses the CBO numbers, which assume the expiration of tax cuts and adherence to the spending caps. Current policy assumes that Congress passes legislation to keep policies where they are now—specifically, that it passes $4.5 trillion of tax cut extensions (1.5 percent of GDP in 2034) and makes offsetting changes to discretionary spending levels that are roughly equivalent to ensuring that underlying discretionary spending grows with inflation plus population.

- **Economic assumptions: (a) CBO, (b) bonus productivity growth, or (c) market interest rates.** The two different policy scenarios are each shown under three different sets of economic assumptions. The first is CBO's economic assumptions.[8] The second is productivity growth is 0.5 percentage point faster than assumed by CBO. The third substitutes market forecasts for interest rates for the CBO forecast; by the end of the window, this forecast is 1 percentage point higher than the CBO forecast (see figure 1d).

Under all six scenarios, the deficit ranges from 6 to 10 percent of GDP by the end of the window. The debt is rising as a share of GDP in every scenario, ending the decade at between 111 and 141 percent of GDP. Real net interest as a share of GDP is also rising in all cases; in three of the cases, it exceeds 2 percent of GDP within the ten-year window.[9]

A 0.5 percentage point increase in productivity growth would improve the debt trajectory but is not sufficient to stabilize the debt over the next decade, even if higher tax rates go into effect in 2026 (CBO 2024a; CBO 2024b). Part of the issue is that although higher productivity growth raises revenue growth, it also raises spending growth. One of the reasons is that the associated faster wage growth would lead formulaically to higher Social Security payments and

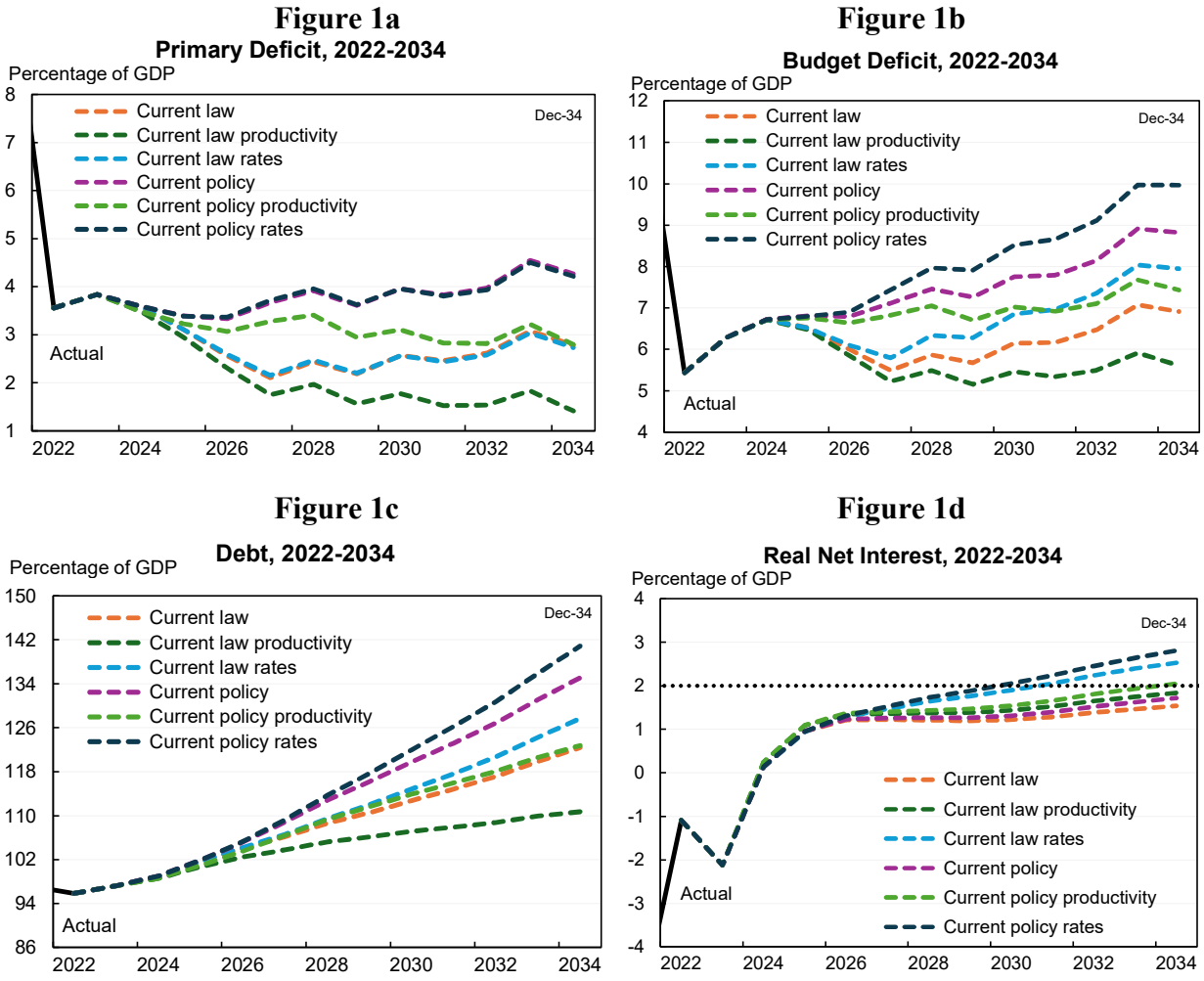
[6] Throughout this paper, market forecasts are as of May 31st, 2024. Market forecasts are from Chatham Financial n.d.

[7] All budget figures and estimates throughout this paper are the author's calculations, based primarily on CBO 2024a; CBO 2024b; and CBO 2024d. Figures for earlier CBO forecasts draw on various earlier editions of the CBO's *Budget and Economic Outlook*.

[8] All modeling assumes that interest rates are 2 basis points higher per percentage point of debt. This endogenous response raises interest rates in the current policy case because extending the tax cuts is assumed to increase debt and drive up interest rates.

[9] *Real net interest = interest – inflation*debt*. The concept is analytically useful because it omits the portion of interest that is just offsetting the inflation-related erosion of debt. Furman and Summers (2019) emphasize it.

Figure 1: Fiscal Scenarios



Source: Author's calculations based on data from CBO 2024 documents (2024a, 2024b, 2024d); Chatham Financial n.d.

economically to faster cost growth for healthcare.[10] All else equal, an approximate 1 percentage point increase in productivity growth would be required to stabilize the debt as a share of GDP. Moreover, the CBO assumes—consistent with macroeconomic theory—that higher productivity growth would lead to greater demand for capital and thus to a higher neutral real interest rate.

Could the debt end up being stable as a share of the economy without any changes in policy? There is a small chance we might get lucky and achieve this outcome. But to expect it is not reasonable. A temperature above 50 degrees in Boston on Christmas Day 2024 is possible, after

[10] From its inception, Social Security has based initial benefits on some version of average wages. To the degree that wages are higher, Social Security benefits will be higher. (Note that this rule does not apply to current beneficiaries whose benefits are indexed to price inflation.) One of the major Medicare costs is wages of medical personnel; to the degree that productivity growth is higher, their wage growth will be higher.

all—which is to say that something *could* materialize due to pure chance but still be unreasonable to forecast ex ante.

2. Where does the debt need to stabilize? <u>At some value—with very low confidence about exactly what value.</u>

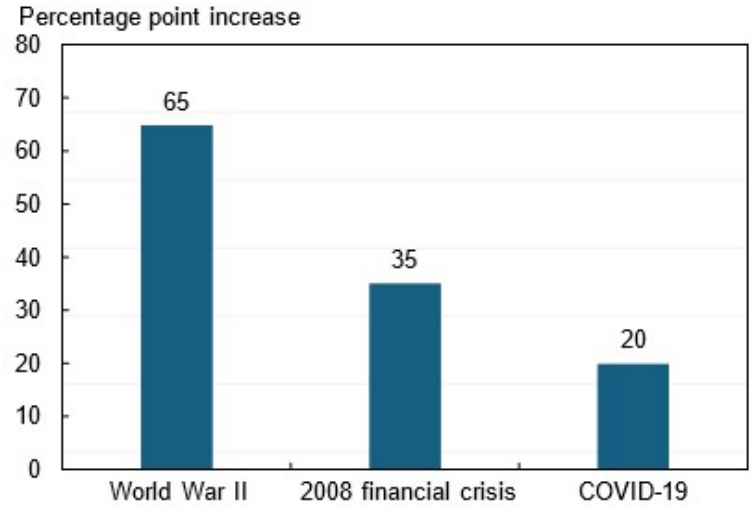
The debt as a share of GDP needs to stabilize. If the debt rises as a share of GDP indefinitely, then at some point it will become impossible to roll the debt over. The debt would then either need to be monetized by the central bank (causing default through unexpected inflation) or formally defaulted on. Forward-looking macroeconomic models are generally not even solvable unless they satisfy a "no-Ponzi-game" condition that the present value of the debt, in the limit, be zero.

It is much less clear what debt-stabilization level would be optimal. Should debt go back to the 35 percent of GDP that prevailed before the financial crisis? Or would it be OK for it to rise to the 150 percent that prevails in Japan today? Or would an even higher level be feasible or even desirable? Argentina had a massive fiscal crisis in 2001, with debt at 45 percent of GDP, while Japan has had no comparable crises—not even with debt exceeding 100 percent of GDP for over two decades. The United Kingdom sustained debt well above that level for about half the last 250 years (Mussa 2002; Broda and Weinstein 2004; UK Public Spending 2024). Part of the issue is that debt levels are only one factor in predicting interest rates and fiscal crises; such outcomes also depend on the market's perception of whether the political system will address fiscal shortfalls, the reasons the debt was accumulated, how the debt compares to other countries, and other considerations.

As the debt has risen, our understanding has also increasingly suggested that the United States has more fiscal space than previously appreciated. If you had asked someone in 2000 to predict what the economy would look like in a world where the debt was 100 percent of GDP and the deficit was 6 percent of GDP, they would likely have expected extremely high interest rates and possibly even a dramatic economic crisis. Instead, interest rates are lower than they were in 2000, and the job market is stronger than it was then. As recently as 2010, fiscal hawks were advocating that debt should be kept below 90 percent of GDP and probably well below that threshold (Reinhart and Rogoff 2010). Now, many of them would probably be pleased if it stabilized at 100 percent of GDP.

On the other hand, the last fifteen years have been a dramatic reminder that debt dynamics are dominated by large, discrete events and not by normal dynamics based on analyzing projections for revenues and spending (Dynan 2023). The debt-to-GDP ratio increased by 35 percentage points in the global financial crisis and by 20 percentage points during COVID—increases that combine to be nearly as much as the 65-percentage-point increase in debt during World War II,

Figure 2: Change in US debt-to-GDP ratio around major world events



Source: Author's calculations based on data from OMB 2024a and CBO 2024d.

as shown in figure 2. So even if the goal were to stabilize the debt-to-GDP at some value, an optimal policy would have it on a downslope in normal times and ratcheting up in emergencies.

3. How large an adjustment is needed for the debt to stabilize a decade from now? Probably between 1 and 5 percent of GDP in higher taxes or lower noninterest spending.

How much would policy need to change in order to stabilize the debt as a share of the economy? The answer depends somewhat on the level at which the debt needs to stabilize. This analysis asks how much of a change would need to be made in the primary deficit—that is, in noninterest spending or taxes—to stabilize the debt at a given year's level or, alternatively, at 100 percent of GDP. The analysis uses the debt dynamics equation:

$$\textit{Primary deficit for stability} = (g - i)\ \textit{debt} / \textit{GDP}$$

where g is the nominal growth rate and i is the nominal interest rate (equivalently, one could use real rates for both variables). The adjustment is simply the CBO baseline deficit compared to the target deficit.

Table 1 shows the results for the six different scenarios: current law and current policy under the CBO forecast, under a higher productivity-growth forecast, and under a market interest rate forecast.[11]

[11] All estimates are the author's calculations based on the CBO documents and market rates referenced above. The "steady state" is based on the average of the last two years of the forecast, which is 2033–2034 for the current budget window.

Table 1. Noninterest spending and/or tax adjustments needed to stabilize the debt by 2034

	CBO forecast	CBO + 0.5pp productivity growth	CBO + market interest rates
Percentage of GDP			
Current law	2.5%	0.7%	3.7%
Current policy	4.2%	2.3%	5.3%
Dollars (if phased in)			
Current law	$6 trillion	$2 trillion	$9 trillion
Current policy	$10 trillion	$6 trillion	$12 trillion
Debt stabilization level			
Current law	122%	111%	128%
Current policy	135%	123%	141%

Source: Author's calculations based on data from CBO 2024 documents (2024a, 2024b, 2024d); Chatham Financial n.d.

In all cases, the estimates are for the deficit reduction required to stabilize the debt starting in 2034.[12]

To understand this table, start with the CBO forecast and current law. Under these parameters, a combination of tax increases and spending cuts would need to total 2.5 percent of GDP annually to stabilize the debt. If this measure went into effect in 2034, then the debt would stabilize at 122 percent of GDP. The exact dollar figure of these required figures over the ten-year budget window used in Washington policy debates depends on the time path; the table shows the ten-year total—assuming that savings are linearly phased in from the first year to the full $1.0 trillion in 2034—of $6 trillion.

Assuming higher productivity growth reduces these fiscal gaps, but some adjustment is still needed. This requirement is consistent with the observation that debt is still rising as a share of GDP even with productivity growth 0.5 percentage points higher. If interest rates are higher, then an even larger fiscal adjustment is necessary. Under current policy, the tax cuts will be extended, adding about 1.6 percent of GDP to the needed adjustment. Overall, the needed fiscal adjustment ranges from 0.7 percent of GDP to 5.3 percent of GDP—which, if phased in, would amount to $2 to $12 trillion over the ten-year budget window.

[12] The fiscal adjustments required to stabilize the debt-to-GDP ratio at its current value of 100 percent are generally within 0.2 percentage points of the adjustments shown in table 1. This analysis does not use the CBO's long-term budget forecast outside the ten-year window. Using that forecast would alter the results by about 0.1 percentage point of GDP: the primary deficit is roughly unchanged after 2034, as rising costs relative to GDP for Social Security and Medicare are offset by reduced outlays relative to GDP for most other government programs. In addition, real bracket creep raises revenue to GDP over time.

The Omnibus Budget and Reconciliation Act (OBRA) 1990 legislated 2.0 percent of GDP of deficit reduction; it was followed by OBRA 1993, which reduced the deficit by another 1.5 percent of GDP. The Budget Control Act of 2011, which resolved the debt-limit impasse, had a much smaller impact, reducing the deficit by only 0.5 percent of GDP. Notably, all three of these laws included substantial defense-spending reductions: the first two reflected the end of the Cold War, while the third reflected the wind down in Iraq and Afghanistan. In some of these laws, some of the legislated deficit reduction was undone by subsequent legislation that, for example, spent above the caps. Table 2 provides some context for these magnitudes by comparing them to past and current deficit-reduction proposals.

President Biden's FY 2025 budget proposes $2.8 trillion in deficit reduction over ten years, or 1.1 percent of GDP in the last year.[13] The president's proposal, however, does not include explicit offsets or budget to continue the expiring tax cuts below $400,000. Extending these tax cuts would, alone, add about $2.8 trillion in costs to the total budget—resulting in a presidential proposal with no net deficit reduction (OMB 2024b).

Table 2. Impact of major deficit legislation or proposal

	Impact in final year of forecast
Omnibus Budget and Reconciliation Act 1990	-2.0%
Omnibus Budget and Reconciliation Act 1993	-1.5%
Balanced Budget Act 1997	-0.5%
Affordable Care Act 2010	-0.1%
Budget Control Act 2011	-0.5%
Fiscal Responsibility Act 2023	-0.5%
Bush tax cuts	2.0%
Trump tax cuts	1.0%
President's FY 2025 budget	1.1%
Bowles-Simpson	-3.6%

Source: Author's calculations based on data from the Bureau of Economic Analysis, the Congressional Budget Office, and the Office of Management and Budget

[13] This figure is the administration's estimate. The CBO has not done a re-estimate, but conceptually such a re-estimate should be comparable to the CBO-based numbers above.

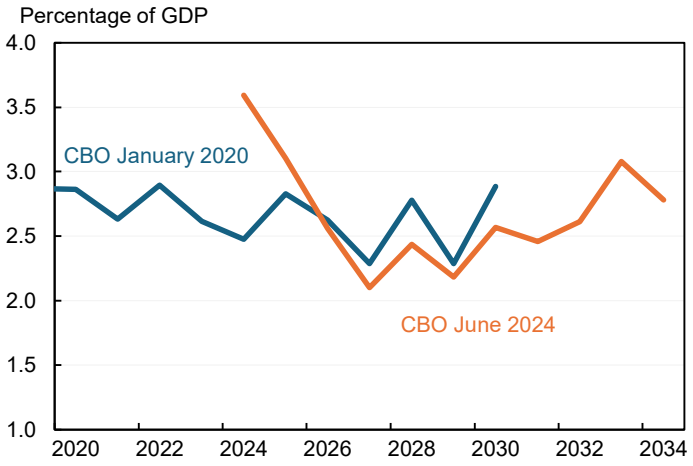
4. Has our fiscal challenge gotten worse in recent years? <u>The fiscal challenge may be worse than the pre-COVID forecast, depending on the outlook for interest rates.</u>

The deficit and debt have been much higher than the CBO expected prior to COVID. In its January 2020 forecast, the CBO projected that debt would rise to 86 percent of GDP at the end of 2023; instead, COVID and its response swelled the debt to 97 percent of GDP.[14] More surprisingly, on a flow basis the deficit was higher than projected as well. It was so despite the fact that by many measures, including GDP and employment, the economy has been stronger than expected over the last two years.

Nevertheless, CBO's current *forecast* for the primary deficit is somewhat improved from what was expected prior to COVID. It is improved despite the fact that the cumulative impact of legislation enacted since then has been to increase spending and cut taxes. However, this improvement is offset by the large increase in nominal GDP. Thus, relative to pre-COVID forecasts, the primary-deficit outlook is more favorable. Figure 3 compares the CBO's current-law primary-deficit forecasts in January 2020 and June 2024.

At the same time, the forecast for interest rates has worsened, as shown in figure 4. The CBO forecast for the average long-run interest rate on federal debt has risen by about 75 basis points, while the market forecast for interest rates has risen by about 225 basis points, with market forecasts going from below CBO in 2000 to well above it today.

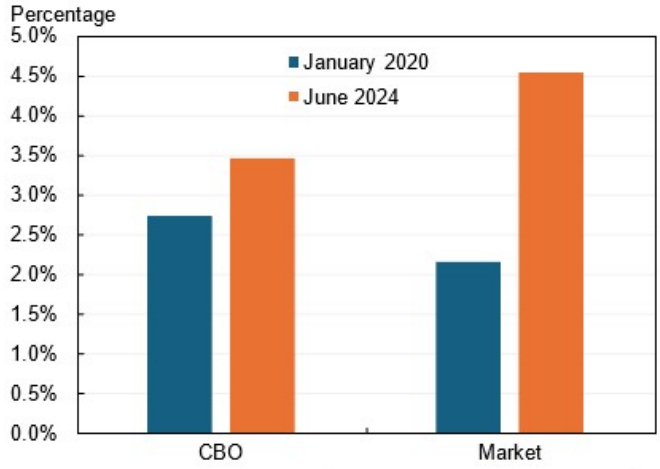
Figure 3: CBO's current-law primary-deficit forecast, 2020-2034



Source: CBO 2020a; CBO 2024d.

[14] Note that the cumulative response to COVID plus other government programs has been substantially more than 11 percent of GDP. But nominal GDP is also considerably above pre-COVID forecasts—thereby offsetting the magnitude of that government spending and those tax cuts, when measured relative to GDP.

Figure 4: Average interest rate forecasts, January 2020 vs. June 2024



Source: Author's calculations based on CBO 2020a; CBO 2024d; FRED via the Federal Reserve Bank of St. Louis; Chatham Financial n.d.

On net, the combination of better primary-deficit and worse interest-rate forecasts means that the deficit reduction needed to stabilize the debt as of June 2024 is basically unchanged from the pre-COVID forecast—when using CBO figures. Using market interest rates, however, the gap has grown dramatically, as shown in table 3.

Finally, figure 5 repeats the same exercise for the CBO's first forecast of the year for every year starting in 2000.[15] It shows how much of a fiscal adjustment would have been needed under each forecast to stabilize the debt, in this case showing it under current policy. These results should be interpreted with a large grain of salt for two reasons. First, difficulties in making fully comparable adjustments to CBO's forecasts to reflect current policy over time. Second, these estimates are based on the adjustment needed in the last part of the ten-year budget window; earlier forecasts showed a larger increase in out-year deficits beyond that period.

Table 3. Noninterest spending and/or tax adjustments needed for fiscal sustainability

	January 2020 forecast (current law)	**June 2024 forecast (current law)**
CBO interest-rate forecast	1.6%	2.5%
Market interest rate forecast	1.0%	3.7%

Source: Author's calculations based on CBO 2020a; CBO 2024d; Federal Reserve Board 2024a; Federal Reserve Board 2024b; Chatham Financial n.d.

[15] This method has the advantage of using reasonably comparable annual ten-year budget forecasts from the CBO instead of the CBO's long-term budget outlooks, which vary in methodology and frequency. It has the disadvantage that it misses any additional adjustment that is needed to offset budget deterioration outside the ten-year window due to the growth of entitlements. That missing adjustment is a larger factor early in the first decade of the 2000s because most of the retirement of the baby boomers was outside the budget window and projected health spending growth was faster. In the latest forecasts, there is little deterioration outside the window, as discussed in footnote 13.

Figure 5: Needed fiscal adjustment over time

Source: Author's calculations based on CBO (first ten-year forecast release of each year from 2000 to 2024); Auerbach and Gale 2020; Auerbach and Gale 2023; Chatham Financial n.d.

Based on the CBO forecast, the fiscal gap has worsened substantially in the last few years relative to its pre-2020 size. Using market interest rates, the budget was expected to be on a sustainable course up through 2018, but it is now expected to be very short of sustainable—with the large change driven by the rise in expected interest rates.

5. What would it take to cut spending or raise taxes by this amount? A menu of options—consistent with past deficit-reduction efforts—could achieve this adjustment.

Under current law, the fiscal adjustment needed to stabilize the debt is 2 to 3 percent of GDP, depending on whether you use the CBO's interest-rate forecast or market rates. An extension of expiring tax cuts would add another 1.5 percent of GDP to this fiscal gap.

Table 4 shows an illustrative menu of fiscal-adjustment options. A few takeaways from this menu. First, the high-income and corporate tax increases proposed by President Biden would raise about 1.3 percent of GDP in revenue (OMB 2024b). These proposals include raising the corporate rate to 28 percent; raising taxes on overseas income; allowing the top rate to return to 39.6 percent; raising the capital gains rate to the ordinary income rate, taxing gains as they accrue rather than when they are realized; and limiting pass-

Table 4. Menu of proposals

Proposal	Deficit impact in last year of forecast
Raise corporate rate from 21% to 28% and other Biden corporate proposals	0.4%
Implement Biden high-income individual tax increase proposals	0.9%
Raise payroll tax rate by 4 percentage points	1.2%
Raise all income tax rates by 6 percentage points	2.0%
Levy a 10 percent value added tax	2.0%
Let tax cuts expire after 2025 (relative to current policy)	1.5%
Spending Proposals	
Cut all income security programs by 20 percent	0.4%
Cap Medicaid spending at CPI+1	0.3%
Shift to Medicare vouchers (depending on the details)	0.3%
Raise Social Security normal retirement age from 67 to 69 and index (NPV)	0.5%
Slow Social Security benefit growth by ~1.2 percentage points per year (NPV)	1.0%
Increase defense spending as GDP grows	-0.5%
Memorandum	
Social Security actuarial deficit (trustees)	*1.2%*
Medicare hospital insurance actuarial deficit (trustees)	*0.2%*

Source: Author's calculations based on figures from CBO 2022b; OMB 2024b; Social Security trustees (Board of Trustees, Federal Old-Age 2024); and Medicare trustees (Boards of Trustees, Federal Hospital Insurance 2024)

through tax benefits. A more aggressive set of proposals could raise a bit more but would likely run into Laffer-curve constraints before it reached about 2 percent of GDP in revenue. Accordingly, high-income revenue is not sufficient to close the fiscal gap under current law, let alone to pay for the extension of the tax cuts or other priorities.

Second, the expiration of the tax cuts is a substantial factor—1.5 percent of GDP—that is of the same order of magnitude as many other substantial proposals. The bulk of this category is taken up by the 2017 tax cuts, which would entail individual income-tax rates rising by 1 to 4 percentage points from their current levels for all but the bottom-10-percent bracket.[16]

[16] The 2017 tax cuts also made substantial changes to the tax base, including increasing the standard deduction, expanding the child tax credit, eliminating dependent exemptions, reducing the Alternative Minimum Tax (AMT), and limiting deductions, including for mortgages and state and local taxes (SALT). These changes are collectively roughly revenue neutral (Clausing and Sarin 2023).

Third, outside Social Security, not even relatively dramatic proposals come close to cutting spending by even 1 percent of GDP—let alone by the 2 percent needed for fiscal sustainability under CBO's current-law assumptions. For example, a 20 percent reduction in every income security program classified in budget function 600—which includes the Supplemental Nutrition Assistance Program (SNAP), Supplemental Security Income (SSI), Temporary Assistance to Needy Families (TANF), Section 8 housing vouchers, and dozens of other programs—would only reduce the primary deficit by 0.4 percent of GDP.

Finally, most but not all of the current-law deficit would be closed by whatever tax or benefit changes restored solvency to Social Security and Medicare. The Social Security trustees estimate

that it would require an immediate and permanent 1.2 percent of GDP increase in taxes or reduction in benefits to ensure the OASDI trust funds were funded for at least 75 years (Board of Trustees, Federal Old-Age 2024).[17] Doing the same for the Medicare Hospital Insurance trust fund would require another 0.2 percent of GDP (Boards of Trustees, Federal Hospital Insurance 2024).

Ultimately, even to stabilize the debt, a broad set of tax increases and/or spending cuts will be required—and even more will be required to the degree that policymakers want to undertake gross policy initiatives like defense spending increases, more spending on children, or tax cut extensions.

6. What will happen if policymakers do not make this fiscal adjustment? The known knowns of deficit reduction are relatively small economic harms; the unknown unknowns are potentially much more worrisome.

The known knowns of fiscal unsustainability, at least over the next few decades, are negative but not particularly large. The unknown unknowns are also negative and likely much larger. A number of papers over the years have considered the costs of deficits and debt, but so much of them are contingent on specific circumstances that there is no widely accepted version (see, for example, Ball and Mankiw 1995; Rubin, Orszag, and Sinai 2004; Reinhart and Rogoff 2010).[18] Recent research by International Monetary Fund (IMF) economists has shown, for example, that the impact of debt surges on future incomes is highly dependent on the debt surges' context (Jalles and Medas 2022).

[17] The CBO has generally been more pessimistic about Social Security's financial outlook. The CBO (2023b) estimated that it would take a 1.7 percent of GDP change to keep the trust fund solvent for 75 years.
[18] See de Rugy and Salmon 2020 for a useful survey of studies.

6.1 Higher interest rates and crowd-out

The conventional channel through which debt accumulation affects the economy is by driving up interest rates, crowding out private investment and thus reducing future GDP growth. Debt accumulation also leads to an increase in foreign borrowing, thus reducing future national income—as that debt needs to be repaid.

Estimates vary widely for the effects of debt accumulation on interest rates. A reasonable middle-ground guess is that every 1 percentage point of debt accumulation adds about 2 basis points to interest rates (Gale and Orszag 2004). If so, debt accumulation in the coming decades could add, say, 1 percentage point to interest rates over time. Higher interest rates reduce capital formation. Moreover, deficits require more borrowing from abroad, so a larger fraction of future GDP has to be devoted to repaying foreigners—thus reducing national income.

One indication of the relative smallness of these conventional channels comes from the CBO's long-run budget outlook. The CBO projects that the debt will rise to 166 percent of GDP in 2054 and continue to spiral higher thereafter. Their model incorporates macroeconomic feedback and predicts that this accumulation in debt, after taking into account offsetting factors, will result in the ten-year Treasury yield rising from 4.0 percent in 2023 to 4.4 percent in 2054. The economy would grow at a 1.6 percent rate in that year, barely below the current pace of potential growth.

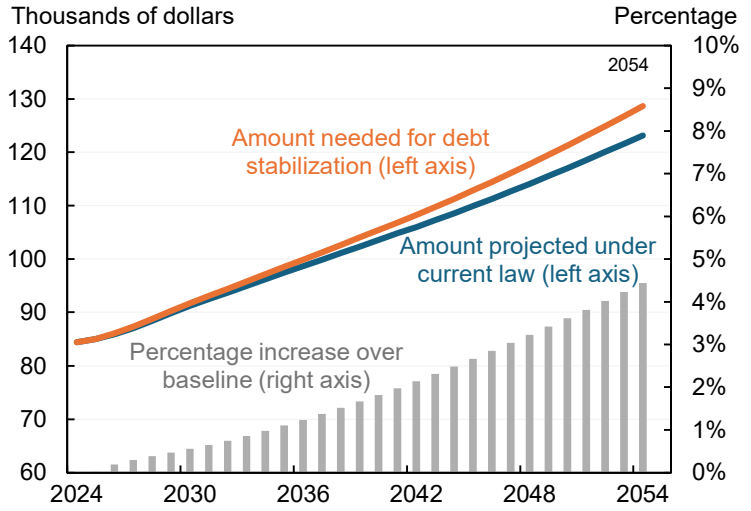
Overall, using these types of conventional models, the CBO estimated that a plan to stabilize the debt at around 100 percent of GDP would result in a growing increase in real GNP per capita that totals about 4 percent above baseline in 2054, as shown in figure 6.[19] Note that to achieve these gains would require raising taxes and/or reducing spending in the interim—measures that could reduce living standards along the transition path. Although many consider it wrong to pass a cost on to future generations (for example, Committee for a Responsible Federal Budget 2022), this issue is distributional and cannot be settled in a value-neutral way. From my perspective future generations will very likely be richer—and so it makes sense to redistribute away from them to poorer current generations.

6.2 Longer delays, larger adjustments

Another consideration is that the longer policymakers wait to address fiscal sustainability, the larger the adjustments will need to be. This requirement arises for three reasons. First, waiting

[19] The chart shows GNP instead of GDP because that number is closer to living standards. GNP subtracts net factor payments to foreigners. One of the benefits of deficit reduction would be to reduce these net factor payments and thus raise living standards—allowing Americans to keep more of the GDP they produce instead of using it to repay foreigners.

Figure 6: United States real GNP per capita, 2024-2054



Source: Author's calculations based on CBO 2024c.

means that there will be a shorter window for people to prepare for changes. Second, spreading changes over a shorter window means that those changes must be larger to achieve the same present value. Finally, waiting could mean that interest rates increase, which would require a smaller primary deficit for sustainability and thus a larger adjustment. Barro (1979) emphasized this channel; it was quantified in subsequent research (for example, CBO 2022a).

6.3 Spare space for future contingencies

Much of the debt accumulated by the United States in its entire history was as a result of two events: the global financial crisis and COVID. The Treasury had no problem borrowing in those two episodes, in part because of substantial de facto coordination with the Federal Reserve, which purchases substantial amounts of federal debt—thus enabling this borrowing while, if anything, interest rates fell. In general, it may be easier to borrow in an obvious national emergency because financial markets will not penalize the government based on the perception that it is irrational. Nevertheless, it is a risk that money might be unavailable in the future precisely when it is most needed. Even if that risk is relatively small for the United States, it still would mean that each emergency would lead to a ratcheting up of the debt—with concomitant ratcheting up of the other costs associated with the debt.

Some economists are concerned about future geopolitical contingencies in which a future adversary deliberately uses the debt as an economic weapon against the United States (for example, Committee for a Responsible Federal Budget 2022). I think the risks such a scenario poses are very minimal. In theory, China could choose to undertake a fire sale of US debt in response to geopolitical tensions. In practice, however, it doing so would have very little impact on the Treasury market—and, if anything, could hurt China more than it could hurt the United

States. China has been steadily reducing the dollar value of Treasuries it holds for more than a decade now and currently holds less than 3 percent of outstanding US Treasuries. Moreover, if it tried to sell all of them immediately—or, more realistically, if it did not roll them over when they matured (most of them are short duration)—then private investors or, in a last resort, the Federal Reserve could easily step in. Some short-term dislocation in Treasury markets might result, but even that dislocation could likely be contained, as it would be smaller than the dislocations caused by other recent events, like extraordinary COVID financing needs.

6.4 Fiscal crisis

History is littered with fiscal crises, including some that are extremely devastating—like the Greek crisis, which has been considerably worse than the Great Depression was in the United States (Alderman et al. 2015). The United States has several features that reduce the chances of a fiscal crisis, including the fact that it borrows in its own currency and controls its own monetary policy. Even when a country borrows in its own currency, markets can still be concerned about de facto default through inflation, requiring higher interest rates to allow debt to be rolled over. For example, in 1994 investors lost confidence in Canada's fiscal situation, and long-term interest rates rose nearly 3 percentage points in six months. It took a dramatic fiscal plan and two years to bring rates back down.

Moreover, even if the chance of a crisis is very small, basic finance theory tells us it could also be very costly. Specifically, policymakers should be willing to pay a large cost to avoid a contingency in which money costs much more (that is, interest rates spike) at precisely the time in which money is most valuable (for example, when it is needed to combat an emergency or a recession).

7. What are the consequences of uncertainty about the magnitude and consequence of the fiscal outlook? Forecasts of debt and its consequences are always uncertain; thus, for insurance, we should likely do more sooner—but there may also be an option value to waiting.

As should be clear to even a semi-alert reader by now, many unknowns remain about both the outlook for the deficit and the consequences of not acting relatively quickly on that outlook. Nevertheless, it would require an unlikely—but not impossible—set of circumstances for the debt to stabilize as a share of the economy without policy changes. This point is especially true given that some sources of uncertainty are asymmetrical, especially future events like pandemics, financial crises, and wars—which can result in very large jumps in the debt-to-GDP ratio.

Nevertheless, the forecast errors are still large relative to the estimated magnitude of the problem. Under current law, with the CBO's interest rates, the fiscal adjustment needed to stabilize the debt is 2 percent of GDP. The CBO, however, routinely makes prediction errors of that magnitude. As a particularly dramatic example, in September 2020 the CBO projected that the debt would reach 106 percent by the end of 2023 (CBO 2020b). After that projection, Congress passed legislation costing $3 trillion through the end of 2023, but the debt ended up at 97 percent of GDP—largely because of the large increase in nominal GDP.

One source of uncertainty is the economic forecast. In particular, the forecast is especially sensitive to real interest rates—which both matter more per tenth-of-a-percentage-point deviation in the forecast and because a tenth-of-a-percentage-point deviation in the forecast is more common and likely. Table 5 shows the CBO sensitivity analysis to different economic deviations, along with the forecast error for the 2014–2023 period, to give a sense of the magnitude by which these variables might deviate from the forecast in the future. It would take a relatively implausible combination of economic changes to stabilize the debt—for example, a 1-percentage-point increase in productivity growth or a 2-percentage-point reduction in real interest rates.

The economy is not the only or perhaps even the largest source of uncertainty. What are classified as "technical factors" can loom even larger. In February 2023, the CBO projected that the deficit in 2023 would be 5.4 percent of GDP—a "forecast" that was made more than partway through the fiscal year, as shown in table 6 (CBO 2023a). Instead, the deficit, adjusted for student-loan timing shifts, turned out to be 7.5 percent of GDP—an error of more than 1.5 percent of GDP. The CBO made this error despite the fact that the de facto recession it had forecast did not materialize. In this case, the largest source of the error was tax receipts coming in well below CBO's expectations, which were conditional on the size of the economy.

Table 5. CBO sensitivity analysis to different economic assumptions

	2013 forecast error for 2014–2023	**Change in 2034 (percentage points)**	
Change of 0.1 percentage points		**Deficit**	**Debt**
Productivity down	0.6	0.3%	2.4%
Labor force down	-0.8	0.1%	1.1%
Interest rate up (real rate)	-2.4	1.2%	7.8%
Interest rate and inflation up (nominal rate)	n/a	0.0%	0.6%

Source: Author's calculations based on CBO 2013 and CBO 2024a; Bureau of Labor Statistics; and Bureau of Economic Analysis via Macrobond

Table 6. CBO forecasts vs. actual for FY 2023

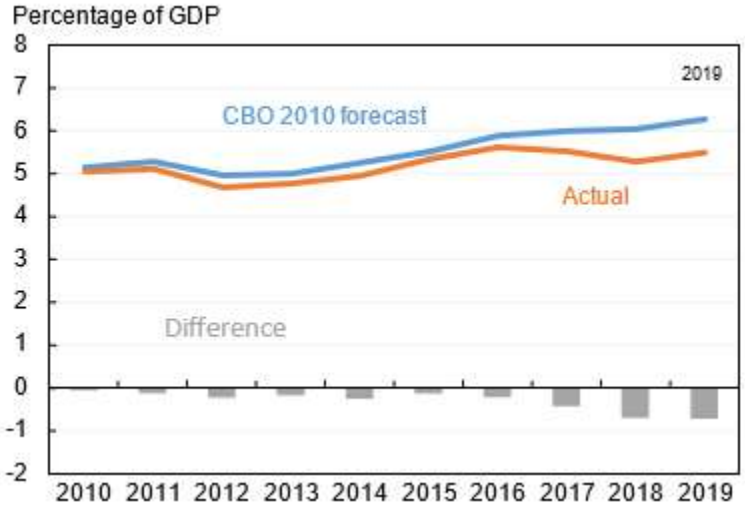
	CBO forecast (February 2023)	Actual
Deficit ($)	$1.4 trillion	$2.0 trillion
Deficit (percentage of GDP)	5.4%	7.5%
Real GDP (Q3 / Q3)	-0.1%	2.9%
Unemployment rate (Q3)	4.9%	3.7%
10-year interest rate (Q3)	3.9%	4.1%
PCE inflation (Q3 / Q3)	3.6%	3.3%

Sources: CBO 2023a and CBO 2024d

Another example of revisions due to technical factors is in the case of health spending. Figure 7 shows the CBO forecast for spending on mandatory health programs (mostly Medicare and Medicaid), made in September 2010 (which incorporated CBO's projection of the impact of the Affordable Care Act), compared to actual spending levels. By 2019, spending was nearly 1 percent of GDP below what CBO had forecast in 2010 (or a nearly one-sixth reduction), with more than 90 percent of that difference classified as resulting from "technical changes"— like, for example, the reduction in expensive blockbuster drugs (CBO 2010). That amount constitutes nearly half the fiscal gap under CBO's current-law forecast.

Finally, as discussed above, periodic events like wars, pandemics, and financial crises can result in the debt rising by a double-digit percentage of GDP. While this kind of outcome is not technically counted as a CBO prediction error—because these changes largely stem from laws

Figure 7: CBO forecast for spending on mandatory health programs (Percentage of GDP)



Source: Author's calculations, based on CBO 2010 and CBO 2024d.

passed in response to these events, and because CBO's forecast is conditional on no new changes in law being passed—to all intents and purposes, these events should be thought of as highly asymmetrical sources of prediction errors.

Uncertainty should affect optimal decision making in two ways. On the one hand, it calls us to take more action for the sake of insurance. Supporters of climate change action cite this principle as a motivation for doing more today. The argument is that giving up a little when the state of the world is good is very valuable if it delivers benefits when the state of the world is bad—a time at which resources are most valuable. Even if the fiscal crisis never materializes, reducing the probability of one is worthwhile.

On the other hand, to the degree that adjustments entail large, fixed costs, there is an option value to waiting to learn more about the magnitude of the problem and the necessity of solving it. Opponents of climate change action cite this principle as a motivation for doing less today. Similarly, on fiscal issues, some economists argue that it would be foolish, for example, to dramatically cut Social Security benefits only to discover a few years later that doing so was unnecessary because the budget forecast was wrong.

At a minimum, the combination of these countervailing considerations says that we should do no harm. It may not make sense to have a massive fiscal plan when the magnitude of the problem is uncertain, but in such a case, neither the insurance consideration nor the option value of waiting provides any rationale as to which steps will make the fiscal problem worse.

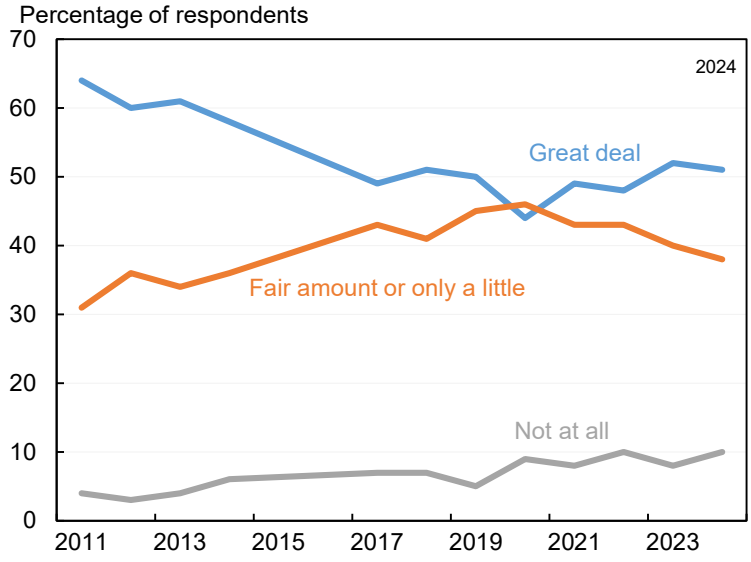
8. What could cause policymakers to act? This scenario is extremely hard to predict, but three possibilities are (1) increased political support for deficit reduction, (2) fiscal forcing events, and (3) economic forcing events.

Finally, what will cause policymakers to act? I will resist the temptation to say that reading this paper will do it—and instead I will speculate about three possible impetuses to action.

The obstacles are substantial. Although public concern about the debt has been growing, that concern is still less than it was in the 2011–2013 period, which was dominated by discussions of the "grand bargain," Bowles-Simpson, and other deficit debates, as shown in figure 8. It is not clear whether the public's interest in this earlier period was a function of politicians talking about the deficit or, alternatively, whether politicians were talking about the deficit because the public was interested.

Beyond public opinion, the American political system presents serious obstacles to action. In total, 42 senators and 189 House members, all Republicans, have signed the Americans for Tax Reform pledge that they will not vote for a penny in tax cuts, with the first pledge dating to 1986

Figure 8: Survey: How much do you worry about federal spending and budget deficit?



Source: Gallup 2024.

(Good 2012). Many Republicans have actively supported trillions of dollars in additional defense spending, and the party is divided and mostly unspecific about any reductions in entitlement spending. Democrats have drawn fewer hard lines, with President Biden's budget including both tax increases and reductions in Medicare spending. Nevertheless, President Biden has pledged not to raise taxes on anyone making less than $400,000 per year—ruling out about 80 percent of

taxable income from being subject to tax increases. He has also opposed reductions in Medicare payments to beneficiaries. Finally, the two parties have proven able to work together to avert disaster or increase the deficit (as, for example, with the bipartisan infrastructure bill or the CHIPS Act), but many of the Republican lawmakers who supported this legislation have since left Congress. The ability to pass meaningful legislation—let alone achieve something even harder, like deficit reduction—going forward is very unclear.

I can see three broad ways in which deficit reduction might come about:

First is a shift in public opinion or a political candidate who exploits what might be latent public support for deficit reduction. Historically, there have been moments where candidates focused on the deficit in their campaigns. For example, in 1992 Ross Perot made it a centerpiece of his campaign; the deficit was likewise a big emphasis of then-governor Clinton's plan. As president, Clinton began his administration with an economic plan that centered around deficit reduction (Clinton White House Archives 2001).

The second possible forcing event would be related to the law and government accounting. One possibility is the expiration of the TCJA tax cuts in 2025, although that event poses more of a

risk for increasing the deficit relative to current law than it does for reducing it. More promising as an action-forcing event is the exhaustion of the combined Social Security Trust Funds, projected for 2035, and of the Medicare Hospital Insurance trust fund, projected for 2036. If policymakers address these exhaustions with a combination of revenue increases or spending reductions, the present value deficit would be cut by about 1.5 percent of GDP. Of course, policymakers could squander this opportunity by choosing to instead use budget gimmicks to transfer funds to these programs without making any fiscal changes.

The third possible forcing event would be economic. It could result from a gradual increase in interest rates; for example, the ten-year Treasury interest rate could rise to 6 percent on a sustained basis, with mortgage rates in the double digits. Or it could result from rapid change of the type that, for example, Canada experienced in 1994 (Henderson 2010). In either case, markets could "force" action by raising the cost of inaction and giving policymakers the opportunity to tout deficit reduction as the solution to widely perceived problems like high mortgage rates.

Conclusion: What I Would Do

So far, I have been laying out analysis and menus of options without putting my own cards on the table. A limiting principle that is some combination of optimal, achievable, and understandable is critical if policymakers are to approach budgetary issues. My recommendation for a limiting principle that, based on current forecasts, would meet these needs would be for policymakers to target balancing the primary budget—that is, the budget excluding interest—no later than 2030.

The more fundamental consideration underlying this proposed target is keeping real interest rate payments below 2 percent of GDP, as proposed by Furman and Summers (2019). Assuming that interest rates are roughly halfway between market and CBO forecasts, achieving this goal would require stabilizing the debt at around 115 percent of GDP, roughly where it is currently projected to be at the end of the budget window. But given periodic emergencies, staying well below this level, with debt declining as a share of GDP in "normal" times, is essential.

If the economic outlook changed substantially, then the primary deficit target could be adjusted—for example, if interest rates look set to stay even higher, then a primary surplus could be needed, whereas a big increase in growth could allow modest primary deficits going forward. However, the necessity of keeping any budget target "understandable" would suggest a high(ish) threshold for adjusting it.

Here is a broad approach to balancing the primary budget by the end of a decade and generating a growing primary surplus beyond the budget window:

1. Do not pass any tax legislation in 2025 unless policymakers can agree on a tax reform that raises revenue by 0.5 percent of GDP (or about $2 trillion) relative to current law.

When you are in a hole, the first rule is to stop digging. The biggest short-term fiscal risk the United States faces is passing tax cuts that would add 50 percent or more to the magnitude of the country's fiscal challenge. If Congress passes no tax laws in 2025—or if the president vetoes anything they pass—then the individual tax code would go back to what it was in 2016. While the temporary provisions in the 2017 tax law improved on the 2016 law in a number of respects—including simplifying taxes by increasing the standard deduction and making the tax code more efficient by broadening the tax base—those changes came at a very high cost that, in my judgment, is not remotely commensurate to the benefits.

Ideally, Congress would pass a law that improves on the 2016 law. Most importantly, it should remedy the 2016 law's failure to raise sufficient revenue. I would suggest a target of 0.5 percentage points of GDP in deficit reduction. Beyond that, tax reform should increase efficiency, help families, and simplify the tax code. It is beyond the scope of this paper to present a detailed proposal, but any reform should at least (a) raise the corporate rate while making expensing of investment permanent (Furman 2020); (b) retain most of the structural changes in the 2017 law while allowing *all* the rate reductions to lapse; and (c) making the child tax credit fully refundable.

2. Adopt PAYGO+ for future legislation so that savings exceed costs by at least 25 percent.

Congress enacted statutory PAYGO in 2010, requiring that all mandatory spending increases or tax cuts be fully offset and not add to the deficit. Congressional procedures impose similar rules, although in the House they just apply to spending. Given the fiscal outlook, PAYGO is no longer sufficient. Considering the option value of waiting on fiscal reform, Congress may not want to make a grand bargain, but under just about any scenario, the current trajectory falls well short of sustainable—so a series of smaller adjustments will be needed. This paper proposes that if a tax cut or spending increase costs 1 percent of GDP, then it should be offset with at least 1.25 percent of GDP—leading to a deficit reduction of 0.25 percentage points.

To provide dynamic feedback, estimates under this proposal should take the CBO's estimates into account. For example, if the CBO estimates that legislation will pay for itself over time, then it does need to be offset.

Personally, I believe substantial desirable investments exist by which we can increase economic growth through innovation, expand opportunity through investments in children, and increase national security through more defense spending. All of these investments should be more than

offset. In addition, a carbon tax and dividend proposal could help address climate change—a portion of the proceeds could be devoted to deficit reduction, with the remainder designated for compensation.

3. Reform Social Security and Medicare.

Reforming Social Security and Medicare by making tax and benefit changes that would ensure the trust funds are solvent for 75 years would reduce the present value of the deficit by about 1.5 percent of GDP. It is beyond the scope of this paper to make explicit proposals, but personally I would make the main Social Security proposal an increase in the payroll tax. Medicare reform could combine a very small tax change with provider and beneficiary reforms.[20]

4. Make limited exceptions for economic and international emergencies.

Finally, there should be an exception for economic and international emergencies like major recessions, pandemics, and wars. These kinds of crises can and should be paid for with temporary measures whose cost is spread out over time.

Overall, this broad outline of an approach would be sufficient to balance the primary budget, putting the debt on a slight downward path as a share of the economy in normal times, with increases in emergencies—keeping real net interest below 2 percent of GDP. As the economy evolves, and especially as interest rates change, this approach would need to be dialed up or down.

[20] See Duggan 2023 for a Social Security reform proposal.

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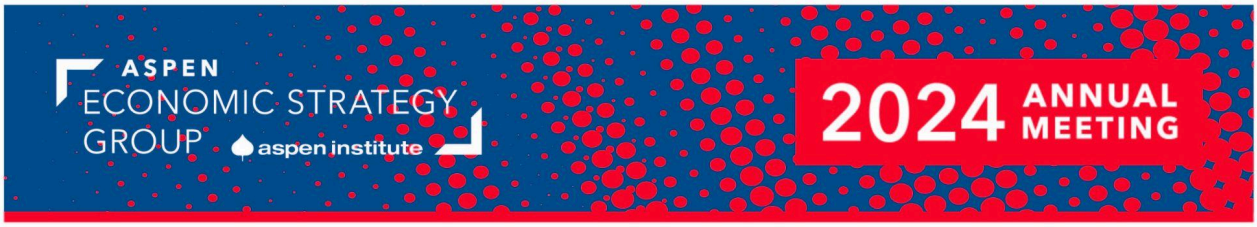

IV. WORKERS, FIRMS, AND COMMUNITIES

Technological Disruption in the US Labor Market

David Deming, Christopher Ong, and Lawrence Summers

How Does Accounting for Population Change Affect Estimates of the Effect of Immigration Policies on the Federal Budget?

(Published by the Penn Wharton Budget Model)

Douglas Elmendorf and Heidi Williams

Why Crime Matters, and What to Do about it

Jennifer Doleac

Technological Disruption in the US Labor Market

JULY 2024

AUTHORS

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ABSTRACT

This paper explores past episodes of technological disruption in the US labor market, with the goal of learning lessons about the likely future impact of artificial intelligence (AI). We measure changes in the structure of the US labor market going back over a century. Perhaps surprisingly, the pace of change has slowed over time. The years spanning 1990 to 2017 were less disruptive than any prior period we measure, going back to 1880. This comparative decline is not because the job market is stable today but rather because past changes were so profound. General-purpose technologies (GPTs) like steam power and electricity dramatically disrupted the twentieth-century labor market, but the changes took place over decades. We argue that AI is likely to be a GPT on the scale of prior disruptive innovations, which means it is likely too early to assess its full impacts. Nonetheless, we present four pieces of evidence that the pace of labor market change has increased post-COVID. First, the labor market is no longer polarizing— employment in low and middle paid occupations has declined while high-paid employment has grown. Second, employment growth has stalled in low-paid service jobs. Third, the share of employment in STEM jobs has increased by more than 50 percent since 2010, fueled by growth in software and computer-related occupations. Fourth, retail sales employment has declined by 25 percent in the last decade, likely because of AI-driven improvements in online retail. The post-pandemic labor market is changing very rapidly, and a key question is whether this faster pace of change will persist into the future.

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Introduction

In recent decades, the spread of digital technology in the US and around the world has changed the skill requirements of many jobs (Muro et al. 2017). More recently, the global COVID-19 pandemic disrupted labor markets around the world, leading to a rapid increase in remote work and changes in relative wages for in-person service jobs (Barrero, Bloom, and Davis 2023; Autor, Dube, and McGrew 2023). Looking to the future, labor market analysts and pundits have predicted that artificial intelligence (AI) will transform work and that employers will deemphasize traditional educational credentials in favor of "skills-based hiring" (see, for example, World Economic Forum 2023; Ellingrud et al. 2023).

Across ten different advanced and emerging economies, a majority of citizens believe that automation will replace existing jobs, increase inequality, and make it harder to find work (Wike and Stokes 2018). Yet automation anxiety is nothing new. In 1964, President Lyndon Johnson created the Blue Ribbon National Commission on Technology, Automation, and Economic Progress, which concluded (among other things) that the US should have a guaranteed minimum income to support workers through the coming wave of automation. Of course, that wave did not come to pass, and the employment-to-population ratio is substantially *higher* now than it was in 1964. Is this time different?

In this paper we analyze past episodes of technological disruption in the US labor market, to learn lessons about the future of work with AI. We create a comprehensive measure of labor market "churn," which allows us to measure and systematically compare changes in the occupation structure of the US labor market over long periods of time.

We find that—contrary to popular imagination—the pace of labor market disruption has slowed in recent decades. The changes in the structure of US employment at the end the nineteenth century were greater than in any decade of the digital era, including the most recent one. Even more disruptive was the period between 1940 and 1970, when agricultural employment was still disappearing, manual labor was shifting into production and away from railroads, and clerical and administrative work were growing rapidly. The years spanning 1990 to 2017 were the most stable period in the history of the US labor market, going back nearly 150 years.

At the dawn of the twentieth century, 40 percent of US employment was in agriculture, compared to less than 2 percent today. Nearly half of all workers held blue-collar production and manual-labor jobs in 1960, compared to only 20 percent today. While the occupation structure of the US labor market has changed since 1980, that change has been relatively modest in historical perspective.

In the past, labor market disruption was fueled by breakthrough general-purpose technologies (GPTs) like steam power and electricity, which enabled the mechanization of agriculture. Mechanization destroyed farming jobs, but it also created factory jobs by increasing labor productivity in manufacturing. Similarly, computer-based manufacturing techniques developed in the 1970s replaced precision production jobs, while also increasing the availability of digital data and the value of analytical and managerial skills.

Although technological breakthroughs often happen suddenly, technology adoption and the pace of labor market change are often gradual. The share of employment in US agriculture fell steadily by 20 percent per decade between 1880 and 1970, and the decline in blue-collar work after 1970 was equally deliberate.

Is AI a GPT? And if so, will it create any long-run labor market disruption on the same scale as the technologies of the past? Broadly speaking, AI—and machine learning (ML) in particular—is a technology that improves our ability to analyze and interpret data. In this sense, it exists downstream of the information technology revolution that began in the 1970s and 1980s. Yet the novelty of AI/ML is the way in which data are used. Rather than following a set of explicit instructions (for example, software code) that are scripted in advance, AI/ML algorithms "learn" about the world by studying and copying actions and implicit rules that are inferred from patterns in the data (Autor 2015; Brynjolfsson, Rock, and Syverson 2019).

AI can predict legal liability from contract language, the likelihood that a medical image indicates a specific pathology, or the next word or phrase in a standard office document, among many other possibilities. In this sense, AI is best understood as a *prediction technology* (Agrawal, Gans, and Goldfarb 2019). Since most jobs require some prediction and decision-making, AI will augment or automate aspects of nearly all jobs in the US economy (see, for example, Deming 2021; Eloundou et al. 2023). Thus, the impact of AI is likely to be widespread and long-lasting, fitting the mold of past GPTs. However, history teaches us that even if AI disrupts the labor market, its impact will unfold over many decades.

For these reasons, it is still too early to forecast the impact of AI on the labor market. Nonetheless, in the second part of the paper we study recent changes in the occupation structure of the US labor market, looking for early signs of technological disruption.

We document four stylized facts about the US employment growth in recent decades. First, we show that job polarization—meaning employment growth at the bottom and top of the wage distribution and declines in the middle—is no longer an accurate description of what is happening in the US labor market. In recent years, employment has declined in both low- and middle-paid occupations and grown rapidly in high-paying managerial, professional, and

technical jobs. *Skill upgrading* describes what is happening in the post-pandemic US labor market better than *polarization* does.

Second, we show that the growth of low-paid service jobs like home health aides, food preparation and service workers, cleaners, barbers, and fitness instructors has stalled completely since 2010, after having grown rapidly in the 1990s and the first decade of the 2000s (Autor and Dorn 2013). Service employment cratered during the COVID-19 pandemic, but employment growth in service occupations slowed in the early 2010s, likely because of rising labor costs (Autor, Dube, and McGrew 2023).

Third, we find that science, technology, engineering, and math (STEM) employment has grown rapidly over the last decade. STEM employment grew from 6.5 percent of all jobs in 2010 to nearly 10 percent in 2024, an increase of more than 50 percent. The growth in STEM work is concentrated in occupations like software developers and programmers, although we also see increases across a broad range of science and engineering occupations. STEM job growth has accelerated especially rapidly since 2017 and is matched by increasing private capital investment in AI-related technology.

Fourth, we find clear evidence of AI-related employment disruption in retail sales. While large language models (LLMs) like ChatGPT are too new to see any direct impact on the labor market, companies have been using predictive AI to optimize business operations since at least the mid-2010s. Online retailers like Amazon use AI to personalize prices and product recommendations and to manage inventory more efficiently, outcompeting big-box retail (see, for example, Deming 2020).

The impact of AI on retail is clear in recent US data. Jobs in retail sales have declined by 25 percent in the last decade. There were 850,000 *fewer* retail sales workers in the US in 2023 compared to 2013, even though the US economy added more than 19 million jobs over this period. The decline in retail sales began long before COVID-19 but has accelerated in the last few years. Labor productivity growth in retail sales has also outpaced that in other sectors. Interestingly, online retail has also led to growth of "last-mile" jobs like light-truck delivery drivers and stockers and order fillers.

The decline of retail sales fits a broader pattern of technology-fueled occupational upgrading in white-collar office work. Since 1990, front-office jobs like secretaries and administrative assistants and back-office jobs like billing and financial processing have declined by more than 50 percent as a share of all jobs in the US economy. Yet managers and business analysis jobs have grown rapidly over this same period. While this change may partly reflect title inflation (for example, manager versus supervisor), it also captures a shift away from routine monitoring and categorizing and toward strategy and decision-making (Deming 2021). Our best guess is that this

trend will continue. We expect continued declines in routine office work and a ratcheting up of firms' expectations of managers and business analysts, who will now be valued only to the extent that they can use AI to become more productive.

Taken together, these four facts suggest that we may be entering a period of more pronounced labor market disruption, fueled by recent technological breakthroughs in AI. To illustrate this point, we recalculate our measure of labor market "churn" through 2022. Although the 2010s were very stable pre-pandemic, the post-pandemic labor market has changed dramatically. A key outstanding question is whether the labor market disruption of the past few years is a temporary response to the changes wrought by COVID-19 or an early sign of AI-fueled labor market disruption.

1. Data and measurement of technological change

We measure technological disruption in the US labor market by studying changes in the skill and task content of work over more than a century. Which types of jobs have grown, and which are disappearing? Technology *substitutes* for human labor through automation (for example, Acemoglu and Restrepo 2019). However, technology also *complements* labor by making existing workers more productive and by changing their capabilities in ways that create new types of work (for example, Autor 2015).

We focus on the labor market impacts of general-purpose technologies (or GPTs), rather than on innovations like genome sequencing that mostly affect specific sectors of the economy (Williams 2013). We follow Bresnahan (2010), who defines a GPT as any technology that is widely used and capable of ongoing improvement, and that enables complementary innovation across many different applications. Past examples of GPTs include new forms of energy such as steam power and electricity, as well as process and management innovations such as the encoding and storing of digital information (for example, the computerization of the labor market) or the Toyota Lean Management (TLM) approach in manufacturing.[1]

GPTs have remade the US labor market, but their impacts often emerge only gradually. Before the advent of steam power, farmers hand-threshed wheat and oats with a flail or relied on horsepower (for example, Rasmussen 1982). Although steam powered machines were invented in the early 1800s, it was not until the 1860s that farmers began threshing grain with "iron horses"—steam-powered traction engines that mechanized agriculture and increased threshing productivity by a factor of more than a hundred. Yet adoption took place slowly over the next half-century. The mechanization of agriculture was only completed after the adoption of the

[1] These four GPTs and others are studied in more detail in David 1990; Bresnahan and Trajtenberg 1995; Lipsey and Chrystal 1995; Crafts 2004; and Rosenberg and Trajtenberg 2004.

internal combustion engine by American tractor companies in the late 1910s and early 1920s (Olmstead and Rhode 2001).

Similarly, while Thomas Edison invented the incandescent light bulb in 1879, electricity had barely been adopted twenty years later. Electric lighting was used by only 3 percent of US residences in 1899, and even as late as the early 1920s only half of US factory capacity had been electrified (David 1990). The historical evidence on GPT adoption suggests that productivity growth follows a "J curve," where growth is initially sluggish because new complementary investments are required (Brynjolfsson, Rock, and Syverson 2021). For example, steam-powered factories had to be organized centrally around inefficient and heavy driveshafts, whereas factories powered by electricity could spread out to accommodate a production line (for example, Du Boff 1979).

To capture the full disruptive impact of GPTs, we study long-run changes in the occupation structure of the US economy from 1900 to the present. It is important to note that many other changes have taken place in the US labor market over the last century, including mass migration from Europe (Abramitzky, Boustan, and Eriksson 2014), rising female labor-force participation during the middle of the twentieth century (Goldin 2006), increasing educational attainment (Goldin and Katz 2007), and declining male labor-force participation (Binder and Bound 2019).

While each of these changes had large effects on the composition of US employment and on wage inequality and social structure, they have typically occurred alongside the changes we document, and we do not explicitly focus on them here. For example, while women are more likely to work in clerical occupations than in blue-collar jobs, the share of women working in both types of jobs increased a lot during the 1950s and 1960s. Of course, changes in labor supply interact with technological disruption. For example, the increasing automation of blue-collar production jobs disproportionately affected less educated men (for example, Abraham and Kearney 2020).

We study the impact of technological change on the labor market by plotting changes over time in the relative frequency of occupations. Specifically, we compute for each year the share of all jobs in the US economy that belong to each occupation group. This approach is superior in our view to studying net job gain or decline, in part because of changes in the size and composition of the labor force over time. Although the US population has grown by about 20 percent since 2000, labor force participation and hours per worker have declined modestly, so that total hours worked increased by about 16 percent (Bick et al. 2023).

We combine data from the US Census for 1880 to 2000 and the American Community Survey (ACS) for 2001 to 2022 to create the longest possible time series. Wages and labor supply weights are only available from 1940 onward. We supplement the Census and ACS data with the

Current Population Survey (CPS) monthly data, which is collected through April 2024. We combine the CPS monthly files into annual averages to maximize precision.

2. Labor market volatility over the last century

With sufficiently broad occupation categories, we can study labor market disruption going back 140 years. Figure 1 presents occupational employment shares from 1880 to the present for six major categories of jobs. In 1880, more than 40 percent of all workers in the US economy were employed as farmers or farm laborers. This share fell steadily by 4 percentage points per decade, and by 1970 only about 3 percent of US employment was in agriculture. Similarly, about 40 percent of workers in 1880 were employed in blue-collar jobs like manual labor, construction, production and manufacturing, transportation, and maintenance and repair. This share stayed relatively constant through 1960, then began a precipitous decline of 4 percentage points per decade, reaching 20 percent by 2010.

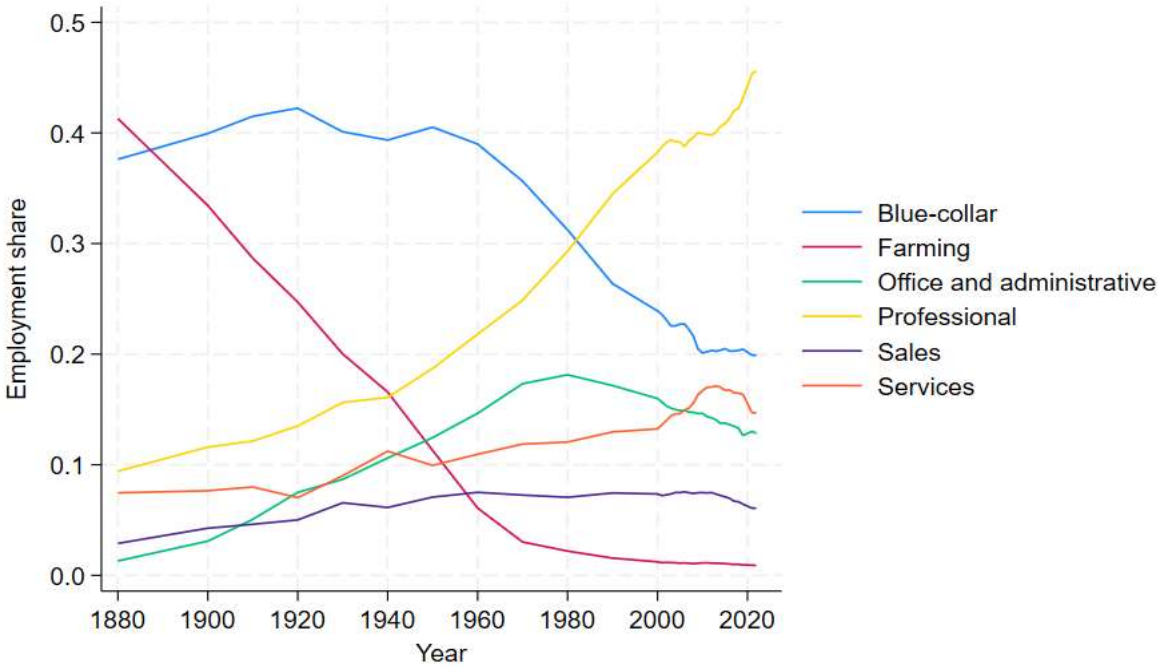
Figure 1 offers two key insights. First, even though technological breakthroughs often occur rapidly, technology gets adopted gradually, and the disruption of labor markets takes decades. Second, the productivity growth enabled by GPTs leads to the creation of new occupation categories and makes other occupations more productive. For example, even though employment in farming fell rapidly during the early twentieth century, agricultural output continued to rise rapidly as it became highly mechanized. The same technology that enabled mechanization of farming also increased the productivity of factory work, enabling new process improvements like assembly lines and creating new jobs.

In some ways this point is obvious. Software developer is one of the fastest-growing occupations in the US, yet it would not exist without the invention of the personal computer. The engineering occupation grew rapidly during the middle of the twentieth century, and electrical engineer cannot exist as a job option if a society has no electricity.

In a groundbreaking new study, Autor et al. (2024) link patent data to the creation of new job titles by census enumerators from 1940 onward to show how technological progress replaces some jobs while complementing the output of others and creating "new work." They find that some patented innovations directly increase labor productivity, which in turns expands the set of tasks that workers do and leads to net employment growth. They call these *augmentation* innovations. Others, which they call *automation* innovations, generate employment declines.

Moreover, Autor et al. (2024) show that during the 1940–1980 period, production occupations were highly exposed to automation innovations, while office clerks and other administrative-support workers were highly exposed to augmentation innovations. This difference is reflected in

Figure 1: Changes in the occupation structure of the US labor market, 1880–2024



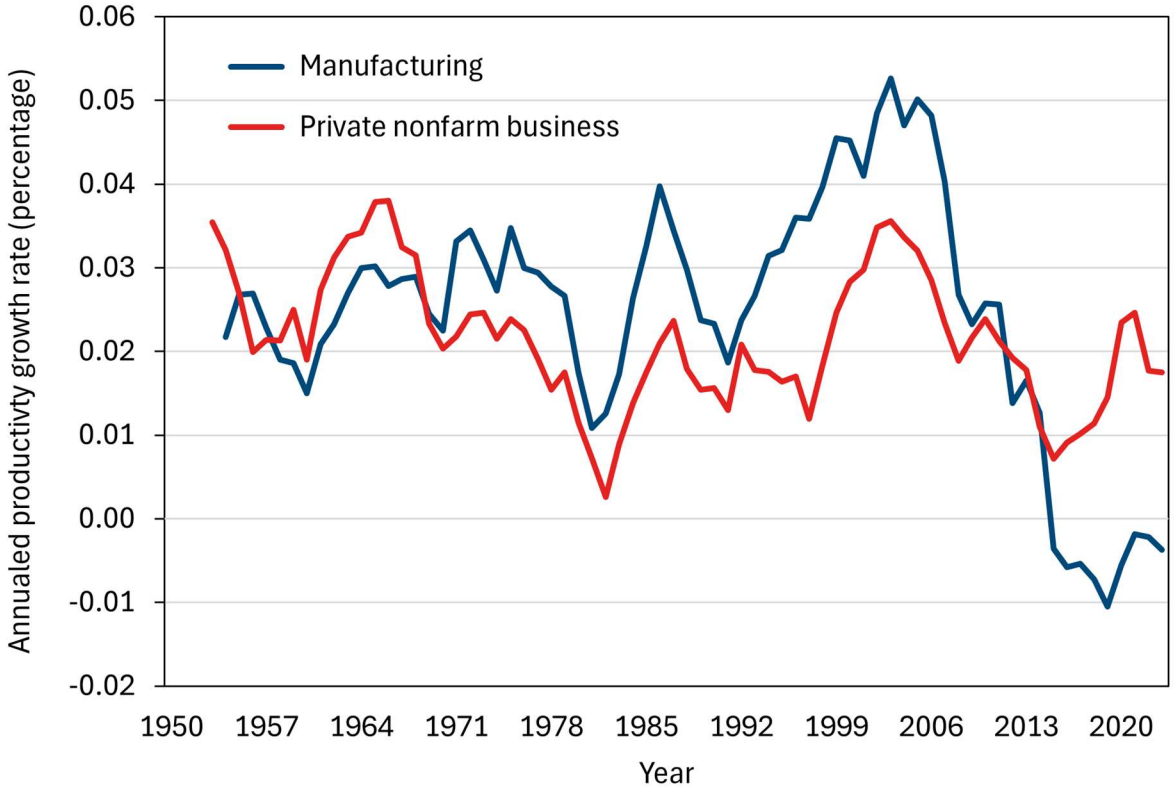
Notes: Calculations are based on decadal US census data from 1880 to 2000 (except for 1890) and 2001-2022 American Community Survey (ACS) samples (except for 2020), sourced via the Integrated Public Use Microdata Series (IPUMS) (Ruggles et al. 2024). Occupations are harmonized across decades to two-digit SOC codes using the IPUMS occ1950 encoding and methodology used in Autor and Dorn 2013; a detailed methodology is described in the data appendix. Samples are restricted to workers aged 18 to 64 in noninstitutional quarters who provide nonmilitary occupational responses. See the appendix for exhaustive definitions of each category.

employment share declines for blue-collar production jobs and growth in clerical, office, and administrative-support jobs.

Figure 2 plots annualized labor productivity growth in manufacturing compared to all other nonfarm sectors of the economy, from 1953 to the present. From 1970 to the early years of the first decade of the 2000s, labor productivity grew faster in manufacturing than in the economy overall. This growth coincides almost exactly with the period of rapid employment declines in blue-collar work shown in figure 1. Productivity growth in manufacturing was the same or slower than overall economic growth in the 1950s and 1960s, and then more recently since 2010.

While technology-enabled productivity growth led to employment declines in manufacturing, it also created new opportunities. Autor et al. (2024) also show how augmentation innovations in businesses processes and information technology led to the rapid rise in the US of a managerial

Figure 2: US labor productivity growth, manufacturing vs. all other industries, 1950–2024



Notes: Calculations are based on Bureau of Labor Statistics "Historical Productivity and Cost Measures" for manufacturing sectors from 1949 to 2003 and "Labor Productivity and Cost Measures" for major sectors from 2004 to 2024. Displayed yearly growth rates have been smoothed out by annualizing five-year growth rates (US Bureau of Labor Statistics 2024). Labor productivity is measured as output per hour worked.

and professional class of workers. To cite just one example, information technology enabled computer-based manufacturing techniques like the computer numerically controlled machine, allowing workers to program routine production tasks like valve cutting with incredible precision (Bartel, Ichniowski, and Shaw 2007). The automation of routine production tasks enabled more customization and process optimization, thereby complementing high-skilled managerial work (Brynjolfsson and Hitt 2003).

We see this process play out in figure 1. Professional occupations—including managers, engineers, lawyers, teachers, and doctors—have grown from less than 10 percent of all jobs in 1880 to about 45 percent in 2024. Professional jobs, which mostly require a college degree and offer high average earnings, have grown especially rapidly in the last 50 years. In both relative and absolute terms, the growth in professional occupations has fully offset the decline of blue-collar work in the US since 1970.

How does the pace of change in the US labor market today compare to that during earlier time periods? The share of employment in farming and agriculture declined steadily by 20 to 25 percent per decade between 1880 and 1980. Employment shares for blue-collar production occupations have declined by an average of 20 percent per decade since 1970. More recently, office and administrative-support occupations declined by 22 percent between 2022 and 2012 after a 12 percent drop the previous decade. Finally, sales occupations have declined by 15 percent in the last ten years, driven by a rapid drop of more than 25 percent in retail sales occupations since 2018. While the decline in office jobs has accelerated in recent years, it does not quite match the magnitude of earlier declines in farming and blue-collar work.

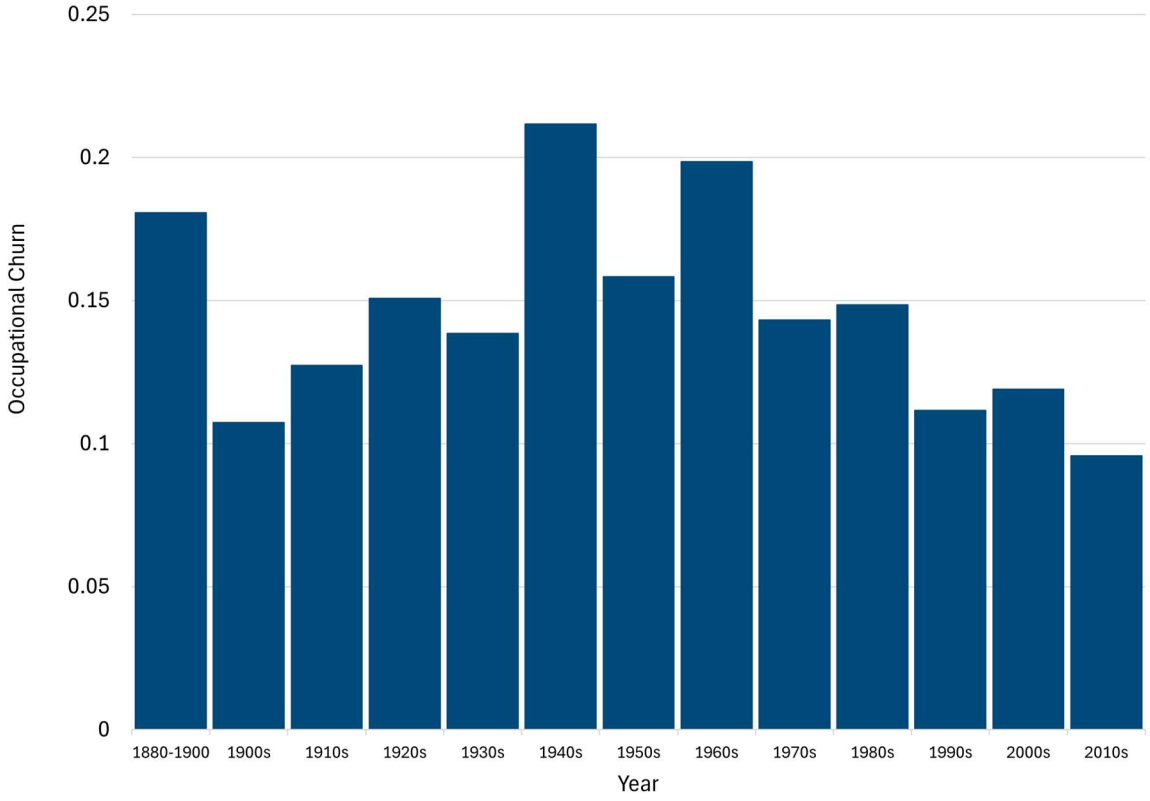
We measure the pace of labor market change more systematically by computing an index of employment disruption that we call *churn.* We define churn for each occupation group as the absolute value of the difference in employment shares over a decade. For example, sales occupations declined from 10.8 percent to 9.1 percent of employment between 2012 and 2022, while business occupations increased from 4.4 to 5.8 percent. By our metric, the churns in sales and business were 1.7 percent and 1.4 percent respectively. We then sum these values up across all occupation categories to get a comprehensive measure of labor market disruption.

While there is no perfect way of capturing labor market change, our churn measure has three advantages relative to other alternatives. First, it is a comprehensive measure that accounts for changes across types of occupations. Second, it is symmetric because employment shares always add up to one and job gains and losses count equally. Third, churn can be interpreted intuitively as a measure of imbalance between periods of time. Suppose there were exactly one hundred occupations. If each had a stable employment share of 1 percent at the beginning and the end of a decade, churn would be equal to zero. If half the shares were at 0.5 percent and half were at 1.5 percent, and the shares flipped completely (so that the occupations at 0.5 percent increased to 1.5 percent, and vice versa), churn would have a value of 1.

Figure 3 plots occupational churn in the US labor market by decade, from 1880 to 2019. To facilitate comparison across many different years, we group occupations into 20 different groups that roughly correspond to the two-digit Standard Occupation Classification (SOC) codes currently used by US federal agencies.[2]

[2] We harmonize occupations across decades by combining two existing crosswalks and a novel crosswalk. We use the occ1950 encoding provided by IPUMS for 1880–1950 and the occ1990dd crosswalk as used in Autor and Dorn 2013 for 1950–2000; we also use a novel crosswalk that harmonizes OCCSOC codes from 2000 to 2022 according to the procedures detailed in IPUMS (Ruggles et al. 2024; Flood et al. 2023). By stitching together crosswalks using overlapping years, we construct a unified crosswalk that allows us to coarsely allocate occupations into groups that correspond to modern SOC codes.

Figure 3: Labor market churn by decade, 1880–2020



Notes: Occupational churn over each period is calculated as the sum of the total changes in absolute value of the employment share attributed to each two-digit SOC code. Employment shares are calculated based on decadal US census data from 1880 to2000 (except 1890) and ACS samples for 2010 and 2019, sourced via IPUMS (Ruggles et al. 2024). Occupations are harmonized across decades to two-digit SOC codes by extending the methodology used in Autor and Dorn 2013; a detailed methodology is described in the data appendix. Samples are restricted to workers aged 18 to 64 in noninstitutional quarters who provide nonmilitary occupational responses.

Figure 3 offers three main lessons. First, the 1880–1900 period and the transition from agriculture to industry were more disruptive than any decade during the computer and digital era. Between 1880 and 1900, the employment share in farming shrank by nearly 8 percentage points. The offsetting gains were distributed evenly across a wide range of occupation groups. On one hand, 1880–1900 is two decades rather than one, so perhaps the lack of data for 1890 overstates the pace of change. On the other hand, shifting employment out of agriculture required mass migration since most other jobs were in urban areas, a disruptive feature that is not captured by our method.

The second lesson from figure 3 is that the three-decade period from 1940 to 1970 was the most volatile period in the history of the US labor market. The transition out of agriculture continued

over this period, with the employment share in farming declining by more than 13 percentage points between 1940 and 1970. There was also a significant compositional shift in blue-collar employment. Construction, installation, and repair jobs grew rapidly, but the employment share in transportation occupations fell from 15 percent to 8 percent. This drop was driven by a shift away from railroad transportation and toward the automobile. Professional and administrative-support occupations also grew rapidly.

The third lesson is that after the 1940–1970 period, the US labor market entered a thirty-year period of relative quietude. In fact, the 1990s and the 2010s were among the least volatile periods since 1880, with 2000–2010 ranking not far behind. This comparative calm is particularly striking when juxtaposed against the automation anxiety that captured public imagination during the 2010s. One study—now cited more than 14,000 times—estimated that nearly half of all US employment could be imminently replaced by computerization (Frey and Osborne 2017).

A historical perspective suggests that the labor market has changed relatively slowly over the past three decades. However, if AI meets the conditions of a GPT—widely used, capable of ongoing improvement, and enabling complementary innovation—the pace of change may quicken.

3. Is artificial intelligence (AI) a GPT?

The term *artificial intelligence* refers broadly to methods that enable machines to perceive their environment, learn, and take actions that achieve certain goals. In practice, recent commercial applications of AI are concentrated in machine learning (ML), a branch of AI research that develops complex statistical algorithms that can learn and generalize from data. The foundation of large language models (LLMs) like ChatGPT is a branch of ML called deep learning, which represents text, images, audio/video, and other data as multilayered neural networks in metaphorical relationship to the human brain.

Broadly speaking, AI and ML are technologies for analyzing, interpreting, and responding to data. Thus, one view is that they are a particularly important chapter of the information technology revolution that began in the 1970s and 1980s. Yet the true innovation of AI and ML is the way in which data are used. Standard programming techniques operate from the top down—they write down a set of instructions in advance (for example, code) that can be routinely and rigorously executed. In contrast, machine learning operates from the bottom up. ML algorithms infer patterns from data, effectively "learning" about the world by studying and copying the actions of others (Autor 2015; Brynjolfsson, Rock, and Syverson 2019).

Robert Solow (1987) famously quipped, "You can see the computer age everywhere but in the productivity statistics." Indeed, apart from a brief period in the early 1990s, labor productivity

growth has been relatively slow over the last several decades. An optimistic view is that we are in the trough of the "J curve" and that the complementary investments in information processing made between 2000 and 2020 will soon lead to an acceleration of productivity growth (Brynjolfsson, Rock, and Syverson 2021).

Agrawal, Gans, and Goldfarb (2019) argue that AI is best understood as a *prediction technology*. They give several examples, such as predicting legal liability based on contract language, surmising the best route between two points given traffic patterns, or supplying text for standard emails and other office documents by predicting the next word or phrase in a sentence string. Better predictions augment human decision-making, allowing some elements of many jobs to be automated. For example, AI can improve diagnostic testing and augment physician accuracy in interpreting medical images (Einav et al. 2018; Agarwal et al. 2023). Even if AI tools do not fully replace physicians (who are still better at understanding the broader context, including patient history), they can increase treatment efficiency, which may lead to other downstream impacts.

Since most jobs involve prediction and decision-making, the impact of AI is likely to be widespread (Deming 2021). Brynjolfsson, Mitchell, and Rock (2018) build an occupation-level measure of "suitability for machine learning" (SML) and find that ML technologies can potentially replace tasks in a broad range of low-, medium-, and high-paying jobs. Eloundou et al. (2023) find that as many as 80 percent of US workers could have at least 10 percent of their job tasks automated by LLMs like ChatGPT.

Still, the automation of individual job tasks does not necessarily reduce employment and may even lead to job gains in some sectors of the economy. The net impact of AI on employment depends on the balance between the replacement of existing job tasks and the impact of productivity gains from automation (if any) on the *total* demand for labor in a sector. In principle, being able to automate a previously onerous task could make workers so much more productive that the increased output offsets the fact that some of their work is now being done by a machine.

In other words, if productivity gains from automation greatly increase the size of the pie, workers may still get a larger slice even if one or two slices now get eaten by robots. Acemoglu and Restrepo (2019) develop a formal model of this tradeoff and argue that the greatest risk for workers is from "so-so" technologies that replace labor without increasing productivity very much, allowing the displacement effect to dominate. One example they give is automated checkout in retail sales.

Three recent studies suggest that generative AI models can significantly increase workers' productivity in writing, customer service, and programming tasks (Brynjolfsson, Li, and

Raymond 2023; Peng et al. 2023; Noy and Zhang 2023). In all three cases, the authors found that generative AI tools had a bigger positive impact on workers who were less productive at baseline, which decreased inequality in performance relative to a workplace without AI (Autor 2024). This finding suggests some reason for optimism about the labor market effects of AI.

A final consideration is whether AI-generated productivity gains will translate into increased demand for the goods and services in a sector. In other words, as we become more prosperous, do productivity gains lead us to want more of what is being produced? Or do we simply spend a smaller share of our income on it over time?

A classic example is agriculture. Farmers became vastly more productive with the adoption of agricultural tools that were powered by GPTs like steam and electricity. Yet because consumers only need so much food, productivity improvements in agriculture caused us to spend less income on food over time, leading to declining employment in farming. A similar dynamic likely holds for manufactured goods, although in both cases US firms are serving a global market, with countries at different stages of economic development. However, it is unlikely that productivity gains in education and healthcare would greatly reduce employment in those sectors, because as we become richer, we want to learn more and live longer. In other words, education and health are more income elastic than food and (perhaps) manufactured goods are.

Our best guess is that AI will end up having broad-based, long-run impacts on the labor market, similar to other GPTs of the past. If AI leads to labor market disruption, how will we know? What will be the early warning signs? The discussion above suggests that we should be looking for two patterns in the data. First, we should expect to see increased investment in new technologies and a J-curve pattern of productivity growth in AI-exposed sectors. Second, we should expect large but steady declines in employment share for AI-exposed jobs, especially jobs in sectors where the income elasticity of demand is low (for example, we don't want much more as we become richer).

While it is far too early to know whether AI will have a comparable impact to GPTs of the past, we present some early evidence below of recent employment trends in the US economy.

4. Four recent trends in the US labor market

Trend 1: Job polarization has been replaced by general skill upgrading

The first labor market trend is job polarization, with barbell-shaped employment growth at the bottom and the top of the wage distribution and declines in the middle (Autor, Katz, and Kearney 2006; Autor 2019). Job polarization has unfolded over several decades, holds across many

different advanced economies, and has been linked to technological changes such as automation in manufacturing and the proliferation of office software.

Figure 4 divides jobs into low-, middle-, and high-paying occupations based on average wages and computes the change in employment share in each category over the last four decades. These results are the same as what is shown in Aspen Economic Strategy Group papers by Autor (2020) and Sacerdote (2020), except those authors only analyzed data through 2016. This figure replicates and extends Autor's (2019) results, which group 2000–2016 into a single year rather than computing separate results for the 2000–2010 and post-2010 periods.

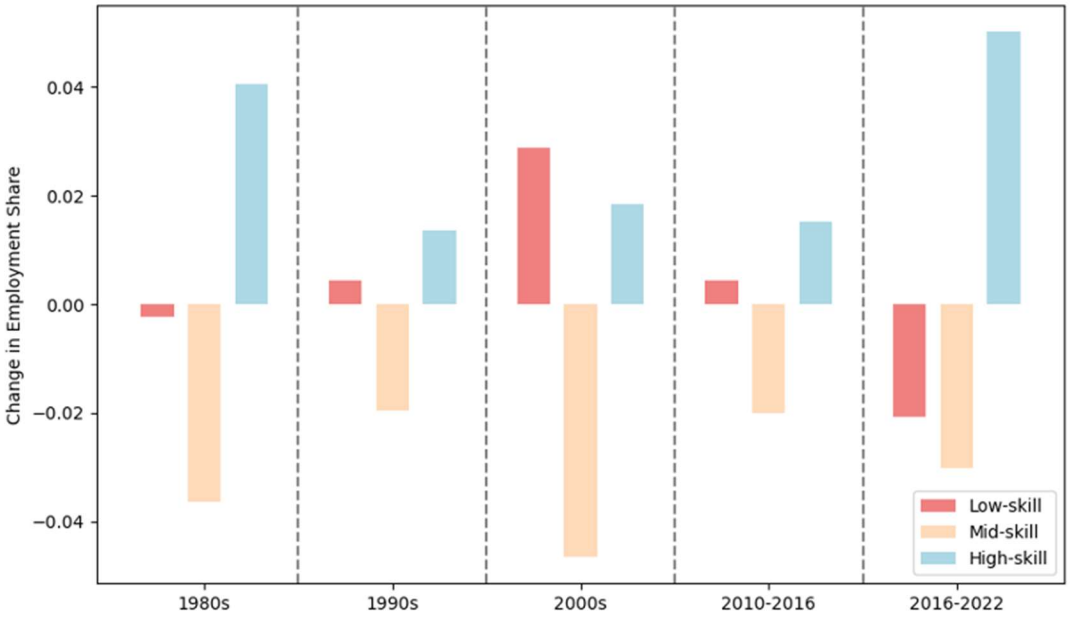
As figure 4 shows, employment growth was highly polarized in the 2000–2010 period, with large gains at the bottom and the top of the wage distribution and declines in the middle. Polarization continued from 2010 to 2016, although to a much lesser degree than in the decade before. However, the labor market has stopped polarizing since 2016. Between 2016 and 2022, low-skilled and middle-skilled jobs both declined by about 2 percentage points, while employment in high-skilled occupations increased by slightly more than 4 percentage points. Thus, employment growth since 2016 looks more like the kind associated with skill upgrading than the kind indicating polarization. We find similar results using the CPS, which collects data through 2024; however, we use the census and ACS in figure 4 because their occupation codes are more consistent over time.

Trend 2: Flat or declining employment in low-paid service occupations

A key explanation for employment polarization in the first decade of the 2000s was the rapid growth of service sector jobs, which replaced middle-skilled (often unionized) production jobs and offered lower wages and fewer employment protections (Autor and Dorn 2013). Figure 5 plots employment in five categories of service sector occupations from 1980 to the present—health support (including home aides), protective services, food preparation and service, cleaning and janitorial services, and personal-care occupations like barbers, fitness instructors, and childcare workers. The solid lines plot data from the census and ACS, while the dashed lines use CPS data through 2024.

Across all five categories, the growth of service jobs stalled in the early 2010s and was flat for most of the rest of the decade. Employment in food service and personal-care occupations fell rapidly in 2020 as a result of the COVID-19 pandemic and had recovered only partly by 2024. With the lone exception of health support occupations, service sector employment is now similar to what it was twenty years ago, early in the first decade of the 2000s. Service occupations have given back nearly all of the rapid job growth they experienced during that decade.

Figure 4: Employment growth by job skill level, 2000-2022



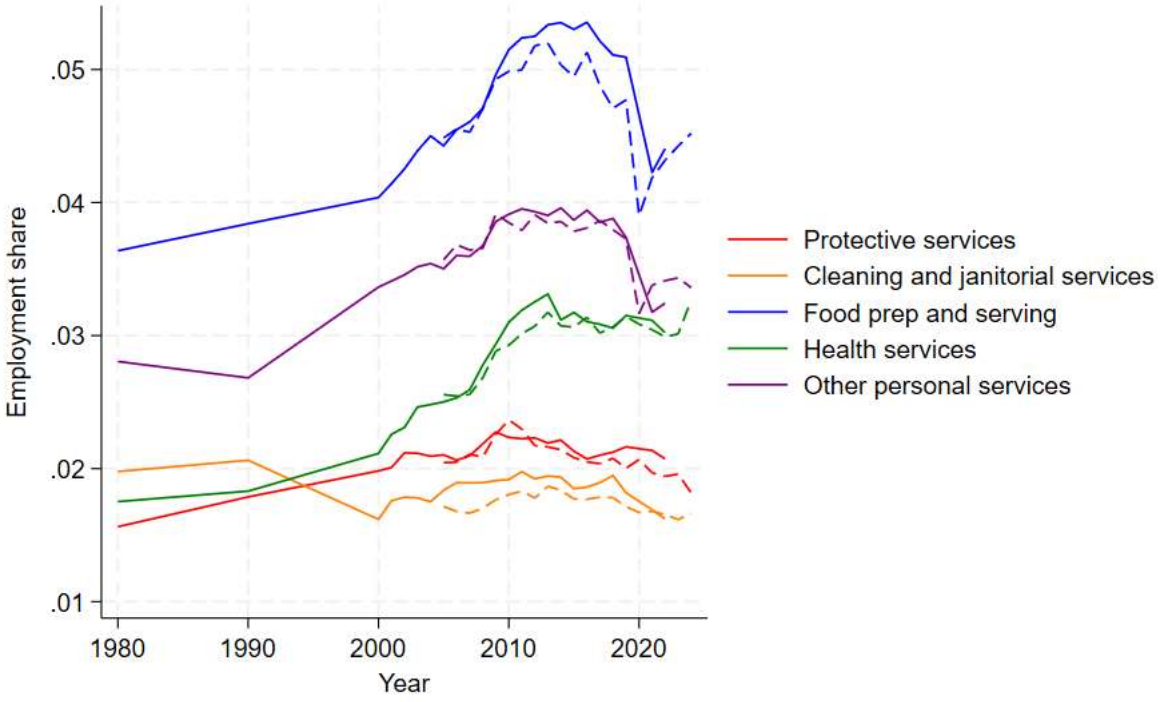
Notes: Calculations are based on the 1980, 1990, and 2000 US censuses (with a 5 percent state sample taken from each) and ACS data from 2010 and 2022, sourced via IPUMS (Ruggles et al. 2024; Flood et al. 2023). Occupations are harmonized to two-digit SOC codes using the IPUMS occ1950 encoding and methodology used in Autor and Dorn 2013; a detailed methodology is described in the data appendix. Samples are restricted to workers aged 18 to 64 in noninstitutional quarters who provide nonmilitary occupational responses. See the appendix for exhaustive definition of each category.

While the decline in service occupations may be indirectly related to technological change, the more proximate cause is rising wages for lower-paid work and increased labor market tightness (Autor, Dube, and McGrew 2023). In theory, rising labor costs could spur automation at the lower end of the job market, as with self-service checkout (for example, Acemoglu and Restrepo 2018).

Trend 3: Rapid employment growth in STEM occupations

STEM (science, technology, engineering, and math) jobs shrank as a share of US employment between 2000 and 2012, while employment in non-STEM professional occupations grew rapidly (Deming 2017). Deming (2017) documents this surprising fact and argues that the demand for social skills is rising because social interaction is required for complex work and is not easily automated by current technologies.

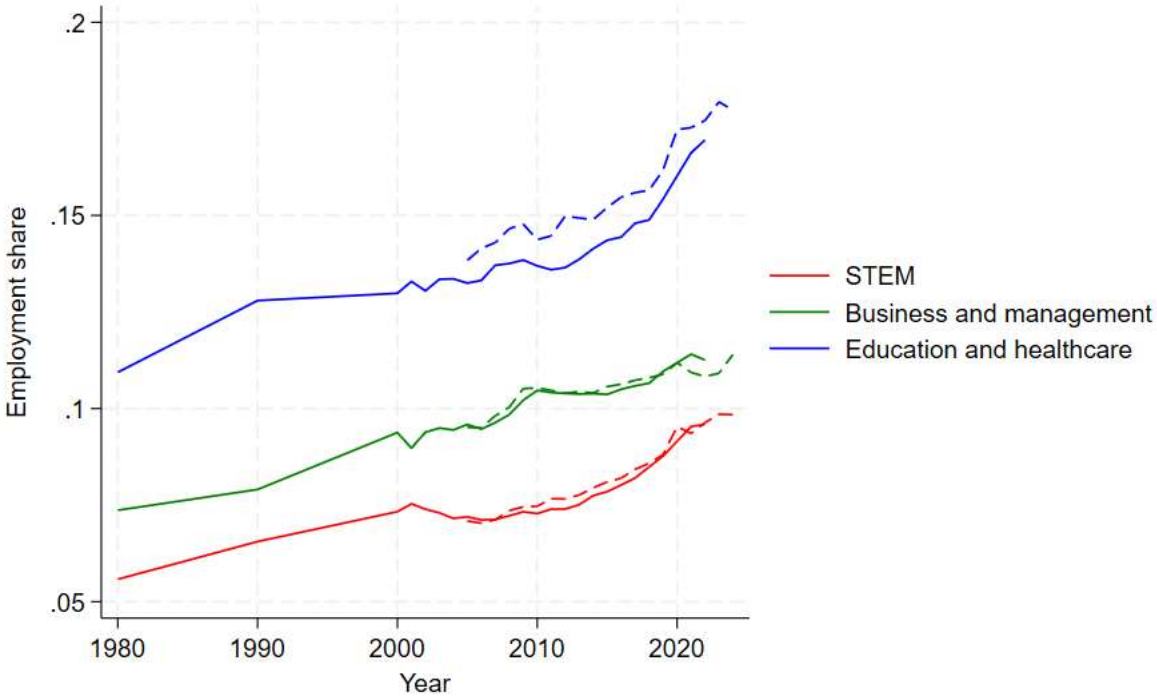
Figure 5: The rise and fall of employment growth in service occupations, 1980–2024



Notes: Solid lines represent ACS calculations; dashed lines represent CPS calculations. ACS calculations are based on the 1980, 1990, and 2000 US censuses (with a5 percent state sample taken from each), and ACS data from 2001 to 2022 (except 2021). CPS calculations are based on Current Population Survey (CPS) monthly data, aggregated by year, from 2005 to 2024. Both datasets are sourced via IPUMS (Ruggles et al. 2024; Flood et al. 2023). Occupations are harmonized across decades using the IPUMS occ1990 encoding. Samples are restricted to workers aged 18 to 64 in noninstitutional quarters who provide nonmilitary occupational responses. CPS samples are additionally restricted to respondents who self-report as being employed. See the appendix for exhaustive definitions of each category.

Figure 6 shows that while the growth in social skill–intensive management, business, education, and healthcare jobs has continued, STEM employment is now also increasing rapidly after having declined in the first decade of the 2000s. The share of all employment in STEM grew from 6.5 percent in 2010 to nearly 10 percent in 2024. About 60 percent of this growth is concentrated in computer occupations like software developers and programmers, although employment has also grown across a wide range of science and engineering occupations as well. STEM employment growth has accelerated especially quickly in the last five years. Moreover, the rapid employment growth in business and management jobs is concentrated in occupations like science and engineering managers, management analysts, and other business operations specialists.

Figure 6: Employment growth in professional occupations, 1980–2024

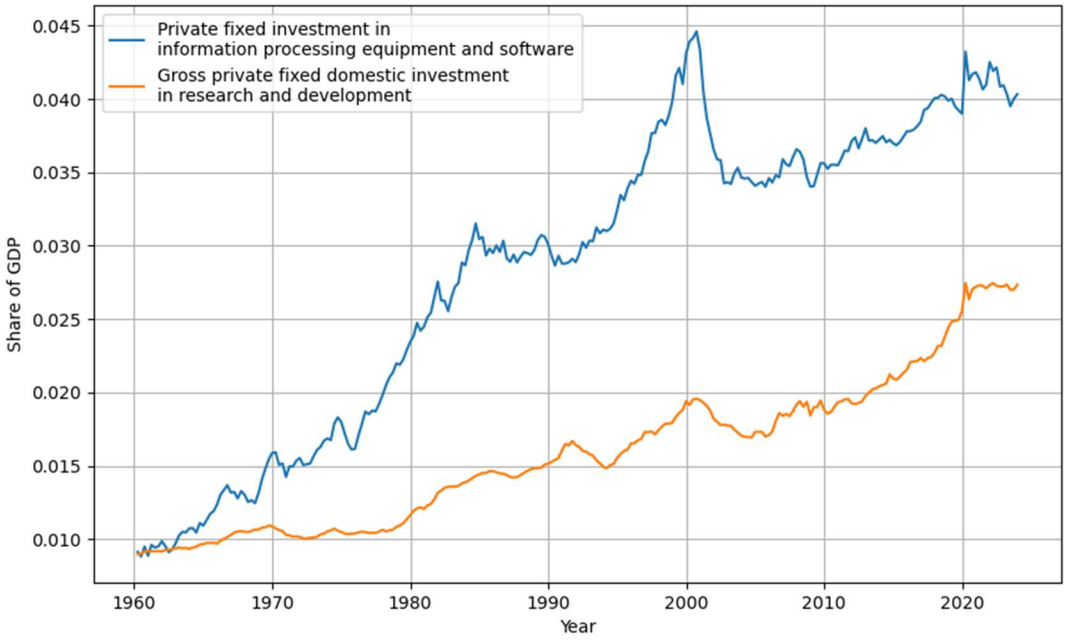


Notes: Solid lines represent ACS calculations; dashed lines represent CPS calculations. ACS calculations are based on the 1980, 1990, and 2000 US censuses (with a 5 percent state sample taken from each), and ACS data from 2001 to 2022 (except 2021). CPS calculations are based on Current Population Survey (CPS) monthly data, aggregated by year, from 2005 to 2024. Both datasets are sourced via IPUMS (Ruggles et al. 2024; Flood et al. 2023). Occupations are harmonized across decades using the IPUMS occ1990 encoding. Samples are restricted to workers aged 18 to 64 in noninstitutional quarters who provide nonmilitary occupational responses. CPS samples are additionally restricted to respondents who self-report as being employed. See the appendix for exhaustive definitions of each category.

Increased employment in STEM occupations is also matched by increased capital investment in AI-related technologies. Figure 7 plots private fixed investment in software and information processing equipment and research and development (R&D) as a share of GDP from 1947 to 2023. Investment in software and information processing peaked in 2000 at nearly 4.5 percent and then fell precipitously during the bursting of the dot-com bubble and the 2001 recession. However, it has rebounded in recent years and is now back above 4 percent. Private nonresidential R&D spending as a share of GDP is now at an all-time high of nearly 2.9 percent.

Much of this spending surge is driven by the increased computing power (or *compute*) necessary to train frontier AI models. Sevilla et al. (2022) find that the number of FLOPs (floating-point operations, a benchmark for computational complexity) required to train the latest Deep Learning models has increased exponentially in recent years. These models require thousands of

Figure 7: Investment growth in information processing, software, and R&D, 1960–2024



Notes: Data is sourced from the Federal Reserve Economic Data series from the Federal Reserve Bank of St. Louis (US Bureau of Economic Analysis 2024a and 2024b).

high-performance graphical-processing units (GPUs) and can sometimes run for months at a time, requiring massive capital investments.

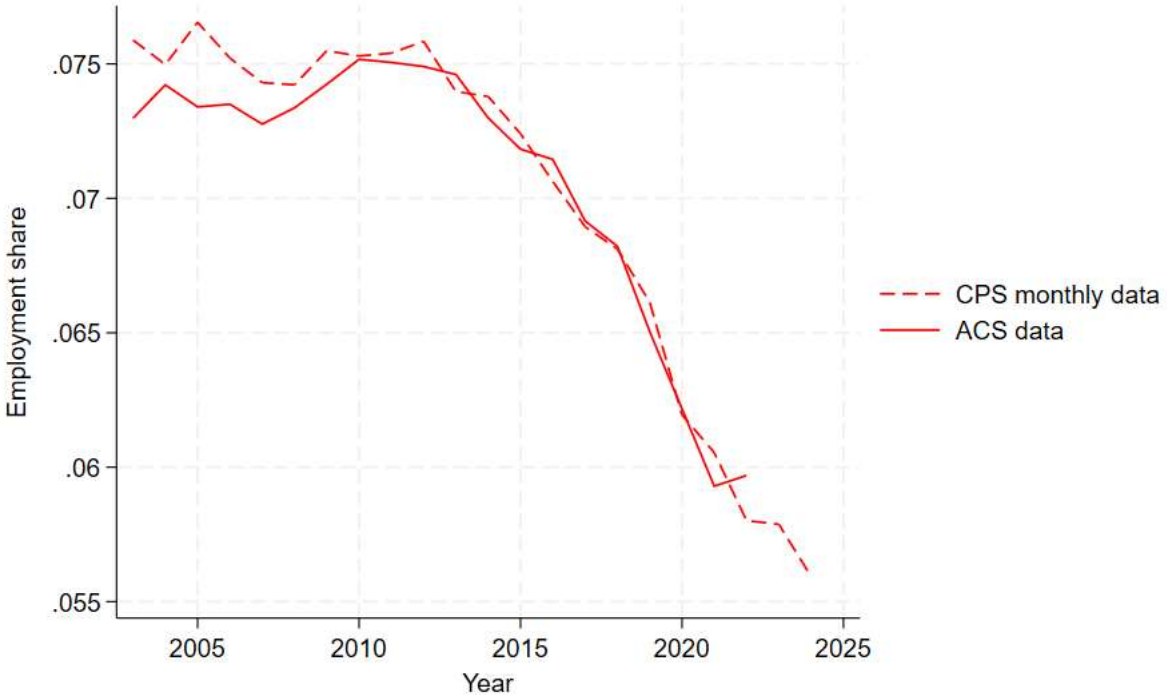
Figures 6 and 7 show that firms have been hiring and developing technical talent and making large investments in frontier technology. This increased investment in physical capital and technically skilled human capital may be a harbinger of future productivity growth, consistent with the J-curve hypothesis.

Trend 4: Declining employment in retail sales

ChatGPT was released in November 2022, so it is probably too early to see any direct impact of ChatGPT or other LLMs on the labor market. Still, companies have been using predictive AI models to optimize business operations since at least the mid-2010s. A particularly early adopting sector was online retail. E-commerce has more than doubled as a share of all retail sales since 2015 (from 7 percent to 15.6 percent; see US Department of Commerce 2024). Online retailers like Amazon use AI to generate personal recommendations (and prices) based on customers' browsing and buying histories, and to predict local product needs and stock warehouses accordingly (Deming 2020).

Figure 8 plots the share of US employment in retail sales occupations from 2003 to 2024. Retail sales jobs held steady at around 7.5 percent of US employment between 2003 and 2013. Between

Figure 8: Employment share in retail sales occupations, 2000–2024



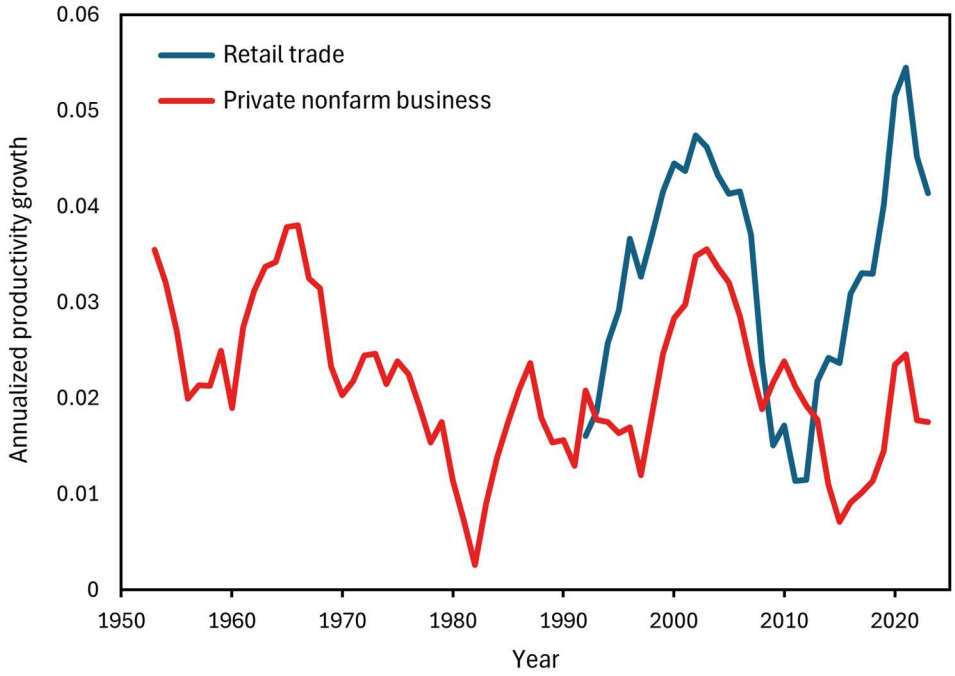
Notes: Calculations are based on ACS data from 2003 to 2022 (except 2021) and the CPS monthly data, aggregated by year, from 2003 to 2024, sourced via IPUMS (Ruggles et al. 2024; Flood et al. 2023). Occupations are harmonized across decades using the IPUMS occ2010 encoding. Samples are restricted to workers aged 18 to 64 in noninstitutional quarters who provide nonmilitary occupational responses and self-report as being employed. See the appendix for an exhaustive list of occupations included.

2013 and 2023, the US economy added more than 19 million jobs. Yet retail sales *declined* by 850,000 jobs over the same period, causing their share of employment to drop from 7.5 to 5.7 percent, a reduction of 25 percent in just a decade. The decline in retail sales jobs began before the pandemic but has accelerated in the last few years.

Labor productivity growth in retail trade has surged over this same period. Figure 9 plots annualized productivity growth in retail trade compared to all other nonfarm business sectors, from 1953 to 2024. Labor productivity growth was slower than average in retail trade during the from 2007 to 2013 but has surged to between 4 and 5 percent in recent years, compared to the average of 2 percent across all sectors. This pattern of rapidly declining employment and fast labor-productivity growth is very similar to what occurred with production jobs in manufacturing half a century ago.

Past episodes of technological disruption in the labor market have created new jobs as well, and there is some recent evidence of job growth as a downstream impact of AI-powered online retail. While the total number of jobs in the US economy grew by 14.5 percent between 2013 and 2023,

Figure 9: US labor productivity growth, retail trade vs. all other industries, 1950–2024



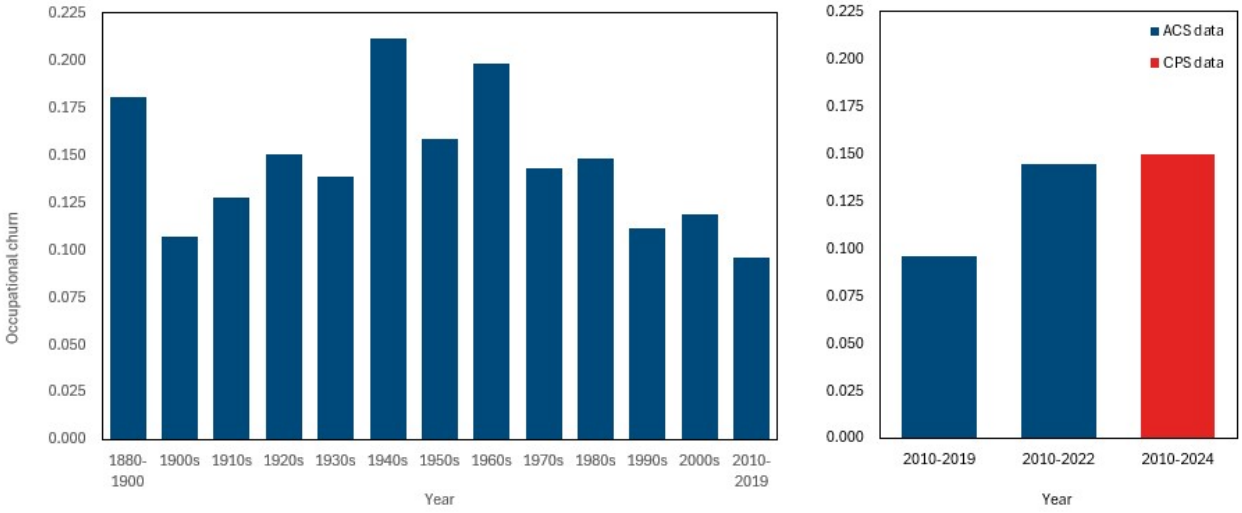
Notes: Calculations are based on Bureau of Labor Statistics "Historical Productivity and Cost Measures" for manufacturing sectors from 1949 to 2003 and "Labor Productivity and Cost Measures" for detailed sectors from 2004 to 2024. Displayed smoothed yearly growth rates are calculated by annualizing five-year growth rates (US Bureau of Labor Statistics 2024).

the number of light delivery service truck drivers grew by 29 percent (Bureau of Labor Statistics 2024). This relative surge in short-haul truck driving is likely driven by last-mile package delivery from online retail sales. Similarly, the occupation "stockers and order fillers" grew from 1.8 million to more than 2.8 million jobs, an increase of nearly 60 percent. Much of this increase is fueled by job growth in the large warehouses maintained by online retailers.

5. Conclusion

Each of these four trends—the end of polarization, stalled growth of low-paid service jobs, rapidly increasing employment in STEM occupations, and employment declines in retail sales—suggests that the pace of labor market disruption has accelerated in recent years. Figure 10 illustrates this acceleration systematically by recalculating our measure of labor market churn for the 2010–2024 period rather than for 2010–2019 as in figure 3.

Figure 10: Occupational Churn, 2010-2024



Notes: Occupational churn over each period is calculated as the sum of the total changes in absolute value of the employment share attributed to each two-digit SOC code. Employment shares for all bars except the last are calculated based on decadal US census data from 1880 to 2000 (except 1890) and ACS samples for 2010 and 2022, sourced via IPUMS (Ruggles et al. 2024). Employment share for 1900 is calculated using the 1880 and 1900 data. The last bar is calculated by aggregating the CPS monthly samples from 2010 and 2024. Occupations are harmonized across decades to two-digit SOC codes by extending the methodology used in Autor and Dorn 2013; a detailed methodology is described in the data appendix. Samples are restricted to workers aged 18 to 64 in noninstitutional quarters who provide nonmilitary occupational responses.

According to ACS data, labor market churn between 2010 and 2022 (still only two years after the COVID-19 pandemic) was greater than that during any period since the 1970s. Using more recent data from the CPS shows that churn was slightly greater when measured over the period between 2010 and 2024. This finding is notable since churn from 2010 to 2019 was lower than it had been during almost every decade since the 1880s. This fact suggests that the post-COVID labor market has been especially volatile by historical standards, in part due to the four trends we identified earlier in the paper. A key unresolved question is whether the post-COVID changes to the labor market are here to stay.

The recent evidence of labor market disruption should also be understood in the broader context of occupational upgrading in white-collar office work. Back-office administrative jobs such as financial, billing, and information-processing clerks shrank from 2 percent of all jobs in 1990 to 1.1 percent in 2024, a decline of nearly 50 percent. Front-office administration, including secretaries, administrative assistants, typists, and proofreaders accounted for 5.8 percent of all jobs in the US economy in 1990, compared to only 2.2 percent today. There are nearly five hundred thousand fewer secretaries and administrative assistants in the US labor market now than there were a decade ago. At the same time, management and business occupations have

grown very rapidly. There were four million more managers and 3.5 million more business and financial operations jobs in the US in 2023 than there were in 2013.

While some of the growth in management occupations probably reflects a relabeling of existing workers (calling someone a manager rather than an office supervisor), it also reflects differences in job function. Notably, the occupation descriptions for office and sales supervisors emphasize monitoring of workers and office processes, whereas the descriptions of managerial roles are more likely to emphasis analysis, strategy, and decision-making (Deming 2021). Notably, about two-thirds of workers in management and business occupations have a four-year college degree, compared to less than one-third of sales and administrative-support workers, and they earn much higher average wages.

History tells us that we should expect the occupational upgrading of office work to continue. In some sense, sales and administrative-support jobs serve intermediary functions. The purpose of a sales worker is to connect firms to consumers who wish to buy their products. The purpose of an administrative-support worker is to reduce communication and coordination frictions between customers and the firm or between workers within the firm. Personalized pricing algorithms and product recommendations, inventory management, oral and written transcription, and automated scheduling are some of the many sales and administrative-support office innovations made possible by AI. In each case, the purpose of the innovation is to increase productivity by smoothing the transmission of information within firms and between firms and the labor market. As AI technology improves, these innovations may lead to declining employment in in sales and administrative-support occupations.

However, the impact of AI on professional and managerial workers is less clear. Early research studies and casual observation suggest that LLMs and other AI tools can replace highly skilled knowledge workers in some job tasks. A reasonable prediction is that the tasks replaced by AI will soon become commodified by the labor market. These tasks include writing business plans, generating good ideas for article headlines, and writing or translating software code. The remaining tasks—analysis, decision-making, an adjudicating between the conflicting perspectives and desires of co-workers—are likely to become highly valuable as a result. While AI certainly helps with these tasks, the demand for good ideas and cogent analysis of complex counterfactual thought experiments (for example. the likely impact of different business decisions, product strategies, etc.) may be nearly unlimited. At least in the near term, AI is more likely to ratchet up firms' expectations of knowledge workers than it is to replace them. In that case, policy solutions such as increased public investment in STEM education and training and reskilling will be necessary to help workers adapt to and effectively use new technologies.

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PENN WHARTON
UNIVERSITY of PENNSYLVANIA
Budget Model

How Does Accounting for Population Change Affect Estimates of the Effect of Immigration Policies on the Federal Budget?

By Douglas Elmendorf and Heidi Williams[1]

Summary: We report estimates from the Penn Wharton Budget Model (PWBM) that exempting employment-based green cards from statutory limits for applicants (and their families) who have earned a doctoral or master's degree in a STEM field---similar to Section 80303 in H.R. 4521---would reduce federal budget deficits by $129 billion from 2025 to 2034. In contrast, a conventional budget estimate, which would include projected increases in federal spending but not the effect of a larger population on federal tax revenues, shows an increase in federal deficits of $4 billion.

Key Points

- Conventional budget estimation assumes that legislative proposals will not change the number of workers in the economy, because such changes would affect GDP, which is assumed to remain unchanged. On a conventional basis, immigration proposals similar to Section 80303 in H.R. 4521 have been estimated by CBO (CBO 2022) and PWBM (Table 1) to increase federal spending, primarily due to greater subsidies for health insurance purchased on the Affordable Care Act exchange, and thereby to increase federal budget deficits.

- However, many legislative proposals to change immigration policies would in fact change the number of workers as a direct consequence and fundamental objective of the legislation. An approach to budget estimation that incorporates projected changes in population provides a more accurate estimate of the budgetary effects of changes in immigration policy. Under such a population-change approach, immigration proposals similar to Section 80303 in H.R. 4521 have been estimated by CBO (CBO 2014) and PWBM (Table 1) to decrease federal budget deficits, as increased collections of individual income taxes and payroll taxes more than outweigh the additional spending.

- Following the population-change approach of incorporating all of the direct budgetary effects of changing the number of people in the United States, the analysts at PWBM estimate that a proposal similar to

Section 80303 in H.R. 4521 would raise federal spending by $4 billion and increase federal revenues by $133 billion from 2025 to 2034, for a net decrease in the federal budget deficit of $129 billion.

- Over the following decade, the difference between estimates under the conventional approach and the population-change approach is even larger, from a $74 billion increase in the budget deficit under the conventional approach to a $634 billion decrease under the population-change approach.

NOTE: Budgetary Effects of Granting Green Cards to Immigrants with Advanced STEM Degrees provides background on estimates presented in this brief.

The Congressional Budget Office (CBO), sometimes in collaboration with the staff of the Joint Committee on Taxation (JCT), has produced estimates of the budgetary impact of proposals to change immigration laws that have used three different approaches:

- *Conventional approach.* These estimates reflect a range of expected behavioral responses—for example, likely changes in the number of people who claim government benefits—except for any responses that would affect gross domestic product (GDP)—for example, changes in the number of workers—because GDP is assumed to remain unchanged. This approach has been used for most immigration proposals—such as for H.R. 4521, Section 80303 (CBO 2022).

- *Population-change approach*.[2] These estimates reflect the behavioral responses included in conventional estimates and also all of the direct budgetary effects of changing the number of people in the United States—in particular, the effects on taxable compensation and therefore on income and payroll tax revenues—but they do not incorporate all of the effects on the economy that CBO expects would occur. This approach has been applied to four legislative proposals—for H.R. 2131 (CBO 2014), S. 744 (CBO 2013a), Senate Amendment 1150 to S. 1348 (CBO 2007a, CBO 2007b), and S. 2611 (CBO 2006a, CBO 2006b).

- *Dynamic approach.* These estimates reflect the budgetary impact of all of the economic changes that CBO expects would occur. This approach has been applied twice, although not as the basis for official budget estimates—for S. 744 (CBO 2013b) and for S. 2611 (CBO 2006a).

At various times in the past decade, the House of Representatives has adopted a rule that CBO and JCT provide dynamic estimates for "major" legislation. However, no immigration proposal during that period has met the criteria to be designated as "major," and therefore no dynamic budgetary estimates have been produced in the past decade. In the two earlier instances when the dynamic approach was applied, the estimated budgetary effects were fairly similar to the estimated budgetary effects using the population-change approach over the first ten years of the estimation period.

By contrast, estimated budgetary effects using the population-change approach can be starkly different from estimated budgetary effects using the conventional approach. Understanding those differences is crucial for Members of Congress and their staffs as they work with CBO and JCT to evaluate possible changes in immigration laws. In this policy brief, we provide a direct comparison of conventional approach and population-change

approach budget estimates for an illustrative policy—similar to H.R. 4521, Section 80303 (CBO 2022)—that would increase the availability of green cards for foreign nationals who are advanced degree holders in the fields of science, technology, engineering, or mathematics (STEM). Specifically, we present budget estimates for exempting employment-based green cards (EB-1, EB-2, EB-3) from statutory limits for applicants who have earned a doctoral or master's degree in a STEM field at a US research institution or foreign equivalent; the cap exemption applies to the principal immigrant as well as their accompanying spouse and minor children.

The estimates we present come from the Penn Wharton Budget Model (PWBM), which is a nonpartisan, research-based initiative at the Wharton School at the University of Pennsylvania that provides economic analysis of the budgetary impact of proposed policy changes. Following the conventional approach, the analysts at PWBM estimate that the proposal would increase federal spending by about $4 billion and have a negligible effect on federal revenues over the 10-year period from 2025 to 2034, leading to a net increase in the federal budget deficit of about $4 billion. By contrast, following the population-change approach of incorporating all of the direct budgetary effects of changing the number of people in the United States, the analysts at PWBM estimate that the proposal would increase federal revenues by $133 billion (and raise federal spending by the same $4 billion as in the conventional estimate) for a net decrease in the federal budget deficit of about $129 billion from 2025 to 2034.

Over the following decade, the difference between the conventional approach and population-change approach estimates is even larger: swinging from a $74 billion increase in the budget deficit to a $634 billion decrease.

Background

In a 2015 report, CBO explained its rationale for using different approaches to estimating the budgetary effects of legislative proposals affecting immigration (CBO 2015, Box 2):

> *Following the long-standing convention of not incorporating macroeconomic effects in cost estimates—a practice that has been followed in the Congressional budget process since it was established in 1974—cost estimates produced by the Congressional Budget Office (CBO) and by the staff of the Joint Committee on Taxation (JCT) typically reflect the assumption that macroeconomic variables such as gross domestic product (GDP) and employment remain fixed at the values they are projected to reach under current law. Thus, when estimating the potential effects of legislative proposals on the federal budget, CBO and JCT generally assume that before-tax wages, the labor supply, and other characteristics of the overall economy would not change as a result of the legislation. (In most cases, those effects would be negligible.) This convention has been followed in estimating the costs of legislation that would make small changes to immigration policy.*
>
> *A change in immigration policy that substantially increased the total population of the United States, however, would cause significant changes in the labor force that were a direct consequence and fundamental objective of the legislation. The magnitude of those changes would depend on the net change in immigration under the policy, as well as how such factors as labor force participation, unemployment rates, average hours of work, and average wages would differ under the policy in comparison with CBO's baseline projections.*
>
> *In such cases, CBO and JCT have relaxed the standard assumption of not accounting for macroeconomic effects of legislation. An example is the cost estimate for S. 744, the Border Security, Economic Opportunity, and Immigration Modernization Act, as reported by the Senate Judiciary Committee in June 2013. That bill*

would have significantly increased the size of the U.S. labor force: Relative to CBO's projections under then current law, enacting that version of S. 744 would have increased the size of the labor force by about 6 million (about 3.5 percent) in 2023 and by about 9 million (about 5 percent) in 2033, CBO and JCT estimated. Employment would have been expected to increase as the labor force expanded because many of the additional immigrants would seek jobs and the larger population would boost demand for goods and services and, in turn, the demand for labor.

But following the standard convention of assuming that employment would remain unchanged relative to current law would have implied that any employment of the additional immigrants would be offset one-for-one by lower employment elsewhere in the population. Because that outcome would be highly implausible, CBO and JCT relaxed the assumption of fixed GDP and employment and incorporated into the cost estimate their projections of the legislation's direct effects on the U.S. population, employment, and taxable compensation, which primarily affected the amount of additional tax revenues that would have resulted from enacting the bill.

Nevertheless, to remain as consistent as possible with the estimating rules that CBO and JCT follow for almost all other legislation, the cost estimate for S. 744 did not incorporate the budgetary impact of every economic consequence of the bill. Rather, in a separate report that accompanied the cost estimate, CBO described the effects that were not taken into account in that estimate (specifically, changes in the productivity of labor and capital, the income earned by capital, the rate of return on capital—and therefore the interest rate on government debt and the differences in wages for workers with different skills) and the additional budgetary effects that would ensue.

Different approaches to cost estimation—conventional, population-change, and dynamic—can result in divergent estimates of federal budgetary effects for similar policies. For example, H.R. 4521, Section 80303, and H.R. 2131 are similar in that both would increase the availability of green cards for foreign nationals who are advanced degree holders in STEM fields:

- CBO's conventional estimate of H.R. 4521, Section 80303—which excluded effects on taxable compensation and therefore on income and payroll tax revenues—was for an *increase* in the federal budget deficit of about $3 billion from 2022 to 2031.
- CBO's population-change estimate of H.R. 2131—which included effects on taxable compensation and therefore on income and payroll tax revenues—was for a *decrease* in the federal budget deficit of about $110 billion from 2014 to 2024.

The fact that these different approaches can lead to estimated budgetary effects for similar proposals that differ in sign is especially problematic because the sign of the estimated effect of a proposal on the deficit is especially salient in the legislative process: Proposals that are estimated to increase deficits are subject to additional points of order and other procedures that affect their consideration by Congressional committees and by the full House or Senate.

Methods

We present budget estimates generated by analysts at the Penn Wharton Budget Model for a representative policy in the spirit of H.R. 4521, Section 80303 (CBO 2022): an exemption of employment-based green cards (EB-1, EB-2, EB-3) from statutory limits for applicants who have earned a doctoral or master's degree in a STEM field at a U.S. research institution or foreign equivalent; the cap exemption applies to the principal immigrant as well as their accompanying spouse and minor children.[3]

This type of policy change would change both the total population of the United States and who among that population has legal permanent residency status versus nonimmigrant status, and each of these channels has potential budgetary impacts. For example, changes to the immigration status of individuals already in the country could have budgetary impacts by affecting eligibility for federal benefits, as CBO notes that immigrants without permanent residency status are sometimes not eligible for programs that immigrants with such status are. Esche, Neufeld, and Williams (2024) estimate the changes in population counts that would result from this type of policy change, and the PWBM analysts use those estimates in their modeling frameworks.

For these estimates, the PWBM analysts assume that the bill would be enacted during fiscal year 2025. For simplicity, the budget estimates presented here do not include any fees or costs associated with applications or other aspects of immigration processing. Because such effects would be handled in an identical manner under the conventional and population-change approaches, excluding the effects does not matter for comparing estimates under those approaches.

Estimates

The PWBM analysts estimate that enacting this proposal would increase so-called direct spending (that is, spending controlled by laws other than appropriation acts) by about $4 billion over the 2025-2034 period (see Table 1). Most of these outlays would reflect increased spending on subsidies for health insurance purchased on the Affordable Care Act exchanges and on other health care programs. Under conventional methods that ignore the changes in the size of the U.S. population, the proposal is estimated to have a negligible effect on federal revenues over the 10-year period from 2025 to 2034. Thus, the conventional estimate is that the proposal would lead to a net increase in the federal budget deficit of $4 billion.

However, when incorporating the changes in the size of the U.S. population, the PWBM analysts estimate that enacting this proposal would increase revenues by $133 billion over the 2025-2034 period (see Table 1). The revenue estimates reflect additional collections of individual income taxes (about two-thirds of the total) and payroll taxes (about one-third of the total) that would result primarily from an expansion of the U.S. labor force. Hence, the population-change approach of incorporating all of the direct budgetary effects of changing the number of people in the United States implies that the proposal would increase federal revenues by $133 billion (and raise federal spending by the same $4 billion as in the conventional estimate) for a net *decrease* in the federal budget deficit of $129 billion from 2025 to 2034.

Table 1. Estimated budgetary effects, 2025-2034

Billions of dollars

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Fiscal Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2025-2034
Increases or Decreases (-) in Direct Spending											
Outlays	0.1	0.2	0.3	0.2	0.3	0.4	0.5	0.5	0.6	1.1	4.2
Increases or Decreases (-) in Revenues											
Revenues	2.0	3.2	5.3	9.9	16.7	19.7	19.4	15.9	17.9	22.8	132.8
Net Increases or Decreases (-) in the Primary Deficit											
Effect on the deficit	-1.9	-3.0	-5.0	-9.7	-16.5	-19.3	-18.9	-15.4	-17.2	-21.7	-128.6

Source: Penn Wharton Budget Model
Components may not to sum to totals due to rounding.

The proposal we are studying would have substantial effects on the size and composition of the U.S. population and labor force in the long run. Therefore, the PWBM analysts also estimated budgetary effects of the proposal for the ten years following the standard 10-year budget window. For the 2035-2044 period, the difference between estimates that do and do not capture the direct effects of changes in population is even larger than during the 10-year budget window: swinging from a $74 billion increase in the budget deficit under the conventional approach to a $634 billion decrease in the budget deficit under the population-change approach (see Table 2).

Table 2. Estimated budgetary effects, 2035-2044

Billions of dollars

DOWNLOAD DATA

Fiscal Year	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2035-2044
Increases or Decreases (-) in Direct Spending											
Outlays	1.9	2.7	3.8	5.3	7.3	8.5	9.3	10.6	11.8	12.7	73.9
Increases or Decreases (-) in Revenues											
Revenues	29.9	37.5	47.6	61.3	75.2	81.6	82.4	86.6	98.1	107.9	708.1
Net Increases or Decreases (-) in the Primary Deficit											
Effect on the deficit	-28.0	-34.8	-43.8	-55.9	-67.9	-73.2	-73.1	-76.0	-86.4	-95.2	-634.2

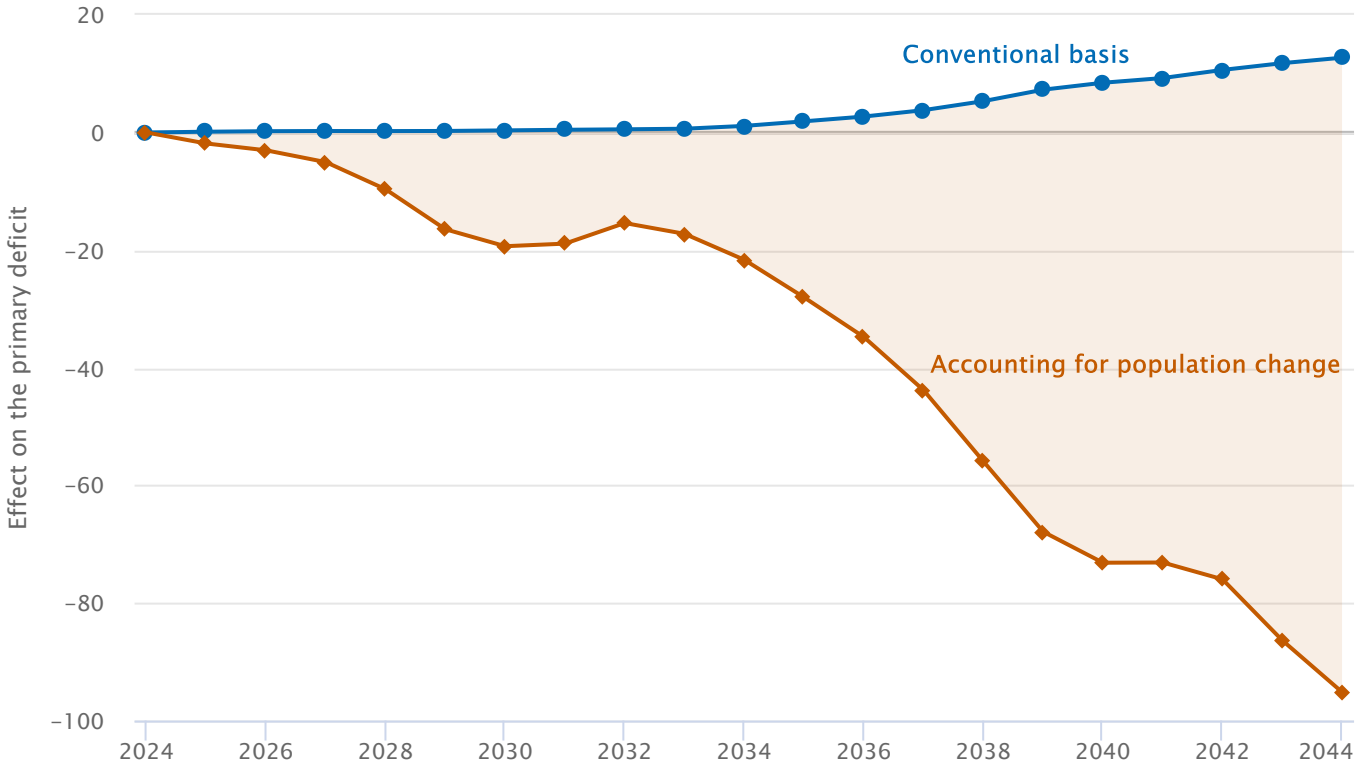
Source: Penn Wharton Budget Model
Components may not to sum to totals due to rounding.

The difference between the conventional approach and population-change approach budget estimates begins to widen substantially in the ninth year after the policy is implemented and continues to widen thereafter (see Figure 1). This pattern arises because of the projected lag in new immigrants naturalizing and sponsoring immediate relatives.

Figure 1. Estimated Effect on the Deficit, Conventional Basis and Population-Change Approach

Billions of dollars

DOWNLOAD DATA



Source: Penn Wharton Budget Model

Conclusion

As noted by CBO (CBO 2015), changes in immigration policy that increase the total population of the United States would generate changes in the labor force as a direct consequence and fundamental objective of those changes. Moreover, CBO has recognized that because conventional budget estimates hold employment unchanged relative to current law, such estimates do not fully capture the budgetary impact of proposed changes in immigration policy. An alternative approach to budget estimation—the population-change approach—captures the direct budgetary impact of changing the number of people in the United States, in particular by increasing compensation and therefore increasing income and payroll tax revenues. This population-change approach has been applied to four legislative proposals—H.R. 2131 (CBO 2014), S. 744 (CBO 2013a), Senate Amendment 1150 to S. 1348 (CBO 2007a, CBO 2007b), and S. 2611 (CBO 2006a, CBO 2006b)—but has not been applied to any proposals since 2014.

Our goal in undertaking this work is to provide additional information to CBO and JCT, to Congress and the relevant Congressional committees, and to the public about the implications of the choice of estimation approach for legislative proposals addressing immigration. The budget estimates presented in this policy brief show that

conventional and population-change approaches can result in sharply divergent estimates of the federal budgetary impact of at least some immigration-related legislative proposals.

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The two references to Senate Amendment 1150 to S. 1348 (CBO 2007a, CBO 2007b) were added as a correction on January 22,2024; we are grateful to Donald Marron for discussions that highlighted their unintentional omission.

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2. Former Acting CBO Director Donald Marron has sometimes referred to this approach as "partially dynamic," but that phrase is not commonly used. ↩

3. This policy change is also in the spirit of other recent legislative proposals such as S. 2384 (the Keep STEM Talent Act of 2023). Note that the policy we study differs from H.R. 4521, Section 80303 by including the EB-3 preference category, and it differs from S. 2384 by including the EB-1 preference category, by not requiring a job offer paying more than median wages for a given occupation and geographic area, and by not being exclusively limited to employers with an approved Labor Certification. A "foreign equivalent" to a U.S. research institution is defined as an institution undertaking $25 million in R&D spending. ↩

Why Crime Matters, and What to Do about It

JULY 2024

AUTHOR

Jennifer Doleac[*]

ABSTRACT

After decades of declining crime rates, the US experienced a spike in violent crime in the wake of the COVID-19 pandemic. While the most recently available data indicates that criminal activity has resumed its descent, crime continues to be a first-order problem for a large number of communities, and the costs of policing, prosecuting, and incarceration are borne by the affected and unaffected alike. The economic costs of crime in the US reach $5–6 trillion annually by some estimates. This paper reviews research and offers policy recommendations to reduce crime through prevention, deterrence, and rehabilitation. First, investing in young children's health and education is extremely effective at reducing crime in the future. Second, policies that raise the probability that perpetrators are caught and face consequences are more effective at deterring crime than making the punishment longer or harsher. Finally, well-intentioned policies with the goal of hiding information about past criminal activity, such as Ban the Box, can have unintended negative consequences. Policymakers therefore should look to long-term investments in children, such as reducing lead exposure and expanding teenage summer jobs programs, along with efforts to detect and apprehend perpetrators today, through technology and increased policing, as evidence-based and cost-effective strategies to lower the economic costs of crime and make communities safer.

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Introduction

Crime is an economic problem, not just a social problem. In this policy brief, I will summarize what we know about crime trends in the United States from the late 1980s through 2023, the economic costs of crime, and what research tells us about what works (and what doesn't) to reduce crime.

1. Recent crime trends

In broad terms, crime rates rose across the US from the 1980s through the early 1990s and then began falling. Researchers still don't fully understand what drove these increases and decreases; these changing trends were likely due to a combination of many factors. What is striking is that that both violent- and property-crime rates fell nearly continuously from the early 1990s until mid-2020.

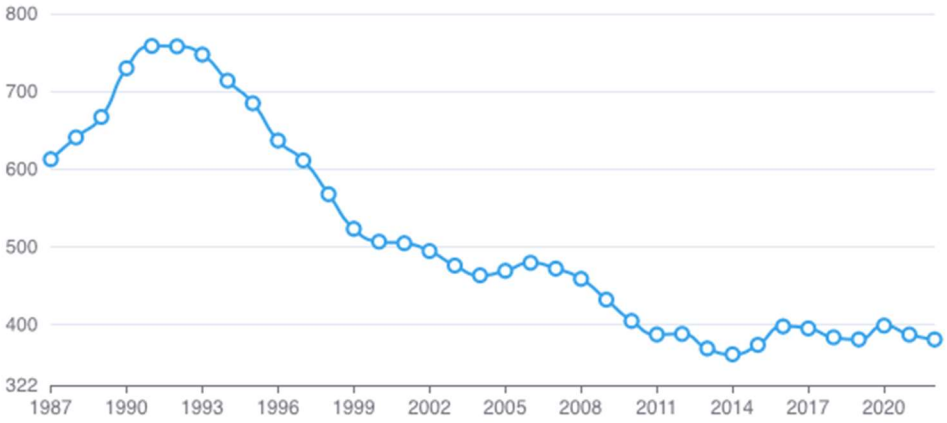
During the Covid-19 pandemic, homicides and shootings spiked, and motor vehicle thefts increased as well. Rates for all three kinds of crime remained far below their early-1990s peaks, but these increases were jarring after decades of increasing safety. Other types of crime fell during the pandemic. While people stayed home, it was more difficult to steal property or break into homes but easier to steal cars (which were not being used regularly) (Morrison 2023).[1] However, fewer people out on the streets meant fewer potential witnesses, and this drop in witnesses appears to have spurred an increase in violence.

Figures 1 and 2 show aggregate violent- and property-crime rates from 1987 through 2022, based on the FBI's National Incident-Based Reporting System (NIBRS) data.[2] The 2020 crime changes are barely visible in these aggregated data; in figures A.1 through A.8, which show separate figures by crime type, it is clear that the pandemic affected only a few specific types of crime (as described above).[3]

The higher rates of homicides and shootings continued through 2021-22, but by late 2023 had fallen back to pre-2020 levels in most places (Asher 2024d).[4] Early data from 2024 suggest that homicide rates have continued to fall in the first half of this year (Asher 2024c). Figure 3 shows

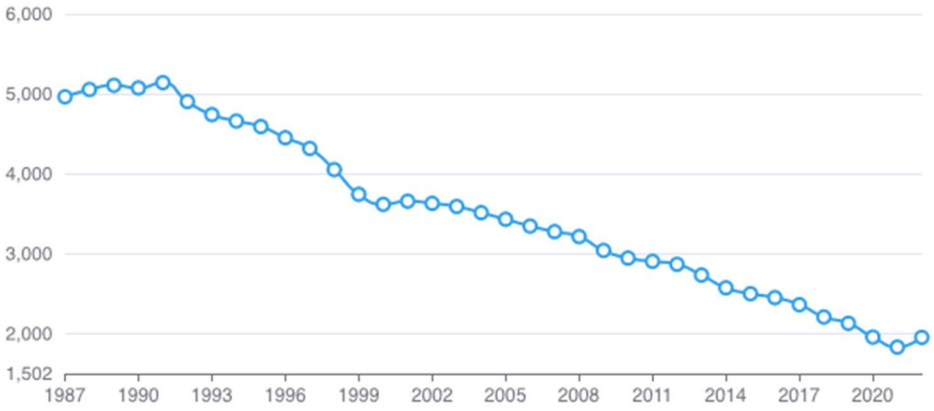
[1] Car thefts also rose due to the discovery (and subsequent viral TikTok videos) that Kia and Hyundai cars could easily be hotwired with a USB drive.
[2] Violent crimes include homicide, rape, aggravated assault (physical assault with an aggravating factor, such as a firearm), and robbery (theft by physical force or threat of violence). Property crimes include burglary (breaking into a building to steal something), larceny (theft), motor vehicle theft, and arson. These offenses are all defined by the FBI as part I crimes and are typically charged as felonies.
[3] Nonlethal shootings are often recorded as aggravated assaults.
[4] Data from the first few months of 2024 show continued crime declines; see Asher 2024d.

Figure 1. US violent-crime rate per 100,000 residents by year, 1987-2022



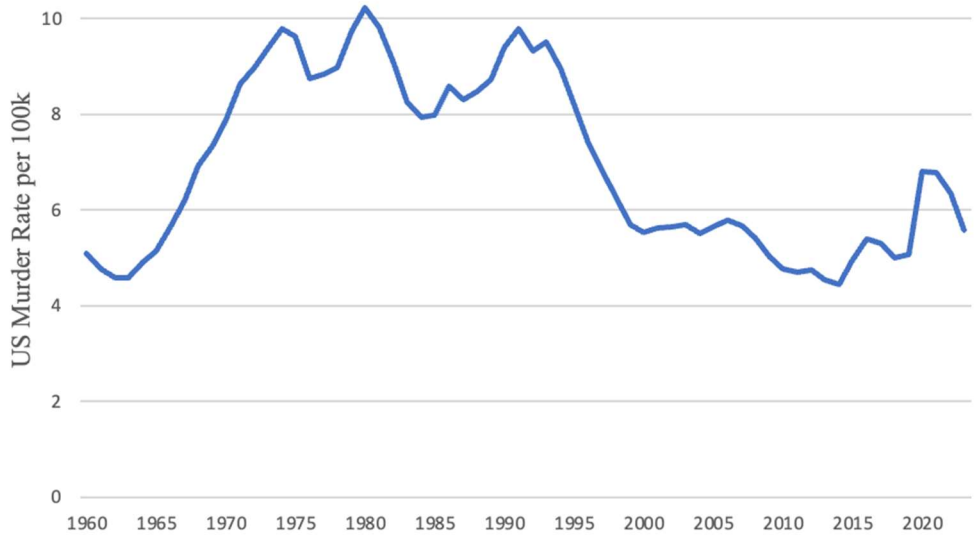
Source: "Trend of Violent Crime from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Figure 2. US property-crime rate per 100,000 residents by year, 1987-2022



Source: "Trend of Property Crime from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Figure 3. US murder rate per 100,000 residents by year, from 1960 to 2023



Source: Asher 2024b, using data from AH Datalytics

the trend in the murder rate over time, using data from AH Datalytics, the best source of up-to-date homicide data.

Crime rates vary significantly across the US. Table A1 shows the 2023 murder rate across the 50 largest US cities tracked by AH Datalytics. Even among these large cities, murder rates range from a low of 3.0 per 100,000 residents in Miami-Dade, FL, to a high of 54.9 per 100,000 residents in Memphis, TN.

Less serious offenses are much more difficult to track nationwide (more on this point below). For example, carjackings are typically not reported separately—they are included as a subset of robberies. Jeff Asher from AH Datalytics dug into the available data (Asher 2024a). He found that carjacking rates are low, relative to historical levels, but rose in 2022. Based on data from 30 cities (the only cities that publish carjacking data separately), it appears carjacking rates fell again in 2023 in 24 of the 30 cities. Washington, DC, was an outlier, with a 98 percent increase from 2022 to 2023.

On average, urban areas have more crime than suburban areas, and suburban areas have more crime than rural areas. This trend holds true for both violent and property offenses. Table 1 shows total violent crime and total property crime, as reported to the National Crime Victimization Survey (NCVS).

Table 1. Crime victimization rates by urban/suburban/rural classification.

Total violent crimes per 1,000 persons age 12 or older				
	2019	*2020*	*2021*	*2022*
Urban	21.1	19.0	24.5	33.4
Suburban	22.3	16.8	16.5	23.9
Rural	16.3	13.4	11.1	15.4
Total property crimes per 1,000 households				
	2019	*2020*	*2021*	*2022*
Urban	153.0	158.9	157.5	176.1
Suburban	100.8	90.5	86.8	98.9
Rural	68.1	65.5	57.7	61.7

Note: Violent-crime victimization rates do not include homicides (as the data are self-reported from crime victims).
Source: Morgan and Thompson 2021 and Thompson and Tapp 2023

Within places, crime tends to be extremely concentrated in particular neighborhoods. So, even though crime rates are much lower now than they were in the mid-1990s, and even though most cities are quite safe on average, crime continues to be a first-order problem for a large number of communities. High crime rates tend to overlap heavily with poverty and are geographically concentrated in similar ways. And, of course, taxpayers in affected and unaffected communities alike pay for the additional policing, prosecution, and incarceration that are necessary when crime is higher.

1.1 Challenges to understanding crime trends

While understanding these broad trends is helpful, there is a lot we don't know about the incidence of crime in the US. The current data infrastructure provides far less information—and in a less timely manner—than US residents are used to having about almost any other aspect of the economy.

Currently, the FBI collects monthly data on reported crime from local police agencies and aggregates those data into the National Incident-Based Reporting System (NIBRS). Not all agencies report each month, quarter, or year, which creates some complications in analyzing the data and understanding what is going on across the country. These data are also available only with a large lag. As of May 2024, the FBI has only released data for 2022. (For this reason, most of the figures above only go through 2022.) But NIBRS is currently the best source of data on reported crime across the country, as it includes a large number of agencies and standardizes the offense definitions.[5]

[5] For a list of the offenses tracked by NIBRS, along with the FBI's definitions of these offenses, see NIBRS 2019.

The next-best source of reported crime data is from individual police departments. Researchers and journalists typically need to go to such departments for more detailed information on specific crime types, including the geographic location of any given offense—often the block or intersection where the offense occurred. (NIBRS data include date and time but provide no geographic information aside from the agency to which the crime was reported.) Police agency data are typically available much sooner than NIBRS data are. The downside, of course, is that to do any analysis or comparison across places, one needs to collect data from all the relevant agencies, one by one.

There are some ongoing attempts to improve upon this status quo. AH Datalytics, a small consulting firm based in New Orleans, collects homicide data from large police departments across the country; its resulting "year to date murder dashboard" is now the best source of timely data on homicide trends in the US (AH Datalytics n.d.c.). Based on the success of this project, Arnold Ventures has funded AH Datalytics to expand this work to include other crime types and a larger number of agencies (AH Datalytics n.d.a.). The hope is to eventually hand off the resulting "Real-Time Crime Index" to the federal government for maintenance.

So, one challenge to understanding crime trends is that our disaggregated system means that we often have an incomplete or substantially delayed picture of what types of crime have been reported to police across the country. Another challenge is that not all crime that occurs is reported to police. Reported crime data do not include this unreported crime. The share of crime that goes unreported varies with offense type and can be sensitive to other factors and trends. The NCVS is the best source we have on the share of crime that is reported to police. Because the NCVS surveys crime victims, homicide is not included in its data; researchers typically assume that homicides are reported at very high rates. Based on the most recent data available (2022), 41.5 percent of violent-crime victims and 31.8 percent of property-crime victims reported the relevant offense to police. These rates vary substantially by specific crime type (Thompson and Tapp 2023).[6] Note that motor vehicle theft is reported at very high rates, in part because insurance companies require a police report to process a claim. For this reason, homicide and motor vehicle theft are often the focus of crime trend analyses, when there are concerns that changes in reporting might confound changes in the underlying incidence of crime.

Finally, minor offenses where there is no clear victim (for example, drug possession, trespassing, disorderly conduct, and public intoxication) are typically reported only when a police officer observes the behavior and makes an arrest. So, trends in these offenses are considered very

[6] In 2022, the percent of victimizations reported to police was: 21 percent for rape/sexual assault, 64 percent for robbery, 50 percent for aggravated assault, 37 percent for simple assault, 45 percent for burglary, 81 percent for motor vehicle theft, and 26 percent for other theft (NCVS 2022).

sensitive to changes in policing (patrol patterns, hiring policies, or enforcement practices) as well as to the likelihood that officers will make an arrest (Lopez, Boxerman, and Cundiff 2023).[7]

2. Economic costs of crime

Crime's effect on the economy must be considered via two important channels: the indirect effects of fear for our personal safety and property, and the direct effects of crime on victims. I will discuss what we know about each of these channels.

Crime affects community members even when they are not directly victimized. For example, fear of crime can affect foot traffic, property values, and school attendance (if parents think it's not safe to walk to school, they might keep their children at home). In general, high levels of crime reduce residents' quality of life and have detrimental effects on neighborhoods (Lacoe, Bostic, and Acolin 2018). Dustmann and Fasani (2016) found that crime causes "considerable mental distress for residents." Effects are driven by property crime, are larger for women, and manifest mostly as depression and anxiety. They estimate that an increase in local crime causes two to four times as much mental distress as an equivalent decrease in local employment. Cornaglia, Feldman, and Leigh (2014) estimate that, in terms of effects on mental well-being, the "society-wide impact of increasing the crime rate by one victim is about 80 times more than the direct impact on the victim." Fe and Sanfelice (2022) used mobile-phone data to track changes in visits to local Chicago businesses after a crime is committed. They found that one additional crime (mostly theft, in their data) committed on a nearby street (within the same census block group) resulted in a 12 percent reduction in consumer visits to local businesses over the subsequent month. Lacoe, Bostic, and Acolin (2018) looked at how crime affects local private investment. In Chicago and Los Angeles, the number of new building permits decreased on blocks where crime was rising. The effect was not symmetrical—that is, investment/building did not pick back up when crime fell—suggesting that the negative effects of crime on local economic outcomes are difficult to undo.

These indirect or spillover effects are important, but in many ways they are more difficult to quantify than the direct costs to crime victims are. These victim costs are both tangible and intangible (McCollister, French, and Fang 2010).[8]

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[7] There has been substantial recent interest in shoplifting, which is also sensitive to changes in reporting. The Council on Criminal Justice released a report in late 2023 on reported shoplifting trends in major cities, but if stores have stopped reporting shoplifting to police (perhaps because they expect limited enforcement actions), then these data will underestimate the true amount of shoplifting.

[8] This discussion is based on McCollister, French, and Fang 2010, a key citation in a large literature focused on estimating the social costs of crime. Other citations come up with slightly different estimates, but their lines of thinking and processes are similar. McCollister, French, and Fang's (2010) analysis uses a combination of approaches to estimate costs of crime. A "cost of illness" approach is used to estimate tangible costs, including the victim's medical expenses, lost earnings, and property damage or loss. A "jury compensation" approach is used to

Tangible costs include medical expenses, cash losses, property theft/damage, lost earnings due to injury, and risk-of-homicide estimates (the probability that the crime might have resulted in death, multiplied by the mean present value of lifetime earnings).

Intangible costs include pain and suffering (as estimated by jury awards) and a corrected risk-of-homicide cost (adding estimated intangible costs of premature death, above the lost earnings included in victim costs).

The estimated victim costs associated with various serious offenses are presented in table 2; each value is per criminal offense.

Combining tangible and intangible costs, Anderson (2021) estimates that the aggregate cost of crime in the United States is $4.7–5.8 trillion *each year*, including transfers from victims to criminals (for example, the cost of stolen property).[9]

So, crime is costly, even in a relatively safe country like the United States. To reduce these costs, the US spends a lot of money to prevent and punish criminal behavior.

2.1 The US criminal justice system and its costs

The criminal justice system in the United States is extremely disaggregated. A simplified version looks something like this: There is a federal system of courts and prisons, with the Federal Bureau of Investigation (FBI) handling enforcement of federal laws. But the vast majority of law enforcement and punishment is conducted at the state and local levels, and almost all criminal behavior that we usually think about (murder, robbery, burglary, shoplifting) is governed by state law (with the definitions of these crimes varying slightly from state to state). Police departments operate at the local (city or county) level, with the exception of state troopers (who enforce the law on state highways). Courts operate at the local level, as do related court personnel such as prosecutors, public defenders, and judges (these offices may be elected or appointed). Jails also operate at the local level; they detain people who are awaiting trial, as well as those sentenced to short periods of incarceration (typically less than a year) and those awaiting transfer to prison for longer sentences. Prisons are operated at the state level. Community supervision, which includes probation, parole, and post-release supervision (all very similar in practice, but involving people

estimate intangible costs, including pain and suffering; these estimates reflect the difference between jury awards in personal-injury cases and any direct economic losses experienced by the associated victim.

[9] Excluding these transfers—which are not completely lost to the economy, as the perpetrator now owns/enjoys them—Anderson (2021) estimates that the annual cost of crime is $2.9–$3.9 trillion.

Table 2. Total costs of crime, to crime victims

	Tangible victim costs	Intangible victim costs	Total victim costs
Murder	$1,070,137	$12,249,342	$13,319,479
Rape/sexual assault	$8,062	$289,681	$297,743
Aggravated assault	$12,624	$137,878	$150,502
Robbery	$4,787	$32,756	$37,543
Motor vehicle theft	$8,871	$380	$9,251
Arson	$16,617	$7,448	$24,065
Household burglary	$1,976	$466	$2,442
Larceny/theft	$696	$15	$711

Source: Estimates are from McCollister, French, and Fang 2010, adjusted to 2024 dollars.

with different sentences), may be operated at the state or local level. To make things even more confusing, all these different agencies have their own data systems (which might be a system of paper files), and these data systems typically do not speak to one another.

In 2021, state and local governments spent 7.5 percent of their overall budgets on the criminal justice system (3.7 percent on police, 2.4 percent on corrections, and 1.4 percent on courts) (Urban Institute n.d.). This percentage amounts to $135 billion spent on police, $87 billion on corrections, and $52 billion on courts. More than 95 percent of this spending is on personnel costs, with the remaining 5 percent being on capital investments.

The federal government also spends about $58 billion each year, about 1.5 percent of its overall budget (as of 2017, the most recent year for which data are available) (Buehler 2021). This total includes $33 billion for police (federal as well as local, through grants programs such as COPS[10]), $17 billion for courts, and $8 billion for corrections.

In 2017, nearly 2.5 million government employees worked in the criminal justice system; 58 percent were employed by local governments, 30 percent were employed by state governments, and the remainder were employed by the federal government. At the state and local levels, criminal justice system employment accounted for 12.4 percent of the entire government workforce (Buehler 2021). Together, crime control efforts make up a meaningful share of the US economy.

[10] The Office of Community Oriented Policing Services (COPS) provides substantial federal funding to local police departments. See https://cops.usdoj.gov/grants for mor information.

This money could be spent much more efficiently if we invested in interventions with a proven impact.[11] There are many downsides to the disaggregated US criminal justice system, but one upside is innovation. There are lots of different agencies, all trying different approaches to public safety. For example, there are between twelve thousand and eighteen thousand police departments (depending on whether you include agencies like transit or campus police), and they all have different practices for hiring, training, and enforcement of the law. This variety—combined with myriad policy and practice changes implemented at the state and local levels each year—makes it much easier to find solutions to existing policy challenges than it would be if all decisions and policies were centralized. The biggest risk we face in this system is that we become wed to potential solutions before we know whether they work. A better strategy is to lean into the experimental approach that our laboratory of democracy has created. By doing so, we will figure out what works well enough to scale.

3. Reasons for criminal justice intervention

The criminal justice system is one tool available to us to prevent crime and improve public safety. As we think about the roles that various criminal justice actors play in the enforcement of the law—and how we might improve upon the status quo—it is useful to step back and think through what the government's goals are when it punishes someone.

Incapacitation: When a court (led by a judge or jury, representing their community) puts someone in jail or prison, it physically prevents that person from committing crime in the community. The reduction in crime that results is referred to as an *incapacitation effect*.

Specific deterrence: Courts may hope that the experience of the punishment is unpleasant enough that a person will want to avoid experiencing it again—and so commits less crime in the future. If this outcome happens, the resulting reduction in crime is referred to as a *specific deterrent effect*.

General deterrence: Courts may also hope that seeing other people face punishment for their crimes will cause all of us to want to avoid that punishment and thus avoid breaking the law. If this broader reduction in criminal behavior happens among the general population, it is referred to as a *general deterrent effect*.

Spending on the criminal justice system—like any government spending—could have indirect economic benefits. For instance, prisons can be a steady source of employment, especially valuable in rural areas that don't have other large employers nearby. Chirakijja (2022) found that prisons do "bring substantial and persistent gains in public employment," but that there is little spillover benefit to the local private economy. In addition, when prisons are built in an area, local property values tend to fall. So, if it weren't for the need to control crime, these public dollars could likely be invested in a more productive way.

Rehabilitation: Prisons offer a lot of programming that aims to help put people on a better path when they get out. Programs such as group therapy, drug treatment, job training, and education classes could all have a *rehabilitative effect*, changing someone's trajectory and reducing criminal behavior after release. On the flip side, the experience of prison might change someone's trajectory for the worse. This outcome is not intentional, but it is possible. Being surrounded by other high-risk people can have a negative influence on behavior, and being incarcerated in violent facilities may cause emotional trauma that makes it difficult to reintegrate into society after release. If someone's trajectory worsens after release, this outcome is called a *criminogenic effect* of incarceration.

Retribution: Finally, courts punish people because the judge or jury feels the defendant deserves consequences for their bad behavior. Even if we learned that prison increased crime rather than reducing it (which could happen over the longer term if the criminogenic effects of prison cancelled out any incapacitation effects), a judge or jury might still think it worthwhile to put someone in prison on the grounds that the person should experience hardship. The amount of retribution (or mercy) someone deserves is a moral question, not an empirical one. Since I am focused here on what research evidence says about what works to improve public safety, I will have little to say about retribution. But it is important to recognize that the issue is one of many in the mix and to be able to distinguish public-safety goals from a desire for retribution.

4. What works to reduce crime

As noted above, various elements of the criminal justice system (police, courts, corrections) are important tools in our crime-reduction tool kit. There are also other tools available, such as improving access to education, availability of jobs, or even air quality. While we're still learning what works and what doesn't, the evidence that already exists points us in clear directions.

How do we figure out what works? Social scientists who study the causal effects of policies and programs on crime try to find contexts that approximate controlled experiments. The key is having a comparison group that tells us what would have happened without the policy or program we're studying. Sometimes it is possible to randomly assign some people or places to receive a treatment, and others not, for a classic randomized controlled trial (RCT). But in many contexts, it is infeasible or unethical to randomly assign people: for instance, we cannot randomly assign people to go to prison. However, researchers have found and made use of lots of randomness in the system that splits otherwise-similar people into treatment and control groups, by chance. (For instance, eligibility cutoffs sort otherwise-similar people into different programs, and court cases are randomly assigned to judges who have different preferences regarding incarceration.) These "natural experiments" provide much of the evidence we have about what works and what doesn't.

A primary takeaway from this literature is that increasing the probability that perpetrators are caught and face consequences has a much bigger deterrent effect on crime than does making the punishment longer or harsher. (This insight is important, as "clearance rates"—a proxy for the share of reported offenses that are solved[12]—are surprisingly low (AH Datalytics n.d.b.). There is lots of room for improvement here.[13] Interventions that help prevent someone's first criminal record are also extremely effective. Pulling someone out of the system once they're in it is much more difficult, though far from impossible.

Below, I describe several interventions that are supported by strong evidence. I've divided these interventions into three buckets: ways to prevent crime (helping people avoid a first criminal act), ways to deter crime (in real time), and ways to rehabilitate offenders (after they're in contact with the criminal justice system). These categories overlap slightly—for instance, access to mental health care can both prevent someone from ever engaging in criminal behavior and help rehabilitate past offenders—but they provide a sense of where these interventions are usually targeted.

Preventing someone's first interaction with the criminal justice system:

Provide summer jobs for teens: Multiple randomized controlled trials (across Chicago, New York City, and Boston) have found that the offer of a summer job for high-risk youth reduces future violent-crime arrests and even mortality due to gun violence (Doleac 2020a). Effects last long after the job ends and do not appear to be due to the earnings or staying busy during those summer months. Instead, the mechanism appears to be exposing teens to career paths and future options they did not know about, as well as mentorship from their supervisors. Focusing on providing summer jobs for teens is a cost-effective approach to preventing crime that deserves more funding.

Provide more and higher-quality education: Policy changes that raise the school-leaving age (Bell, Costa, and Machin 2022) and interventions that increase the quality of education that young people receive (Deming 2011) both reduce future criminal justice involvement. Keeping kids in school for more years has an incapacitation effect—essentially, we are keeping them busy when they would otherwise have been getting into trouble. Education investments also improve the noncriminal options available to teens and young adults, thereby increasing the opportunity costs of criminal activity that might lead to punishment. So, investments in education are a

[12] This proxy is imperfect. In practice, it is computed as the number of arrests divided by the number of reported crimes in a given year. Because arrests might be made in a subsequent year, it is not uncommon to see clearance rates over 100 percent (e.g., if there are two murders in 2021 and two murders in 2022, and the police department makes arrests in all four murders in 2022, the clearance rate in 2022 would be 200 percent). Police departments track arrests rather than charges or convictions (which may be a better proxy for identifying cases that are "solved") because the latter information lives in court databases, which are typically not accessible to police departments.
[13] For information on one approach to increasing clearance rates, see Newburn's (2024) summary of the recently introduced VICTIM Act.

strong preventative measure that reduce crime rates. Recent research highlights that rating school quality solely based on test scores can miss important quality factors that are important for outcomes such as criminal justice involvement (Doleac 2022c). It is therefore important to consider multiple dimensions of quality when investing in education.

Provide cognitive behavioral therapy for high-risk groups: Cognitive behavioral therapy (CBT) is a form of therapy that pushes people to think more deliberately about the costs and benefits of their actions and to question their assumptions and mental shortcuts so as to avoid "thinking traps" or "cognitive mistakes." It has been rigorously evaluated in several settings, showing meaningful benefits. For example, a randomized controlled trial of the Becoming a Man program in Chicago found reductions in violent arrests and recidivism for participants in local schools and juvenile detention facilities (Heller et al. 2017). The *Parcours* program in prisons throughout Quebec also reduces recidivism (Doleac 2024a). And an RCT of the READI (Rapid Employment and Development Initiative) program—which provided men at high risk of gun violence in Chicago with the offer of jobs plus CBT—found evidence of substantial social benefits (while some less-serious crimes increased, more serious offenses such as homicides and shootings fell) (Doleac 2023a). A CBT-inspired training program for police officers also shows tremendous promise: an RCT in Chicago found less use of force alongside fewer injuries of officers (Doleac 2024b). Finding ways to expand these effective programs would likely yield big crime-reduction benefits.

Reduce exposure to lead for young children: Extensive, high-quality evidence demonstrates that exposure to lead at a young age has large, detrimental effects on life outcomes, including educational attainment and criminal justice involvement (such as violent-crime arrests) (Doleac 2021c). The mechanism appears to be that lead mimics calcium in the brain and thus affects brain development, hampering impulse control and causing learning difficulties. Both reduced impulse control and lower educational attainment likely explain the increase in criminal behavior. A strong scientific consensus exists that removing lead from the environment would have long-term benefits that easily pass a cost-benefit analysis—including reductions in crime. However, these benefits will not be realized until fifteen or more years after the intervention. Policymakers' and voters' focus on the short run means we have not invested in this evidence-based crime reduction strategy.

Reduce exposure to air pollution for high-risk groups: There is substantial scientific evidence on how exposure to air pollution negatively affects animals' brain functioning, including increasing aggression. In line with this finding, recent, strong evidence suggests that exposure to air pollution has real-time effects on violent crime. The evidence includes studies looking at what happens when wind blows pollution from a highway one way versus the other way (variation that is unrelated to underlying crime trends). When pollution exposure in a neighborhood increases (due to these unexpected changes in wind direction), violent crime goes up (Doleac

2020b).Mitigating this exposure (for instance, through better air filtration in homes and schools) would have meaningful crime-reduction benefits.

Deterring crime in the community:

Hire more police: The most traditional approach to increasing the probability that perpetrators are caught is to put more police on the street. Indeed, a long literature shows that hiring more police officers and increasing police presence in communities both have large deterrent effects on crime—especially violent crime like homicide. Based on the fiscal costs of police and the estimated crime-reduction benefits of additional police, most US cities are substantially under-policed (Chalfin and McCrary 2018). That said, concern is warranted about the social costs of policing—particularly costs incurred by the unnecessary escalation of incidents to arrests or use of force (Ang 2021). At this point, the policy frontier is finding ways to capture the public-safety benefits that come with policing, while mitigating the costs—perhaps through updated training (as with procedural justice training; see Owens et al. 2018), via a recently piloted training program based on cognitive behavioral therapy (Doleac 2024b), or simply through updated management practices (as with, for example, a Police Leadership Academy now being piloted by the University of Chicago Crime Lab; see University of Chicago Crime Lab n.d.). But putting more police on the streets remains an effective, evidence-based way to reduce crime relatively quickly.

Use technology to increase detection of perpetrators: Technology provides a way to increase detection of offenders—and thus deter crime—at much lower financial cost than hiring more police officers. For instance, several studies show that surveillance cameras reduce crime (see, for example, Gómez, Mejía, and Tobón 2021; Priks 2015). Using the staggered rollout of cameras across places in cities, they estimate big reductions in violent offenses (homicide, assault) and property offenses (robbery, theft). Adding known offenders to law enforcement DNA databases increases the probability that repeat offenders will be caught and dramatically reduces recidivism (Anker, Doleac, and Landersø 2021; Doleac 2017). Blood-alcohol-content monitors quickly detect and deter the consumption of alcohol when it is prohibited (for example, as a condition of community supervision); this deterrence in turn reduces alcohol-related offenses such as DUIs and domestic violence (Kilmer et al. 2013). These technologies are extremely cost-effective based on the financial costs alone, but it is worth considering potential privacy costs, especially as new tools are developed. The Policing Project at New York University regularly conducts "privacy audits" of law enforcement tools like these, to highlight potential privacy costs and ways to mitigate those costs (often there are straightforward ways to do so, for example by adjusting data storage practices). But the privacy costs of non-technological options are not zero. Putting cameras on every street corner may have fewer social costs than putting police officers in the same places. And standard police investigations often require digging into victims' and suspects' private lives (investigating, for example, whom they recently matched with on dating

apps); many people would consider the use of DNA databases to match crime scene evidence with known offenders' DNA to be far less invasive. Regardless, as more tools become available with which to detect perpetrators, it will be important to compare the costs (financial, privacy) of these technologies with their crime-reduction benefits, which are often large.

Rehabilitating people with past criminal justice involvement:

Err toward leniency in the prosecution of first-time defendants: We know that the probability of detection matters for crime prevention, but how large do the consequences need to be? Putting a criminal offense on someone's record can make it more difficult for them to later find a job and housing, and these challenges in turn may make it difficult for them to avoid criminal activity in the future. Strong research suggests that erring toward leniency for first-time offenders—giving them a second chance to avoid a first criminal record—dramatically reduces recidivism. Nonviolent misdemeanor defendants who were randomly assigned to more lenient prosecutors—that is, those who were more likely to drop their charges—were 50 percent less likely to show up back in court with new charges (Doleac 2021b). Similarly, nonviolent felony defendants who got lucky and happened to have their cases heard when they were more likely to receive a "deferred adjudication" were also 50 percent less likely to show up back in court with new charges (Mueller-Smith and Schnepel 2021). (With a deferred adjudication, defendants' charges are dropped if they successfully complete a probationary period with no misconduct or new crime.) In both contexts, the effects were much larger for first-time defendants. It appears that at the time of that first charge, defendants are at a fork in the road. We can choose to pull them into the criminal justice system (by giving them a criminal record) or send them on their way. If we choose the latter path, a large share will course-correct on their own and avoid future crime. Such a scenario doesn't mean the initial crime carried no consequences: in most of these cases, the person was arrested and had to show up in court (perhaps missing work to do so). My interpretation of these findings is that, for a large share of people, such consequences alone constitute enough of a punishment and wake-up call. Erring toward leniency at that early stage has important crime-reduction benefits without incurring any additional spending.

Use electronic monitoring as an alternative to incarceration: Outside the US, electronic monitoring (EM) is widely used as an alternative to incarceration—either in place of short prison sentences or as a means of early release from prison. People placed on EM are typically confined to their homes with limited opportunities to leave only for court-approved purposes such as work, school, and medical appointments. A GPS monitor tracks their whereabouts. This kind of monitoring provides much of the public-safety benefit of incarceration (incapacitation), while minimizing incarceration's negative effects (being locked up with other high-risk people, disrupting work or schooling). But if EM is viewed as less unpleasant than prison, its use could have less of a deterrent effect. Research on the net effects of EM in Australia (Williams and Weatherburn 2022), the UK (Marie, Moreton, and Goncalves 2011), France (Henneguelle,

Monnery, and Kensey 2016), and Sweden (Grenet, Grönqvist, and Niknami 2024) find big benefits of this tool: in all these contexts, replacing time in prison with time on EM reduces recidivism (Doleac 2022b). A recent study in Chicago finds similar effects in the pretrial context (using EM as an alternative to pretrial detention), which suggests that the benefits we've seen in other countries are likely to apply in the US as well (Rivera 2023). EM is also far cheaper than incarceration, making this policy shift a win-win: less crime for less money.

Improve access to mental health care: Sometimes criminal behavior is the result of untreated mental illness. What if we made it easier for those at risk of committing crime to access the care they need? A large and growing number of studies provide compelling evidence that expanding access to mental health care does indeed reduce recidivism and local crime rates (Doleac 2018). Many of these studies consider the effects of Medicaid expansions that made low-income adults without dependent children eligible for that program. Another study looks at what happens to South Carolina residents who are kicked off Medicaid at age nineteen (it is more difficult to qualify for the program as an adult than as a child); incarceration rates immediately increase, and this effect is largest for those who had relied on Medicaid for medications related to mental illness (Doleac 2021d). Other lower-touch interventions are also effective. For instance, a program in Johnson County, Kansas, contacted people who screened as being at high risk of mental illness, after they were released from jail, and offered to make them appointments at a local mental health treatment center. That program reduced recidivism by 17 percent (Doleac 2022a)! Making mental health care affordable and easier to access (including via "warm hand-offs," as in the Johnson County context) is a smart crime-reduction strategy.

Repeal bans on public benefits: People with criminal records are barred from receiving various state and federal public benefits, such as food stamps and other forms of welfare. The motivation for this restriction is mainly retributive: policymakers didn't want tax dollars supporting people who'd broken the law. There are several studies that measure the effects of these restrictions on recidivism and on the next generation (the kids of those who are ineligible). Most studies find that ineligibility for public benefits increases recidivism (Doleac 2021a). One recent study that did not find direct recidivism effects of eligibility bans on those with criminal records nevertheless found that such bans increased the future criminal activity of the children who lived in those households (Mueller-Smith et al. 2023). (This finding is consistent with a much larger body of evidence showing that access to resources like food stamps in childhood reduces future criminal behavior, among other beneficial effects; see Bailey et al. 2023). At this point, it seems clear that these public-benefit restrictions have big public-safety costs. Repealing them would reduce crime rates—probably in the near term and certainly in the longer term.

5. What doesn't work

Strong evidence also suggests that some popular policies do not work. These ineffective interventions include:

Long prison sentences: Prison has a strong incapacitation effect when the people who are locked up would otherwise be committing crime in the community. However, lots of evidence suggests that people "age out" of crime relatively quickly—most people stop committing crime by their early to mid-twenties (Doleac 2023b). Because of this trend, the incapacitation benefits of prison sentences diminish rapidly. In addition, most people on the margin of committing crime are not thinking very far ahead, and so lengthening prison sentences offers little to no deterrent effect. Combined with the high cost of incarceration (roughly $100 per person per day), this state of affairs means that, while imposing some prison time on offenders can have a large public-safety benefit, long prison sentences will rarely pass a cost-benefit test (see Raphael and Stoll 2014). (There are exceptions, of course—consider a serial murderer who defies rehabilitation efforts—but these exceptions are rare and serve mostly to prove the rule.) The sole argument in favor of long prison sentences is a desire for retribution. If your concern is public safety, long sentences provide little value, and our tax dollars are much better spent on other things.

Intensive community supervision: In several contexts, people are placed on "community supervision" instead of being locked up in jail or prison. This kind of supervision includes pretrial release (instead of detention), probation (instead of a prison sentence), parole (early release from prison), and post-release supervision (supervision after a prison sentence is completed). Community supervision works very similarly in all cases: it requires that supervisees meet regularly with case managers and follow strict rules, such as adhering to a curfew (being home by a certain time each night), abstaining from drug or alcohol use, avoiding contact with people with felony records, and so on. The reason for these rules is to provide clear guidance that might help someone avoid risky situations and (if rules are broken) to flag people who are at high risk of committing more crime. "Technical violations" of these rules often mean supervision is revoked and the person is sent to jail or prison. Many studies have examined the efficacy of more-intensive versus less-intensive supervision (that is, supervision that imposes more or fewer rules), including several randomized trials. These studies find no public-safety benefit to more-intensive supervision. With more rules, people often rack up more technical violations and thus more days in jail or prison, but they do not become any less likely to engage in future criminal behavior (Doleac and LaForest 2022). A North Carolina policy change that completely eliminated incarceration as a punishment for all technical violations found some tradeoffs, but it still passed a cost-benefit test under reasonable assumptions (Rose 2021b). In Kansas, lawmakers eliminated and then reinstated post-release supervision; a study of these policy changes found that post-release supervision had no impact on reoffending (Sakoda 2023). The punchline of all these studies is that community supervision—at least as it is currently designed—adds little

value. We could make community supervision much less intensive in most cases with no harm to public safety. And then we might invest the money we're saving into other, more effective strategies.

Truth-in-sentencing policies: Traditionally, most people sent to prison are eligible for parole after serving a portion of their sentence. A parole board considers an offender's behavior while incarcerated, as well as what programs they've completed and other evidence that they've been rehabilitated. If the board determines that the offender is sufficiently low-risk, it will release them from prison and they'll serve the remainder of their sentence in the community. People across the political spectrum have, historically, disliked this system—some thought early releases were too lenient, and others thought that parole board decisions were too arbitrary and biased. As a result, "truth-in-sentencing" policies became popular; these policies require that people serve most or all of their sentences with no opportunity for traditional parole. We now know that these policies have been counterproductive: because they remove the possibility of an early release, they remove the incentive to invest in rehabilitation and good behavior. In practice, we see that truth-in-sentencing policies often have little effect on total time served, because judges adjust their sentences when they know there's no possibility for early release (Macdonald 2024). But the way people use their time in prison changes: they commit more violent infractions in prison and participate in less programming like GED classes. And these changes have consequences. After release, recidivism rates are higher for those sentenced under truth-in-sentencing than they are for those subject to traditional parole rules (Macdonald 2024). Regardless of your views on how long sentences should be, eligibility for parole is the smart-on-crime approach to deciding when someone should be released. It's time to abandon truth-in-sentencing policies.

Transitional jobs programs for people recently released from prison: One of the biggest challenges people face when they leave prison is finding a job. Without one, it is difficult to build a stable life and avoid future criminal activity. Unfortunately, employers are often reluctant to hire people with criminal records. One reason for this reluctance might be that people who have been involved in the criminal justice system do not have the soft skills that employers are looking for—for example, the ability to show up on time and work well with others. Transitional jobs programs aim to address this gap, offering people a temporary job (typically for six months) where they can gain experience and practice those soft skills. The programs then focus on helping participants transition into regular private-sector jobs. There have been several randomized trials of transitional jobs programs for people who were recently released from prison, and they have been mostly disappointing (Doleac 2023b). People do show up when offered these jobs, but they show little to no reduction in recidivism during the program. Even worse, once the temporary job ends, employment rates are equal between the treatment and control groups. These programs are a reminder that good intentions are not enough—many programs that sound like great ideas are not effective in practice.

Wraparound services for people recently released from prison: People coming out of prison face many challenges: limited education, limited work experience, difficulty finding a safe place to live, untreated mental illness, substance use disorders, emotional trauma from living in violent environments (including prison), and even smaller issues like not having a valid photo ID. Addressing any one of these problems often doesn't feel like enough. As a result, many programs that aim to help this population rapidly expand to add more components to address as many of these issues as possible. These holistic, "wraparound-service" programs are extremely common—and they often include evidence-based components (like CBT). But unfortunately, studies show that these programs are not effective at reducing recidivism (Doleac 2019) It's not clear why. It might be that trying to do everything at once means it's impossible to do any of it well. It could also be that holding someone's hand through all these challenges limits their ability to achieve wins on their own and reduces their sense of agency. Whatever the reason, these wraparound service programs—while well-intentioned!—should be viewed with skepticism. Our resources will likely have a larger impact if we invest in more-targeted strategies.

Ban the Box policies to help people with criminal records find jobs: Many people with criminal records would make great employees but can't even get a job interview because of their criminal record. Ban the Box (BTB) policies aim to help people with records get their foot in the door, banning employers from asking about criminal records until late in the hiring process (often after a conditional job offer has been made). The policy does not change employers' reluctance to hire people with criminal records, but it pushes them to make interview (and even conditional-offer) decisions with less information. It turns out that when employers can't ask who has a record, they try to guess. And then they rely on the more limited information they do have—race, age, education levels—to try to infer who is likely to have a recent criminal record that employers might be worried about (Doleac 2016). A prominent field experiment showed that when BTB goes into effect, racial gaps at the interview stage widen (Agan and Starr 2018). Another study found that, on average, BTB reduced employment for young Black men with limited education (the group most likely to be helped by BTB if it was effective) by 5 percent (Doleac and Hansen 2020). Together, these studies show that young Black men without criminal records are hurt by these policies—when forbidden to ask, employers assume these men have criminal records. Other studies have shown that BTB also doesn't help people with criminal records get jobs, likely because they are still rejected when employers are finally able to do a background check at the end of the process (Rose 2021a). All told, the substantial literature on BTB provides another cautionary tale: well-intentioned policies sometimes do more harm than good. Unfortunately, these policies are still popular and widely implemented across the US (Donvan, Avery, and Doleac 2024). Approaches that provide more information about job seekers (enabling employers to identify those who are a good match for the job) or that directly address employers' concerns (for example, by shifting any liability risk from employers to the courts or government) are likely to be much more effective.

6. Popular policies with too little evidence to support them

Finally, many other initiatives and innovative ideas exist for which there is at this point only limited evidence of efficacy. I'll highlight just a couple of high-profile examples:

Community violence interruption: Community violence interruption (CVI) programs are community-based strategies aimed at reducing violence, typically without the involvement of law enforcement. Program employees work to build trust in the community and mediate conflict. Some studies of CVI programs exist, but they generally do not have strong research designs and are frequently oversold in public conversations. These studies do not include plausible comparison groups that would enable researchers to determine whether the programs are effective. At this point, it is reasonable to say these programs are promising, but they are not evidence-based (Pugliese et al. 2022). (An exception is the READI program, described above in the section on cognitive behavioral therapy. That RCT provides a model for how other such programs could be rigorously evaluated.)

Clean Slate policies to help people with criminal records find jobs: Based on the same motivations as Ban the Box (BTB) policies (described above), Clean Slate policies facilitate the sealing of criminal records, hiding them from the view of employers, landlords, and the general public. Early forms of this policy aimed to make record sealing automatic when people's records were eligible based on state law. (The current default is a long, bureaucratic process that fewer than 10 percent of eligible people make it through.) More recent policy changes expand who is eligible for record sealing. The primary goal is increasing employment for people with criminal records. The real-world effects of such policies remain an empirical question; so far there are three relevant studies on the matter. One study considers the effect of Fair Credit Reporting Act (FCRA) rules that seal non-conviction records after seven years, a Maryland FCRA policy that seals conviction records after seven years, and a much-anticipated Pennsylvania Clean Slate law that sealed all non-conviction records immediately upon going into effect. That study finds no effect of any of those record sealing policies on employment (Agan et al. 2024). A study from New Zealand looks at the effects of sealing convictions after seven years in that country and similarly finds no effect on employment (Dasgupta, Ghimire, and Plum 2021). Finally, a related study looking at the effect of downgrading felony convictions to misdemeanors in California found no effect on employment (Agan et al. 2023). One reason that these policies have no impact could be that the damage from these records was already done by the time they were sealed. It is possible that other forms of these policies, without these long waiting periods, would have more beneficial effects, but it is also possible that sealing records sooner, when employers still care about them, would have BTB-style unintended consequences (that is, employers might rely on race as a proxy for recent conviction, as they did before criminal records became easier to access

Interventions that are effective at reducing crime: *Prevention* • Providing summer jobs for teens • Providing more and higher-quality education • Providing cognitive behavioral therapy for high-risk groups • Reducing exposure to lead for young children • Reducing exposure to air pollution for high-risk groups *Deterrence* • Hiring more police • Using technology to increase detection of perpetrators *Rehabilitation* • Erring toward leniency in the prosecution of first-time offenders • Using electronic monitoring as an alternative to incarceration • Increasing access to mental health care • Repealing bans on public benefits
Interventions that are ineffective: • Long prison sentences • Intensive community supervision • Truth-in-sentencing policies • Transitional jobs programs for people recently released from prison • Wraparound services for people recently released from prison • Ban the Box policies to help people with criminal records find jobs
Interventions with insufficient evidence on efficacy: • Community violence interruption • Clean Slate policies to help people with criminal records find jobs

in the late 1990s and early in the first decade of the 2000s).[14] Currently, no compelling evidence exists that these policies are effective, but policies are rapidly changing. More research is needed to inform continued expansion of these policies in the US. Given the effects of BTB policies, it would be smart to be humble about Clean Slate's likely impacts.

7. Conclusion

Even in a relatively safe country like the US, crime continues to ravage communities, with substantial economic costs that are borne by all of us. But we can use a variety of evidence-based, cost-effective strategies to lower these costs and make communities safer. The strategies

[14] See the literature review in Doleac and Hansen 2020 for citations; for more on potential problems with Clean Slate, see Doleac and Lageson 2020.

summarized above offer a lengthy menu of options, any of which would be worth additional investment. But the three I think could move the needle the most are:

1. Increasing use of technology to detect and deter crime
2. Increasing access to mental health care for high-risk populations
3. Reducing young children's exposure to lead

An overarching, evergreen issue is also how to improve data quality. Better data facilitates more and better research on what works, and the data systems in the various criminal justice agencies across the US are outdated and do not speak to one another. This state of affairs substantially hampers progress. We should all be pushing our local agencies to make their data available—publicly whenever possible, and to researchers only when the data are more sensitive.

The Real-Time Crime Index, mentioned above, promises to improve the availability of timely data on reported crime. Another resource, the Criminal Justice Administrative Records System (CJARS), links administrative criminal records from local and state agencies with records from other agencies and with census data holdings (including surveys like the Current Population Survey and administrative data like Social Security Administration records).[15] CJARS data are available to researchers in secure data centers and have already been a game-changer. Expanding investment in resources like these would be extremely helpful.

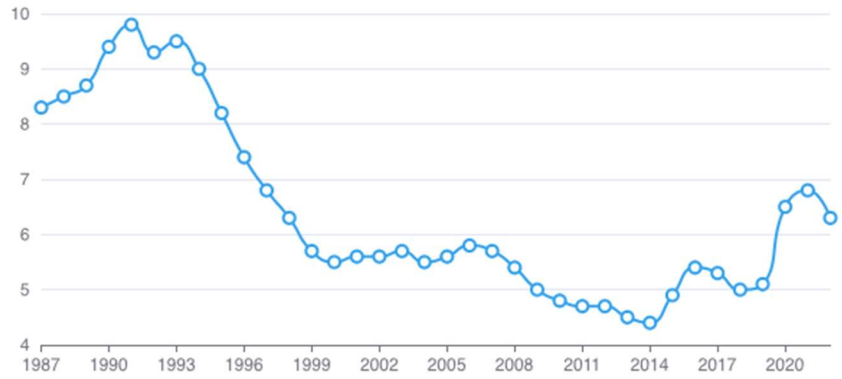
More broadly, in order to make meaningful progress as quickly as possible, we should change the way we approach policy problems in this space. These problems are challenging and multifaceted, and different people will often have different views about how to solve them. We must try new approaches, but we must also be humble. Most of our good ideas won't work as well as we'd hoped, many won't work at all, and some will even backfire. Instead of assuming our good ideas will be effective, we should assume they will fail, and we should aim to fail fast so that we can rapidly begin iterating new approaches. As voters and citizens, we should demand that policymakers provide rigorous evidence that their proposed solutions are having the effects they'd hoped for.

I am an optimist. I believe we will continue to find new solutions to our most pressing public-safety challenges. But we owe it to ourselves—and, especially, to the communities hit hardest by crime—to make sure the solutions we're investing in actually work.

[15] CJARS can be accessed via https://cjars.org.

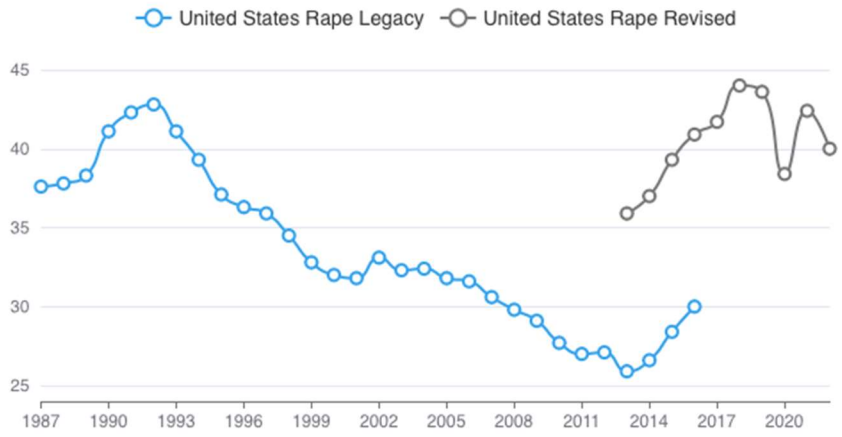
Appendix

Figure A.1. US homicide rates per 100,000 residents by year, from 1987 to 2022



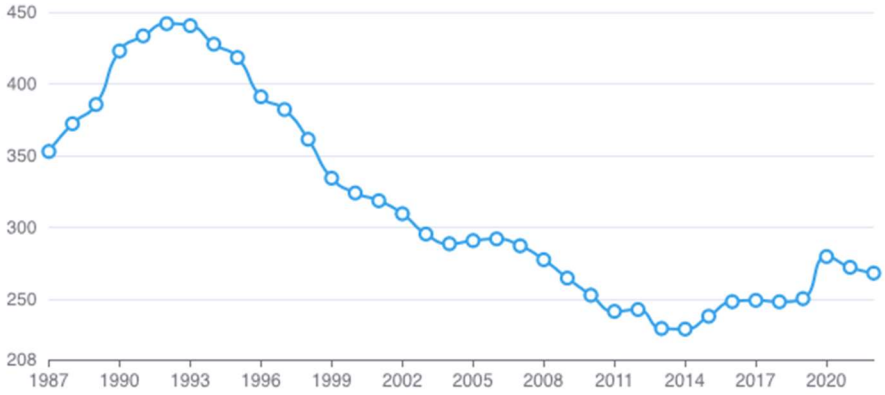
Source: "Trend of Homicide from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Figure A.2. US rape rates per 100,000 residents by year, from 1987 to 2022



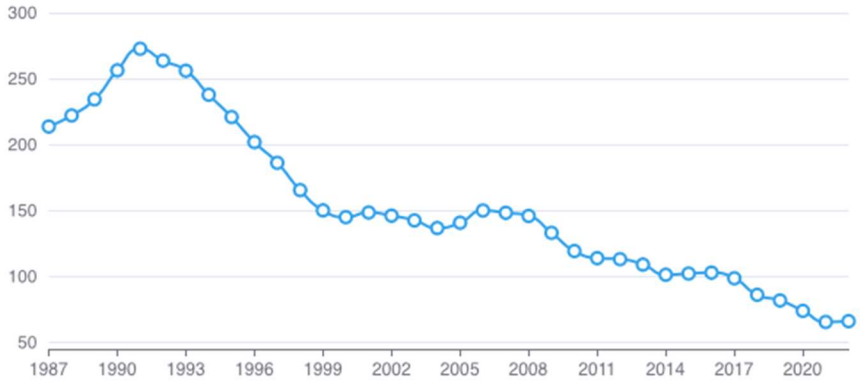
Source: "Trend of Rape from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend
Note: The FBI's definition of rape expanded in 2013 to include non-vaginal penetration.

Figure A.3. US aggravated-assault rates per 100,000 residents by year, from 1987 to 2022



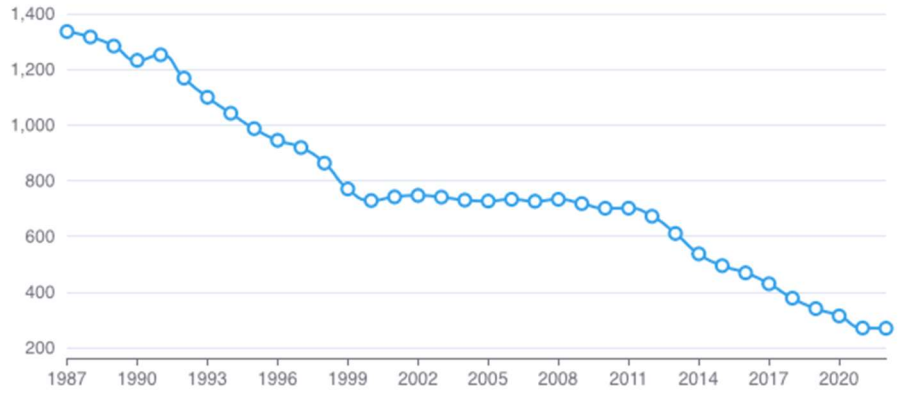
Source: "Trend of Aggravated Assault from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Figure A.4. US robbery rates per 100,000 residents by year, from 1987 to 2022



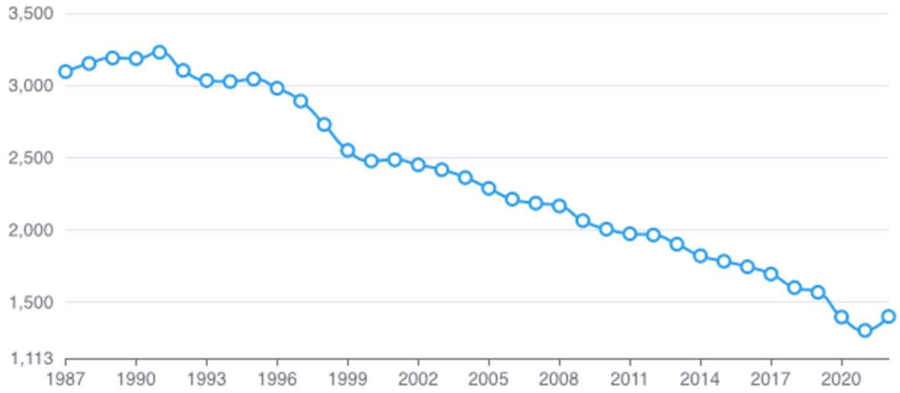
Source: "Trend of Robbery from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Figure A.5. US burglary rates per 100,000 residents by year, from 1987 to 2022



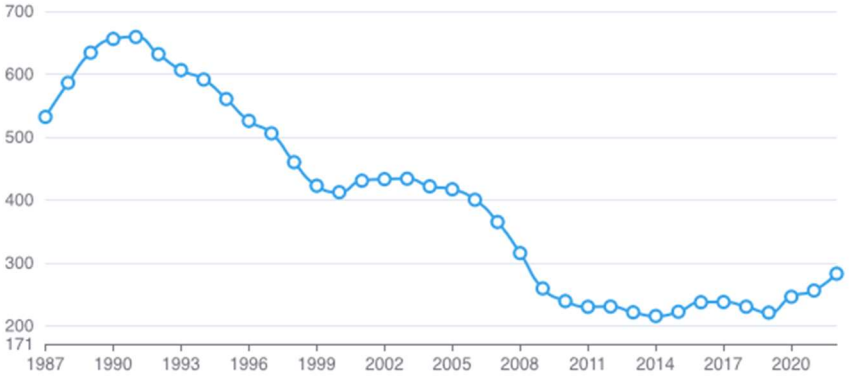
Source: "Trend of Burglary from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Figure A.6. US larceny rates per 100,000 residents by year, from 1987 to 2022



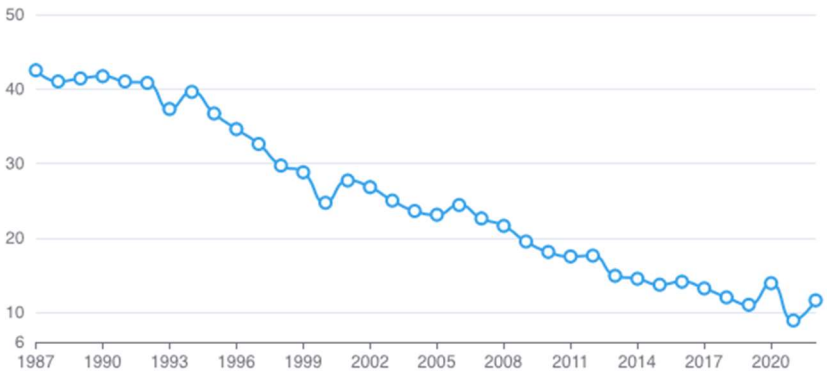
Source: "Trend of Larceny from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Figure A.7. US motor-vehicle theft rates per 100,000 residents by year, from 1987 to 2022



Source: "Trend of Motor Vehicle Theft from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Figure A.8. US arson rates per 100,000 residents by year, from 1987 to 2022



Source: "Trend of Arson from 1987 to 2022," FBI Crime Data Explorer, accessed June 27, 2024, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/crime-trend

Table A1. Murder rates in the 50 largest cities tracked by AH Datalytics, 2023

Memphis, TN	54.9	Colorado Springs, CO	6.2
Baltimore, MD	45.4	Bakersfield, CA	6.1
Washington, DC	40.8	Oklahoma City, OK	6.0
Detroit, MI	40.6	Omaha, NE	5.8
Kansas City, MO	35.7	Long Beach, CA	5.8
Milwaukee, WI	30.0	Boston, MA	5.7
Atlanta, GA	26.6	El Paso, TX	5.6
Oakland, CA	26.6	Mesa, AZ	5.1
Philadelphia, PA	24.8	Virginia Beach, VA	5.0
Louisville, KY	24.0	New York, NY	4.6
Chicago, IL	23.2	San Jose, CA	3.7
Las Vegas, NV	20.1	San Diego, CA	3.2
Indianapolis, IN	19.4	Miami-Dade, FL	3.0
Dallas, TX	18.9		
Albuquerque, NM	17.3		
Minneapolis, MN	16.9		
Columbus, OH	16.4		
Nashville, TN	15.7		
Houston, TX	14.7		
Jacksonville, FL	13.0		
Phoenix, AZ	12.0		
Tulsa, OK	11.7		
Portland, OR	11.7		
San Antonio, TX	11.2		
Denver, CO	10.7		
Tucson, AZ	10.6		
Charlotte, NC	10.6		
Tampa, FL	10.0		
Wichita, KS	9.3		
Fort Worth, TX	9.2		
Los Angeles, CA	8.6		
Seattle, WA	8.4		
Sacramento, CA	7.2		
Raleigh, NC	6.9		
Austin, TX	6.9		
San Francisco, CA	6.7		
Fresno, CA	6.4		

Source: Author's calculations based on murder counts from AH Datalytics n.d.c., and 2022 population estimates from the US Census Bureau.

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