BUILDING A MORE RESILIENT US ECONOMY

Foreword by
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This volume was produced to provide policy-relevant evidence about current challenges confronting the American economy. Authors are invited to share their views about policy issues, which do not necessarily represent those of the Aspen Institute, members of the Aspen Economic Strategy Group, or their affiliated organizations.

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Foreword

Henry M. Paulson, Jr. and Timothy F. Geithner

The Aspen Economic Strategy Group's sixth annual policy volume focuses on building a more resilient US economy.

Several major economic and geopolitical disruptions and developments in recent years—including the global COVID-19 pandemic, Russia's invasion of Ukraine, and growing tensions with China—have heightened the need to get our domestic finances in order, strengthen supply chains, and build a strong domestic workforce.

How the United States navigates ongoing economic challenges in the coming years will have significant consequences for decades to come. Policymakers will need to make difficult spending and tax policy decisions to bring the US fiscal situation into better balance and to maintain our ability to invest in key priorities like national security, health care, and addressing climate change.

Given demographic and fiscal trends, to what extent will Medicare, Social Security, and other key safety net programs need to be reformed? How should the government raise more revenue to address the federal government's fiscal imbalance? What are some priority investments that we need to make to ensure the future of the US economy?

This book examines these and related questions and offers evidence-based answers. Part I describes the long-term fiscal problems facing the US and considers challenges and solutions related to Social Security financing, prescription drug pricing, and reforming the US business tax code. Part II discusses the need for more widespread investments in youth, both immediately to rectify pandemic-induced learning loss and more generally as an investment in our nation's future. Part III considers pressing global economic issues, including US efforts to strengthen its supply chains, as well as the current state of China's economy and the factors that will determine its future trajectory.

Our annual policy volumes are intended to apply the best current economic research to help develop policy solutions to make the US economy work better for everyone. They do not represent the consensus view of the Aspen Economic Strategy Group's members.

Introduction

Melissa S. Kearney*, Justin Schardin, and Luke Pardue*****

September 2023

The post-pandemic US economy features a strong labor market but also persistent inflation, rising levels of debt, and acute educational challenges. These issues are compounded by ongoing, systemic difficulties: domestic and global, economic and political. This policy volume considers these topics and others, with a thematic focus on building a more resilient US economy.

The federal government's aggressive fiscal and monetary policy in 2020 and 2021 mitigated the potential economic losses from the pandemic-induced recession and sped up economic recovery. However, trillions of dollars of federal assistance boosted aggregate demand in the face of constrained supply, spurring inflation to highs not seen since the 1980s. Restrictive monetary policy in the form of higher interest rates has helped tame inflation.

The overall response, however, has left the United States with a higher accumulated debt and larger deficits going forward. These results are compounded by more persistent factors, including the aging of the US population and rising health care costs, which drive up spending on major US entitlement programs including Social Security and Medicare.

After a long period of low interest rates led to some complacency about the US federal budget situation, current forecasts point again to at least somewhat higher interest rates that will make the continued imbalance between federal spending and revenues unsustainable. Building a more resilient US federal budget will require reforms that narrow the gap between spending and revenues, while maintaining sufficient levels of both to support national priorities. Accomplishing this task will require bipartisan cooperation and forward-looking congressional leadership.

The US labor market has remained strong in the post-pandemic period, but it shows signs of cooling and still faces long-term challenges that predate the pandemic. Despite widespread worries about women disproportionately falling out of the workforce

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during the pandemic, female rates of labor force participation and employment now exceed pre-pandemic levels (US Bureau of Labor Statistics (BLS) 2023a).

However, male labor-force participation and employment rates have recovered more slowly and remain depressed compared to prior decades: 86.4 percent of prime-age men in the US were employed in August 2023, equal to the 2019 average but below the 87.9 percent averaged in the 1990s (US Bureau of Labor Statistics 2023a, 2023b). As prime-age men work at lower rates, and as an aging population pushes a larger share of workers into retirement, the size of the workforce will start to grow much more slowly than it has in the past. Over the next ten years, the US labor force is forecast to add half the number of workers it added from 1990 to 1999 (Congressional Budget Office 2023a).

Building a more resilient US workforce will require promoting widespread employment and making investments in youth and young adults to build human capital and skills. It is troubling that the pandemic accelerated already-declining college enrollment: in 2022, there were over one million fewer students enrolled in college than there were in 2019 (National Student Clearinghouse 2023).

The pandemic disruption also led to large losses in student learning. Assessment data from 1.6 million elementary school students across more than 40 states indicate that in the spring of 2021, students were on average five months behind in mathematics and four months behind in reading progress compared to pre-pandemic cohorts. Learning losses were even larger for students in majority-Black schools and schools with lower average family income (Dorn et al. 2021). That study estimated that, if left in place, this learning loss could reduce lifetime earnings by $49,000 to $61,000 per student. Making up for these learning losses before they become permanent is an urgent priority, but doing so will not be easy.

Both the pandemic shock and recent geopolitical developments, including rising tensions with China and the war in Ukraine, have demonstrated the fragility of US supply chains and production. Businesses that lowered costs through just-in-time inventory practices, single-source suppliers, and manufacturing in countries with unstable political situations were left more vulnerable to supply shocks that fueled inflation. And heightened global tensions threaten the prospect of economic cooperation while creating political pressures at home for protectionist and nationalist policies.

The chapters in this book consider these and related issues. They are organized into three sections, as described below.

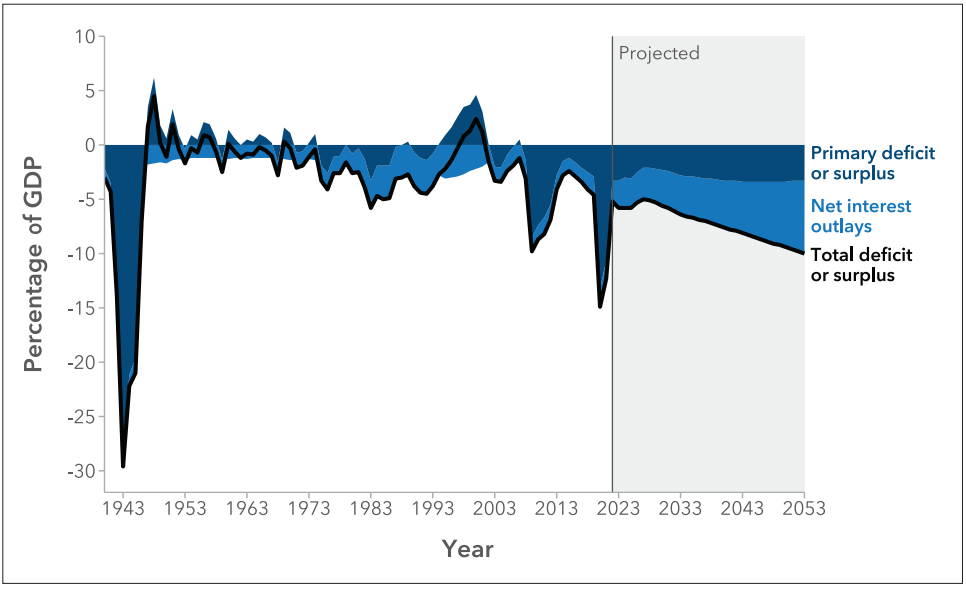
1. Addressing US Fiscal Challenges

The US is facing rising levels of debt and interest payments, as well as federal government spending that is on pace to grow faster than revenues. Figure 1 below, reproduced from the Congressional Budget Office (CBO), shows total deficits, primary deficits, and net interest outlays, historically back to 1940 and projected out to 2053. From 2023 to 2053, the budget deficit is projected to rise to 10.0 percent of gross domestic product (GDP), a level only reached during World War II and the COVID-19 pandemic.

As a result, the overall level of federal debt is projected to rise above 100 percent of GDP, exceeding levels seen in the US during either of those periods. Such a high level of debt threatens the resiliency of the US economy. It would push up interest payments and slow economic growth by crowding out private investment and public spending that could otherwise be used to make investments in America's workforce, infrastructure, and productive capacity.

Figure 1. Components of the Federal Deficit or Surplus as a Percentage of GDP, 1940–2053

Total deficits, primary deficits, and net interest outlays



Source: Congressional Budget Office (2023b).

Note: Primary deficits exclude net outlays for interest.

In chapter 1, "High and Rising US Federal Debt: Causes and Implications," Karen Dynan explains that the outlook for federal debt represents a major economic challenge for the United States. Drawing on the same forecasts cited above, she notes that even under optimistic economic scenarios, debt will soon reach levels well above historical experience, a circumstance that will impose significant economic costs and risks.

Dynan explains how the US arrived in this situation, observing that though economic developments and policy changes over the past two decades have materially raised the level of current and projected debt, the primary factors behind the projected upward trajectory of debt remain population aging and rising health care spending. She also notes that fortunate economic developments, such as high productivity growth or lower-than-expected interest rates, are unlikely to put the budget on a sustainable trajectory.

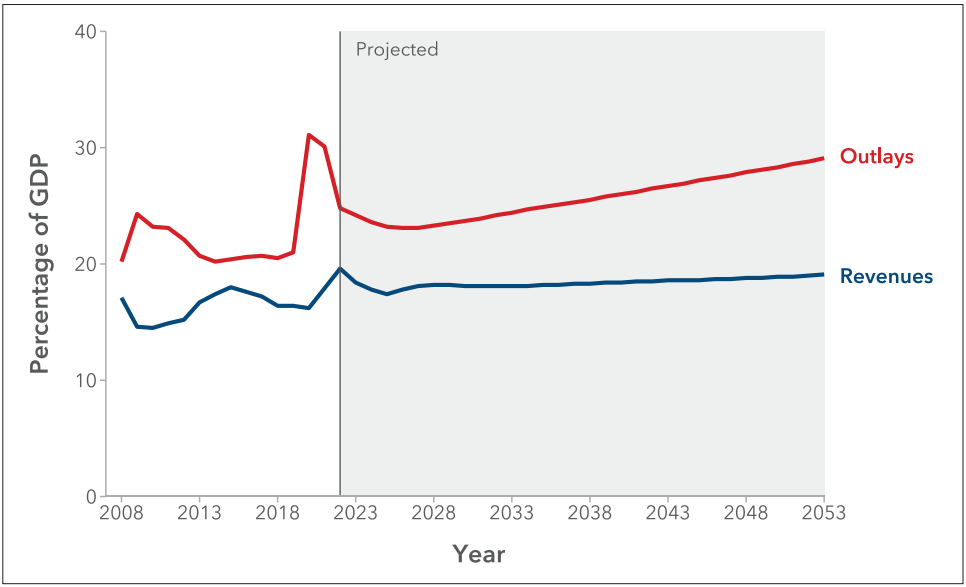
Addressing the budget imbalance will require bringing spending and revenues more in line. As shown in figure 2 (top panel), according to the CBO, federal outlays are expected to rise from 24.2 percent to 29.1 percent of GDP over the next 30 years. This level is substantially higher than was seen in the period from 1993 to 2022, when outlays averaged 21.0 percent of GDP. The projected growth in federal outlays reflects, in part, rising interest rates, persistently large primary deficits, and increased spending on Social Security and the country's major health care programs—driven by the aging of the population and growing health care costs.

Dynan presents various policy reforms that would reduce the deficit to more sustainable levels. But she also acknowledges that each of these reforms would have significant disadvantages. Cutting spending on mandatory programs such as Social Security and Medicare would have more of an impact on federal budget projections than would cuts to other nondefense discretionary programs, but across-the-board cuts to these programs would inflict harm on older Americans with low levels of income and those with more health problems. Policy makers have a variety of options for raising more tax revenue, but the advantages and disadvantages of different tax reforms also need to be carefully considered.

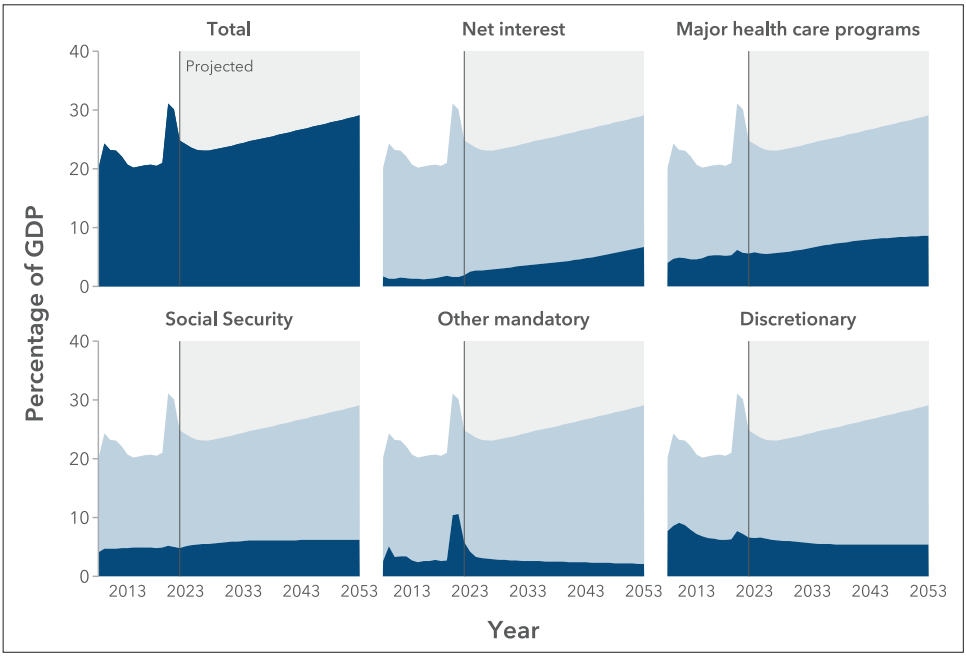
Mark Duggan offers a proposal for reforming Social Security finances in chapter 2, "Reforming Social Security for the Long Haul." He describes Social Security as arguably the most important spending program in the US, but he warns that the program stands on unstable financial footing. He cautions that with the Social Security trust fund projected to hit zero by 2033, the situation could force across-the-board benefits cuts of nearly 25 percent.

Figure 2. CBO Projections for Federal Spending and Revenues, 2008–2053

Total outlays and revenues



Outlays, by category



Source: Congressional Budget Office (2023b).

Duggan observes that Social Security's fiscal imbalance is now much worse than the one that policymakers confronted 40 years ago. At that time, the program's annual deficits made up a much smaller fraction of Social Security benefits than they will under current projections for coming years, and demographic trends were not so problematic for the program's long-term finances.

The perilous spot the program finds itself in today is largely driven by two demographic factors: people are living much longer, and fertility rates have declined.[1] Two additional drivers of the worse-than-expected Social Security trust-fund balance have been slower-than-expected earnings growth during the last 40 years and rising earnings inequality, which have together caused an increasing share of earnings to be above the program's taxable maximum and thus not contributing to Social Security's revenues.

As Duggan notes, this more difficult situation for Social Security's finances comes at a time when America's political and governing system seems much less capable of solving problems through bipartisan compromise. But he cautions that if changes are not implemented soon to improve Social Security's finances, the program's structural deficits will almost inevitably crowd out other important government-spending priorities.

Duggan proposes a package of six reforms aimed at raising revenue and slowing benefits growth to put the program on a sustainable fiscal path—while maintaining benefit levels for low- and middle-income retirees who rely on the program for economic security. He proposes (a) increasing the Social Security payroll tax rate; (b) subjecting a higher share of wages to Social Security's payroll tax; (c) an additional tax rate on all earnings above the annual taxable maximum; (d) a modest increase in the full retirement age; (e) a progressive adjustment to Social Security's progressive benefit formula; and (f) allowing Social Security's trust fund to temporarily borrow from the US Treasury against future annual Old Age, Survivors, and Disability Insurance (OASDI) surpluses.

Looking to entitlement programs beyond Social Security, spending on federal health care programs such as Medicare is consuming a larger share of federal spending. The size of these programs is set to rise further as the population ages and as health care costs—of which pharmaceutical drug costs make up a significant part—rise.

In chapter 3, "Why Drug Pricing Reform Is Complicated: A Primer and Policy Guide to Pharmaceutical Prices in the US," Craig Garthwaite and Amanda Starc describe the opaque and complex process of pharmaceutical price setting in the US. The authors

1 Kearney and Levine's 2022 AESG paper explored the causes and consequences of the decline in US fertility rates and observed that the evidence does not suggest a return to above-replacement-level fertility (average lifetime births of 2.1 per woman) in the US anytime soon.

argue that at its core, drug pricing in the US involves a tradeoff: drug firms are granted a large degree of market power as an incentive to make the large, fixed, and sunk investments necessary for them to bring new products to market. Although high domestic prices have resulted in greater pharmaceutical innovation, there are ways to make markets more competitive and efficient, thereby lowering costs without reducing drug innovation.

Drug price negotiations involve a complex set of discounts, or rebates, among manufacturers, pharmacy benefit managers of health insurance programs, wholesalers, and pharmacies. Many points along this supply chain have also seen substantial market consolidation recently. The complicated structure and opacity of certain parts of the chain may lead parties—such as single-source drug manufacturers, larger pharmacy chains, and pharmacy benefit managers—to unnecessarily extract profits at the expense of consumers.

US policymakers have proposed several solutions to curb rising drug prices, including a provision in the 2022 Inflation Reduction Act that allows Medicare to directly negotiate certain drug prices. But Garthwaite and Starc argue that promoting competition and reducing barriers to entry within certain markets, while preserving incentives for innovation, should be the aim of any policy intervention.

Within the generic drug market, reducing barriers to entry can help prevent natural monopolies from forming. The authors suggest potential solutions that include streamlining the application process for generics, reforming the drug patent system, and working with other countries to expand generic markets to lower costs. They stipulate that when generic markets are too small to support multiple firms, the Food and Drug Administration should allow for a properly regulated form of market exclusivity to prevent monopolistic behavior in these product markets.

At the same time, increasing transparency at points within the drug supply chain will also work to restrain price increases beyond the value added. For instance, the size of rebates negotiated between drug manufactures and middlemen acting on behalf of pharmacies is not disclosed. Rather than banning these discounts, which often work to lower costs, providing this information to all parties along the chain will help to ensure that downstream negotiations occurring between these middlemen, pharmacies, and insurers can take place on equal footing.

Chapter 4, "The Next Business Tax Regime: What Comes After the TCJA?", turns to the revenue side of the ledger. In this chapter, Owen Zidar and Erick Zwick suggest potential reforms to the US business tax regime, with a particular focus on reforming the business tax code. They observe that business income is a substantial part of the overall tax base and a large portion of income and wealth held by the richest and

wealthiest Americans comes from business activity, as opposed to wage income. They take the position that the business tax code needs to be revised to make it more difficult for wealthy individuals to shield substantial amounts of income from tax liability through business tax loopholes. Their policy proposals draw on lessons from the experience of the 2017 Tax Cuts and Jobs Act (TCJA) and provide a path forward.

Zidar and Zwick provide an overview of the business tax base in the United States and of how business activity is taxed. They then describe how the TCJA reformed business taxation and what the early evidence says about how the TCJA affected economic activity. They report that academic research indicates that TCJA tax cuts did not deliver higher corporate tax revenue, as the law's advocates had suggested it would.

Careful research does find an increase in business investment activity as a result of TCJA provisions. But the additional tax revenue this activity would have brought in was more than fully offset by the large mechanical decline in revenue coming from lower tax rates. Furthermore, with regard to the prediction that this tax reform would boost worker wages, they report that the most reliable evidence finds that wages only increased for highly paid employees and executives, not for the median worker.

Drawing on these lessons, Zwick and Zidar propose specific tax reforms guided by three overarching goals: preserving productive business activity, promoting efficiency by harmonizing tax rates across income tax bases, and increasing tax progressivity. They propose to return key components of the federal tax code to what they were in 1997, with higher rates for dividend taxes, estate taxes, capital gains taxes, and top marginal income tax rates.

The authors also propose changes to estate taxes and individual marginal income tax rates because, as they explain in their paper, most estate tax wealth is in the form of either private business assets or publicly traded stock, and most business income in pass-through form is taxed at the top marginal income tax rate. They further recommend several adjustments to corporate taxation to better support productive investment, and reforming international tax provisions in the TCJA. A key takeaway from this paper is that business income and individual income are tightly linked, especially for the richest Americans, and smart tax policy requires that the two tax regimes be treated as an intertwined system.

2. Investing in America's Youth

A productive workforce is critical to the United States' future economic growth and competitiveness. Achieving this goal requires a vibrant, skilled working-age population and the healthy development of children, who are the workforce of the future.

The AESG has taken up various aspects of human capital development over the past several years. A 2019 AESG working group proposed an infusion of federal dollars aimed at building the supply-side capacity of community colleges to deliver high-quality education and skill development (Ganz et al. 2019). Recent AESG papers have examined potential benefits of career- and technical-education programs (Stevens 2019) and apprenticeship opportunities (Lerman 2019). In a 2021 AESG paper, Gordon and Reber argue for a renewed focus on the fundamentals of the K–12 system to improve US schools.

The state of K–12 learning took a major hit during the COVID-19 pandemic, with years of progress that had been made in improving student outcomes being wiped out. Through 2022, national test scores reveal major learning loss among elementary school students, with math scores in 2022 down to levels not seen since 1999 (National Assessment of Education Progress 2022).

In chapter 5, "Overcoming Pandemic-Induced Learning Loss," Jonathan Guryan and Jens Ludwig propose a concrete solution to address pandemic-era learning loss: high-impact tutoring. The authors argue that intensive or "high-dosage" tutoring has been shown to have promising effectiveness for students of any age. Studies of both demonstration and real-world tutoring interventions indicate large learning improvements.

Guryan and Ludwig suggest that high-impact tutoring should be an integral part of efforts to remediate pandemic-era learning loss and that the challenge of scaling such programs can be aided by the use of technology. As a matter of federal policy, the authors suggest that Congress extend the deadline for using pandemic recovery funding to pay for such tutoring programs, and that states and the federal government should consider additional funding for both immediate tutoring efforts and to build out an infrastructure for longer-term tutoring programs.

Chapter 6 takes a broader look at the country's investments in future generations. In this chapter, titled "The Economic Case for Smart Investments in America's Youth," Melissa S. Kearney and Luke Pardue observe that the US spends relatively little on children, despite consistent evidence that such outlays yield large long-term social returns. In 2019, the federal government spent an estimated $5,595 per child on programs benefiting children under 18, compared to $29,189 per elderly American on entitlement programs alone (e.g., Social Security and Medicare)—a gap that remains even when state, local, and private charitable giving are accounted for.

When economists compare the evidence of the effectiveness of government spending across recipients of all ages, they find that spending on children under 18 generates consistently larger returns than programs targeting elderly and non-elderly adults alike. Efforts such as expanding Medicaid to young children significantly improve

these children's adult health. Offering high-quality preschool programs to children in low-income families and mentorship opportunities to disadvantaged teens has been found to boost educational outcomes and raise earnings when these children enter the workforce. These programs build a healthy, skilled next generation, and in doing so, they raise public revenue and often reduce spending enough to pay for themselves.

As a matter of social values, there are good reasons to invest in children growing up in disadvantaged settings. However, from a purely economic perspective of impact investing, there is a strong case to be made for evidence-based investments in youth. As the country faces new and existing challenges discussed in these chapters, investing in children is one of its greatest opportunities for building a more resilient future.

3. Navigating Shifts in the Global Economy

Along with the domestic challenges highlighted above, new and ongoing global challenges require a reexamination of American economic and diplomatic approaches. These challenges include global supply-chain disruptions and growing tensions between China and the West.

In chapter 7, "Manufacturing Resilience: The US Drive to Reorder Global Supply Chains," Mary E. Lovely begins with the recognition that recent disruptions caused by the COVID-19 pandemic, along with the threat of further interruptions from rising geopolitical risks, have exposed the fragility of modern supply chains. To build more resilient networks, US policymakers have taken three main approaches: increasing domestic manufacturing capacity ("reshoring"), building new supply chains among foreign partners aligned with US interests ("friendshoring"), and reducing bilateral tensions with critical trade partners such as China ("derisking").

Lovely evaluates these strategies, weighing the likelihood that each will reduce the potential of future disruptions against the costs to taxpayers and consumers. Reshoring, she argues, builds domestic capacity but is costly and only tenable in a few critical sectors. Friendshoring balances the efficiencies of trade while preventing reliance on rival states but can ultimately result in longer and less transparent networks. Finally, derisking our relationship with China will allow the US to diversify critical supply chains but is complicated by the country's dominant role in world trade and by ongoing political tensions.

Efforts to reduce supply risks can be improved, Lovely argues, by better targeting policy toward the supply chains it seeks to move rather than making open-ended actions to alter supply chains. This approach would balance the need to secure critical supply chains with America's longstanding commitment to a rules-based

trading order—and would avoid forcing other countries to diverge from a global economy of which China is an integral part.

Hanming Fang takes up the topic of China's economic prospects specifically in chapter 8, "Where Is China's Economy Headed?" Fang contends that the main factors driving uncertainty about China's economic growth path are the internal political economy and the external environment, even more so than uncertainty around the standard economic and demographic factors of productivity growth, population aging, and capital investment and consumption patterns.

Fang observes that the growth of the Chinese economy over the last four decades is one of the most transformative events of global economic history. The growth of China's economy since the late 1970s has been rapid; China went from being one of the poorest countries in the world to being its second-largest economy. As defined by World Bank criteria, China emerged as a lower-middle-income country in 2001 and transformed to an upper-middle-income country in 2010.

From 1990 to 2022, China's real GDP per capita grew from 4.1 percent of the US per capita GDP level to 28.4 percent. In terms of aggregate economic activity, China is now approaching par with the United States. In 2022, China's nominal GDP was 18 trillion USD, or three-quarters the size of the US economy ($24 trillion); adjusting for purchasing power, China's GDP was 28.8 trillion USD, about 20 percent larger than that of the US.

Fang contends that the Chinese economic growth miracle of the last four decades was a result of the country's warming relationship with the US-led West and of its corresponding embrace of market-oriented reforms and globalization. He observes that it is generally accepted that the double-digit annual growth rates China experienced during the 1980s, 1990s, and first decade of the 2000s are a thing of the past, but that predictions of future annual growth rates vary widely among analysts, ranging from 1 percent to 8 percent over the next 10 to 15 years.

These predictions tend to differ by the analysts' sectoral perspective. For instance, investment banks tend to focus on annual or even quarterly growth rates instead of on medium- or long-run rates. They also tend to pay relatively more attention to the fiscal- and monetary-policy stances of the Chinese government than to more fundamental economic factors, such as the declining size of China's workforce, whereas forecasts from economists tend to put a relatively heavy weight on economic fundamentals, returns to investment, productivity growth, and the consequences of potential technological decoupling from the West.

China's rapid growth has come with an increased willingness by Beijing to exercise its geopolitical influence, while this willingness—along with some of China's economic and political practices—has contributed to greater friction with the West, and with the US in particular, over the past several years. At the same time, China faces serious structural economic challenges, including an aging population and declining workforce, a precarious real estate sector, and high levels of income inequality that may impede a transition to a consumption-driven growth model.

But, in Fang's view, these issues could be addressed by appropriate reform measures. The larger risk for China, he argues, is that necessary reform efforts will be blocked by vested interests spurred by perceived external threats to China's national security and perceived internal threats to social stability. Ultimately, where the Chinese economy heads in the next decade will depend on whether deeper reforms are implemented to enhance rather than impede its market-based economy and to spur additional economic growth.

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PART I

ADDRESSING US FISCAL CHALLENGES

High and Rising US Federal Debt: Causes and Implications
Karen Dynan

Reforming Social Security for the Long Haul
Mark Duggan

Why Drug Pricing Reform Is Complicated: A Primer and Policy Guide to Pharmaceutical Prices in the US
Craig Garthwaite and Amanda Starc

The Next Business Tax Regime: What Comes After the TCJA?
Owen Zidar and Eric Zwick

High and Rising US Federal Debt: Causes and Implications

AUTHOR

Karen Dynan*

ABSTRACT

The outlook for federal debt represents a significant economic challenge for the United States. Economic developments and policy changes over the past two decades have materially raised the level of current and projected debt, but the primary factors behind the projected upward trajectory of debt remain population aging and rising health care spending. Even under optimistic economic scenarios, debt will soon reach levels well above historical experience, which will impose significant economic costs and risks. Although changes in policy that substantially narrow the deficit have economic and political disadvantages, they are necessary to put the federal budget on a sustainable path.

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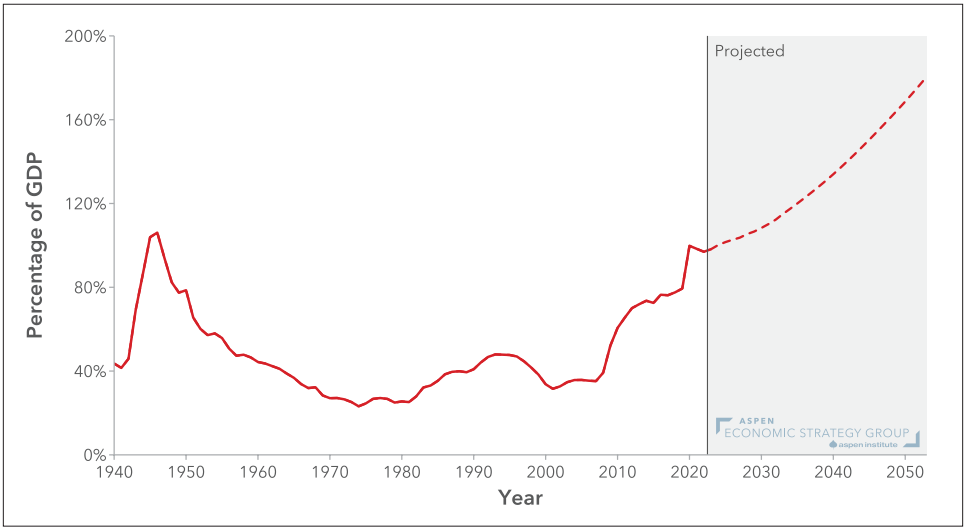
1. Introduction

The outlook for federal debt represents a significant economic challenge for the United States. Currently, federal debt stands at 98 percent of GDP, close to its highest level ever. As shown in figure 1, projections by the Congressional Budget Office (CBO) suggest that, under current law, the federal debt will reach 115 percent of GDP within the next ten years, with a further increase to about 180 percent of GDP by 2053 (CBO 2023c).[1] This paper examines the factors contributing to the high level of debt and its projected upward trajectory, presenting seven key points crucial for understanding the US fiscal outlook.

Figure 1. Federal Debt Held by the Public, 1940-2053



Source: CBO (2023c).

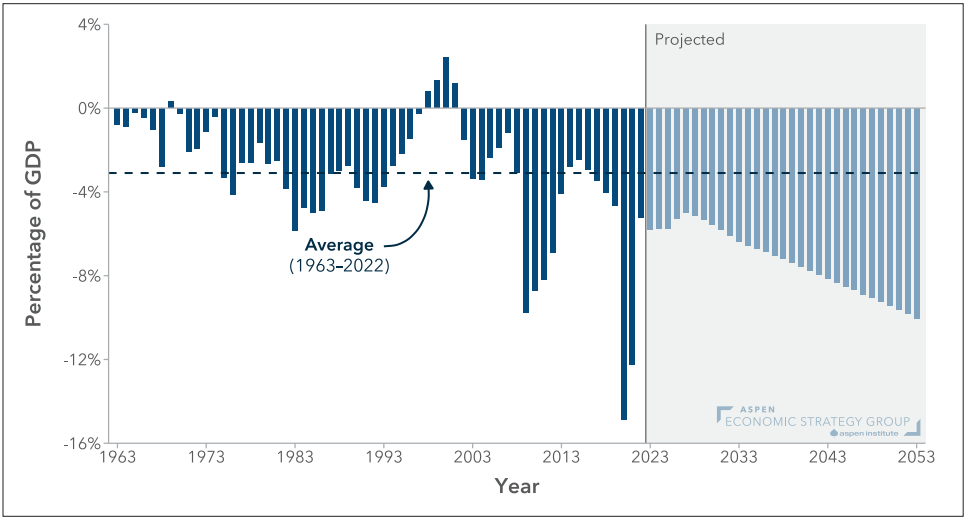
2. Population aging and rising health care spending are the primary factors underlying the sharp upward trajectory of debt.

Behind the projected surge in US federal debt is the expected evolution of the federal budget deficit, which is currently high and projected to rise steeply under existing law. As shown in figure 2, the budget deficit has moderated from its peak during the pandemic, but, at 5.8 percent of GDP in 2023, it is elevated by historical standards.

1 This paper will focus on the unified budget (including Social Security and other programs with trust funds) and will assume that scheduled payments are made even after the relevant trust funds are exhausted. The paper thus abstracts from the point that, in the absence of reform, the Social Security Administration will not have the legal authority to pay full benefits once its trust fund is exhausted (Duggan 2023).

And, like debt, the budget deficit is projected to climb much higher over the next three decades, reaching 10 percent of GDP by 2053. The fundamental cause for the steep increase is that, under current law, some types of government spending will rise considerably as a share of GDP.

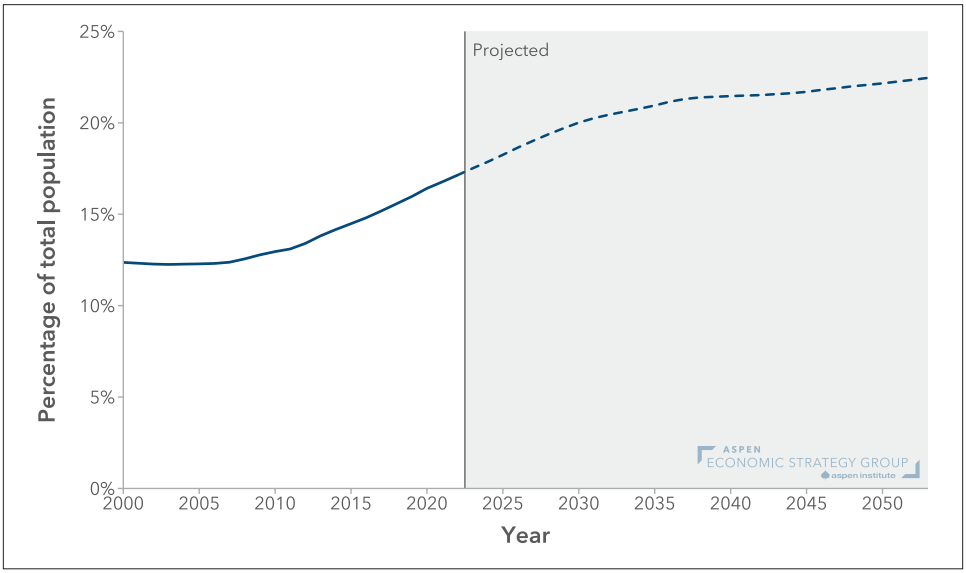
Figure 2. Federal Deficit and Surplus, 1963-2053



Source: CBO (2023c).

The aging US population is a key factor contributing to higher projected government spending. As can be seen in figure 3, the proportion of the US population aged 65 and over has already risen from approximately 12 percent in the first decade of the 2000s to 17 percent today, with projections indicating a further increase to more than 22 percent by 2050 (CBO 2023c). The growing older population will require significant federal support for both income and health care. Sabelhaus (2022) provides a recent discussion of this issue, but as illustrated by the 1990 report of the Social Security trust fund, this point has been long understood (Social Security Administration 1990). The amount of such support will depend on the extent to which support is targeted to more needy older people or provided more broadly; that, in turn, will depend on how society prioritizes the welfare of older people relative to that of younger people as well as long-term fiscal constraints.

Figure 3. Share of US Population 65 and Older, 2000-2053



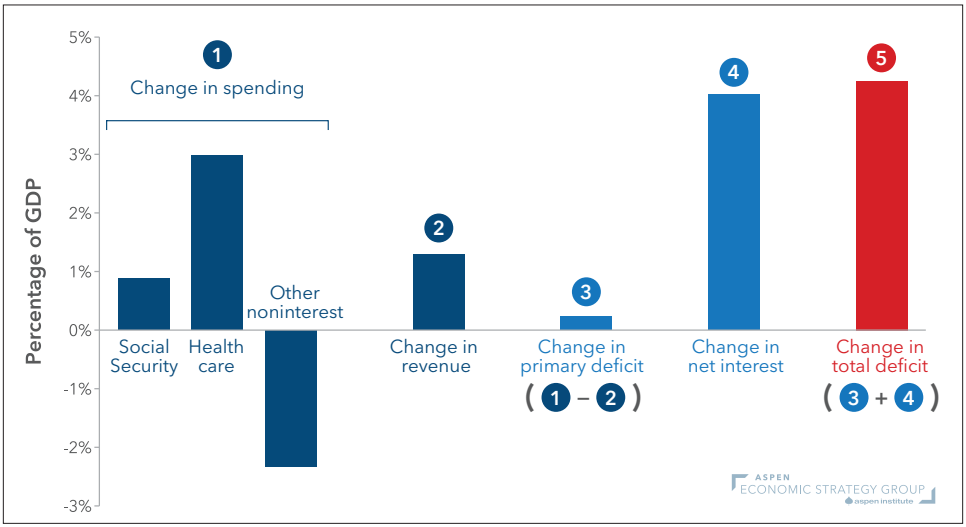
Source: CBO (2023c).

The pace at which health care costs are likely to rise represents another key force pushing up projected federal spending. Growth in spending on health care per person has exceeded GDP growth per person for many years, with analysts at the Centers for Medicare and Medicaid Services (CMS) estimating an average annual "additional cost growth" (also known as "excess cost growth") of 1.3 percent between 1985 and 2021 (Heffler et al. 2023).[2] Although additional cost growth trended down over this period—averaging only 0.5 percent per year between 2005 and 2021—a reasonable expectation is that health care spending growth will materially outpace GDP growth in the years ahead.

Figure 4 sheds light on the quantitative importance of these factors under current law, breaking down the rise in the deficit that CBO projects over the next 30 years into its main components. The figure uses a starting point of 2024 to remove the effects of pandemic-related factors that influence the 2023 federal deficit. CBO projects that the deficit in 2024 will be 5.8 percent of GDP and that the primary deficit (the deficit excluding interest payments) will be 3.0 percent of GDP.

2 I follow CBO in using the term "additional cost growth" in this paper.

Figure 4. Parsing the Change in the Federal Deficit, 2024-2053



Source: CBO (2023c).

The dark blue bars in the graph correspond to 2024–2053 changes in components of the primary deficit (the deficit excluding interest payments on the debt). The first two blue bars show the substantial influence of the aging population and rising health care costs. Social Security outlays are projected to rise by nearly 1 percent of GDP by 2053. Spending on major federal health care programs will rise by 3 percent of GDP. The rise in the primary deficit (the light blue bar) is not that large, at 0.2 percent of GDP, but the limited increase occurs only because of a sizable decline in noninterest spending outside Social Security and major health care programs as well as a material rise in tax revenues.[3] These projections are consistent with current law, but, as discussed below, the potential for changes in the current law means there is upside risk on the spending side and downside risk on the tax side.

While the projected increase in the primary deficit over the next 30 years is small, its starting size is large. At 3 percent of GDP in 2024, the primary deficit is notably higher than its average over the past 50 years of 1.5 percent. These large primary

3 The projected decline in other noninterest spending as a share of GDP reflects several features of current law. First, annual appropriations for so-called discretionary spending are legislated to increase with inflation but not with real GDP growth. Second, the number of people qualifying for many mandatory programs in this category, such as the Supplemental Nutritional Assistance Program, declines as incomes rise. Third, outlays per beneficiary in many mandatory programs rise with inflation but not with real incomes. Under current law, tax revenues increase as a proportion of GDP because rising real income will push people into higher tax brackets and because certain provisions of the 2017 Tax Cuts and Jobs Act are scheduled to expire in a few years.

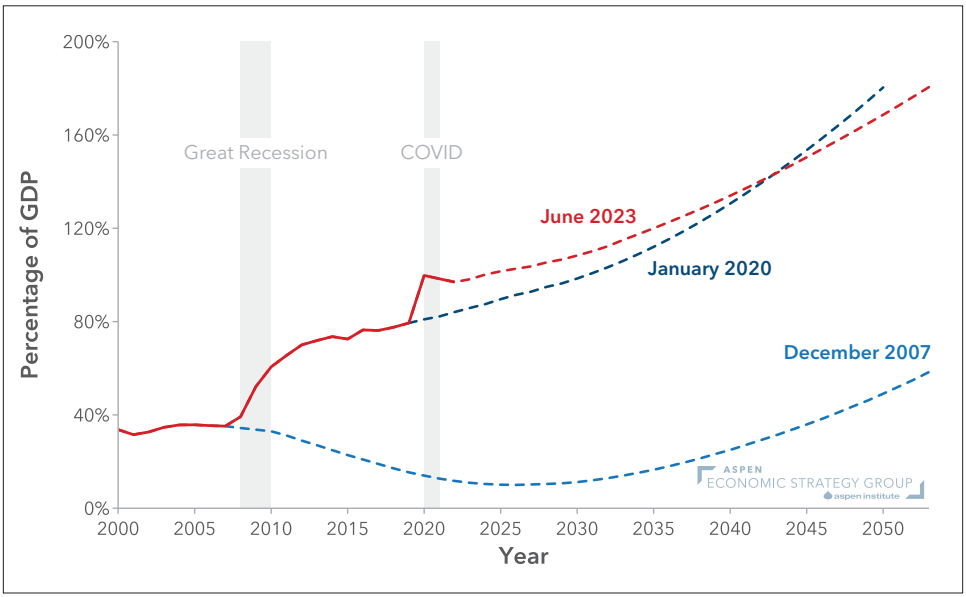
deficits, along with an already-high level of debt and interest costs, lead to a dramatic snowball effect over time that is illustrated by the light blue and red bars in figure 4. Ongoing large primary deficits generate additional debt that then leads to mounting interest costs, which in turn lead to a considerable additional increase in the total deficit and debt. Under the assumption that government borrowing rates remain at levels that are somewhat higher than the levels of the late 2010s but not especially high by historical standards (an issue discussed more fully below), CBO estimates that higher interest costs will push up the overall deficit by a further 4 percentage points (second light blue bar), for a projected increase in the total deficit of roughly 4.3 percentage points of GDP (red bar) over the next 30 years. Absent policy changes, this dynamic will push the deficit and debt ever higher—including in the years beyond CBO's window.

3. Economic developments and policy changes over the past two decades have significantly shifted current and projected levels of federal debt.

The United States has seen two significant adverse shocks to economic activity in the 21st century—the deep and prolonged Great Recession that began in 2007 as a result of the global financial crisis, and the sharp economic downturn that followed the onset of the COVID-19 pandemic in early 2020. Deficits tend to balloon during deep recessions and weak recoveries because lower economic activity reduces taxable income and because fiscal policy aimed at mitigating recession harms and stimulating demand raises government spending and further reduces tax revenues. These recent episodes fit this pattern.

Figure 5 shows different vintages of CBO's federal-debt projections to offer additional perspective on how those downturns (as well as other factors) affected federal debt. Looking at just the actual realizations of debt to date, shown by the solid portion of the red line, one can see the surges in debt that occurred during the Great Recession period and during the COVID-19 pandemic. The other lines in figure 5 show CBO's projections just prior to these episodes. The level of federal debt and its projected trajectory remained higher after each episode, even though, in both cases, the deficit (not shown) shrank considerably as the economy normalized.

Figure 5. Different Vintages of Federal Debt Projections, 2000-2053



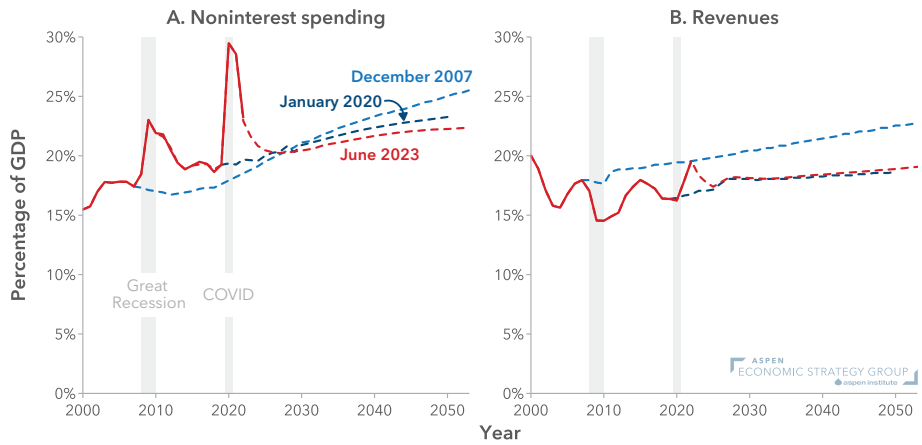
Sources: CBO (2007; 2020; 2023c). 2007 and 2020 projections rebated to match current history at starting point.

The large upward shift in the path of federal debt between 2007 and 2020 (corresponding to the gap between the light-blue and dark-blue lines of figure 5) warrants further attention, as it arose only partly from the effects of the Great Recession. To better understand this change, consider how noninterest spending and revenues have evolved, again using different vintages of CBO projections, shown in panels A and B of figure 6.

Comparing the light-blue line with the red line in panel A reveals that noninterest spending was much higher than expected during the Great Recession and the weak recovery that followed. As would be expected, the disparity gradually diminished as the economy returned to a healthy state in the mid-2010s. The dark-blue line in panel A shows that the projected trajectory for noninterest spending after 2030 was somewhat lower on the eve of the COVID-19 recession than it had been prior to the Great Recession. A deeper dive into the data shows that the downward revision over the longer run can be more than accounted for by revisions to projected spending on major health care programs, which likely reflect significantly lower-than-anticipated additional health care cost growth during the years between the two recessions. CBO's most recent projection (the dashed portion of the red line) shows noninterest spending revised down a bit further relative to pre-COVID-19 expectations over the long run, again because of lower projected health-spending growth as well as other factors.

While changes in the projected path of noninterest spending since 2007 helped lower the longer-term path of debt as a proportion of GDP, the opposite is true of changes in the projected path of tax revenues. As shown in panel B of figure 6, current and projected revenues as a share of GDP have been marked down significantly since 2007. As with noninterest spending, the imprint of the Great Recession is evident, with weak income and temporary tax-relief measures driving actual revenues (red line) considerably below the 2007 projection (light-blue line) during the recession and the early recovery years. In the mid-2010s, tax revenues rose back toward the level projected in 2007, but they subsequently fell again relative to GDP, and CBO's projection in 2020 (dark-blue line) shows revenues well below the 2007 projection. CBO's 2023 projection for tax revenues is nearly identical to its 2020 projection over the longer term.[4] The lasting downshift can be traced to major changes in tax policy, including the extension of the tax cuts implemented in the early 2000s and the further tax cuts enacted in 2017.[5] Indeed, if the provisions of the 2017 tax cuts that are scheduled to expire in the next few years were to be extended, the projected path of tax revenues would shift further down—by between $400 billion and $500 billion per year in the late 2020s and early 2030s, or about 1¼ percent of currently projected GDP (CBO 2023b).

Figure 6. Different Vintages of Federal Noninterest Spending and Revenues Projections, 2000-2053



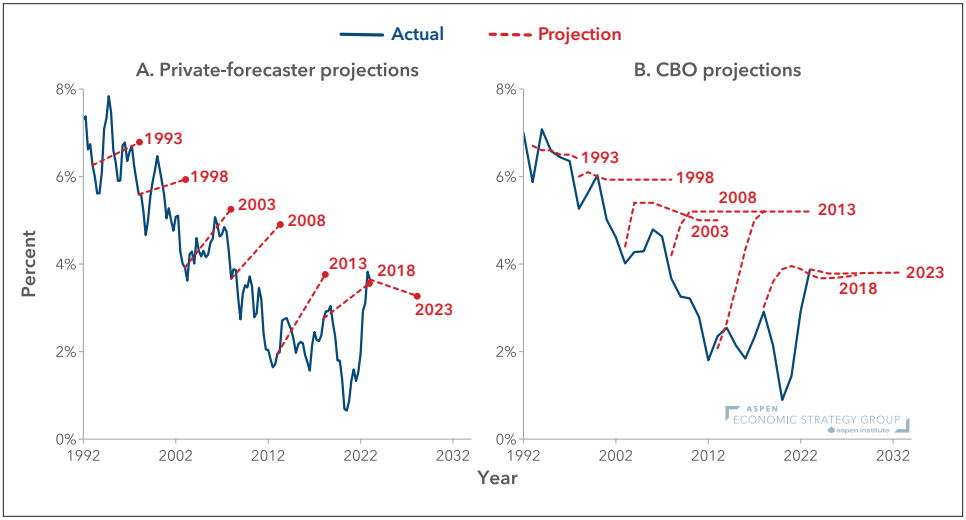
Sources: CBO (2007; 2020; 2023c). 2007 and 2020 projections rebased to match current history at starting point.

4 Comparing the red and dark-blue lines for the last couple of years, one sees that tax revenues came in much higher than projected in 2020. According to CBO (2023c), the higher-than-projected tax revenues reflected special factors that temporarily boosted tax receipts, such as an increase in capital gains realizations following strong asset-price appreciation.

5 For context, revenues as a share of GDP have averaged 17.4 percent over the last 50 years, so the December 2007 projection called for revenues to be above this average by increasing amounts over time.

An unexpected economic development that had a material positive influence on the fiscal outlook in recent decades is a substantial—and what many experts believe to be lasting—decline in interest rates. The interest rate on ten-year Treasury notes, for example, declined from approximately 7 percent in the early 1990s to around 2 percent in the late 2010s. (As Natel and Barrett [2023] highlight, this decline occurred at all maturities and in most advanced economies.) This development has helped the fiscal outlook, because, for given levels of revenues and noninterest spending, lower interest rates result in reduced interest payments and a lower overall deficit. Panels A and B of figure 7 show that this development came largely as a surprise. The dots in the left panel shows different vintages of private forecasters' projection of the average rate on 10-year Treasury notes over the next 10 years; the dots are labeled with the year of the survey and dashed lines connect them with the interest rate at the time of the survey. The dashed lines in the right panel show different vintages of CBO's projection of the same interest rate for each year of the 10-year window following the date of the projection. As can be seen, both private forecasters and the CBO adjusted their interest-rate projections only as the downward trajectory of actual rates unfolded.

Figure 7. Actual and Projected Interest Rate on 10-year Treasury Notes, 1992-2033



Source (Panel A): Survey of Professional Forecasters. Dots show 10-year expected average, plotted 5 years after forecast date.

Source (Panel B): CBO 2023c and earlier CBO economic outlooks; 2003 projection interpolated and smoothed.

One striking fact that highlights the importance of this 3–4 percentage-point decline in interest rates is that actual net interest costs in the decade following CBO's 2007

projection were lower than that projection despite the much higher path of debt that resulted from the Great Recession and the extension of tax cuts made in the early years of the 2000s. In August 2007, CBO projected that net interest costs from 2008 to 2017 would be 1.6 percent of GDP. Net interest costs over this period turned out to be 1.4 percent of GDP, despite a debt path that averaged 34 percentage points of GDP higher than the 2007 projection.

The future course of interest rates has been a topic of much discussion. Just before the pandemic, CBO projected that the interest rate on ten-year Treasury notes would be on average just slightly higher than its 2019 level of 2.1 percent in the early 2020s (CBO 2020). Interest rates turned out to be somewhat lower than anticipated in the early pandemic period because of the weak economy and then, with the surge in inflation in 2021 and 2022, they jumped higher (with the ten-year Treasury rate averaging 3.8 percent in the first nine months of 2023). Over the longer run, forecasters project that interest rates will be above their late 2010s level but remain low by pre-1990 standards. For example, as shown in the rightmost dashed lines in both panels of figure 7, private forecasters and CBO share a belief that the interest rate on the ten-year Treasury note over the next decade will be 3–4 percentage points below the expected level as of the early 1990s. The majority of this revision can be attributed to a downward shift in expectations of the real interest rate, as corresponding inflation forecasts have trended only slightly down—by ½ to 1 percentage point.

4. Even under optimistic economic scenarios, debt will reach levels well above historical experience.

The rate at which productivity, defined as output per unit of input, grows is a factor that will significantly influence the evolution of federal debt relative to GDP. Higher-than-expected productivity growth leads to higher GDP growth, which in turn makes rising debt levels easier to manage.

Even under optimistic economic scenarios, debt will soon reach levels well above historical experience, which will impose significant economic costs and risks.

Productivity growth is notoriously hard to predict, with experts often failing to foresee key shifts in productivity trends. One important example is the sizable step-up in trend productivity growth that occurred in the late 1990s: After two sluggish decades, multifactor productivity growth averaged an impressive 2 percent per year between 1995 and 2004. While that surge is now thought to have been related to advances in information technology, it followed a long period in which the broad economic benefits of better computers were unclear. (Some years earlier, Robert Solow, the renowned economist and winner of the 1987

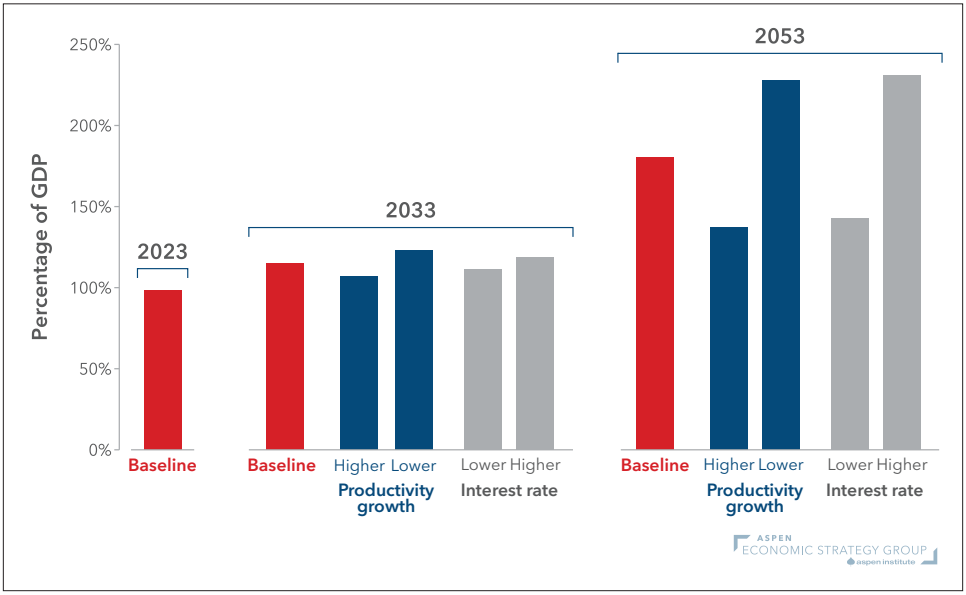
Nobel Prize, famously quipped, "You can see the computer age everywhere but in the productivity statistics.") The end of this pickup in trend productivity growth came in the early years of the 2000s, again without warning, and productivity growth has averaged only 0.9 percent per year since 2005.

CBO has tested the sensitivity of the debt-to-GDP ratio projected in its long-term budget outlook to fluctuations in trend productivity growth (CBO 2023d). CBO's baseline projection assumed that multifactor productivity would increase at a trend rate of 1.1 percent, a bit higher than the average over the first two decades of the 2000s. CBO recomputed the debt-to-GDP ratio under an optimistic scenario, where trend growth is 0.5 percentage points higher, and under a pessimistic scenario, where trend growth is 0.5 percentage points lower.

The blue bars in figure 8 show the results. The differences in the projected debt-to-GDP ratio relative to the baseline (in red) are small ten years from now in both optimistic and pessimistic scenarios but rise considerably over time. Under the optimistic scenario, the debt-to-GDP ratio is 44 percentage points lower in the early 2050s than in the baseline and, under the pessimistic scenario, the debt-to-GDP ratio is 47 percentage points higher. The size of the gap between the optimistic and pessimistic scenarios highlights the uncertainty in budget projections, as it is almost as large as the current ratio of debt to GDP. Still, at 137 percent of GDP in 2053, debt in the more optimistic outcome is well above the historical range and (as in the baseline) would be expected to continue to snowball beyond the projection window.

The unanticipated changes in interest rates discussed earlier suggest that it is also worth considering the sensitivity of projected federal debt relative to GDP to the assumed path of interest rates on government borrowing. As explained earlier, the decline in Treasury yields over the past few decades has improved fiscal outcomes (for given levels of revenue and noninterest spending), and the corresponding reduction in projected yields has improved the fiscal outlook (again, for given levels of revenue and noninterest spending). But predicting how interest rates will evolve over the longer term is challenging. The International Monetary Fund (IMF) (2023) has made forceful arguments that interest rates will remain low by historical standards, and some prominent economists concur (e.g., Blanchard 2023). However, Rogoff, Rossi, and Schmelzing (2022) argue that the last couple of decades may have been anomalous and interest rates may move back toward their previous levels, and other experts have pointed to the rise in government debt around the world as a reason for interest rates to be on a higher track than they were before the pandemic (e.g., Summers 2023). The notable further rise in the ten-year Treasury rate in the early fall of 2023 may be supportive of the more pessimistic view, but, as yet, it is too early to draw firm conclusions.

Figure 8. Projected Debt/GDP Under Alternative Assumptions, 2023, 2033, and 2053



Source: CBO (2023d).

Notes: The higher (lower) productivity growth scenario adds (subtracts) 0.5pp to (from) the baseline growth rate; the lower (higher) interest rate scenario reflects cumulative decreases (increases) in the baseline path of 5 basis points per year.

In its July 2023 long-term budget outlook, CBO assumed that the nominal yield on ten-year Treasury notes would be 3¾ percent ten years from now and then drift up to around 4½ percent over the following two decades (CBO 2023c). With consumer price index (CPI) inflation projected to return to a level consistent with the Federal Reserve's 2-percent target for personal consumption expenditures (PCE) inflation, the real yield on ten-year Treasuries is projected to rise from 1½ percent ten years from now to 2¼ percent by the early 2050s, as surging federal debt begins to drive up the real cost of borrowing. By comparison, that real yield averaged 3¾ percent between 1988 and 1997, 2¼ percent between 1998 and 2007, and ¾ percent between 2008 and 2019.

CBO has assessed the sensitivity of budget projections to its assumed path of the interest rate (CBO 2023d). CBO estimated the ratio of debt to GDP under an optimistic scenario, where the average interest rate on federal debt is below the baseline rate by a differential that starts at 5 basis points in 2023 and increases by 5 basis points each year (before macroeconomic effects are accounted for), and under a pessimistic scenario, where the interest rate on federal debt is above the baseline rate by corresponding amounts.

The gray bars in figure 8 show the results. The difference in the projected debt-to-GDP ratio relative to the baseline (in red) is small ten years from now but rises considerably over time. Under the optimistic scenario, the debt-to-GDP ratio is 38 percentage points lower in the early 2050s than in the baseline and, under the pessimistic scenario, the debt-to-GDP ratio is 50 percentage points higher. Once again, the gap is large, but, even in the more optimistic scenario, the ratio of debt to GDP is well above the historical range by the end of the projection window and likely to climb higher thereafter.

These sensitivity analyses underscore the point that "good luck" with macroeconomic outcomes is unlikely to change the conclusion that US federal debt is on an unsustainable trajectory. They are also a stark reminder that, under current law, less-favorable-than-expected macroeconomic outcomes—which are plausibly just as likely as the optimistic scenarios—will push federal debt to eye-popping levels even earlier. Moreover, as Summers (2023) noted, current law calls for some policy changes that are likely to meet political resistance, such as the scheduled expiration of parts of the 2017 tax cuts and declines in defense and nondefense discretionary spending relative to GDP to levels not seen in the past half-century. This consideration, along with the likelihood that new challenges will emerge that lead Congress and the president to increase spending or reduce taxes for specific purposes, are a further source of upside risk to the trajectory of federal debt.

5. The post-pandemic burst of inflation has been a small positive (on net) in terms of fiscal sustainability but has also raised the risk of an economic slowdown that could more than undo that improvement.

Inflation soared to levels not seen since the early 1980s in the wake of a post-pandemic surge in demand that went well beyond aggregate supply, as bottlenecks, supply-chain issues, worker shortages, and other factors held back the productive capacity of the economy. CPI inflation rose from 1.3 percent in 2020 (on a twelve-month basis) to 7.2 percent in 2021 before moderating slightly to 6.4 percent in 2022. It has slowed somewhat further since then, but as of late summer 2023, underlying inflation appeared to still be well above 3 percent, with growing support for the view that inflation will return to more normal levels only gradually (see, for example, Bernanke and Blanchard 2023 and Cecchetti et al. 2023). This rise in inflation, along with a sharp tightening of monetary policy aimed at reducing inflation, has pushed up government borrowing rates. At 3.8 percent over the first nine months of 2023, the interest rate on ten-year Treasury notes was much higher than its level of 1 percent at the beginning of 2021.

These developments affect the fiscal outlook through multiple channels. Starting with the primary budget deficit, an increase in inflation has mixed effects. Higher inflation tends to push up government spending through larger cost-of-living adjustments (COLAs) and through higher prices of goods and services purchased by the government. However, tax revenues also rise with higher inflation. Although much of the tax code is indexed for inflation, some parts are not, such as the income thresholds above which taxpayers pay the net investment income tax. In addition, tax revenue from capital income is higher during periods of high inflation, as capital income increases with inflation and is taxed based on nominal values. These offsetting factors tend to largely balance each other out: A March 2022 CBO analysis considered the potential effect of higher inflation alongside increased interest rates on the primary deficit and concluded that the net changes in the primary deficit over the following ten years would be minor (CBO 2022a).

The higher nominal interest rates that have accompanied high inflation are a negative for the fiscal picture, as newly issued federal debt will have higher interest rates. These higher rates will boost payments both on new borrowing and on debt that is rolled over. Some sense of the magnitude of this effect over the past year can be seen through CBO's revision to projected net interest costs: Relative to what was expected in March 2021, interest costs are now projected to be $4.2 trillion higher over the 2021 to 2031 period (although that change would also incorporate the effects of incoming data, policy changes, and other adjustments to CBO's assumptions).

Nominal interest rates would be expected to revert toward earlier norms as inflation eventually returns to the Fed's 2-percent target. However, interest rates might not fully recover if the inflation-risk premium on government debt is permanently higher. In particular, with a heightened sensitivity to the possibility of being paid back in dollars worth less than anticipated, future prospective investors may demand some additional compensation to purchase debt.

Importantly, higher inflation also has positive effects on the fiscal outlook as the interest burden on debt that is already outstanding shrinks relative to the tax revenue collected. Because the interest payments on existing debt are a fixed nominal percentage, nominal interest payments on debt that is already outstanding do not increase. However, higher inflation leads to higher nominal incomes, which raises nominal tax collections.[6] Quantitatively, this positive effect is significant and, over the short term, tends to dominate the effects of higher interest costs on new debt and any changes in the primary deficit on the numerator.[7] For example,

6 The indexation of much of the tax code means that the tax rate on any given amount of real income is little changed when inflation is higher, but there will still be more income in nominal terms to tax.

7 As Arslanalp and Eichengreen (2023) emphasize, raising inflation is not a strategy for attaining long-run fiscal sustainability; although nominal tax revenue may continue to grow at a higher pace, the boost to interest costs from higher inflation will rise over time as debt issued at higher nominal interest rates comes to be a larger share of the government's portfolio.

CBO's rules of thumb imply that if both inflation and nominal interest rates were 1 percentage point higher than in their baseline projection for the next ten years (and provided that other key economic assumptions remained unchanged), federal debt relative to GDP would be ½ percentage point lower than baseline in 2024 and 4¼ percentage points lower by 2033.[8]

A crucial caveat to the above arguments is that they essentially assume that all else is equal when it comes to the performance of the real economy. If taming inflation ultimately requires the economy to slow markedly, the implications for the fiscal outlook could be much different. In its efforts to combat inflation, the Federal Reserve raised its policy rate repeatedly between March 2022 and July 2023 for a total increase of 5¼ percentage points. This increase, which was much larger than initially anticipated, represented the most aggressive monetary tightening since the early 1980s. As yet, it is unclear whether the US economy will experience a so-called soft landing, where inflation subsides with below-trend-but-positive growth and a recession is avoided. To date, US economic activity has remained solid, with consumer spending continuing to rise, housing activity looking to have stabilized, and the unemployment rate remaining close to its lowest level in decades. However, amid concerns about lagged effects of monetary policy, the potential for further rate hikes, and troubles in the banking sector, economists surveyed by the *Wall Street Journal* in mid-July put the odds of the US economy entering at least a mild recession over the following 12 months as greater than 50 percent (Torry and DeBarros 2023). As discussed earlier, a recession—particularly a deep recession—would seriously hurt the fiscal outlook.

6. The increasing amounts of federal debt relative to GDP that would occur under current law will impose increasing economic costs and growing risks for the country.

Economists have long warned that high government debt comes with costs and risks. As William Gale cautioned in a 2019 paper written for the Aspen Economic Strategy Group, "rising debt will slowly but surely make it harder to grow the economy, boost living standards, respond to wars or recessions, address social needs, and maintain the nation's role as a global leader" (Gale 2019).

One major concern about higher government debt is that increased borrowing by the government crowds out borrowing by households and businesses. This competition for funds drives up interest rates, making it more expensive for individuals and

8 This calculation was done using CBO's *Workbook for How Changes in Economic Conditions Might Affect the Federal Budget: 2023 to 2033* (CBO 2023a). The workbook constrains the assumed changes to inflation and interest rates to be no greater than 1 percent each year.

businesses to borrow. As a result, private investment in productive capital decreases, leading to lower future output and national income. Elmendorf and Mankiw (1999) characterize the cost of crowding out as "significant," using a model to show that eliminating government debt at the time (when it was equal to about half of annual GDP) would increase real GDP over time by as much as 3½ percent. To put this figure in context, it implies that having that amount of government debt would be the equivalent of giving up three to four years of productivity growth.[9]

A second concern about high government debt is that it raises the risk of a fiscal crisis. If investors become reluctant to lend money to the government because they fear the debt will not be repaid, government borrowing rates can rise suddenly as prospective lenders demand more compensation to hold government debt. In addition, higher inflation can result if people come to believe that the government will need to print more money to cover its debt payments and other expenses—and worries about higher inflation can push up borrowing costs and can become self-fulfilling as well. In addition, the value of the dollar may decline as foreign securities become more attractive for people looking for "safe" investments, possibly sharply if there are worries about debt monetization and recession. The European sovereign debt crises in the early 2010s demonstrate how damaging fiscal crises can be for economies and how difficult they can be to fix—even in higher-income countries.

A further and related risk comes from the debt ceiling set by law, which prohibits the Treasury Department from issuing debt beyond the ceiling to finance government activities. The logic of having a legislated debt ceiling is unclear because it can restrict the issuance of debt that is required to fill the gap between government spending and revenues that have been set by other legislation.[10] Periods when federal debt is approaching the debt ceiling often see substantial politically driven legislative maneuvering, raising the risk that the ceiling will be breached and, in turn, that US government debt will not be honored in a full and timely way. Indeed, presumably in reflection of this risk, past episodes of brinksmanship over the debt ceiling have been associated with higher government borrowing rates prior to resolution; according to an analysis by the Government Accountability Office (GAO), the temporary increase in Treasury rates that resulted from the 2011 delay in rising the debt limit cost the government $1.3 billion in fiscal year 2011 (GAO 2012). Moreover, and more worryingly, if the debt ceiling were actually breached, even for a short period, that could significantly reduce the appeal of Treasury securities as a safe asset—at best,

9 A more recent estimate from Smetters and Dinerstein (2021) is roughly consistent, showing that adding $1 trillion of debt now (about 4 percent of GDP) could lower GDP by as much as 0.28 percent in 2050. Importantly, Smetters and Dinerstein point out that the effect depends on what the debt is used to finance; their calculation assumes the debt finances government measures that do not enhance potential GDP over the longer run.

10 This inconsistency may be why debt ceilings are extremely uncommon in other countries.

such an outcome would likely lead to permanently higher interest rates on Treasury securities, and, at worst, cause a fiscal crisis.

Higher debt also comes with the costs of reduced "fiscal space," meaning a limited capacity to increase the budget deficit, even temporarily, without endangering the access of a country's government to financial markets or the sustainability of its debt. A lack of fiscal space constrains a country's ability to effectively address sudden domestic needs, such as economic crises or pandemics, as well as international threats. This limitation has adverse implications for both welfare and economic growth. For instance, amid worries about high federal debt, Congress passed no further discretionary fiscal packages to address the harms of the Great Recession after 2012, even though the potential for hardship and scarring was still high (in 2013, long-term unemployment was down from its high but still averaged about 3.5 times its pre-recession level). In practice, measuring fiscal space is challenging, but even the perception that a country has exhausted its room for maneuvering can complicate the political dynamics of responding to an economic crisis.

A perceived lack of fiscal space can also, of course, reduce the political appetite for government spending that would address longer-run challenges. Pardue and Kearney (2023) offer a recent example, highlighting proposals to impose certain work requirements and make other changes to key safety-net programs—the Supplemental Nutrition Assistance Program, Temporary Assistance for Needy Families, and Medicaid—as part of negotiations over raising the debt limit in the spring of 2023. Pardue and Kearney argue that such limits to eligibility for these programs would be "neither an effective way to rein in the spending that is driving up US debt, nor … in the nation's long-term interests," citing evidence of both the programs' limited share of the federal budget and the programs' benefits in terms of better long-run economic outcomes.

But note that higher government debt can have upsides. For example, debt may be used to finance public investments in productive assets, which can offset some or all of the harms associated with the crowding out of private investment. Alternatively, debt may fund other changes in fiscal policy that bring benefits to the economy and society (including the better long-run outcomes associated with the safety-net programs just discussed). In addition, the higher interest rates that come with increased debt provide more flexibility for monetary policy to respond to weak aggregate demand. Indeed, as argued by Summers and Rachel (2019), the zero-lower-bound issues that hampered countercyclical monetary policy in many advanced countries in the pre-pandemic period would have been much worse had it not been for the significant expansion of global government debt in the late twentieth and early 21st centuries.

7. Determining a plausible policy framework for keeping federal debt manageable is difficult.

Notwithstanding the very real costs of high levels of outstanding debt described in the previous section, we lack compelling evidence regarding the largest feasible amount of debt and there is no clear prescription for the optimal amount of debt.

On the largest feasible amount of debt, there is no reason to believe a preordained threshold for debt exists beyond which a fiscal crisis will occur. Rather, a crisis will occur if and when financial-market participants come to believe that the country will not honor its obligation to make payments on the federal debt. Such a change in beliefs would hinge on assessments of political will as much as economic strength and would likely be spurred by evaluating many indicators beyond the amount of debt.

Regarding the optimal amount of debt, the answer depends primarily on the amount of government saving or dissaving that would be needed to achieve a chosen amount of national saving. National saving is the sum of savings by households, businesses, and government, with government saving a negative under budget deficits. Economics alone cannot say what that level of saving should be. Generally, younger generations and generations yet to be born benefit from more national saving, and older generations benefit from less saving. How to weight the welfare of different generations is a choice that society needs to make.

Another approach to the question of how much the government should save is to leave aside national saving and instead evaluate the appropriate amount of saving for the government itself. For example, one could argue that each generation should pay for its own activities and not impose those costs on later generations. However, this potential approach is not practical at this point, as Social Security and Medicare were launched and have functioned mostly as pay-as-you-go systems, so early generations benefited from those programs beyond what they paid in, and later generations need to bear those costs in some fashion.[11]

One traditional rule of thumb for federal fiscal policy is to balance the budget. This goal is straightforward to understand, and it continues to have some political appeal.[12] However, the goal is more stringent than necessary to keep federal debt on a sustainable path, and it is so ambitious relative to the current outlook as to be unrealistic.

11 More generally, this fact underscores that important considerations for any proposals that would put Social Security and Medicare on sustainable paths are the relative burdens borne by people in different generations and the relative burdens borne by people with different lifetime resources within generations.

12 Many state governments use some version of a balanced-budget rule, but the specifics of those rules vary across states, and capital expenditures are generally excluded.

For example, balancing the overall budget would be a much larger change than is needed to keep federal debt from increasing much beyond its current size of roughly 100 percent of GDP. According to CBO (2022b), achieving that goal would require some combination of reductions in noninterest spending and increases in taxes beginning in 2027 that would average 2.8 percent of GDP. This amount of belt-tightening would be substantial, amounting to about an $800 billion reduction in the deficit in 2027—or about $2,400 per person. But the overall deficit in 2027 was projected to be 4.6 percent of GDP or roughly $1.4 trillion, about 1.75 times as large as the cuts needed to stabilize debt. Therefore, balancing the overall budget would lead debt to drop over time relative to GDP. Such a policy might (or might not) be desirable for various reasons, but it would be associated with much larger changes than are needed to keep debt from snowballing—and, as will be discussed in the next section, those changes come with their own costs.

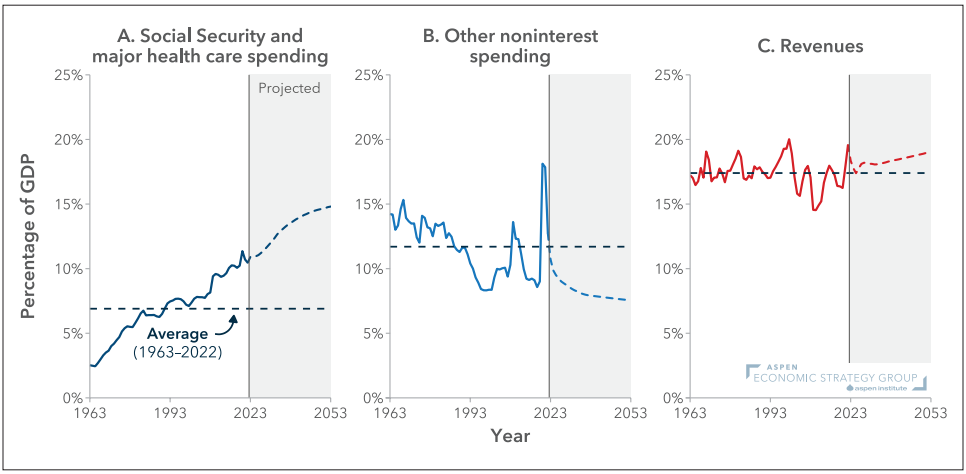
An alternative and less demanding benchmark would be to balance the *primary* budget—that is, to set tax revenue equal to noninterest spending. Achieving that goal would imply increases in revenue or reductions in spending that reduce the deficit by an average of 3.3 percent of GDP over the 2027 to 2052 period. With this amount somewhat higher than what would be required to keep federal debt where it is now, this approach (if pursued in 2027 and beyond) would be expected to result in debt falling slowly relative to GDP.[13]

8. There are a variety of policy changes that would help bring the structural deficit back to sustainable levels, but they all have disadvantages as well.

The "fiscal gaps" described above may not seem insurmountable. For example, as noted, a combination of reductions in noninterest spending and increases in taxes that reduce the deficit by an average of 2.8 percent of GDP in coming decades would be expected to keep the ratio of debt to GDP at its current level. That figure does not appear particularly problematic in an economy with annual growth in real GDP of roughly 2 percent. However, in practice, policymakers will have great difficulty enacting changes of that magnitude.

13 It is not uncommon for economists to raise the issue of how "r" compares with "g" in discussions of fiscal sustainability. The former refers to the real interest rate and the latter refers to the growth rate of real GDP, which, as already discussed, are crucial determinants of the path of federal debt relative to GDP. If "r=g" and the primary budget were in balance, debt-to-GDP would be stable because the government would only be borrowing to cover its interest payments; therefore, debt would grow at the rate of interest, and GDP would grow at the same rate. In CBO's 2022 projection, the projected interest rate on all federal debt was slightly less than the projected growth rate of the economy—so balancing the primary budget would be more than sufficient to keep the debt-to-GDP ratio from rising.

Figure 9. Federal Spending and Revenues, 1963-2053



Source: CBO (2023c).

To set the stage for this discussion, figure 9 shows history and projections for the major contributors to the primary federal deficit, along with dashed lines in each panel indicating the average value for the past 60 years. Panel A shows the steep projected increase in federal spending on Social Security and Medicare; at 11 percent of GDP today, this spending is already above its historical average of 7 percent. As discussed earlier, the aging of the population and the excess growth of health care spending relative to GDP means that, under current law, this spending is likely to rise to 15 percent of GDP in 2053. Panel B shows other noninterest federal spending, which is now fairly close to its average value of 12 percent of GDP but projected to decline to less than 8 percent of GDP in 2053. Panel C shows tax revenues, which have been hovering around their historical average of 17½ percent in recent years but are on track to rise to 19 percent by 2053 under current law.

The option of cutting spending on mandatory programs like Social Security and Medicare is frequently discussed because these programs are so large and because they are likely to grow significantly in coming decades. Also, while one can debate the economic significance of the Social Security and Medicare trust funds, the fact that they are likely to be fully depleted in the next decade or two is likely to carry substantial political weight.

However, it is crucial to understand the tradeoffs associated with potential cuts to Social Security and Medicare. Reductions in the benefits provided by these programs could inflict hardship on some older Americans, especially if the cuts are across

the board.[14] Based on an analysis of poverty data, for example, Burtless (2019) concludes that the Social Security program has produced "spectacular and sustained improvements in well-being" among the older population. According to data from the Census Supplemental Measure, all else equal, an additional 18 million adults 65 or older would have been in poverty in 2021 without their Social Security benefits (Creamer et al. 2022). At the same time, some people who receive Social Security benefits also have other sources of income that would support adequate consumption in retirement even if Social Security benefits were reduced to some extent.

Note also that cuts in Social Security may take the form of raising the retirement age, on the logic that people are living longer. However, doing so on a uniform basis would be problematic, as improvements in life expectancy seem to have been limited to the top three quintiles of the income distribution (National Academies of Sciences, Engineering, and Medicine 2015).

Reductions in Medicare spending could take different forms, but large cuts would be problematic. An increase in the eligibility age, for example, could leave people without health insurance at a point in their lives when significant medical problems tend to emerge. Cutbacks in payment rates for health care services could impinge on the finances of hospitals and physician practices and then ultimately on the quality of care they provide. Restructuring the ways in which Medicare covers health care could be useful, but many experiments with different models of payment have not been successful. Medicaid is also important to the welfare of older Americans, as it funds more than half of long-term care (Chidambaram and Burns 2022).

Turning to other types of non-interest spending, reductions in mandatory spending on younger Americans, particularly poor children and their families, would also hurt vulnerable people. Moreover, many types of cuts would be likely to reduce economic mobility. A growing body of evidence shows that programs such as Medicaid, the Supplemental Nutrition Assistance Program, and the Earned Income Tax Credit not only provide support for low-income families today but also represent crucial investments in the future lives of the children in those families. Children whose families benefit from those programs tend to experience better outcomes as adults, in terms of earnings and other measures, and those higher earnings boost potential output and tax revenues over time.[15] The implication is that cutting these programs has costs that go beyond increasing current hardship. Further, because the composition of those who benefit from these programs skews toward minorities, the programs represent important steps toward reducing a variety of economic inequities.

14 Duggan (2023: p. 50 of this volume) argues that, in the absence of reform, the Social Security Administration is likely to make across-the-board cuts in benefits when its trust fund is exhausted.

15 A 2019 special issue of the *Annals of the American Academy of Political and Social Science* on entitlement reform has chapters on different programs documenting the evidence regarding their short-term and long-term benefits (Moffitt and Ziliak 2019).

Cutting discretionary government spending can seem appealing in the abstract to policymakers, because plans for future cuts are often not specific about which programs would see spending reductions—but such cuts become much less appealing when specific choices need to be made. Reducing defense spending (about half of total discretionary spending) could jeopardize national security in a world facing increased geopolitical tensions. Reducing nondefense discretionary spending could lower federal investments in infrastructure and in research and development that are important for future potential output and well-being. Alternatively, such reductions could lower benefits like Pell Grants and low-income housing assistance that, like the mandatory benefit programs just discussed, support people today and brighten their futures. Moreover, nondefense discretionary spending represents only about 15 percent of total noninterest federal spending and has experienced no trend relative to GDP for the past 60 years—suggesting that, despite repeated calls for cutbacks, policymakers believe that such spending serves legitimate purposes.

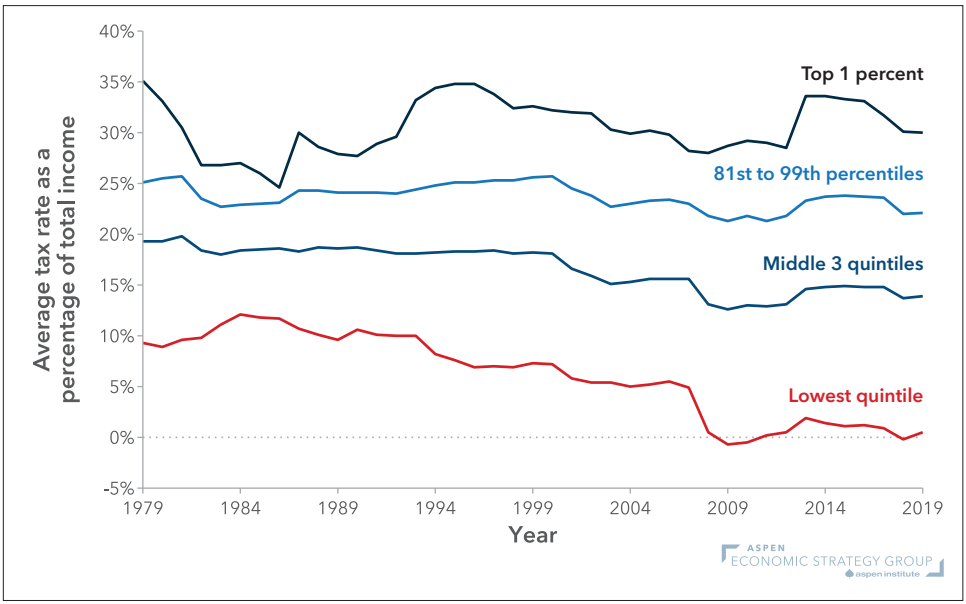
Legislation to raise taxes could help to put federal debt on a more sustainable path. Increases in household and business income tax rates would be on top of the increases built into current law and would have distortionary effects. Enactment of other taxes, such as a value-added tax or a tax on carbon emissions, would have different sorts of effects that would need to be analyzed separately; for example, a carbon tax would provide a useful incentive to reduce carbon emissions.

Many people seem to think that federal taxes have increased significantly over time, but that perception is not borne out by the data. Panel C of figure 9 shows that federal tax revenue as a share of GDP has shown some variability but little trend over the past half-century, as the increases that would arise from "real" bracket creep (as income growth in excess of inflation pushes more income into higher tax brackets) have been effectively offset by changes in the economy and legislated reductions in taxes. In addition, CBO (2022c) estimates that the overall federal tax rate paid across most of the income distribution has declined over the past 40 years, which is the period for which comparable data are available. The estimates of those tax rates include all sources of pre-tax income (including imputed income from noncash compensation) in the denominators and all federal taxes (including taxes associated with Social Security and Medicare as well as an allocation of corporate taxes) in the numerators.

Figure 10 shows that overall federal tax rates have declined notably over time for households in the bottom quintile and have declined slightly over time for households in the middle three quintiles taken together and for households in the 81st to 99th percentiles. For households in the top 1 percent of pre-tax income, the

overall federal tax rate has fluctuated considerably and currently stands near the middle of its range during the past 40 years.[16]

Figure 10. Average Federal Tax Rates by Income Bracket, 1979-2019



Source: CBO (2022c).

However, if the expiring provisions of the 2017 tax-cut law are allowed to end as scheduled, this change will combine with real bracket creep to increase revenue relative to GDP in the future. This increase, which is built into CBO's baseline projections, can be seen in the dashed portion of Panel C of figure 9. The increase would raise the tax burden and, by pushing up effective marginal tax rates, would increase the distortion to behavior caused by the tax system. Those distortions could cause people to work less, save less, invest less, and innovate less.

9. Conclusion

The challenge posed by high and rising federal debt is significant but manageable as a matter of economics. The big problem is political. Most voters have little understanding of the composition of federal spending, the distribution of the federal tax burden, trends in federal spending and revenue, and the consequences of alternative budget

16 See Zidar and Zwick (2023: p. 131 of this volume) for a discussion of how the tax rate for this group has been affected by the conversion of labor income to "pass-through" business income.

decisions. That lack of understanding is natural, because voters have other things to do with their lives besides examine budget data. But, as a result, voters are dependent on their elected leaders to communicate the facts and tradeoffs the country faces, and our elected leaders have not done this well. Promises not to touch key elements of federal spending or revenue are popular, but they cannot all be realized if we are to put the budget on a sustainable path.

The challenge posed by high and rising federal debt is significant but manageable as a matter of economics. The big problem is political.

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Reforming Social Security for the Long Haul

AUTHOR

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ABSTRACT

Social Security is arguably America's most important government program, as it is the main source of income for most elderly Americans and represents the primary tax paid by most workers as well. Forty years after Congress made its last significant changes to the program, Social Security again faces severe funding challenges, primarily due to a declining number of workers per Social Security recipient and slower-than-predicted growth in taxable earnings. Absent any change in policy, the program's trust fund will be depleted in about ten years and payments to Social Security recipients will immediately decline by an estimated 23 percent. In this document, I propose a package of six reforms, aimed at raising revenue and slowing benefits growth, that would tackle this challenge head-on and put the program on a sustainable fiscal path. These proposals insulate America's most economically vulnerable and instead call for sacrifice primarily from those with high incomes, who have seen large increases in lifetime benefits recently due to their rising life expectancy. If implemented, this reform package will ensure that Social Security benefits for elderly and disabled Americans and for their dependents will not be at risk in the future and that the program will not consume an ever-increasing share of federal spending.

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1. Introduction

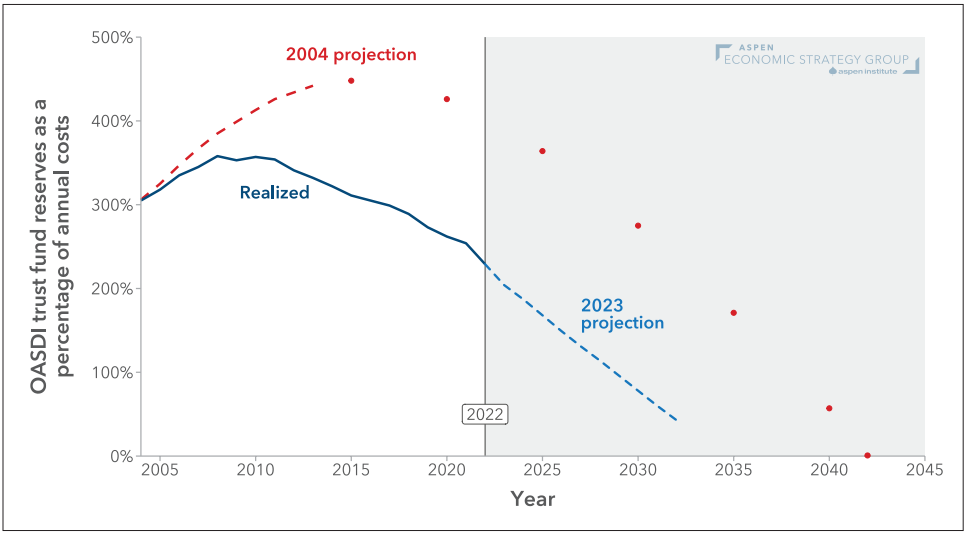
Old Age, Survivors, and Disability Insurance (OASDI)—more commonly known as Social Security—is America's largest and arguably most important government expenditure program. One in five Americans (67 million) will receive a Social Security payment this month, while about 180 million workers (and their employers) will contribute tax payments to the program. These tax payments from both workers and their employers account for the vast majority of Social Security's revenues each year (91 percent in 2022) and exceed individual income tax payments for most workers (Social Security Administration 2022; Joint Committee on Taxation 2019). Survey data indicate that Social Security is the most important source of income for elderly (aged 65 and up) Americans, with OASDI accounting for more than half of income for most elderly adults (Dushi, Iams, and Trenkamp 2017).

In the first few decades following the issuance of the first Social Security check in January 1940, there were dozens of legislative changes to the program. These changes included increases in tax rates and in benefit generosity; they also included expansions to the taxable wage base and to benefit eligibility. All these changes culminated in the bipartisan Social Security Amendments of 1983 that addressed significant financial troubles in the program, including the deficits it ran in every year from 1975 through 1981. The two key components to the 1983 amendments were (1) an increase in the program's tax rate (not fully phased in until 1990) from 10.6 percent to 12.4 percent and (2) an increase in the full retirement age from 65 to 67 (phased in gradually and completed for those born in 1960 and later). These changes put the program on a much stronger financial footing and allowed the program's trust fund to grow from just 15 percent of annual expenditures in 1983 to a peak of 387 percent 25 years later, in 2008.

In the 40 years since the 1983 amendments, there have been no further significant legislative changes to Social Security. This status quo is perhaps not surprising, since Social Security benefits have not been at risk as they were in the early 1980s with an increasing trust fund that reached a peak (in nominal terms) of $2.91 trillion in December 2020.

But government officials and other observers recognized 40 years ago that the 1983 amendments would not permanently solve Social Security's funding problems. At the time, the program's actuaries expected that OASDI's revenues (including both tax revenue and income from the trust fund) would be sufficient to finance OASDI benefits through approximately 2058. Over time, these initial projections proved to be much too optimistic. As shown in figure 1, the most recent estimates indicate that the now-declining trust fund will hit zero in just ten years. And as this same figure shows, the most recent projections for Social Security's finances are considerably worse than they were less than 20 years ago in 2004.

Figure 1. SSA's Projections for the OASDI Trust Fund: 2004 vs. 2023



Source: Social Security Administration (2004, 2023b).

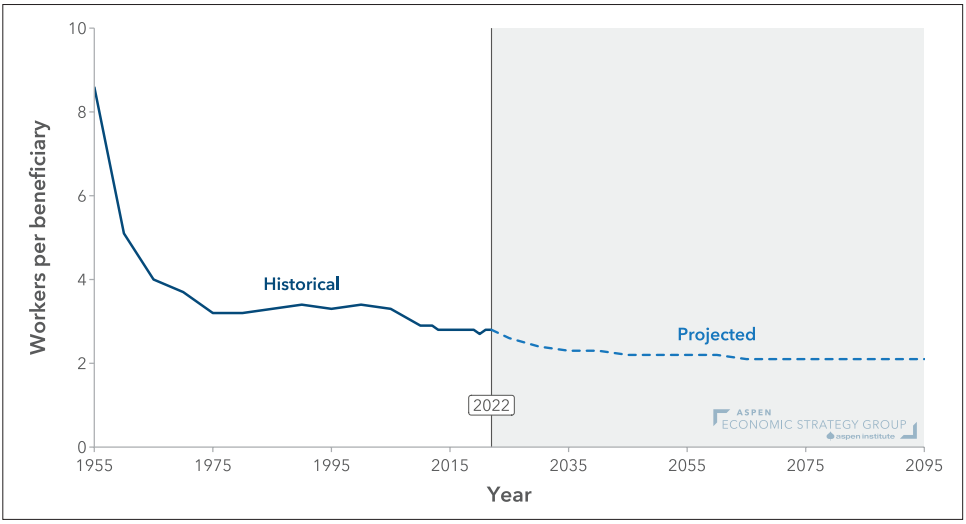
The key driver of the program's shift from annual surpluses to annual deficits, which will rise as a share of program spending going forward, has been a steadily declining ratio of workers to OASDI recipients, since individuals are now living much longer, and fertility rates have declined significantly over time as well. Two additional drivers of the faster-than-expected depletion of the Social Security trust fund have been slower-than-expected earnings growth during the last 40 years and rising earnings inequality, which has caused an increasing share of earnings to be above the program's taxable maximum (rising from just 10 percent in 1983 to 19 percent by 2021; see SSA, 2023) and thus not contributing to Social Security revenues.

Social Security again faces severe funding challenges, primarily due to a declining number of workers per Social Security recipient and slower-than-predicted growth in taxable earnings.

The challenge for Social Security during the upcoming decade and beyond is much greater than the one that policymakers confronted 40 years ago. At that time, annual deficits were a much smaller fraction of Social Security benefits than they are projected to be ten years from now. Additionally, the country was then becoming demographically stronger in each year after 1983 as baby boomers (then 19–37 years old) aged into higher earnings years. Now that same baby-boom generation is aging from workers

into benefit recipients, with program expenditures rising rapidly as a result. As figure 2 shows, the number of workers per OASDI beneficiary was relatively stable throughout the 1980s, 1990s, and the first decade of the 2000s, but this number has declined substantially in recent years (from 3.3 in 2007 to 2.8 in 2022) and is projected to decline further (to 2.5 by 2030, 2.3 by 2035, and 2.2 by 2040).

Figure 2. Ratio of Covered Workers to Social Security Beneficiaries



Source: Social Security Administration (2023b).

Unfortunately, this more difficult financing challenge is reaching us at a time when America's political system seems much less up to the challenge of solving problems through bipartisan compromise.

In the pages that follow, I outline the basics of today's Social Security program and a set of changes that would put the program on a much stronger financial footing and allow it to continue paying promised benefits to current and future OASDI recipients for many decades to come. I work within the structure of the existing (largely pay-as-you-go) system rather than proposing a major overhaul such as a shift to privately managed individual accounts. Additionally, I assume that the program will continue to finance OASDI benefits from OASDI revenue sources rather than from, for example, general federal revenues. Specifically, I propose six simple changes to Social Security that would put this program on a sustainable fiscal path while maintaining benefit levels for low- and middle-income retirees:

1. Increase Social Security's payroll tax rate from 12.4 percent to 13.4 percent.
2. Increase the Social Security wage base so that 90 percent of earnings will be subject to Social Security's payroll tax (as was true in 1983).
3. Apply a 3.0 percent tax rate on all earnings above the annual taxable maximum (currently $160,200 for an individual).
4. Increase the full retirement age from 67 to 68 while leaving benefits unchanged for those who claim retired-worker benefits during the first two years of eligibility (from 62 to 64).
5. Reduce the growth rate of benefits for high-income earners by freezing the second "bend point" in Social Security's progressive 90-32-15 benefit formula.
6. Allow Social Security's trust fund to "go negative" by temporarily borrowing from the US Treasury (as many state unemployment insurance trust funds do during recessions), with future annual OASDI surpluses used to repay this debt.

In my judgment, and for reasons I expand on below, this package is appropriate in that it includes a mix of tax increases and benefit reductions, with the largest sacrifice required of high-income workers. The reform package leaves untouched benefits for current OASDI recipients and for the most vulnerable future OASDI recipients. If changes along these lines that significantly improve Social Security's finances are not implemented in the very near future, then the program's structural deficits will almost inevitably crowd out other important priorities such as military spending and investments in clean energy.

2. A Primer on Social Security

Social Security is America's largest government program, with total expenditures of $1.24 trillion in 2022 and total revenues slightly lower, at $1.22 trillion. The program paid an average monthly benefit of $1,698 to 66.6 million Americans in April 2023. As the following table shows, by far the largest category of recipients is retired workers (49.3 million), though there are another 17.3 million beneficiaries, including 7.5 million disabled workers and 9.7 million spouses or children of current retired or disabled workers or of deceased workers. It is important to emphasize that Social Security is not just a retirement program, but that it also provides insurance to workers and their families against death and severe disability. Indeed, Social Security's official name is Old Age, Survivors, and Disability Insurance (OASDI).[1]

1 Social Security (or OASDI) combines two distinct programs: Old Age and Survivor's Insurance (OASI) and Disability Insurance (DI). Both programs are self-financing, and each has a separate trust fund that—based on current statute—cannot borrow from the US Treasury. Both OASI and DI are designated as off-budget. The only other federal account designated as off-budget is the US Postal Service (Congressional Research Service 2020).

Table 1. Social Security Benefits, April 2023

	Number of recipients (in thousands)	Average monthly benefit
OASDI total benefits	66,558	$1,698
Retirement benefits	51,975	$1,785
Retired workers	49,295	$1,835
Spouses of retired workers	1,982	$897
Children of retired workers	698	$860
Survivor benefits	5,878	$1,449
Nondisabled widow(er)s	3,498	$1,713
Disabled widow(er)s	210	$894
Children of deceased workers	2,060	$1,071
Widowed mothers and fathers	108	$1,223
Parents of deceased workers	1	$1,537
Disability benefits	8,705	$1,341
Disabled workers	7,482	$1,484
Spouses of disabled workers	88	$405
Children of disabled workers	1,135	$474

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Source: Social Security Administration (2023).

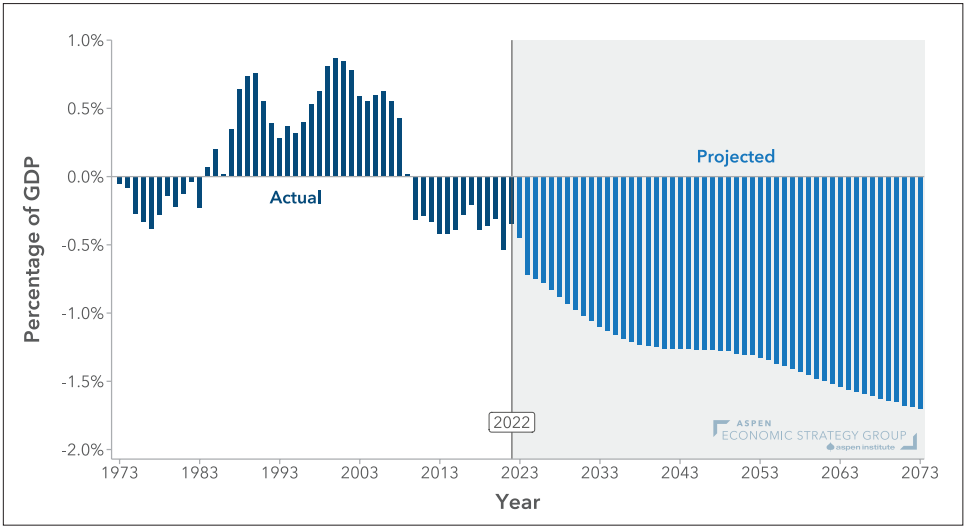
Over the next ten years, what was in 2022 a relatively modest OASDI deficit of $22 billion (less than 2 percent of OASDI revenues) is projected to steadily increase to $380 billion in 2032 and thereby steadily deplete the OASDI trust fund, which stood at $2.82 trillion as of December 31, 2022. By 2033, when Social Security's actuaries predict that the combined OASDI trust fund will hit zero, the annual deficit will be more than 20 percent of annual revenues. As a result, absent changes in legislation, Social Security would only be able to pay about 77 percent of promised benefits, with this percentage likely declining in subsequent years. Based on current law, the Social Security Administration (SSA) would then have to apply an equal (in percentage

terms) "haircut" to the more than 80 million people projected to be receiving Social Security benefits in 2033.

The magnitude of this challenge is captured by the following figure, which shows annual Social Security surpluses and deficits as a percentage of GDP (excluding interest on the program's trust fund). Amounts for future years represent projections by the SSA (Congressional Budget Office 2022b).

Figure 3. Actual and Projected Annual Deficits for Social Security

Social Security surplus or deficit as percentage of GDP, by year: 1973-2073



Source: Social Security Administration (2023b).

2.a. Social Security's Revenues

There are three primary sources of revenue for Social Security. The first is a 12.4 percent payroll tax, half of which is paid by workers and half by employers (with the full 12.4 percent paid by self-employed individuals) up to Social Security's annual taxable maximum, which in 2023 is $160,200 (approximately 2.5 times the average annual wage). In 2022, these payroll taxes accounted for $1.11 trillion (90.5 percent) of OASDI's $1.22 trillion in revenues. An additional 5.4 percent was accounted for by income from Social Security's trust fund (which had assets of $2.82 trillion at the end of 2022 and was invested entirely in US Treasury securities with an effective interest rate of 2.3 percent last year), with the remaining 4.0 percent received from income taxes on the Social Security benefits of OASDI recipients with relatively high incomes.

One important development since the 1983 amendments is that the fraction of earnings that are beyond Social Security's annual taxable maximum has steadily increased due to rising earnings inequality, from just 10 percent in 1983 to 19 percent by 2021. This taxable maximum is automatically "indexed up" each year along with growth in average wages so that, for example, the 2023 taxable maximum is approximately twice the 2001 taxable maximum of $80,400. For the first 25 years of Medicare's existence, that program shared the same annual taxable earnings base. However, the Medicare tax base was increased significantly in 1991 (from $51,300 to $125,000) and was then eliminated in 1994, so that all earnings are now subject to Medicare's 2.9 percent payroll tax.[2]

As I describe below, adjusting the OASDI tax rate, increasing the taxable maximum so that 90 percent of earnings are subject to Social Security taxes, and applying a 3 percent tax on earnings beyond the taxable maximum would significantly improve the program's financial outlook. The financial challenges facing the program were summarized in a recent Congressional Budget Office (CBO) report that predicted that absent any change in legislation, OASDI benefits will decline by 23 percent in 2033 when the trust fund hits zero (Congressional Budget Office 2022b).

2.b. Eligibility for Social Security Benefits

To be insured for Social Security's retirement or disability benefits, an individual must have worked for at least ten years.[3] Benefits for retired workers and disabled workers accounted for 80.0 percent and 9.8 percent, respectively, of total OASDI benefits paid in April 2023. Survivors' benefits are also available for the spouses and children of deceased workers, with these benefits representing 7.5 percent of total benefits paid. And finally, the spouses and children of retired and disabled workers accounted for the remaining 2.6 percent of benefits paid in April 2023. In contrast to benefits for retired and disabled workers, survivors' benefits and benefits for spouses and children do not require an individual to have ten or more years of work history. The share of Social Security benefits paid to widow(er)s and family members has steadily declined over time for several reasons, including longer life expectancies and an increase in female employment (causing more women to claim their own Social Security benefits rather than their spouses').

2 As of 2013, an additional 0.9 percent Medicare tax is imposed on earnings above $125,000 ($250,000 if married filing jointly), and a 3.8 percent Medicare investment tax is levied on earners with adjusted gross incomes above those same thresholds.

3 Young adults can potentially qualify for Social Security disability benefits with fewer years of work given that they could not legally have yet worked for ten years.

2.c. Social Security's Benefit Formula

An important and little-understood feature of Social Security is the formula used by the Social Security Administration (SSA) that converts an individual's entire earnings history into the *primary insurance amount (PIA)*. Also known as the PIA, this amount is the monthly benefit for a person who claims retirement benefits at his or her full retirement age (FRA) or for a disabled worker in his or her first month of eligibility. There are two primary steps to this process:

2.c.1. Average Indexed Monthly Earnings

The first step involves the calculation of an individual's average indexed monthly earnings (AIME). For this calculation, SSA considers only the highest 35 years of indexed annual earnings (including only those earnings on which Social Security taxes were paid) for a retired or disabled worker.[4] If, for example, an individual worked only from ages 25 through 59, then earnings in all 35 of those years would be considered when calculating the AIME. If instead an individual worked every year from ages 18 through 64, then only the 35 of those 47 years when the individual earned the most would be counted in the AIME calculation. If an individual worked for only 20 years, then SSA would average fifteen zeroes into the AIME calculation. Earnings from previous years are indexed up to account for the growth in average economy-wide wages over time.[5]

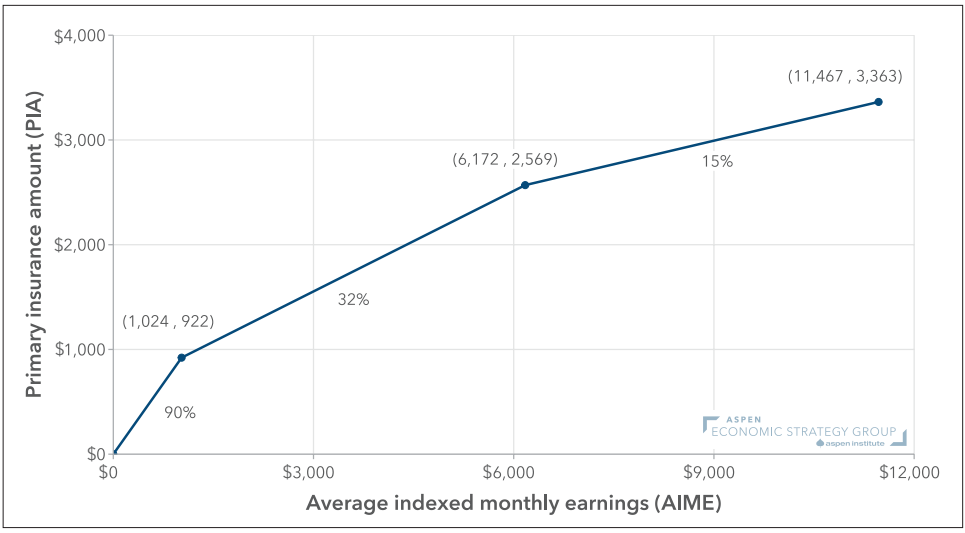
2.c.2. PIA and Benefits Progressivity

Using the AIME, the Social Security Administration then calculates the primary insurance amount as shown in the benefit formula displayed in figure 3. For an individual reaching age 62 in 2022, SSA replaces the first $1,024 in AIME at a 90 percent rate and the next $5,148 at a 32 percent rate. Any AIME above $6,172 is replaced at 15 percent. The maximum possible PIA (using earnings through 2022) for someone born in 1960 would be $3,363, though this figure could increase slightly during the subsequent years if this person continued to work at age 63 and beyond (thereby potentially increasing his or her AIME).

4 Fewer than 35 years are used for a disabled worker if, for example, he or she is only 40 years old.

5 For example, the indexing factor for a person reaching age 62 in 2022 for his or her 2005, 1997, and 1987 earnings would be 1.51, 2.03, and 3.02, respectively. The indexing factor is equal to 1.00 for earnings received in or after the year that a person reaches age 60.

Figure 4. Social Security PIA vs. AIME Benefit Formula in 2022



Source: Social Security Administration (2023c).

If, for example, an individual's average monthly earnings in her best 35 years, adjusted for wage growth as described above, were $4,000, then her PIA would be (($1,024 x 0.9) + ($4,000 - $1,024) x 0.32), or $1,874. For this individual, Social Security would replace almost half of her average monthly earnings.

As this figure suggests, the PIA represents a much higher fraction of earnings for low-income workers than for high-income workers. Consider two hypothetical workers born in 1960 named Lucy and Holly who earned exactly 50 percent and 200 percent of average annual earnings in each year from 1980 through 2022. Given SSA's progressive benefit formula, the PIA would represent 60 percent and 30 percent, respectively, of each person's earnings in 2022. While this comparison suggests that Social Security is a better deal for low-income workers such as Lucy (with respect to a rate of return), much of this benefit is offset by the fact that higher-income workers like Holly live, on average, significantly longer.

While Social Security's benefit formula has remained the same for more than 40 years, the bend points in the formula are indexed up each year with average earnings growth in the economy. So, while the bend points for a worker born in 1960 were $1,024 and $6,172, they were about half that amount for a counterpart born in 1937 (at $505 and $3,043) and just one-fourth that amount for someone born in 1921 (at $254 and $1,528). As I describe below, altering this formula by freezing the 32-15 bend point (rather than indexing it to average economy-wide earnings) would reduce the growth rate of benefits for high-income recipients while preserving its progressivity and the distributional aims of the program.

2.d. Social Security's Actuarial Adjustment

Upon reaching the age of 62, a person with ten or more years of earnings can claim Social Security retired-worker benefits. However, if she was born in 1960 or later, she would receive only 70 percent of her PIA when claiming at 62 (five years before her full retirement age of 67). That person can choose to increase monthly benefits received by delaying claiming, with for example 80 percent of the PIA received at age 64, 100 percent at age 67, and 124 percent at the age of 70. The actuarial adjustment is 5.0 percent per year from ages 62 to 64, 6.67 percent per year from ages 64 to 67, and 8.0 percent per year from ages 67 to 70.

The Social Security Administration allows a person to claim retired-worker benefits partway through the year. As a result, there are in fact 97 different possible ages at which an individual can claim retired-worker benefits, ranging from 62 years and 0 months to 70 years and 0 months (or later, though with no actuarial adjustment after age 70). For example, a retired worker claiming benefits at the age of 65 years and 6 months would receive 90 percent of their PIA while someone claiming at 68 years and 3 months would receive 110 percent. All else equal, those who expect to live longer have a stronger financial incentive to delay claiming since they can enjoy the higher monthly benefits for more months in the future.

Disabled workers have no similar financial incentive to delay claiming—they receive 100 percent of their PIA if and when they meet the program's medical eligibility and other criteria (with payments beginning five months after the onset of disability). The fraction of non-elderly adults receiving Social Security Disability Insurance (SSDI) benefits rose steadily from the mid-1980s until about a decade ago (Duggan 2015), when the stringency of the program's medical-eligibility criteria appears to have increased. An individual receiving SSDI benefits is converted to Social Security's retired-worker category upon reaching full retirement age (FRA).

From the early 1980s through 2006, more than half of individuals claiming retired-worker benefits claimed them at age 62. But during the past fifteen years, there has been a steady decline in this share and a corresponding increase in the share claiming later. For example, from 2006 to 2021, the fraction claiming at age 62 fell from 50.2 percent to just 26.1 percent. During that same period, the share claiming at age 70 (or later) more than quadrupled, increasing from 2.0 percent to 8.6 percent. This shift likely reflected a combination of three factors that have all increased the relative advantages of claiming benefits later.

First, since individuals are living longer, those who delay claiming can enjoy higher benefits for more years. Someone who expected to live to just 72 would likely prefer ten years of reduced benefits (70 percent of PIA if claiming at age 62) to five years

of full benefits (100 percent of PIA if claiming at age 67) or two years of maximum benefits (124 percent of PIA if claiming at age 70). But if instead that person expected to live to age 82 or 92, the financial incentive to delay claiming would be much greater since the individual would enjoy higher benefits for more years. These increases in life expectancy have been greater for high-income individuals (Chetty et al. 2016), who also are less likely to rely on Social Security as their primary source of income.

Second, the historically low interest rates in recent years have also raised the financial incentive to delay claiming, as higher future benefits of delaying until age 67 or 70 are relatively more valuable. Finally, the actuarial adjustment beyond the full retirement age has increased from 3 percent annually to 8 percent annually, and recent research has shown that many workers responded to this change by delaying claiming beyond their FRA (Duggan et al. 2023).

Individuals who claim at the early retirement age tend to have lower incomes and be in worse health than those who claim at the full retirement age or later. As I describe below, one can fine-tune the actuarial adjustment in Social Security to reduce the growth rate of benefits while leaving benefits unchanged for those who claim early, as these claimants tend to be in worse health and have lower incomes.

2.e. The Level of Social Security Benefits

For the reasons outlined above, there is substantial variation across Social Security recipients in the monthly Social Security benefit received. For example, 11 percent of retired workers had a monthly benefit of less than $800 in December 2021 while 10 percent had a monthly benefit of $2,600 or more. This discrepancy partly reflects the effects of delayed claiming—the corresponding shares are 7 percent and 25 percent for those claiming at or after their full retirement age versus 13 percent and 3 percent for those claiming before that age. Put another way, those who claim early tend to have much lower incomes than do those who claim later.

Disabled workers tend to have lower monthly OASDI benefits than retired workers, with 13 percent receiving less than $800 per month from SSA and just 4 percent receiving $2,600 per month or more. This difference is not driven by actuarial adjustment but instead reflects the fact that workers with lower earnings are more likely to become disabled and to qualify for SSDI. Table 2 displays the distribution of monthly benefits for retired workers and for disabled workers in December 2021.[6]

6 As shown in table 1 above, average benefits for the spouses and children of both retired and disabled workers are substantially lower than for retired and disabled workers, while average survivors' benefits are comparable.

Table 2. Distribution of OASDI Benefits for Retired and Disabled Workers

Monthly benefit, December 2021	Retired workers	Disabled workers
$1–$799	11.0%	13.4%
$800–$999	9.0%	15.8%
$1,000–$1,199	9.8%	17.1%
$1,200–$1,399	9.6%	14.0%
$1,400–$1,599	9.6%	10.8%
$1,600–$1,799	10.1%	8.1%
$1,800–$1,999	10.6%	5.9%
$2,000–$2,199	8.4%	4.3%
$2,200–$2,399	6.5%	3.5%
$2,400–$2,599	5.1%	3.1%
$2,600 +	10.4%	3.8%
Average	**$1,658**	**$1,358**

Source: Social Security Administration (2023).

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Analysis of survey data from three different sources indicates that most elderly (defined here as ages 65 and up) Americans receive more than half their income from Social Security and approximately one in four receive more than 90 percent of their income from Social Security (Dushi, Iams, and Trenkamp 2017). As table 3 below shows, this reliance on Social Security varies substantially by age, gender, marital status, race, ethnicity, educational attainment, and lifetime income. For example, more than 60 percent of individuals aged 80 and up receive more than half their income from Social Security versus 42 percent of those between ages 65 and 69. Similarly, approximately two-thirds of elderly adults without a high school degree receive more than half their income from Social Security versus one-third among college graduates. Furthermore,

Most elderly Americans receive more than half their income from Social Security and approximately one in four receive more than 90 percent of their income from Social Security.

Black and Hispanic individuals are more likely to receive more than 90 percent or more of their income from Social Security than are their non-Hispanic White counterparts. And perhaps most striking of all, more than 80 percent of individuals in the lowest two quintiles of income rely on Social Security for more than half their income versus just 2 percent of those in the top income quintile.

Table 3. Share of the Elderly Who Receive ≥ 50 Percent or ≥ 90 Percent of Income from Social Security

Category	≥ 50%	≥ 90%	Category	≥ 50%	≥ 90%
Total	52%	25%	White (non-Hispanic)	52%	24%
Women	55%	27%	Black (non-Hispanic)	57%	33%
Men	48%	21%	Other (non-Hispanic)	44%	23%
Ages 65–69	42%	18%	Hispanic origin	52%	31%
Ages 70–74	51%	23%	Married	46%	19%
Ages 75–79	57%	27%	Not married	60%	33%
Ages 80+	61%	33%	Lowest income quintile	87%	64%
No high school diploma	68%	41%	Income quintile 2	82%	48%
High school graduate	58%	28%	Income quintile 3	63%	14%
Some college	50%	21%	Income quintile 4	25%	1%
College graduate	35%	14%	Highest income quintile	2%	0%

Source: Dushi, Iams, and Trenkamp (2017).

Previous research has shown that more generous Social Security benefits lead to both lower poverty rates among the elderly (Engelhardt and Gruber 2004) and to lower mortality rates among SSDI recipients (Gelber et al. 2023). If not carefully designed, any reduction in Social Security benefits to address the program's fiscal challenges as described above could therefore lead to increases in poverty and/or mortality.

3. Lessons from the 1983 Amendments

The challenge that faced policymakers in the 1980s when Social Security had run deficits for seven consecutive years (from 1975 through 1981) was significant. The problem was especially urgent since the Social Security trust fund had less than two months of benefits in reserve. But fortunately for them, the annual deficits were small, at just 1–4 percent of total program expenditures. Additionally, the deficits were projected to transition to annual surpluses by the late 1980s or early 1990s, even absent any policy changes, as the large baby-boom population entered its higher-earnings years.

As a result of the small annual deficits, only minor changes were needed to the program to address the immediate risk to benefits. Policymakers responded by raising the payroll tax from 10.6 percent to 12.4 percent from 1983 to 1990 but made no change in the payroll tax base. This change merely accelerated tax increases that were already scheduled to take effect. The following table shows how both Social Security's tax rate and its taxable wage base (as a ratio of average annual earnings) have increased over time (in ten-year increments) since the program's inception. As the table shows, Social Security's revenues grew both because of increases in the taxable wage base and because of increases in the tax rate, though neither has changed since the 1983 amendments.

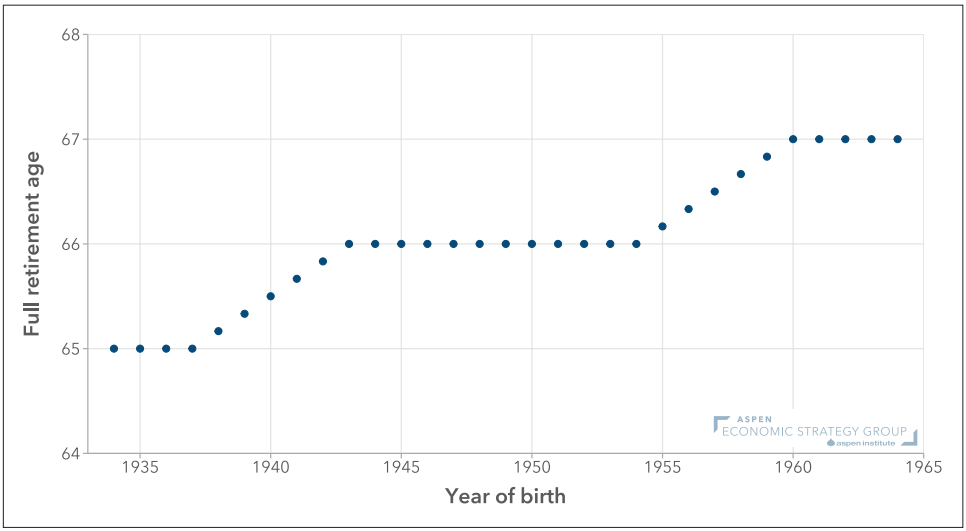
Table 4. Total OASDI Tax Rates and Taxable Maximum by Calendar Year

Year	Tax rate	Taxable max / average wage
1940	2.0%	2.2
1950	3.0%	1.3
1960	6.0%	1.2
1970	8.4%	1.3
1980	10.2%	2.1
1990	12.4%	2.4
2000	12.4%	2.4
2010	12.4%	2.5
2020	12.4%	2.5

Source: Social Security Administration (2023).

But in contrast to most previous Social Security reforms, the 1983 amendments also significantly reduced the generosity of benefits. The amendments increased the full retirement age (FRA) from 65 to 67 and simultaneously lowered the fraction of full benefits that one could receive at age 62 from 80 percent to 70 percent. Crucially, these changes were phased in gradually, with individuals born in 1937 or earlier (age 46 or older then) unaffected by the changes while those born in 1960 or later were fully affected. The following figure shows the evolution of the program's FRA (in years and months) by year of birth—a change that essentially represented about a 12.5 percent cut in Social Security benefits once it was fully phased in.

Figure 5. Social Security's Full Retirement Age by Year of Birth



Source: Social Security Administration (2023d).

It is striking that these reductions in benefit generosity have now been fully phased in and there has been essentially no political backlash. Such criticism was likely forestalled because individuals had sufficient time to plan and to adjust their savings and employment plans accordingly by—for example—working longer and/or saving more. Previous research has shown that the changes led to increases in employment, which amplified the beneficial effects of the reform on the long-term solvency of the program (Mastrobuoni 2009).

Historical experience suggests that tax increases can be implemented relatively quickly and improve Social Security's finances. But any benefit cuts will likely need to be phased in gradually so that individuals on the cusp of retirement or who have already retired are not blindsided. Consistent with this caution, in 1991 and again in 1994, the tax base for the Medicare program with its 2.9 percent payroll tax rate increased substantially. More specifically, the 1991 change that was signed into law by President George H. W. Bush increased the tax base from $51,300 to $125,000 while the 1994 change eliminated the cap so that all earnings were subject to the Medicare tax. These changes significantly extended the solvency date of Medicare and there has been little evidence to suggest that either change had harmful effects on labor supply, a common and legitimate concern with any tax increase.

4. Reform Principles

Once policymakers decide that they are ready to confront the increasingly urgent issue of Social Security's medium- and long-run fiscal health, three key decisions await them.

4.a. Should fiscal balance in the program be achieved through tax increases, benefit reductions, or a combination of the two (as in the 1983 amendments)?

If no changes in policy are made, then the Congressional Budget Office (CBO) projects that in ten years the federal government will have to reduce benefits by about 23 percent for the 80 million individuals expected to be receiving Social Security benefits in that year.[7] This "haircut" to benefits will likely increase in subsequent years, given projected further declines in the number of workers per retiree. This across-the-board benefit cut will be necessary because, given current law, Social Security is not authorized to incur debt. Therefore, once the trust fund hits zero, it must change benefits to bring the deficit to zero. Doing so will place the entire adjustment to the program's fiscal imbalance on the benefit side and will likely impose especially severe hardship on those with low incomes, underrepresented minorities, women, and the oldest beneficiaries—given their much greater reliance on Social Security (see table 3).

Alternatively, policymakers could strive to avoid benefit cuts by increasing the program's 12.4 percent payroll tax rate and/or its annual taxable wage base (currently set at $160,200). According to estimates from the CBO—updated to reflect recent revisions to the expected date of trust-fund exhaustion—the payroll tax rate would need to increase by about 4 percentage points or more to fill the substantial annual deficits that will exist when the trust fund reaches zero. This approach would lead to the imposition of substantial Social Security taxes for all workers—for example, Social Security taxes for a worker earning $50,000 annually would increase by $2,000. Alternatively, Congress could fill a majority of the program's fiscal hole by eliminating the cap on Social Security taxes (and by simultaneously giving no credit in the form of higher future Social Security benefits for any taxes paid beyond $160,200). One potential problem with such a significant and immediate increase in either the tax rate or the tax base is that it could reduce employment or hours of work, which would have adverse effects on other tax revenues such as individual income

7 Given that recipients are legally entitled to their full benefits under the Social Security Act, but Social Security cannot legally pay out more funds than it has available, there is some debate over how (and to some degree, whether) this reduction in benefits will occur when the trust fund hits zero. Here I take the most straightforward interpretation that recipients will, on average, see a 23 percent reduction in benefits in 2033. See Congressional Research Service, 2022, for a more detailed discussion of this issue.

taxes, thereby worsening the federal government's fiscal challenges elsewhere in the federal budget.[8]

4.b. Should changes to Social Security taxes and/or benefits be phased in gradually, immediately, or once again as a combination of the two (as in the 1983 Amendments)?

Policymakers will not have the luxury of phasing in all policy changes gradually, as was possible in 1983. This choice will not be viable because the deficit as a share of spending in 2033 will be more than ten times greater than it was just prior to the 1983 amendments. Additionally, in 1983, projected deficits were declining rather than increasing, as they likely will be in 2033. Social Security is now drifting into the situation that both President Bill Clinton and President George W. Bush had hoped to avoid in their efforts to strengthen Social Security's finances in the late 1990s and the first decade of the 2000s.

4.c. Should changes be across-the-board ones that would apply to all workers and/or benefit recipients (as with the 1983 amendments and their increase in the program's payroll tax rate), or should they instead be targeted (by, for example, increasing the taxable wage base from its current $160,200 level—a change that would only affect high-income earners)?

Policymakers will need to decide in the coming years whether to make changes to Social Security that apply equally to all taxpayers and/or beneficiaries or whether to target the changes to those with higher incomes and benefit levels. With the 1983 amendments, Congress chose the former approach with an across-the-board increase in the payroll tax rate and in the full retirement age. But both income inequality and wealth inequality have soared in the 40 years since, and thus the case for targeting tax increases and/or benefit cuts to those with higher incomes is stronger now than it would have been then (or when Medicare eliminated its taxable maximum in 1994 or increased Medicare premiums for high-income taxpayers in 2006).

There is no one obvious right way to tackle the significant fiscal imbalances in Social Security. Some combination of benefit cuts and tax increases is inevitable, as was the case 40 years ago, when the challenges that Social Security faced were small relative to the ones that we face today. Necessary changes to Social Security would have been much smaller and could have been phased in gradually if past policymakers had not ignored the issue and left this problem for others to solve.

8 Using the 2011 and 2012 reduction in Social Security taxes as a natural experiment, Powell (2015) estimates a small (.08) elasticity of earnings at Social Security's taxable maximum, suggesting that increasing taxes beyond the taxable maximum would lead to a modest reduction in earnings, partially offsetting revenue gains. Estimates from Liebman and Saez (2006) suggest an even smaller elasticity using tax reforms from the 1980s and 1990s.

5. A Six-Part Proposal to Permanently Strengthen Social Security

The first five proposed changes below to Social Security include a mix of both tax increases and benefit reductions (relative to current law); both immediate and gradual changes; and two policies that apply equally to all as well as three policies differentially affecting workers with the highest earnings. Taken together, these policies would involve some sacrifice by all workers but an additional sacrifice from high-income workers, given the significant increases in inequality since the last major reform of Social Security.[9] Current Social Security recipients or those who will claim benefits soon would see no reduction in benefits. The benefit reductions for future Social Security recipients insulate disabled workers and those with low incomes as well as those who would be likely to claim their Social Security retired worker benefits at or soon after the early-retirement age of 62.

The fiscal impact of the proposed changes—especially those on the benefit side—would increase steadily over time and would eventually return the program to annual surpluses. It is beyond the scope of this document to calculate a full year-by-year "score" (analogous to the scoring conducted by CBO) of the impact of the proposed changes on Social Security's annual surplus/deficit or on the level of the trust fund each year. Such a score would depend on the year in which each change is implemented, how rapidly the changes were phased in, and the behavioral response of individuals (and their employers) to the changes. There is also of course substantial uncertainty about the evolution of key variables in the future, including earnings growth, mortality, and immigration.

Additionally, even if some of the proposed changes were implemented immediately, Social Security's trust fund would still likely hit zero before 2040. That is why the sixth proposed change calls for the US Treasury to temporarily loan funds to Social Security (as Social Security loaned funds to it over the last 40 years and as it loans funds to state unemployment-insurance programs during and after recessions). This loan could be paid off later as the full effect of the gradually phased-in proposed changes is realized. This transfer from the US Treasury to the Social Security trust fund would not be without precedent. For example, in both 2011 and 2012, the US Treasury Department financed a Social Security tax cut with a total transfer of $217 billion from the US Treasury to the OASDI trust fund across the two years.

Drawing on estimates from CBO and from related research, I estimate that these reforms, coupled with the ability to borrow from the US Treasury, could deliver

9 As shown in a 2022 CBO report on the distribution of household income, from 1979 to 2019 average inflation-adjusted after-tax income increased approximately twice as much among the highest 20 percent of taxpayers as it did among the remaining 80 percent of taxpayers (123 percent versus 63 percent—see the data underlying exhibit 18 in Congressional Budget Office 2022a).

essentially permanent solvency for the OASDI program through a mix of tax increases and benefit cuts, with the latter phased in more gradually than the former.

5.a. Raise the Social Security payroll tax rate by 1.0 percent to 13.4 percent.

The Social Security payroll tax rate has been at a constant 12.4 percent for 33 years, with the most recent increase, from 10.6 percent to 12.4 percent, phased in gradually between 1983 and 1990 following the 1983 amendments described above. One rationale for a payroll tax rate increase is that the present value of Social Security coverage for workers has risen substantially over time due to rising life expectancy and less stringent medical eligibility criteria to qualify for SSDI than were in effect at the time of the 1983 amendments. Research suggests that previous increases in the Social Security tax rate did not significantly reduce labor supply (Liebman and Saez 2006), though these increases would still inevitably reduce disposable incomes for workers.[10]

This 1.0 percent tax increase alone would fill about 28 percent of the fiscal gap that the program faces beginning in 2033.[11] It is purposefully much smaller than the nearly 4.0 percent increase that CBO has estimated would be required to close the entire gap since it would impose costs on all workers rather than only those with the highest earnings. For example, a worker with earnings of $30,000 annually would pay an additional $150 in Social Security taxes each year; that person's employer would pay an additional $150 as well. To the extent that increases in employers' payroll tax bills partially or fully "pass through" to workers in the form of lower wages, the ultimate cost to workers of this policy change could be larger than just the increase in their own direct taxes.

5.b. Increase the taxable maximum so that 90 percent of earnings are again subject to Social Security payroll taxes.

Forty years ago, when the 1983 Social Security amendments were signed into law, fully 90.0 percent of workers' total earnings were subject to Social Security taxes. At that time, the program's taxable wage base was $35,700, with this amount indexed to average annual earnings each year. Since average annual (nominal) earnings have more than quadrupled in the 40 years since, Social Security's taxable wage base is now much higher as well—at $160,200 in 2023.

10 See Kim, Kim, and Koh (2022) for a recent review of the literature regarding the effects of payroll tax rates on employment and earnings, including the extent to which tax increases or reductions pass through to earnings.

11 The actual impact would of course depend on many factors, including the behavioral response of both workers and employers to the payroll tax change. For reference, the most recent OASDI report projects payroll tax revenues of $1.735 trillion in 2032 and a program deficit that same year of $407 billion (excluding interest on the trust fund). Absent any behavioral response, the payroll tax change would reduce the deficit by $140 billion (34 percent of the total).

Despite this large increase, the share of workers' earnings that are not subject to the Social Security payroll tax has steadily increased – from 10.0 percent in 1983 to 14.1 percent in 2003 to 18.6 percent by 2021. This trend has been driven by the well-known increase in income inequality during this same period. Had the program's tax base instead been adjusted each year so that approximately 90 percent of earnings were subject to Social Security's payroll tax, the program's current financial difficulties would be much less severe.

This adjustment would yield significant incremental payroll tax revenues for the program, though this effect would be partially offset by correspondingly higher Social Security benefits in the future since it would increase average indexed monthly earnings (AIME) for some high-income workers. Estimates from the Joint Committee on Taxation indicate that the taxable maximum would have to be increased from $160,200 to about $300,000 in 2023 to cover 90 percent of earnings.

According to data from the Congressional Budget Office and the Social Security Administration, the combined impact would eliminate 19 percent of the program's projected annual deficit in 2032 if it were fully implemented by that year. But this would be a very significant increase in payroll taxes to implement immediately and could lead to significant disruptions in employment and earnings for the nearly 11 million workers with earnings above the taxable maximum.

It would therefore be prudent to phase this change in gradually by increasing Social Security's taxable maximum by just 2.5 percent more each year than average annual earnings growth. If the distribution of earnings remained relatively stable in the coming years, then after about 25 years, fully 90.0 percent of earnings would once again be subject to Social Security's payroll taxes. To the extent that earnings inequality increased (declined) over time, then the number of years needed would be correspondingly higher (lower) to get to 90.0 percent.

The savings for the program could be substantially larger if the incremental taxes paid did not translate into higher Social Security benefits in the future or if the program's benefit formula were adjusted to reduce the incremental benefits paid to high-income taxpayers stemming from their higher AIME. I propose an adjustment along these lines in Section 5.e. below.

5.c. Levy a 3 percent tax on earnings above the taxable maximum.

As described above, Social Security taxes are not presently levied beyond the annual taxable maximum, which is currently set at $160,200 and has been indexed up each year with average earnings growth for the last few decades. This component of the reform proposal would yield a third source of incremental revenue by applying a 3

percent tax rate on any earnings above the taxable maximum. In contrast to the provision described in the preceding section, this incremental revenue would not increase high-income workers' AIMEs, nor would it generate higher Social Security benefits for them in the future.

This change would differentially affect high-income taxpayers and, according to CBO estimates (2015), could make a significant dent in Social Security's long-run fiscal imbalance. One rationale for imposing an additional tax on those with high incomes beyond the increase in the payroll tax rate and in the program's taxable wage base is that life expectancy has risen much more among those with very high incomes since the 1983 amendments were passed. As a result of these improvements, the increase in the present value of Social Security benefits has been much greater for high-income workers.

A similar change occurred for the Medicare payroll tax base nearly 30 years ago. From its inception in 1966 through 1990, Medicare used the same payroll tax base as Social Security did. But the Medicare tax base was increased substantially in 1991 (from $51,300 to $125,000) and then the cap was eliminated three years later in 1994. There has been little evidence to suggest that the extension of Medicare's 2.9 percent payroll tax to all worker earnings significantly reduced either earnings or employment. Indeed, these tax increases preceded a historically strong performance for the US economy during the mid and late 1990s, with declining unemployment, increasing labor-force participation, and rising earnings through 2000.

While this change would of course lower after-tax income for America's highest earners, they are the group whose earnings have grown the most since the 1983 amendments. The incremental revenue that this change would produce would decline somewhat over time given the increase in the taxable maximum described in section 5.b.

This 3 percent tax, applied to all earnings greater than Social Security's taxable maximum, would fill about 12 percent of the fiscal gap that the program faces beginning in 2033.

5.d. Increase the full retirement age from 67 to 68.

One of two major changes implemented by the 1983 amendments to Social Security increased the full retirement age (FRA) from 65 to 67. These changes were phased in gradually so that those born in 1937 or earlier were unaffected while those born in

1960 or later were fully affected.[12] This change resulted in a substantial reduction in benefits for those claiming at ages before FRA. For example, people claiming retired-worker benefits at age 62 saw their benefits decline from 80 percent of their PIA to 70 percent of PIA as a result of these amendments, a decline that represented a 12.5 percent cut in benefits. The evidence to date convincingly demonstrates that these reforms caused many people to delay retirement and to delay claiming their Social Security benefits (Mastrobuoni 2009). The delay in retirement amplified the beneficial effects of this reform on the Social Security trust fund through the policy-induced increase in employment and payroll tax revenue.

One potential concern with these reforms was the financial hardship that they imposed on the most disadvantaged, especially those in poor health, who tended to claim at the early retirement age of 62. Research by Duggan et al. (2007) shows that the 1983 amendments led to a significant increase in applications for SSDI, since the full-PIA benefits associated with an SSDI award changed from being 25 percent more generous than early retirement benefits at age 62 to 43 percent more generous. These findings suggest that further reductions in the generosity of retirement benefits at age 62 would lead still more individuals to apply for SSDI benefits.

To address this potential concern, my fourth proposal involves an increase in the full retirement age from 67 to 68 that leaves unchanged the generosity of benefits for those claiming between the ages of 62 and 64. Individuals who claim at these earlier ages tend to be in worse health with less savings and so the reform purposefully insulates them from the effects of reduced retirement benefit generosity. The following table shows the generosity of retirement benefits for someone reaching age 62 in 2022 as a function of claiming age and compares this with the generosity of the proposed change. While this increase would inevitably induce changes in the timing of retired-worker benefit claims, a back-of-the-envelope calculation suggests that once fully phased in, it would fill approximately 15 percent of Social Security's long-term funding gap.

12 The FRA increased in two-month increments from 65 to 66 for those born in 1937 (65) to those born in 1943 (66) and again in two-month increments for those born in 1954 (66) to those born in 1960 and later (67).

Table 5. Current and Post-Reform Generosity of Retired-Worker Benefits by Age at Claiming

Claiming age	Percentage of PIA disbursed in current law	Proposed percentage of PIA
62	70	70
63	75	75
64	80	80
65	86.7	85
66	93.3	90
67	100	95
68	108	100
69	116	108
70	124	116

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Source: Social Security Administration (2023) and author's proposal.

This change would ultimately represent a 5–8 percent reduction in benefit generosity relative to current law for those claiming at or beyond the full retirement age. As described above, this group tends to include those with higher incomes, as lower earners tend to claim benefits at the early retirement age of 62 or soon after that. This change seems appropriate given the financial pressures of the program combined with the much greater increase in life expectancy among those with high incomes since the 1983 amendments were enacted.

5.e. Freeze the 32-15 bend point and introduce a new 15-5 bend point in the Social Security benefit formula.

The Social Security benefit formula displayed in figure 3, coupled with the percentage-of-PIA figures shown in table 5, implies that individuals born in 1960 could receive a monthly Social Security benefit of $4,170 (or more than $50,000 per year), if they have earned more than Social Security's taxable maximum throughout their careers and if they delay claiming benefits until age 70. This fifth and final component of the reform proposal would freeze the bend point in the 90-32-15 Social Security benefit formula shown in figure 2 so that benefits would increase more slowly for high-income

taxpayers while they would continue to increase as called for in current law for those with low and middle incomes. It would also introduce a new 15-5 bend point to reduce the incremental benefits received by the highest income workers from the increase in the Social Security taxable maximum described in Section 5.b.

This final component would have little impact on benefit generosity initially though would replace an increasing fraction of earnings at 15 percent rather than 32 percent, with this change only affecting benefits for those with high incomes. To consider the effect of this shift on Social Security benefits, suppose that the AIME at the 32-15 bend point had been frozen ten years ago at $4,624 (for someone born in 1950). This figure is much lower than the actual bend point of $6,172 in effect in 2022 (for someone born in 1960) and would lead to a $263 (= (.32 - .15) * (6172 – 4624)) reduction in the PIA for a high-income taxpayer whose earnings were above the taxable maximum throughout his or her work years. The corresponding reduction in benefits would be significantly greater if the 32-15 bend point had been frozen in 2002—with monthly benefits falling by $443 (or about 13 percent) for high-income Social Security recipients.

Most of Social Security's retired-worker recipients—including all recipients with benefits below the median—would be unaffected by this change in benefits for at least 25 years. Even the highest-income recipients would only see a lower growth rate of benefits—not an actual cut in their benefits—and they would have sufficient time to plan (as was true for the increase in FRA induced by the 1983 amendments). The effects of this change on the Social Security trust fund would be small initially but would grow substantially over time as benefits for high-income earners would grow much more slowly than they do under current law.

The introduction of a new 15-5 bend point would moderate the increase in Social Security benefits that high-income workers would receive from the increase in the taxable maximum described in 5.c.[13] More specifically, about 6 percent of workers have had earnings above the taxable maximum in recent years. This group would see an increase in payroll taxes that they pay and in their eventual AIME. This provision would lead to greater savings for the program from the increase in Social Security's taxable maximum than if the 90-32-15 formula was unchanged.

There are three key benefits of this adjustment to the benefit formula relative to other possible changes that reduce the generosity of Social Security benefits. First, it would give individuals adequate time to plan and adjust their savings and employment decisions (as the 1983 amendments did) since the effects would be small for those about to retire but would be much larger for those born in the 1980s

13 Referring to figure 4, this would introduce a 5 percent slope in the figure 4 Social Security benefit schedule beyond the current maximum AIME of $11,467 (which would increase with average earnings).

and later. Second, it would not affect benefits for those with low or middle incomes, whose incomes grew more slowly relative to the national average during the last few decades than did those of their counterparts a few decades ago. The third benefit of this provision is that its beneficial effects for Social Security's trust fund would grow substantially each year, with an increasing fraction of beneficiaries' AIME replaced at a 15 percent rather than a 32 percent rate.[14] This change, in combination with the other four provisions described above, would eventually allow Social Security to generate annual surpluses once more.

Freezing the AIME at the 32-15 bend point for 25 years would fill about 24 percent of the fiscal gap that the program faces, though this full effect would not be realized until after the Social Security trust fund reaches zero. Introducing a new 15-5 bend point (at an AIME of $11,467 if using the 2023 benefit formula) would generate further budgetary savings that would conservatively fill at least another 2 percent of this gap in the long run.

5.f. Allow Social Security to borrow from the General Fund as state UI trust funds do.

Even if all five of these reform proposals were implemented in the next few years, the Social Security trust fund seems certain to hit zero in the next decade (as both CBO and the SSA project) or soon after. One approach that policymakers could take would be to allow Social Security to borrow from the US Treasury (as state unemployment-insurance trust funds often do, especially during and after recessions) and pay those amounts back in the future. This approach would have the advantage of disciplining the Social Security program's finances so as not to crowd out spending elsewhere in the federal budget (for example, national security spending or investments in clean energy). Once the reductions in benefits and the increase in the program's taxable maximum are fully phased in, Social Security would then have sufficient surpluses to pay down its debt.

With the clear caveat that significant uncertainty exists about earnings growth, mortality, immigration, and many other variables—including behavioral responses to the proposed changes outlined above—I estimate that the five proposed changes would each contribute significantly to closing Social Security's fiscal gap as outlined in the table 6. Two of the changes would be implemented immediately in 2026 while the other three would be phased in over time.

14 If the growth rate in earnings observed over the last few decades were to continue in the years ahead, the 90-32 bend point would catch up to the 32-15 bend point in about 45 years.

Table 6. Contribution of Policy Proposals to Closing Social Security's Fiscal Gap

Proposed change	Percentage of total impact	Phase-in period
Increase payroll tax rate from 12.4 percent to 13.4 percent	28%	2026
Increase taxable max to cover 90.0 percent of earnings	19%	2026–51
Impose a 3 percent tax on earnings above the taxable max	12%	2026
Increase full retirement age from 67 to 68	15%	2026–2032
Freeze AIME at 32-15 bend point and create 15-5 bend point	26%	2026–51

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Source: Author's calculations and analysis using data from SSA and CBO.

6. Discussion

Taken together, the reforms outlined in this proposal could ensure that Social Security is adequately funded for current and future generations of Social Security recipients. At present, more than one in four American adults receive benefits from the program while more than two-thirds of adults pay Social Security taxes. The last major amendments were able to extend the solvency of the program by about 50 years—from the mid-1980s to about 2033. In contrast to the current proposal, those policy changes applied equally to all taxpayers and to all Social Security recipients (with effects varying only by year of birth).

The current proposal takes as a starting point that both income and wealth inequality have increased significantly since the 1983 amendments as has inequality in life expectancy. Because of these changes and given the fiscal pressures on the program resulting primarily from a declining number of workers per Social Security recipient, the current proposal calls for larger sacrifices from workers and Social Security recipients with the highest earnings. Additionally, benefit reductions are phased in gradually so that existing Social Security recipients are unaffected and so that those future recipients with low incomes and/or in poor health are insulated from these changes in the program.

US policymakers have for decades kicked the proverbial can down the road on this predictable funding challenge that we as a nation are now facing. It is time for individuals on both sides of the political aisle to work together on reforming America's largest government expenditure program so that it is adapted to 21st century realities while continuing to protect the most economically vulnerable. The changes called for in this proposal would achieve these goals while ensuring that Social Security is fundamentally strong for today's workers and for future generations as well.

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Why Drug Pricing Reform Is Complicated: A Primer and Policy Guide to Pharmaceutical Prices in the US

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ABSTRACT

Pharmaceutical pricing in the United States is a complicated and opaque process. Confusion over price setting and the method by which new drugs are brought to market can lead to ineffective and even harmful policies that decrease society's access to innovative new treatments without providing sufficient decreases in spending to justify the cost. At its core, drug pricing in the United States involves a tradeoff: allowing high prices today provides firms with the incentive to make the large, fixed, and sunk investments necessary to bring future new products to market. In that way, high prices are a central part of the process by which we get new drugs. That being said, firms may—in some areas of the market—take advantage of the complexity of the system to extract profits at a rate that far exceeds any beneficial incentive effects. A wide variety of firms and individuals in the market exhibit such behavior. In this paper we both explain the underlying complexities of how prices are set and suggest areas where policy reforms could improve the market.

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1. Introduction

In the United States, prescription drugs are often sold at orders of magnitude over their marginal cost of production. The resulting large margins per unit sold attract attention from policymakers, the media, and customers. As a result, pharmaceutical pricing sparks frequent and heated debate. Of course, the margin on each drug sold provides little insight into the overall costs of developing innovative pharmaceuticals. The total cost of developing and demonstrating the safety and efficacy of potential new drugs involves large research and development investments. All these expenditures are made under considerable risk with the majority resulting in failures. For example, it is estimated that only 10 percent of products that enter into clinical trials in humans make it to the market (Takebe, Imai, and Ono 2018). An even greater number of targets fail long before they ever make it into human trials.[1]

At the same time, the increasing scope of scientific knowledge means that the number of conditions that can be addressed by pharmaceuticals has massively expanded—along with the resulting spending for those treatments. Prices for these treatments have increased, partly as the result of new targeted treatments tailored to better-defined and narrower populations.[2] Combining all these factors together with the broader fiscal burden of increased social welfare spending across the government sets the stage for meaningful controversy over pricing.

This controversy was part of the motivation for the passage of the 2022 Inflation Reduction Act (IRA). This monumental legislation represents the first attempt at government price setting for prescription drugs in the United States. Under the IRA, the Center for Medicare and Medicaid Services (CMS) has the power to "negotiate" prices for the drugs that account for the most spending by Medicare.[3] Firms unwilling to accept the price negotiated by CMS will either be forced to stop selling *all their products* to the Medicare system or pay fines that could amount to over 1,900 percent of a drug's overall revenue.[4] While these negotiations have not yet begun, and there are existing legal challenges to various features of the law, the IRA likely does not represent the end of policy discussions in this area. For example, President Biden's 2024 budget proposed both doubling the number of drugs subject to price setting and beginning this process just five years after new drugs come to market

1 It is, however, important to remember that products that fail earlier require far less investment and in many ways are preferred to those that fail later, after millions of dollars have been invested.

2 As products treat a more defined population, treat more serious conditions, and/or are more effective, society's willingness to pay for these products should also increase.

3 Under the Inflation Reduction Act (IRA), drugs can only qualify for negotiation if they are among the top 50 products in terms of Medicare spending under either the part D or part B programs.

4 "Inflation Reduction Act Considerations for Pharma Companies," PWC, August 2022, https://www.pwc.com/us/en/services/tax/library/inflation-reduction-act-considerations-for-pharma-companies.html.

(as opposed to the 9–13 years dictated by the IRA) (Newman 2023). Similarly, many Democratic members of Congress have also suggested additional measures to lower prices or shorten periods of market exclusivity. Recently, Senator Bernie Sanders announced he would place a hold on President Biden's nominees for various health care agencies without a comprehensive plan from the Biden administration for reducing drug prices (Diamond 2023).

The blunt and somewhat clumsy approach of the IRA and many other proposed policies toward drug pricing primarily reflects society's frustration over high pharmaceutical prices. This frustration stems from the fact that these prices are all too often attributed to unmitigated corporate greed with no other benefit. In many ways, policy reform in this area would be far easier if this simplistic caricature were true.

Nor are high pharmaceutical prices in the United States a mystery, mistake, or accident. Instead, these high prices are a deliberate feature of the complex system by which new products are brought from the scientific bench to the patient's bedside. Therefore, our goal as a society should not be focused simply on lowering prices but instead on increasing value. In part, reaching this goal depends on achieving the correct balance between access to products today and access to new innovations in the future.

Pharmaceutical innovations result from private firms making large, fixed, and sunk investments in research and development. For successful products, the scientific knowledge created by these investments (i.e., the understanding of the mechanism of action underlying product efficacy and the process for manufacturing and developing the molecule) is largely a public good; that is, it is non-rival and non-excludable.[5] Absent some form of intellectual-property protection, another firm could easily create its own version of these novel innovations at a fraction of the cost invested by the innovator firm.

Firms are unwilling to invest in developing new products without some expectation of a positive return. In our existing system, this expectation is supported by a time-limited period in which the innovative firm can charge high prices for that specific molecule without the threat of direct competition.[6] This broader context of the

5 These two qualities are the economic characteristics of a public good. Scientific knowledge is non-rival: two firms may both use it at the same time. It is also non-excludable: once it is known, you cannot force others to unlearn it. These economic characteristics mean that the optimal provision of public goods often requires some form of government intervention. Such intervention can also include the direct financing or provision of the public good, as if the case with "basic science" research funding from the National Institutes of Health. Given that basic science research is difficult to fully protect with intellectual-property legislation, the government has become more involved in direct support.

6 During this time period, innovators do face competition from other products that treat the same condition. Such products may have the same mechanism of action but use a different molecule, or they may offer a completely different method of treating patients with the same condition.

development process leads to two conclusions. First, profits for these firms are not as high as the margins for each product sold because of the fixed costs of developing drugs. This fact is especially true in light of the failures in the sector broadly—described below—and the need to provide significant returns on the portfolio of investments to attract risk-based capital. Second, high prices that are the result of monopoly protections for innovative products are a necessary part of the system of developing drugs.[7]

However, while the need to attract and incentivize investment implies the need for a degree of price setting above marginal cost, the optimal policy is not one that allows unbounded markup. Two considerations are at play. First, certain factors (beyond those alluded to above) are driving up prices, specifically market failures and other features of the pharmaceutical value chain, described below. The policy suggestions in this report attempt to address these other sources of high prices—many of which increase spending without a commensurate positive impact on social welfare or patient health.

Drug pricing in the United States involves a tradeoff: allowing high prices today provides firms with the incentive to make the large, fixed and sunk investments necessary to bring future new products to market.

Second, optimal pharmaceutical innovation policy is not simply about allowing an unending amount of investment in new products and ever higher prices. Instead, it involves acknowledging and managing the fundamental tradeoff at the center of drug development. This tradeoff involves the cost of reduced access today from higher prices and the benefit of ensuring future access by increasing firms' incentives to develop new products. To understand this tradeoff, we must know the answers to two questions: (1) How much would demand go down if prices were higher? (2) How does investment in developing new products respond to changes in expected revenue? Ignoring this tradeoff will lead to lower social welfare.

The answers to these questions are also country-specific. It is well known that pharmaceutical prices in the United States are often quite higher than they are in other developed countries. In fact, one of the few bipartisan sources of agreement about pharmaceutical prices in the United States is clear frustration over the divergence between prices in the US and those in other countries. This frustration certainly was an impetus for the passage of the IRA as well as for several earlier drug-

7 A broader reform of the system—so that it no longer relies on private firms or risk capital and instead uses only government funding—is conceptually possible. However, such a broader reform is beyond the scope of this paper (and the authors have great skepticism that it would lead to a more efficient outcome).

pricing reforms supported by both Speaker Nancy Pelosi and President Trump that explicitly linked prices in the United States and those in other European countries.[8]

Why are these other developed markets able to charge low prices and avoid the fundamental tradeoffs described above? While insurance systems vary across countries, a unifying feature of all markets' lower prices is a willingness by governments to more directly set pharmaceutical prices for their citizens. These other countries, however, have not somehow "solved" the difficult question of drug pricing. Instead, these governments enjoy a freedom that is unavailable to the United States. Given the relatively small size of European countries, very few pharmaceutical firms concentrate on any particular one when determining whether to make the large, fixed, and sunk investment in developing a new product. As a result, these countries are free to demand lower prices and to free ride off United States profits (Lakdawalla 2018).

In this way, as long as countries offer a price that is above the marginal cost of production, marketing, and distribution, they can enjoy lower prices and access to medicines that generally match that in the United States.[9] Therefore, the implications of the United States adopting the more European types of pricing systems would be quite different from any individual European country making the same decision because it would create a much larger decrease in profits and therefore have a larger impact on the investment decisions of pharmaceutical firms (Garthwaite, Sachs, and Stern 2022).

Differences between the impacts of price-setting policies in the United States and Europe demonstrate that determining optimal policy depends on understanding the nuances of the health care and pharmaceutical markets. In particular, it is important to focus on how prices are set and how those prices result in revenue for innovative firms or impact access for patients. While no area of US health care is uncomplicated, few parts of the broader sector rival price setting for pharmaceuticals in their opacity. In this paper, we provide a description of the main elements of drug pricing in the US that need to be understood in order to promote smart policy reform. By demystifying the complexities of the pharmaceutical pricing system, we hope to illuminate policies that increase the value the system creates as well as the proportion of that value captured by patients. The purpose of this policy brief is therefore twofold:

8 The ultimate price response to these policies is unclear. It is almost certain that prices in the United States would not fall to those currently charged in Europe. Instead, pharmaceutical prices would determine a profit-maximizing price that balanced reduced sales in Europe (from higher prices) with reduced profits in the United States (from lower prices).

9 It is, however, clear that countries that tend to demand lower prices get later and less generous access to new medications than those offering higher prices do. This pattern holds particularly true when these lower-paying countries are used as part of the reference price-setting process for the higher-paying countries. See Maini and Pammolli 2023; Kyle 2007.

1. Explain how drugs move from manufacturers to patients—with a focus on the economic relationships at each stage of the value chain.
2. Identify areas where the contractual structure of payments and/or actions by existing firms results in a disproportionate share of value being captured by various parts of the value chain—and offer solutions to these issues. That is, describe instances in which profits are likely to exceed the level necessary to generate socially efficient investments.

2. A Primer on Pharmaceutical Prices

A key feature of the pharmaceutical sector that makes it different from many other markets is that most purchasers of pharmaceuticals are insured customers. This state of affairs weakens the relationship between the prices manufacturers charge and the demand for their products (Lakdawalla and Sood 2013). Understanding how demand changes in response to prices requires understanding (a) the role of insurers in determining patient access to drugs, and (b) the role of prices in determining how manufacturers invest in new products. It is also important to understand the revenues firms expect to capture should their investments in new-product development be successful. Both processes are complicated in the pharmaceutical sector because what is meant by "price" is ambiguous.

In pharmaceutical markets, "price" is at best an elusive term. Insured patients must often make out-of-pocket payments at the pharmacy counter. This specific cost is the price most consumers react to, even though it almost always represents a small fraction of overall spending on the product. The majority of spending is dictated by the "net price," which is what the plan sponsor (i.e., the employer or insurance company responsible for medical spending) pays to gain access to the product. However, even this net price may vary depending on factors including who the payer is and how the patient gains access to the drug. For example, Medicare will pay a different price for patients to receive the immuno-oncology product Keytruda than private insurers UnitedHealth or CVS will pay for their patients to receive the same product in the same setting. Similarly, a Medicare patient purchasing the biologic product Humira to inject subcutaneously at home would access it through a different payment system than would a Medicare patient receiving Humira as an infusion in a provider's office. Much of this variation is based on the nature of the value chain through which products move from manufacturers to patients. Different products reach patients via various intermediaries and, based on the type of product, patients have a variety of forms of insurance coverage.

There are three broad categories of economically important pharmaceutical prices:

1. The public list price common across all payers in the system. This price is most similar to the sticker price at a car dealer that is the starting point for a negotiation and is almost never actually paid by any customer.
2. The net price actually paid by a plan sponsor or government insurer. This price is negotiated by a pharmacy benefit manager or dictated by regulation. The net price for a product is different for every plan, and the size of the discount varies within plans across products.
3. The out-of-pocket payment from the consumer, which varies based on the plan, the product, and the patient's other medical spending throughout the year.

The first price is largely chosen by the manufacturer and has little bearing on the actual net price paid—however, as we describe below, it has meaningful implications for patient cost-sharing. The method by which the second and third prices above are determined primarily varies along three dimensions:

1. How many other products exist that treat the same underlying medical condition.
2. Whether the product is purchased in a retail setting or administered by a medical provider.
3. Who is paying for the product (e.g., a commercial insurer or a government program).

2.a. The Distribution of Pharmaceutical Spending

Understanding the relative importance of these features of the price-setting process requires context about the distribution of pharmaceutical spending. To give some scope for understanding pharmaceutical prices, we begin by providing context across four categories.[10]

2.a.1. Retail vs. Non-Retail Pharmaceuticals[11]

One of the most important economic dimensions along which pharmaceutical products vary is whether they are purchased by a patient at a retail location (either an in-person store or a mail order pharmacy) or whether they were administered by

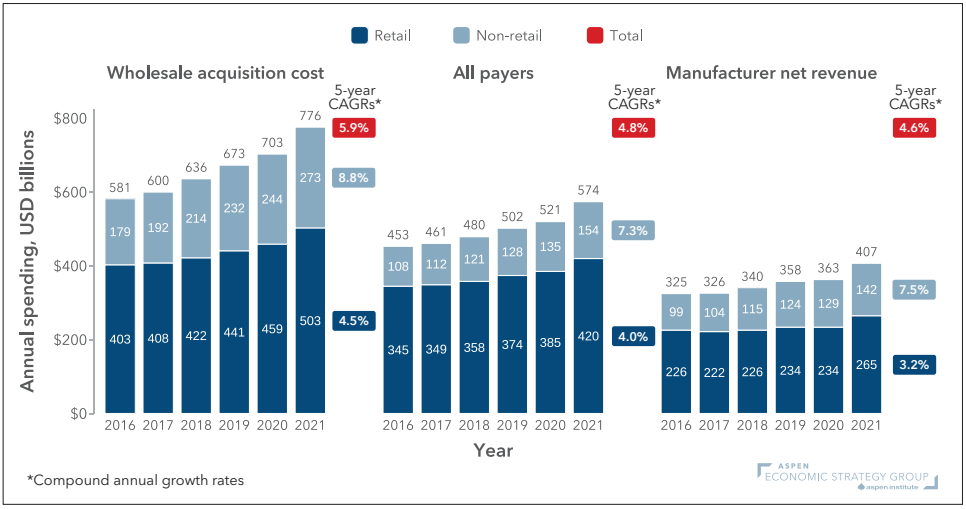
10 While the following estimates of spending rely on imprecise pricing data, they are meant to provide broad context rather than explicit numbers.

11 In addition to physician administered outpatient drugs, products are also sold to hospitals for use in the inpatient settings as well as to be distributed through their outpatient pharmacies as part of the 340(B) system. Important reforms may be required in this area, but they are beyond the scope of this policy brief.

a medical provider in an outpatient setting. As will be discussed below, the price-setting process for these two situations is different in ways that have important impacts on both patient costs and provider profits.

Figure 1 charts retail spending by payers based on whether it occurred in the retail or physician administered (PAD) setting. In 2021, approximately 27 percent of pharmaceutical spending was for PADs—up from 14 percent in 2016—with the rest being purchased at a retail or mail order pharmacy.

Figure 1. US Medicine Spending Levels and Segmentation by Channel, 2016-2021



Source: IQVIA (2022).

Part of the reason for this growth is the rising importance of specialty medications—many of which are PADs. Specialty products are, broadly, more expensive products that treat more serious conditions and often require special handling or administration. From 2011 to 2021, specialty medications grew from 28 to 55 percent of overall drug spending (IQVIA 2022). This growth was driven by increased spending for autoimmune (459 percent) and oncology (326 percent) products.

2.a.2. Small-Molecule and Large-Molecule Products

While there is no consistent definition for a specialty medication, there is a clear scientific difference between products based on their underlying molecule type. This distinction between small- and large-molecule drugs impacts how patients access the product, how providers are paid, and the evolution of competition for the molecules.

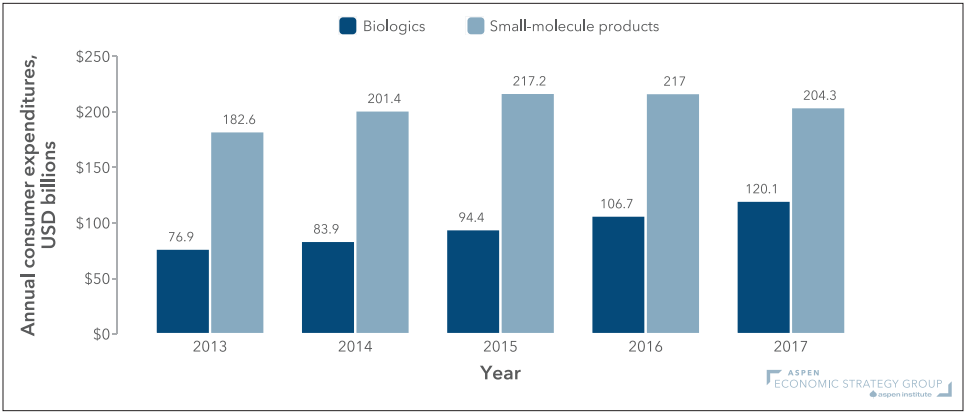
The most common view of pharmaceuticals is one of simple pills that are relatively inexpensive to produce and are sold to large numbers of customers. These products are almost invariably small-molecule products that are taken orally and sold at retail pharmacies.

Scientific advances, however, have allowed for the development of new types of large-molecule or biologic products. Large-molecule products are typically proteins that are grown rather than manufactured. Because they are grown, the marginal costs of manufacturing these products are far higher and require that firms have meaningfully more expertise. These proteins are often delicate and cannot survive in a patient's gastrointestinal tract. As a result, these products must be injected and are more likely to be infused as PADs, although subsequent development of these products at times allows for a subcutaneous version that a patient can administer in their own home.

Finally, given their complexity, large-molecule products cannot be exactly replicated. As we discuss below, this impossibility has meaningful implications for the structure and nature of competition—in particular, it is hard for a new firm to enter and gain market share from an incumbent innovative firm.

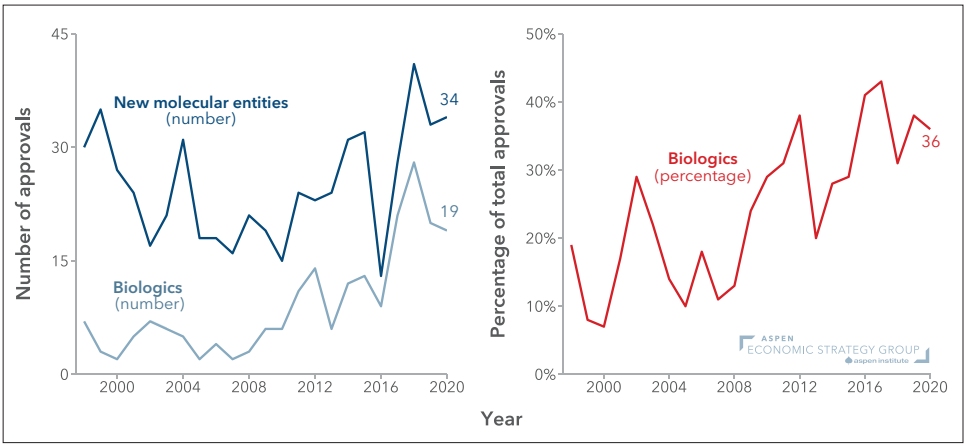
Figure 2 shows consumer spending broken out by molecule type. In 2017, approximately 37 percent of pharmaceutical spending was for large-molecule products. This figure reflected nearly a 25 percent increase since 2014—and the share is likely to continue growing over time as large-molecule products come to make up a greater share of the set of approved drugs. Figure 3 charts FDA approvals by year based on product type. This number has risen steadily, and these biologic products now account for approximately 40 percent of all approvals each year.

Figure 2. Consumer Spending in Billions, Small- vs. Large-Molecule Products, 2013-2017



Source: Makurvet (2021).

Figure 3. Annual FDA Drug Approvals by Product Type, 1998-2020



Source: http://www.nature.com/articles/s41587-022-01630-6

2.a.3. Branded vs. Generic

Pharmaceutical products are intended to be a single-source branded product for a limited time period. These branded drugs have some form of market exclusivity (provided by either the Food and Drug Administration or a patent) and may not be imitated. Although "blockbuster" branded drugs capture much attention, most prescriptions are for generic drugs. A recent analysis of sales data shows that only 20 percent of *prescriptions* are for branded drugs; this number has remained fairly flat for the better part of a decade (Parasrampuria and Murphy 2022). However, over 80 percent of *drug spending* is on branded drugs, because they are meaningfully more expensive than their generic counterparts.

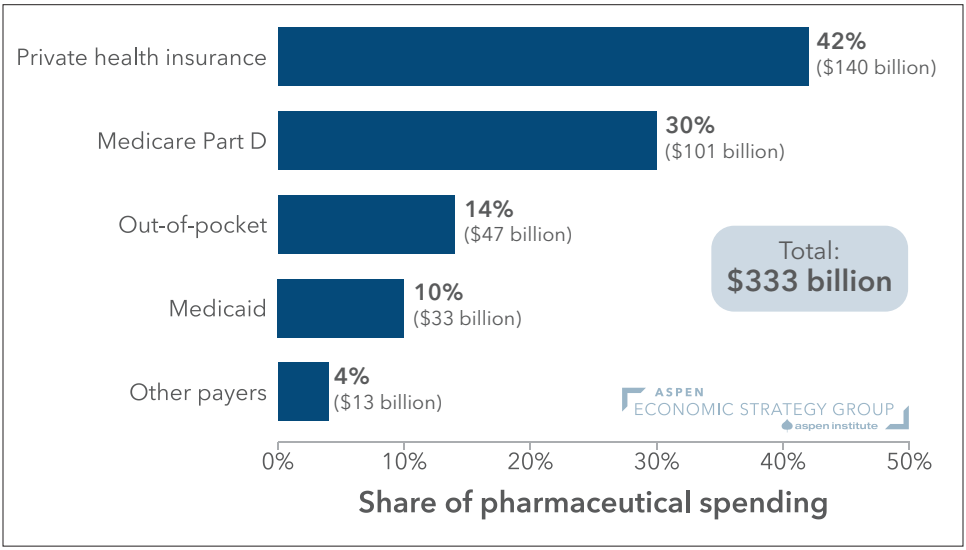
2.a.4. Spending by Payer Type

The final important distinction is whether the payer involved in a purchase is Medicare, Medicaid, or the commercial segment. Within each of these segments, prices vary across all the dimensions discussed above. But prices also vary within those categories based on payer type (i.e., Medicare prices for large molecules compared to prices for the same products in the commercial segment).

While the US health care system is often described as a free-market system dominated by private firms, in reality government payers of various types are a meaningful part of the payment system for pharmaceuticals. Figure 4 shows 2017 pharmaceutical spending by payer. The largest single payer is private health insurance, which accounts for 42 percent of all spending, while Medicare accounts

for 30 percent and Medicaid another 10 percent. Given their massive scale, the statutory payment rules implemented by these government payers can have wide-ranging implications.

Figure 4. Total US Retail Prescription-Drug Spending, 2017

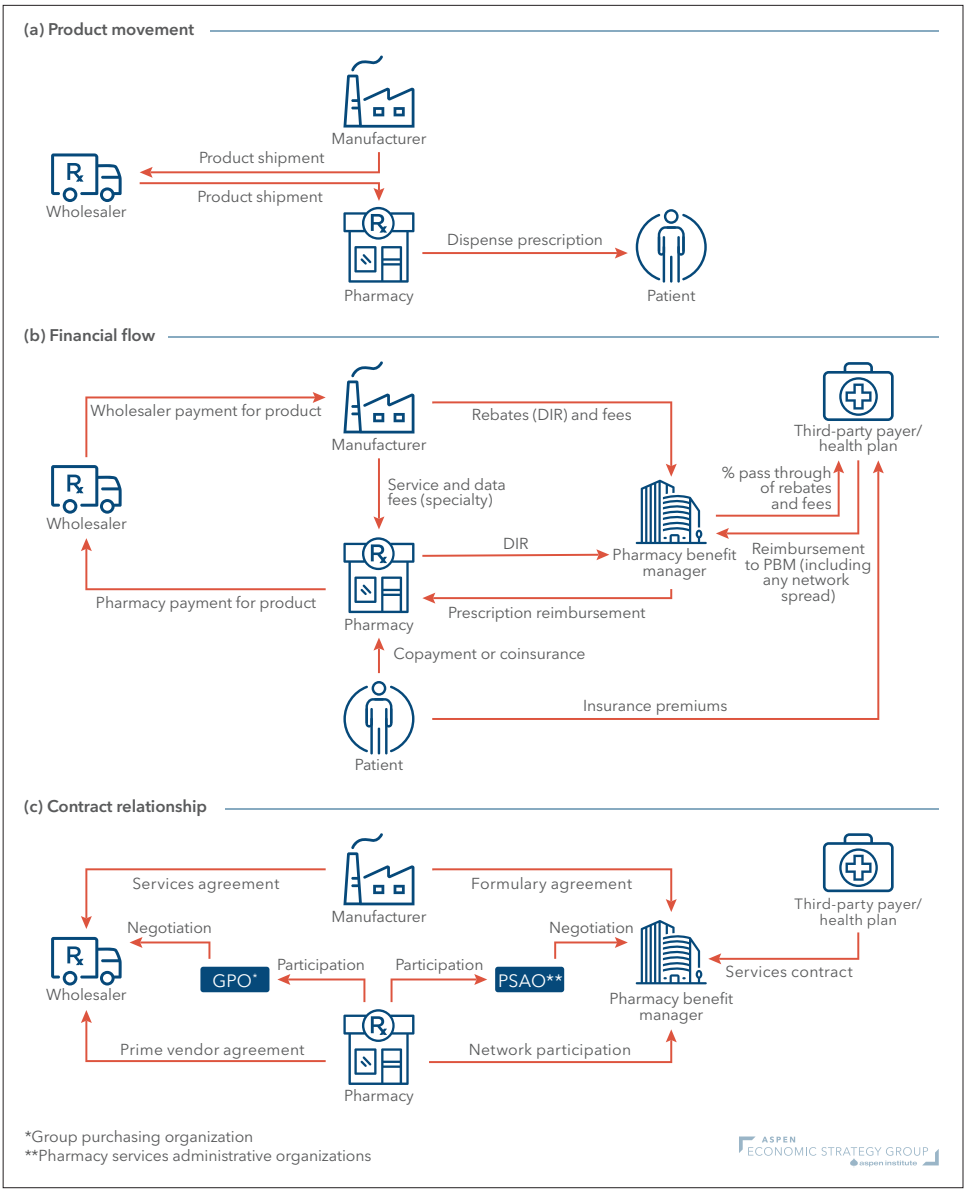


Source: Cubanski et al. (2019).

2.b. Price Setting for Branded Retail Pharmaceutical Products

As detailed above, the majority of pharmaceutical products are purchased at retail pharmacies. These products come to market through the value chain detailed in figures 5(a)—(c). To attempt to provide some clarity to what is often described as an opaque process, the panels of the figure depict the flow of products, the flow of funds, and the contractual relationship, respectively.

Figure 5. The US Pharmacy Distribution and Reimbursement System for Patient-Administered, Outpatient Brand-Name Drugs



Source: Fein (n.d.).

The path of a product from a manufacturer to the patient, depicted in figure 5a, is remarkably similar to paths found in nearly every other market that relies on wholesalers to serve as middlemen between manufacturers and retailers. The value chain starts with the manufacturers that are the patent holders selling branded products in the market.[12,13] In many cases, these manufacturers are innovative firms that received approval from the FDA to sell new products, but firms also acquire production rights at various points in a product's lifecycle.[14] As in many other markets, drug manufacturers provide wholesalers with products in return for payment.[15]

The largest wholesalers in the pharmaceuticals market are McKesson, Amerisource Bergen, and Cardinal. These firms represent over 90 percent of market volume (Mulcahy and Kareddy 2021). Wholesalers purchase products from manufacturers based on small discounts on the publicly available list price known as the wholesale acquisition cost (WAC). While almost no one ultimately pays this price for a drug, the WAC is the best-known price and is the one most commonly discussed in media reports about "high and rising" drug prices. The discounts negotiated by wholesalers are summarized by the average manufacturer price (AMP), which represents the average price paid by all wholesalers for each product. The discounts received by wholesalers are often for features such as prompt payments and generally amount to only a few percentage points off the WAC.

Wholesalers then sell branded products to pharmacies at approximately the prevailing WAC, that is, a price that is largely similar to a wholesaler's acquisition cost (Seeley 2022). Any spread between the acquisition cost and the price paid by pharmacies represents profit for the wholesalers.[16]

12 In some cases, manufacturers may use other firms to undertake the actual manufacturing. These firms are referred to as contract manufacturing organizations (CMOs). In addition, the actual patent holder for a given drug may be a combination of firms that hold various rights to the underlying intellectual property and may split up revenues based on various royalty agreements. While these arrangements are economically interesting when it comes to questions of capital allocation and drug development, they are beyond the scope of this brief.

13 In reality, the value chain starts even earlier, with the active product ingredients that are essential (but often commodity) inputs into product manufacturing. For the purposes of simplicity, we abstract away from this part of the value chain.

14 Additionally, the firm that ultimately receives FDA approval is often not the same firm that initially began developing the product. Often, products begin at smaller biotechnology firms and then are acquired at some point in their development. While this process is economically interesting, it is outside the scope of this brief. That said, it is important to realize that even if the firm selling the drug did not initially develop the product, it is the commercial opportunities available for products that dictate investment at all stage of product development.

15 That said, in the pharmaceutical industry manufacturers then provide separately negotiated discounts to plan sponsors (i.e., the insurance company or employer purchasing the product, rather than the actual consumer of the product). We discuss these nuances below after establishing how products move through the system.

16 Historically, this process included a practice of "forward buying," that is, purchasing large amounts of drugs today, holding them in inventory, and then selling them later, after manufacturers raise the WAC and thereby mechanically increase the price paid by pharmacies. However, as the pace of price increases has declined, this strategy has proven far less lucrative for wholesalers.

Patients purchase pharmaceuticals from a pharmacy, either in a physical location or by mail. Over time, this market has become increasingly concentrated. In 2022, the five largest pharmacies were CVS Health (both mail order and retail), Walgreens Boots Alliance, Cigna (mail order), UnitedHealth Group (OptumRx mail order), and Walmart Stores. Together these five account for 64 percent of all retail sales (Fein 2023b). Larger pharmacies may have more leverage in negotiations with both wholesalers and buyers. This leverage could allow them to earn more margin on the spread between the acquisition price and the sales price of the drugs. It also allows them to demand greater dispensing fees for medications—fees that can represent the majority of the pharmacy profits from branded expensive drugs. Left behind in this pattern of consolidation are the remaining independent pharmacies that have little market power and therefore have experienced consistent decreases in reimbursements for their services.

In addition to traditional retail pharmacies, many patients now receive their prescriptions from specialty pharmacies distributing specialty medications. These medications are generally expensive, treat complex conditions, and often require more careful handling in terms of refrigeration and storage. Patients taking them also often need more intensive interactions with a pharmacist.

As a result of these features, specialty pharmacies likely generate additional value for patients who use these expensive medications. Increasingly, pharmacy benefit managers (PBMs)—that is, the entities responsible for managing the pharmaceutical benefits of health insurance programs—have moved into owning mail order or in-person specialty pharmacies. They have also been requiring enrollees to use these integrated pharmacies rather than independent providers. It is possible firms are doing so even if this decision decreases the quality of the insurance product for enrollees that value access to these pharmacies. PBMs may engage in this behavior because independent specialty pharmacies, compared to their retail counterparts, may generate more unique value for customers that specialty pharmacies can attempt to leverage into higher reimbursements. While in many markets such a strategy would be unlikely to create profits, many patients using these drugs are actually not profitable for insurers because such patients have exceptionally high medical costs. Underserving such patients on quality (even if doing so incentivizes them to move to another insurer) may result in a more advantageously selected insurance pool.

2.c. How Net Prices Are Determined for Retail Pharmaceutical Drugs

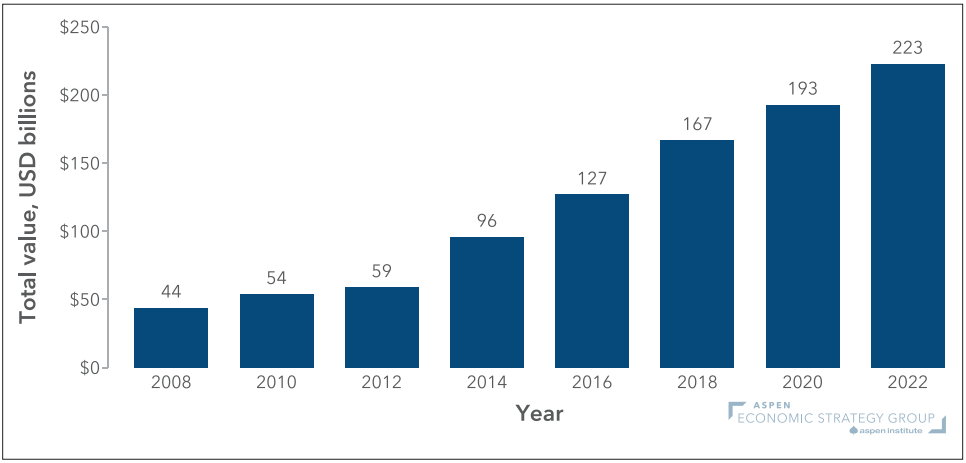
The prices paid on the distribution side of the drug market are largely divorced from both the profits of manufacturers and the payments by customers and plan sponsors (i.e., the employer, fully insured plan, union, or other entity responsible for paying for the drug). Figure 5b depicts the flow of funds and negotiations regarding retail prices in the pharmaceutical market.

2.c.1. The Role of Rebates in Determining Retail Pharmaceutical Prices

The actual prices paid for retail pharmaceuticals are largely determined by negotiations between PBMs and manufacturers (or by regulation). PBMs are the firms responsible for managing the pharmaceutical portion of a patient's health insurance benefit. This management includes, among other activities, negotiating discounts (or "rebates") off the WAC, negotiating prices paid to pharmacies, establishing networks of pharmacies, and establishing formularies (i.e., determining which products patients have access to and at what out-of-pocket price).

Negotiating rebates with plan sponsors is economically meaningful, as this process determines retail prices and thus profits for manufacturers. These profits provide incentives for firms to invest in new products and serve as an essential component to tradeoffs in the retail sector. As in the wholesale market, everything related to the PBM-manufacturer-pharmacy relationship begins with the WAC. However, the divergence of retail prices from WAC is greater than the divergence seen in the wholesaler market—evidence that rebates are economically significant. The role of rebates has also grown in recent years. Consider the evidence in figure 6, which charts total rebates paid in the system from 2007 to 2022. Over that period, these rebates have grown from $43 billion to $223 billion—a rate that far exceeds growth in drug spending. The biggest change in rebates happened after 2012, when the policy changes described below made increased Medicare list prices more advantageous.

Figure 6. Pharmaceutical Manufacturers' Off-Invoice Discounts, Rebates, and Price Concessions, 2008-2022

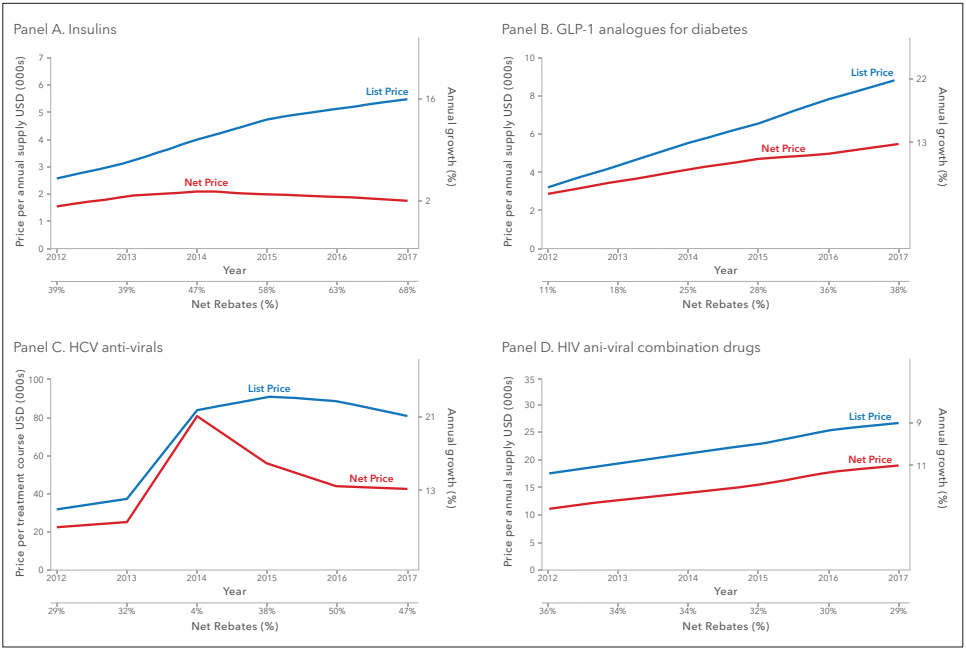


Source: Maas (2020).

Growing rebates reflect, in part, the ability of PBMs to credibly promise to move market share to alternative products. In therapeutic areas where many competing products are available to patients, there are more opportunities to move patients and, as a result, larger discounts. Consider figure 7 from Kakani, Chandra, and Chernew (2020), which shows net price and list prices for products that treat various conditions. In panels A and B, a growing gap is evident between net and list prices for insulins and GLP-1 analogues—both of which are drug categories containing multiple products that offer similar therapeutic benefits. In panel D, which represents prices for HIV antiviral products, there has been almost no divergence between these two prices. Over the time period depicted in the figure, there was almost no change in competitors; nor were any products introduced that offered meaningfully different clinical benefits for HIV antiviral drugs.

Perhaps the most interesting example is panel C, which contains prices for cures for hepatitis C (HCV). This class started as a near monopoly with the introduction of Sovaldi and Harvoni by Gilead in late 2013 as the only existing cures for this disease. For that reason, the list and the net price are exceptionally close. After competition emerged in 2015 (with the introduction of Abbvie's Viekira Pak), there is a greater spread between these prices—reflecting the ability of PBMs to force manufacturers to negotiate when there are good substitutes.

Figure 7. Growth in List and Net Prices Per Treatment Course or Annual Treatment Supply in Select Categories (2012-2017)



Source: Kakani, Chandra, and Chernew (2020).

PBMs move market share across competing products using formularies that dictate what drugs patients may access. Formularies generally involve both financial and nonfinancial forms of utilization management. Nonfinancial utilization management includes processes such as prior authorization, step therapy, and at the extreme, complete exclusion from coverage. Prior authorization requires pharmacies to receive permission from the payer to dispense a drug to a particular patient. This process is often used for expensive products and involves consultations between the payer and the prescribing physician. Step therapy requires patients to try and fail on therapeutic substitutes before getting access to newer and more expensive treatments for their condition. At the extreme, some drugs are altogether excluded from coverage. As of 2022, the three largest PBMs each excluded more than 400 products—with each plan differing in its particular exclusions (Fein 2022a). The terms of nonfinancial utilization management are negotiated by the PBM, plan sponsor, and manufacturer. Providers offering larger discounts are managed less in this way than are those who refuse to concede on price. Therefore, even though patients are largely shielded from prices in this sector, utilization management of PBMs nevertheless drives a negative relationship between price and quantity.

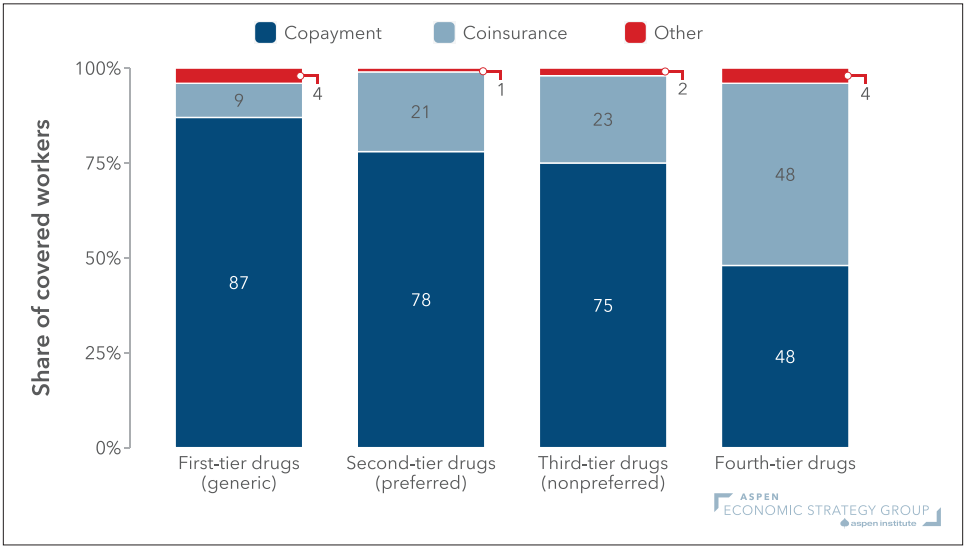
Patients are not entirely shielded from the cost of their prescriptions, however, because formularies also practice financial utilization management. Such management is implemented in the formulary through a series of tiers of increasing costs for patients. As part of the negotiation between PBMs and manufacturers, manufacturers who offer greater price concessions gain access to a greater number of formulary tiers in which patients face reduced cost sharing and out-of-pocket payments. Increasingly, PBMs are using more tiers in their formularies. Just over 60 percent of customers with high-deductible plans have four tiers of cost sharing for pharmaceuticals, compared to only 41 percent in more traditional health care plans (Fein 2023a). The majority of customers, regardless of plan type, have at least three tiers in their formulary.

Patient cost sharing comes in three main forms: (1) a deductible, or a pre-specified amount of medical spending wherein the patient is solely responsible for all costs; (2) a co-payment, or a fixed payment a patient makes to access a drug; and (3) coinsurance, or a percentage of a drug's costs that a patient must pay before gaining access to the product.

Figure 8 depicts the type of cost sharing applied to drugs based on their formulary tier. Drugs assigned to higher formulary tiers are more likely to be covered by coinsurance than by co-payments. This practice often exposes patients to greater out-of-pocket payments. Figure 9 shows average co-payment and coinsurance amounts by tier. For drugs on the fourth formulary tier, the average co-payment per prescription is over $100 and the average coinsurance amount is 25 percent—figures that can result in

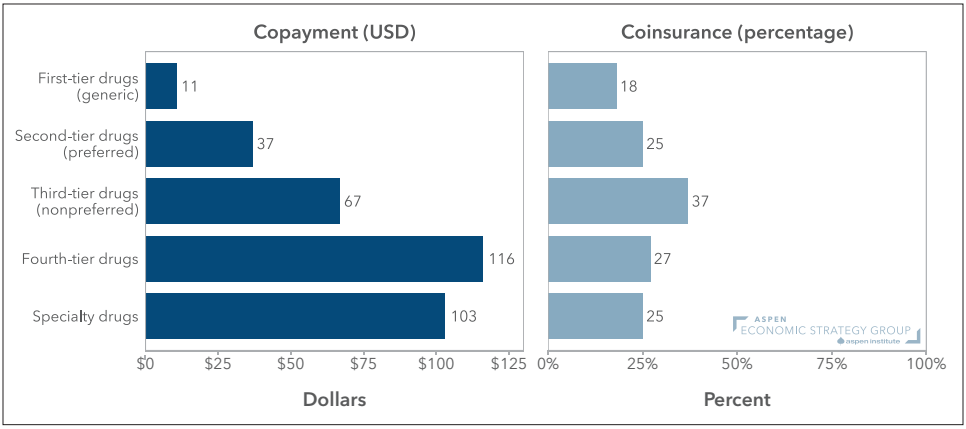
high cost sharing for exceptionally expensive drugs. For example, Revlimid—a drug that treats multiple myeloma—has a list price of approximately $20,000 per month. Thus, patients with 25 percent coinsurance would be responsible for paying $5,000 out of pocket each month to gain access to this life-saving medication.[17]

Figure 8. Type of Cost Sharing for Prescription Drug Benefits, Employer-Sponsored Plans Without High Deductibles, by Benefit Tier, 2022



Source: Fein (2023a).

Figure 9. Average Cost Sharing by Prescription Drug Tier, Employer-Sponsored Plans, 2022



Source: Fein (2023a).

17 A patient's ultimate charges are determined by any limits in the insurance contract on the enrollee's out-of-pocket payment cap. Insurance contracts with lower limits on potential out-of-pocket payments tend to charge higher premiums.

This degree of cost sharing has implications beyond simply pharmaceutical pricing. Recent research shows that even small increases in cost sharing impact medication adherence in ways that negatively impact health, up to and including increasing mortality among affected patients (Chandra et al. 2023). There is little evidence that patients are responding to high cost sharing in a particularly well-informed manner; they appear to stop taking nearly all drugs when faced with higher out-of-pocket expenses. Given these broader effects of cost sharing, it is important that any discussion of pharmaceutical pricing contends with both the net price paid by plan sponsors and the out-of-pocket costs of consumers.

The degree of cost sharing is intrinsically linked to the publicly available WACs set by pharmaceutical firms. Given that the magnitude of negotiated rebates is meant to be confidential, any cost-sharing payments based on a drug's price (i.e., deductibles and coinsurance) are a function of the publicly available WAC and not of the drug's ultimate net price (i.e., the price after the negotiated rebate). For products with large rebates (i.e., those where there is a large difference between the WAC and the net price), this state of affairs can result in patients paying a meaningful fraction of the drug's net price as a cost-sharing payment. They are especially likely to do so in the more complicated formularies described above, wherein patients are expected to pay a significant percentage of the drug's price.

2.c.2. Contract Structure and the Distribution of Profits

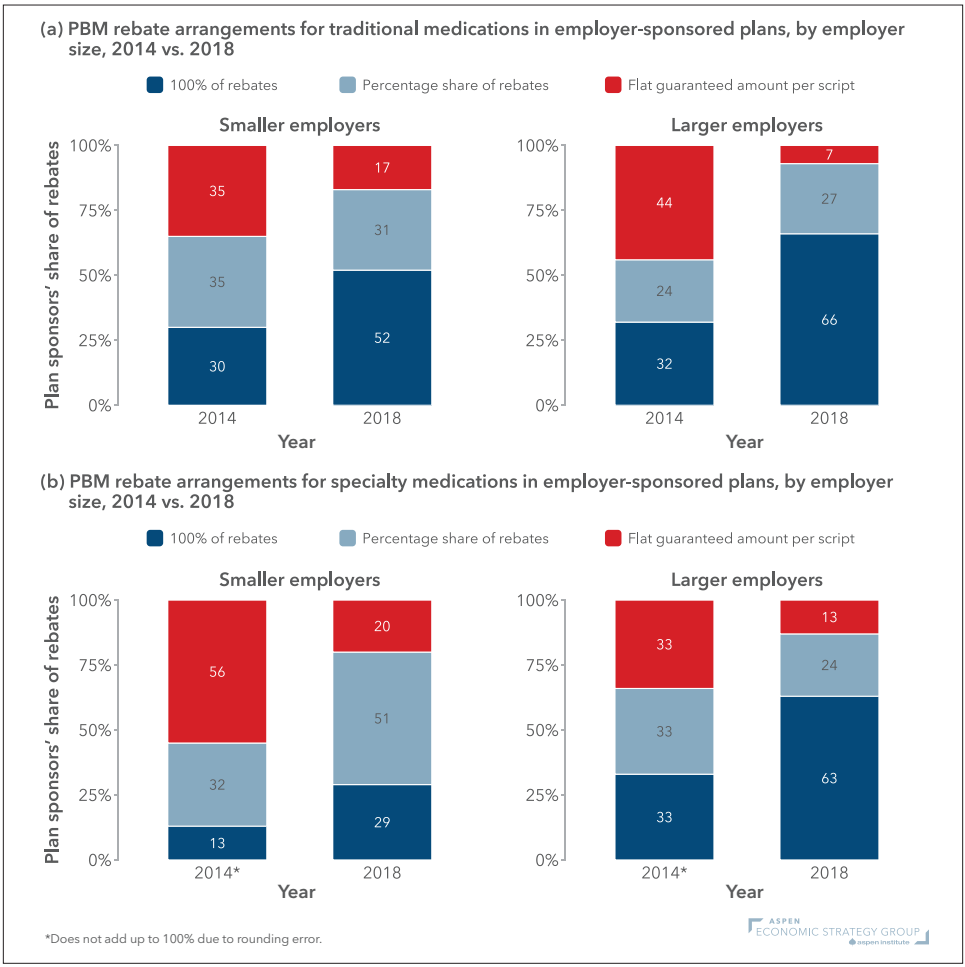
Given the relationship between list prices and rebates, this negotiation process has become an increasingly controversial part of the pharmaceutical value chain. The second area of bipartisan consensus, after the inequity of low European drug prices, is the view that PBMs are exploiting their position as middlemen to siphon money from both patients and pharmaceutical firms.

Understanding whether this belief is true requires knowing more about the PBM business model. PBMs are paid for their services through a variety of means, such as by charging a per-member-per-month (PMPM) fee, keeping a pre-specified portion of the negotiated rebate, and keeping the difference between what they pay the pharmacy for a drug and what the plan sponsor pays (i.e., spread pricing). Critics contend that because the PBM initially receives the rebate and/or keeps part of it as compensation, the market is broken. In point of fact, however, all of these contractual features are interrelated and reflect the specifics of the market structure.

In plans where the PBM keeps a portion of the rebate, they almost always earn a lower PMPM fee. Similarly, when they earn a higher PMPM fee they receive a smaller (or no) share of the rebate. Increasingly, plan sponsors are negotiating PBM contracts where they receive all or a substantial share of the rebates negotiated by the PBM. Figures 10(a) and 10(b) show estimates of the percentage of all rebates shared in part with plan sponsors. A growing fraction of plan sponsors, particularly for large plans, receive all their negotiated rebates from the PBM.

Plan sponsors might desire that PBMs receive a fraction of the rebate because such an arrangement provides managers an incentive to negotiate larger discounts. But for PBMs to keep a portion of the rebate is controversial—after all, these firms can generate larger rebates by allowing list prices to rise. Such cases would not result in greater savings for the plan sponsor (indeed, they might increase sponsor costs) but would increase the profits of the PBM. Similarly, PBMs can capture a portion of the spread between what the plan sponsor pays for a product and what the PBM pays the pharmacy. This practice, known as spread pricing, can provide the plan sponsor with certainty and insurance against volatile drug pricing. One risk, however (which we describe below), is that plan sponsors may be kept in the dark as to the true value they are bringing to the table when purchasing pharmaceuticals—and that PBMs may exploit that ignorance for their own profit.

Figure 10.



Source: Fein (2019).

2.c.3. PBM Concentration and Impact on Consumers

If a PBM increased list prices solely to capture more of a rebate, or if they were not putting sufficient effort into negotiating large rebates, total drug spending for plan sponsors would increase. Similarly, if a PBM were charging a plan much more than they themselves were paying pharmacies, pharmaceutical spending in that plan would rise.

Of course, if plan sponsors are concerned about PBMs manipulating prices to obtain higher rebates or spreads, they can move their contract to another PBM. The validity of this threat to discipline PBMs is a function of the level of competition in the PBM market. Therefore, concerns about pricing in this area should focus more on the amount of competition in this market than on the contractual arrangements between the parties.

There are valid reasons for concern about competition related to market concentration. The largest PBMs are CVS Caremark, OptumRx, and Express Scripts, which together represent over 80 percent of the market. Another 15 percent is accounted for by Humana Pharmacy Solutions, Prime Therapeutics, and Medimpact (Fein 2023c).

Beyond being concentrated, a set of vertical mergers over the last five years has transformed the PBM market. Currently, the four largest PBMs are wholly owned by large national insurance firms. After these mergers, a PBM using rebates to capture value from a plan sponsor would appear to just be taking money from another part of their commonly owned firm.

But if vertically integrated PBMs are not allowing rebates to increase solely to capture an inappropriate amount of value from plan sponsors, why do we continue to see rebates rise even after such extensive vertical integration? For one, the integration of a PBM and an insurer may not have much impact on incentives for PBMs as they relate to plan sponsors. In turn, insurance companies in the commercial market increasingly serve simply as administrators of employer plans.[18] In those contractual settings, the PBM may still have an incentive to use rebates to capture more value as profit.

Another reason for these rising rebates, however, could be the interplay between cost sharing, list prices, rebates, and insurance premiums. For products with many customers and a wide list-to-net spread in prices, cost sharing can be used strategically to lower premiums and increase market competition.

2.c.4. A Numerical Example of Strategic Cost Sharing

Consider the cost of a monthly product with a $1,000 list price and a $600 rebate, where the patient has a $2,000 deductible and 20 percent cost sharing. As mentioned above, given the desire to maintain the confidentiality of negotiated prices, price-based cost sharing is a function of the list price (before rebates) rather than the net price. For this product, the patient pays the full price for the first two prescriptions: meeting her $2,000 deductible. Despite not paying anything, the plan sponsor still gets $1,200 in rebates for those two prescriptions—money that can either be used to lower premiums for all customers (i.e., the larger number of healthy customers not buying expensive drugs) or kept as profits. The relative disposition of these funds will depend on the market structure.

For the next ten prescriptions that year, the patient would pay $2,000 out of pocket ($200 each: 20 percent cost sharing on a $1,000 list-price drug), while the plan sponsor

18 For these plans, the health insurer is operating as a third-party administrator (TPA) that offers an administrative-services-only (ASO) contract to the plan sponsor. While the TPA organizes the benefits, the plan sponsor is still responsible for drug spending. For example, approximately 70 percent of UnitedHealth's commercial business involves insurance plans where the firm administers the benefit but bears no risk of higher medical spending, including spending on pharmaceuticals. See UnitedHealth Group 2023.

would only pay $4,000 for the drug (at $400 each after the rebate). Ultimately, the patient would pay an annual cost of $4,000. The plan sponsor would only pay a net cost of $2,800, since the sponsor would also receive rebates of $1,200 that were effectively paid by the sick patient. In this way, the rebate dollars have offset a massive fraction of the costs of insuring this patient.

This concern is not theoretical. A recent Senate Finance Committee report on insulin pricing contained emails between manufacturers and PBMs about the potential to offer a lower-list-price version of insulin. The report described the emails in this manner: "Two weeks prior to this email, Eli Lilly executives raised the possibility that PBMs would object to a list price reset because it would result in (1) a reduction in administrative fees for PBMs, (2) a reduction in rebates, which would impact PBMs' ability to satisfy rebate guarantees with some clients, and (3) *impair their clients' ability to lower premiums for patients, thereby impacting their market competitiveness"* (Grassley and Wyden 2021, emphasis added).

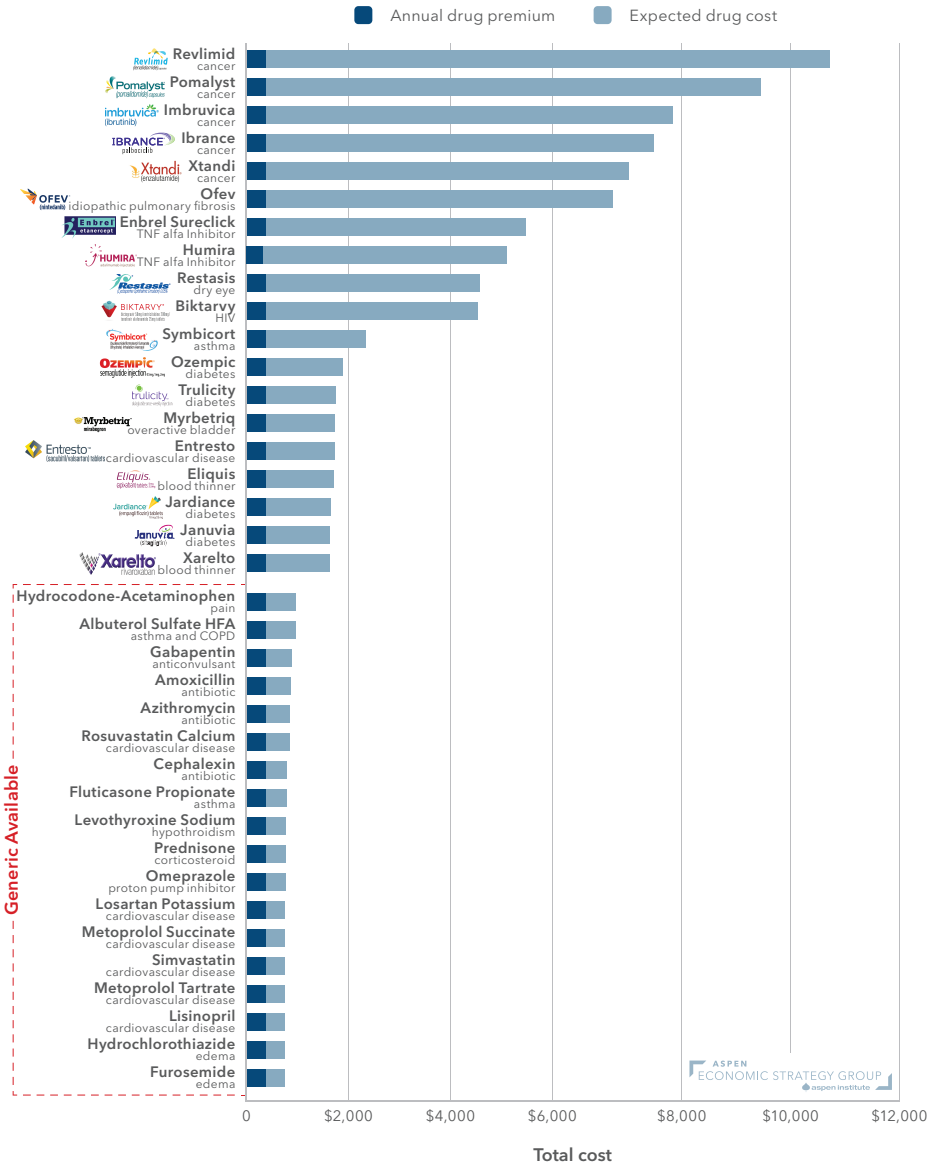
To examine this issue further, we use Medicare data to construct measures of expected spending for hypothetical consumers.[19] We begin with the best-selling drugs for 2021. To measure the extent to which they treat chronic conditions, we calculate medication position ratios (MPRs) using historical data. (MPRs are the number of days' supply the patient fills in a year, divided by 365.) We note that the average MPR of these blockbuster drugs is over 0.8x. Using a comparison tool created by the federal government, we then calculate expected out-of-pocket costs for a patient taking these drugs.

We input demographic information for a hypothetical consumer in Evanston, Illinois. We then collect premium and expected out-of-pocket costs by plan. We input this data first for the average consumer and then for a consumer taking each of the drugs described above. We then define "total expected spending" as the sum of (certain) premiums and expected out-of-pocket costs. We report this information for the lowest- and median-cost plans available to the consumer.

The results of this exercise are depicted in figure 11. The top of this figure includes branded drugs for which there are no generic or biosimilars available. It is immediately obvious that many patients with conditions such as cancer, autoimmune diseases, asthma, and HIV spend thousands of dollars out of pocket each year. For example, once we consider the known and certain cost sharing, patients taking ibrutinib (Imbruvica) for various types of leukemia could face an annual premium of $7,495. If that patient took no prescription drugs for a medical condition, their premium would only be $345. In this way, large cost sharing payments have introduced medical underwriting into insurance for prescription drugs.

19 While we use Medicare data for this exercise, we do not mean to suggest that the problem is exclusive to Medicare.

Figure 11. The Median Medicare Part D Plan: Total Cost by Drug



Source: Authors' calculations.

As we discuss below, other concerns emerge because of a lack of transparency around payments. While PBMs negotiate with plan sponsors about the distribution of rebates, growing anecdotal evidence suggests that manufacturers and PBMs engage in meaningful transfers that are classified as administrative fees rather than as rebates. Like rebates, these payments are often determined as a percentage of WAC, but they are less apparent to plan sponsors who do not have insight into the financial arrangements between manufacturers and PBMs—even when those payments result from sponsor spending.

It is unclear whether such administrative fees represent bona fide services or are instead simply a renamed version of rebates that are designed to allow PBMs to take advantage of asymmetric information to capture more value from the supply chain—questions we come back to when we discuss policy solutions for drug pricing below.

2.d. Prices in Medicare Part D

The process for determining prices for commercial retail pharmaceuticals described above dictates spending for the largest purchasers of prescription drugs in the United States. The second largest purchaser is Medicare. Specifically, the Medicare Part D program provides retail prescription-drug coverage for the elderly and the disabled.

While Part D is a social insurance program that is primarily financed by the federal government, nearly all features of negotiation and administration in this program are handled by private firms. The five largest firms in the Medicare Part D market are UnitedHealth, Humana, CVS Health, Centene, and Cigna. Together, these plans account for 75 percent of Part D enrollment. Each of these firms is a large and sophisticated insurer that negotiates drug prices as part of its normal business model. In their role as Part D plan sponsors, they effectively operate as highly regulated commercial firms. That said, particular features of reinsurance and financing do influence prices and strategies in this market.

The financing of drug expenditures in Part D has evolved over time—and was meaningfully changed as part of the IRA. Figure 12 charts the structure of expenditures as of 2023 and forecasts it for after 2025—when the majority of IRA changes will have gone into effect. Key elements of the current Medicare Part D cost-sharing structure are as follows:

1. Deductible period: Enrollees are required to cover all prescription expenses for a deductible period.

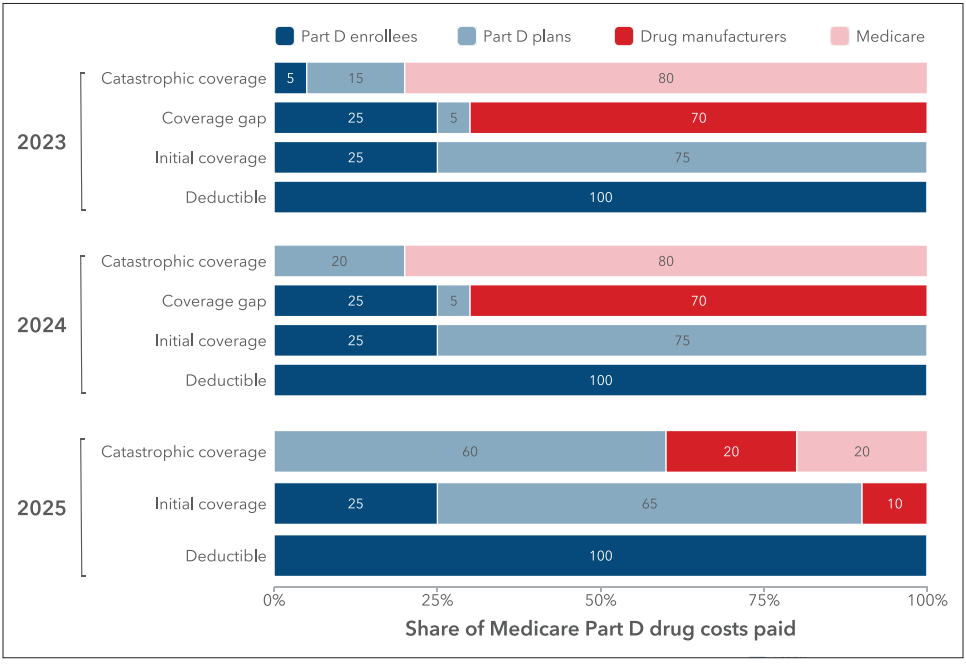
2. Initial coverage: Following the deductible period, patients face coinsurance of 25 percent, with the remaining 75 percent of expenditures paid for by the Part D plan (e.g., UnitedHealth or CVS).

3. Coverage gap: After reaching a certain out-of-pocket threshold, individuals then pay 25 percent coinsurance, but the Part D plan's responsibility falls to only 5 percent. The remaining 70 percent is paid by drug manufacturers.

4. Catastrophic phase: After $7,400 in out-of-pocket spending, the enrollee contribution falls to only 5 percent. However, for individuals who have not secured supplemental insurance coverage, there is no upper limit on their expenditures. The government is responsible for 80 percent of these costs, and Part D plans pick up the remaining 15 percent.

Under this method of dividing expenses, high cost sharing for enrollees (which can be driven by higher list prices) increases their out-of-pocket share of total spending and reduces the expenditures of both plans and manufacturers. This reduction comes at the expense of both enrollees and taxpayers: work demonstrates that products with a higher share of patients on Medicare had greater list-price growth, as both manufacturers and Part D plans attempted to shift spending onto patients and the government (Ippolito and Levy 2023).

Figure 12. Share of Medicare Part D Drug Costs Paid by Enrollees, Plans, Drug Manufacturers, and Medicare, 2023-2025



Source: Cubanski and Neuman (2023).

These costs led to calls for additional reforms to Medicare Part D cost sharing in the IRA. The most salient of these changes, depicted in figure 12, was to remove any enrollee responsibility for spending in the catastrophic phase. In addition, the government share of spending in this period was reduced to 20 percent, while Part D plans are now responsible for 60 percent. The IRA reforms also include a cap on out-of-pocket expenditures of $2,000. However, even if we examine the estimates in figure 11 there are still a number of drugs that would automatically put patients at this limit each year simply as a result of their chronic—and known—condition.

2.e. Prices for Retail Drugs in Medicaid

The third-largest purchaser of prescription drugs is state Medicaid programs. Medicaid is the government insurance program for impoverished and disabled Americans. Unlike Medicare Part D, prices in this market are determined by regulation that guarantees that Medicaid pays the lowest or "best" price in the market. For branded drugs, this requirement is met by granting Medicaid a rebate equal to the greater of 23.1 percent of the AMP (i.e., the price paid by the wholesaler for the product) or the largest rebate available to any commercial-plan sponsor in the market.

The existence of these Medicaid rebates has implications for commercial price setting more widely, leading to higher prices for certain drugs. Effectively, this system of reference pricing across payers means that manufacturers who give large discounts to commercial payers will have to give similar discounts to Medicaid. The connection between discounts in the commercial market and Medicaid primarily exists for drugs in competitive therapeutic areas where the average rebate already exceeds the 23.1 percent of AMP minimum discount. In those categories, the existence of the Medicaid best-price rebate has been shown to increase commercial drug prices, as firms must now pass on their largest discounts in the private market to all patients in Medicaid. Larger discounts therefore become more costly, particularly for drugs with a large fraction of patients on Medicaid (Duggan and Scott-Morton 2006).

Medicaid also receives an inflationary rebate designed to shield the program from price increases that exceed inflation. Firms must provide a rebate to the government that represents the difference between the current list price (based on the first price for the drug in the market) and an inflation-adjusted reference (based on the consumer price index). For drugs that have been on the market for many years and/or experience large price increases, these inflationary rebates can be quite large. For example, the Congressional Budget Office (2021) estimates that an economically meaningful fraction of products in Medicaid are now sold at between 0 and 5 percent of the Medicare Part D price.

The role of these inflationary rebates will only grow due to policy changes in the 2021 American Rescue Plan Act. This legislation removed a cap on the size of the inflation rebate that had been equal to the list price of the drug. When a rebate equals the list price of a drug, the manufacturer receives no revenue for the product from Medicaid. As a result of this policy change, for drugs where the inflation rebate exceeds the list price of the drug, manufacturers would actually be required to pay a Medicaid agency each time a patient fills a prescription for the drug.[20]

Most Medicaid programs are administered by private managed care organizations (MCOs). Although Medicaid is already guaranteed the lowest price in the market, MCOs provide value primarily by negotiating with pharmacies to lower dispensing fees and ingredient costs (Dranove, Ody, and Starc 2021). The ability of private insurers to obtain discounts hinges on their ability to say no to high-cost drugs and pharmacies. To the extent that state Medicaid agencies can do the same, they may also be able to reduce costs. However, the federal government recently denied the Massachusetts Medicaid program's request to restrict the state-administered formulary and pharmacy network, limiting the negotiating power of these MCOs.

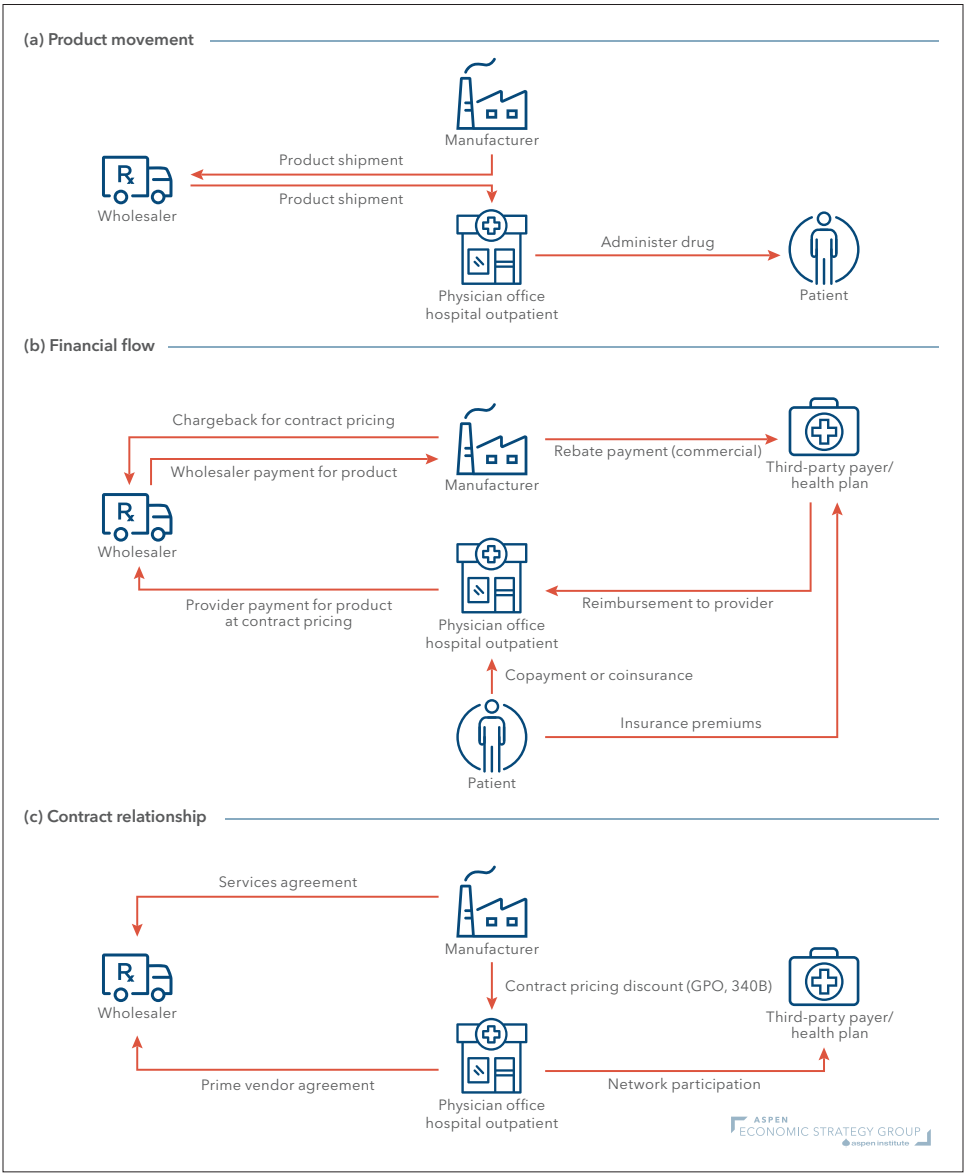
2.f. How Net Prices Are Determined for Physician Administered Drugs

While most pharmaceuticals are obtained in a retail setting (i.e., a traditional or specialty pharmacy), an increasing fraction of drugs are administered to patients in a physician's office or outpatient clinic. These physician administered drugs (PADs) are paid for through a different system. The basics of this system are summarized in figure 13. Like figure 5, this graphic shows basic product-movement patterns within a distribution system, then shows financial flows and contract relationships within the same system.

Rather than being administered by PBMs under a plan's pharmacy benefit, PADs are negotiated and paid for through the medical benefit. These drugs exist under a buy-and-bill system in which medical providers first acquire drugs and are reimbursed only when they administer the product.

20 The interplay between the various parts of the Medicaid system is important. While previous work has shown that the existence of the Medicaid Best Price rebate increases commercial prices, Feng, Hwang, and Maini (2023) find that the combination of all features of the Medicaid pricing system lowers commercial prices. It may lower them even more when rebates can exceed list prices, as was seen by the recent move in the insulin market toward lower overall list prices (Wilkerson 2023).

Figure 13. Distribution and Reimbursement of Provider-Administered Outpatient Drugs: Buy-And-Bill



Source: Fein (2021).

Medical providers negotiate discounts on these products from a wholesaler. Such negotiation is carried out either directly by the health system or through a group purchasing organization (GPO), that is, an organization that pools demand across a variety of health systems to negotiate prices. Increasingly, these providers also implement formularies by which they constrain access to some products to obtain larger discounts (Pedersen et al. 2020).

The Medicare system is one of the largest purchasers of PADs, and their payment methodologies cast a long shadow over the payments by commercial payers in this market. PADs are paid through Medicare Part B—often described as the "medical benefit,"[21]—and pricing works as follows:

- For each drug, Medicare calculates the product's average sales price (ASP), which represents the product's price net of rebates and discounts. ASPs reflect the average prices paid two quarters prior, making them a lagging indicator of post-rebate prices.
- Providers are reimbursed, with providers normally receiving 106 percent of the drug's ASP. Providers acquired this product at a negotiated price that could be above or below ASP based on the provider's negotiating power.[22]
- Many commercial insurers also base their negotiations with providers on a percentage of the drug's acquisition cost—though they often pay an add-on fee that is far greater than the 6 percent paid by Medicare.

As we discuss below, reimbursing providers in this way has immediate economic implications.

2.g. Prices for Small-Molecule Generic Products

The discussion above describes how prices are determined for branded drugs. Such drugs are single-source products for which one firm has intellectual property protection giving it the exclusive right to manufacture a particular product.[23] Such firms have monopoly pricing power over their particular product, and they face competition from therapeutic substitutes (i.e., products that treat the same condition using a different product).

21 One consequence of the vertical integration in the commercial market is a merging of the medical and the pharmaceutical benefit into a single product. This merger could change how drugs are negotiated and formularies constructed.

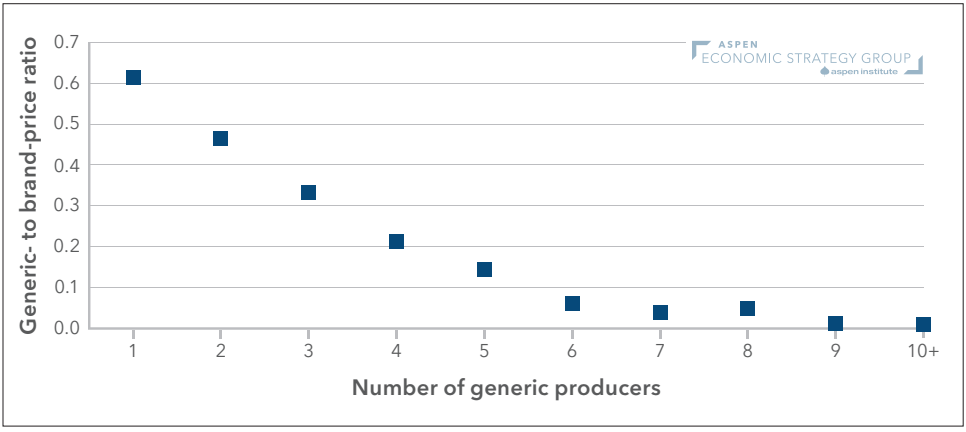
22 While providers are supposed to receive 106 percent of ASP, this figure was reduced to 104.3 percent during the budget sequester. In addition, a provider prescribing a qualified biologic can receive 108 percent of ASP for that drug.

23 In some situations, multiple firms have a financial stake in a product because of royalties, IP licensing, or other partnerships. Even in these settings, there is normally one firm acting as the manufacturer and supplying the product to the market.

While the majority of spending in the US is on such branded products, they represent a minority of the total pharmaceuticals sold in the market. In the United States, over 80 percent of prescriptions are filled by generic drugs. As a result, policies that affect generic competition have important consequences for consumers.

Since the passage of the 1984 Drug Price Competition and Patent Term Restoration Act (also known as the Hatch-Waxman Act), generic drugs have been a competition success story. After loss of exclusivity, generics capture a large fraction of the market at substantially lower prices (Scott-Morton 1999). Figure 14 shows how prices fall based on the number of generic providers that enter the market. By the time the fourth firm has entered a product market, prices have typically fallen by 80 percent.

Figure 14. Median Generic Prices Relative to Brand Price Before Generic Entry: Average Manufacturer Price (AMP)



Source: Conrad and Lutter (2019).

The success of generics in lowering prices can be attributed to several supply-side factors. First, insurers steer consumers to lower-cost generics through formulary design. Second, many states require automatic substitution at the point of sale, often a retail pharmacy. Such automatic substitution provides a means for low-cost entrants to capture market share without investing much in marketing or other costs. It also provides strong incentives for generic firms to produce at a low cost.

Retail pharmacies play an important role in the generic supply chain. As in other industries, retailers purchase drugs directly from manufacturers or from wholesalers. The decision of which manufacturers' products to stock is an important strategic choice, as consumers are largely indifferent to or ignorant about the supplier of these medications. Unlike buyers in other industries, however, pharmacies negotiate

reimbursement directly from third-party payers such as insurers. Pharmacy prices and rebates are set separately using different mechanisms.

Pharmacies often sign contracts that pay them a fixed dispensing fee plus an ingredient cost proportional to wholesale costs. Unlike dispensing fees, ingredient costs typically vary across drugs. Historically, average wholesale costs have been misestimated and manipulated (Alpert et al. 2013).[24] As a result, these contracts can distort behavior.

Many payers (insurers) have introduced new contractual arrangements, including provisions for maximum allowable costs. Under such contracts, payers set a ceiling price for specific active ingredients. Pharmacies profit by negotiating discounts from wholesalers for selling a particular version of a generic product.

Several factors threaten the competitiveness of generic drug markets. As discussed above, the retail and mail-order pharmacy market is increasingly concentrated and vertically integrated. In addition, shortages can reduce quantity, and anticompetitive behavior can increase prices.

Recent developments in generic markets have affected both the quantity and prices of generics sold. Drug shortages are increasingly commonplace. Manufacturer investments in reliability and quality depend on expected returns. Because price competition is so fierce in these markets, investments may be inefficiently low. Leibman et al. (2017) note that shortages are especially common for generic and injectable drugs—products that require more sophisticated and expensive manufacturing capabilities. They further show that reimbursement policy—which generates savings for payers—impacts supply. A policy change lowering reimbursement for some generic injectables led to greater shortages.

Alleged anticompetitive behavior has also led to skyrocketing prices. For example, an active collusive ring of generic manufacturers led to price hikes for over 100 drugs. The scheme generated $12 billion of additional profit for drugmakers (Cuddy 2020). Harms from the cartel likely persisted even beyond a formal investigation—the cartel was remarkably stable and appeared to persist without active collusion even after intervention.

Collusive prices are stable in the years following the formation of a cartel, even after investigation. The market becomes more attractive to entrants following price hikes. Starc and Wollmann (2022) find that entry plays an important role in disciplining the cartel. Cartelized markets experience a 30–40 percent increase in entry compared

24 Ingredient costs are often inflated, and as a result reimbursed point-of-sale prices can meaningfully exceed pharmacies' marginal costs.

to un-cartelized markets. However, largely due to delays at the FDA, the time from regulatory filing to approval typically exceeded two years. Yet simulations show that entry is beneficial to consumers, reducing cartel harms by a third. Taken together, the structure of the market for generic drugs generates low returns to both entry and investment in quality.

The stability of this cartel demonstrates that firms do not need to engage in active collusion in order for generic drug prices to remain elevated. In small markets and/or those where entry is difficult, it is possible for firms to *tacitly collude* to maintain high prices across multiple products.

Recently, several entrants into the generic industry have attempted to deal with high prices. These entrants include both Mark Cuban's CostPlus Drugs and CivicaRx. The potential effects of these two entities differ. CostPlus Drugs is currently serving as a middleman that is acquiring drugs from the lowest-cost owner of an abbreviated new drug application (ANDA—i.e., the FDA right to manufacture and market a product). Therefore, to the extent that high prices are the result of either formal or tacit collusion among ANDA holders, CostPlus Drugs can have little effect. It can, however, influence spread-pricing contracts and the resulting cost sharing for patients. That said, the ultimate effect is less clear, as changes to spread pricing will affect the equilibrium contract terms as PBMs negotiate to change those terms.

CivicaRx is a nonprofit organization that was started by a consortium of hospitals spearheaded by Intermountain Healthcare in Utah. Initially these hospitals were interested in addressing natural monopolies on small-market drugs and drug shortages for hospital administered pharmaceuticals—both of which dramatically increased hospital costs and limited profits. Civica initially engaged in contract manufacturing from existing ANDA holders (providing guarantees of demand for these products) and began construction of its own manufacturing and applications for its own ANDAs. It also partnered with the Blue Cross Blue Shield Association to undertake the same activities for drugs sold through retail channels.

2.h. Prices for Biosimilar Products

Post-patent products for small molecules are referred to as generic products because they are exact bioequivalent copies of existing products. For biologic or large molecule products, however, the nature of the complexity of the molecule means that firms cannot simply make an exact copy of the product. Since 2010, firms have been allowed to develop and manufacture "biosimilar" products.[25] These

25 Firms were allowed to sell such biosimilar products in Europe in 2006 when Omnitrope entered as a biosimilar for human growth hormone.

products are intended to be broad replicas of the branded reference biologic product that provide an identical therapeutic benefit to the original product. However, since they don't represent an *exact bioequivalent copy*, biosimilar products do not enjoy the same rules regarding automatic substitution as small-molecule generics.

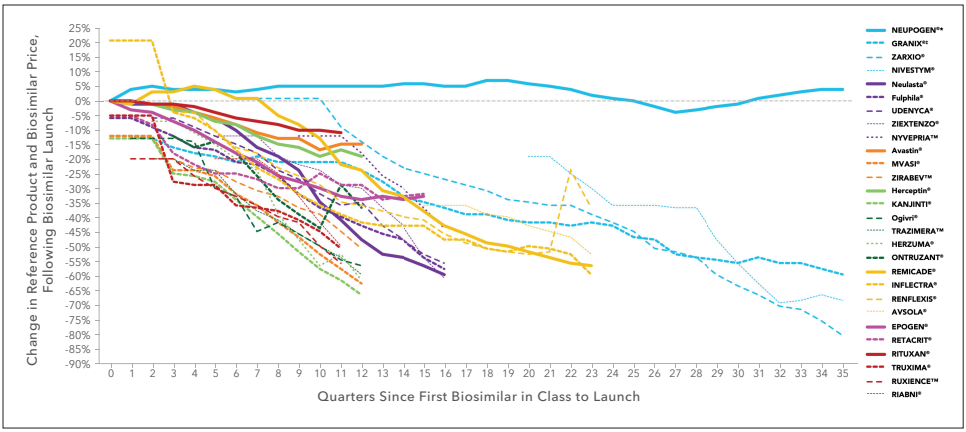
The lack of automatic substitution means that patients using a biosimilar require a specific prescription for the exact product. For example, one of the highest-grossing drugs in history is adalimumab (Humira). After a series of patent disputes, in 2023 Amgen released a generic version of Humira, adalimumab (Amjevita). Humira's 2022 list price of $6,922 per month, with an average rebate of reportedly 40 percent, subjected this biologic to significant attention. Patients gaining access to the product would need a new prescription for Amjevita and not for Humira. A pharmacist would not be able to provide a patient with a Humira prescription for the lower-cost Amjevita unless a doctor provided a new prescription. Therefore, a US biosimilar manufacturer such as Amgen was required to negotiate with PBMs for formulary placement (and to market to consumers and physicians) in a manner more similar to that of a manufacturer of an innovative biologic product than that of a small-molecule generic manufacturer.

Historically, biosimilars were paid similarly to their reference products; that is, providers were reimbursed 106 percent of ASP. However, the biosimilars' add-on payment (i.e., the 6 percent additional payment above ASP) was based on the ASP of the reference product rather than on the biosimilar price. To increase the adoption of biosimilar products, the IRA increased this payment for biosimilars to 108 percent of ASP for the first five years following market entry.[26] Following this period, the biosimilars' reimbursement will return to the standard 106 percent.

While biosimilar entry in the United States has not been as robust as it has been in Europe, these products are gaining market share and competing on price with reference products. Consider figures 15 and 16, which show the ASP and market share for biosimilars and reference products based on the number of quarters since entry. The impact of these products varies, but in general they have reduced prices for the reference products. Some of this variation is based on the strategy of the reference product and the characteristics of the drug—which we discuss below.

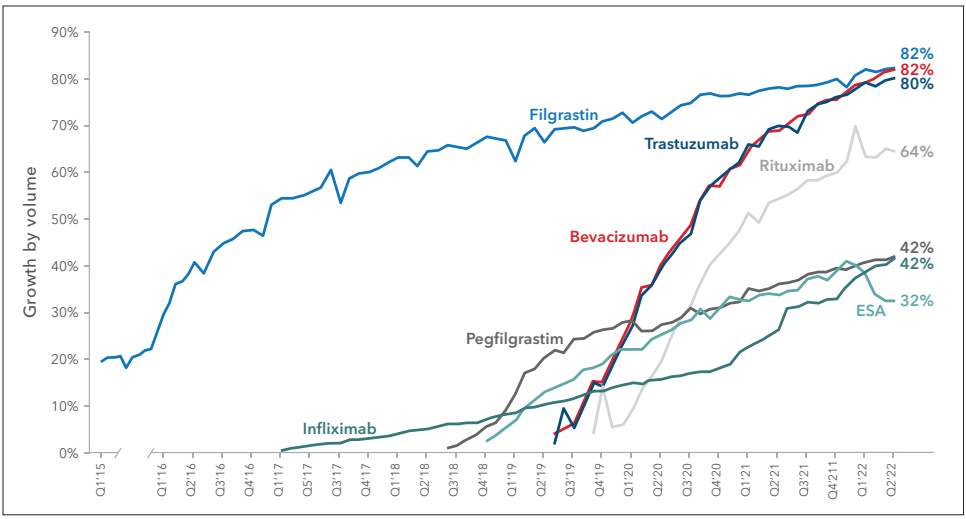
26 This payment is only available for biosimilar products with a price below the ASP of the reference product.

Figure 15. Downward Trend in ASP for Biosimilars and Reference Products Over Time



Source: Amgen (2022).

Figure 16. Biosimilar Uptake Curve



Source: Amgen (2022).

3. Economic Concerns Regarding Pharmaceutical Prices[27]

As discussed above, controversy over the high and rising prices of prescription drugs has resulted in legislative and policy activity including the passage of the IRA. The evidence is clear that such legislation will reduce the level of investment in

27 Some of this text also appears in previous congressional testimonies by Craig Garthwaite.

new products and the pace of new biopharmaceutical product entry.[28] In addition, the blunt nature of such reforms often ignores valuable benefits that come from ongoing research into existing products. This phenomenon holds particularly true in the more complicated world of modern pharmaceuticals, in which products receive multiple indications (i.e., they are often approved by the FDA to treat multiple conditions). Such approvals can only be obtained through continued clinical trials and investment after a product launches. Regulations that shorten the period of exclusivity, for example, could impact welfare not only through the extensive margin of fewer products being introduced but also via the intensive margin of a decreased use of existing rugs resulting from reduced information about the potential clinical applications of those products.

The mere fact that innovation will decrease is not a reason to ignore questions regarding optimal drug prices. Our goal is not to develop a system that creates as many products as possible but instead one that maximizes social welfare. Given that so many features of the pharmaceutical market are dictated by government policy—in particular, the length and strength of intellectual property protection—the question of how much we pay for drugs is ultimately a policy decision.

Optimal policy should focus on identifying areas where the existing systems for acquiring or purchasing drugs and/or financing their purchase are causing unnecessary inefficiencies that decrease access to products today without providing sufficient incentives for firms to invest in future innovation.

Optimal policy should focus on identifying areas where the existing systems for acquiring or purchasing drugs and/or financing their purchase are causing unnecessary inefficiencies that decrease access to products today without providing sufficient incentives for firms to invest in future innovation. We detail several such areas for policy reform below.

3.a. Implementing Price Negotiation in Medicare Part B

"Medicare," defined as the Centers for Medicare and Medicaid Services (CMS), has historically been barred from directly negotiating the price of retail drugs. This proscription is often referred to as the *non-interference provision* of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA), that is, the

28 The exact magnitude of this effect is surrounded by a great deal of uncertainty. However, a clear body of research shows a strong connection between expected profits of new products and firm investments in research and development.

enabling legislation for Medicare Part D.[29] However, Part D relies on private firms that construct prescription drug plans and negotiate prices (Kirchhoff 2022).

As part of the IRA, CMS will now have a more direct hand in setting prices for the most expensive drugs in the Medicare program. CMS will effectively have an unfettered ability to set prices for small-molecule products beginning nine years after market entry and large-molecule drugs after 13 years. Such price setting power could have meaningful implications on the investment decisions of firms, particularly for the small-molecule products that may face price setting after a shorter period of time.

Even before the IRA, Part D had benefitted from price negotiations by private firms engaged in the retail prescription drug market. However, many policymakers and health policy experts have concerns that the physician administered drugs covered by Medicare Part B face less stringent negotiations. As detailed above, Medicare reimburses physicians under a buy-and-bill system that is governed by the price negotiated for the product in the commercial market. The purpose of this system is to provide doctors with simplicity and predictable reimbursement. In addition, Medicare hopes that this system will allow the government to leverage private-sector negotiations to secure lower prices with government involvement. Unfortunately, these attractive features come at a cost for the entire system, as Part B procurement rules increase prices for public and private markets while also potentially shifting market share at the margin to more-expensive treatment options.[30]

To understand the widespread effects of Part B, consider the motivations of a pharmaceutical manufacturer negotiating with GPOs and providers to determine a drug's optimal price. These profit-maximizing manufacturers set prices at a point that earns the greatest profits. Higher prices will, by definition, *decrease* the firm's total profits. They will do so because the increased margin per product sold will not make up for the lost quantity resulting from greater use of prior authorization, step therapy, increased cost sharing, or other utilization management tools. If such a decrease does not come about, then the profit maximizing firm was charging an inefficiently low price in the first place.

By linking public and private prices, however, the Part B purchasing rule distorts the optimal pricing decision in the private market. Firms are now willing to increase

29 Specifically, the relevant clause states that "the Secretary: (1) may not interfere with the negotiations between drug manufacturers and pharmacies and PDP sponsors; and (2) may not require a particular formulary or institute a price structure for the reimbursement of covered part D drugs."

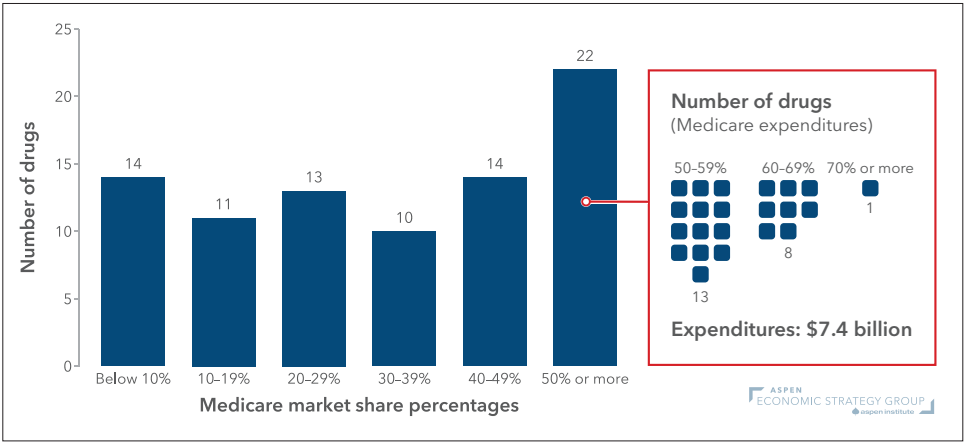
30 This pressure on prices is particularly acute in the case of launch prices. Given that the ASP is a lagging indicator of price, manufacturers face some difficulty in quickly raising prices because the actual price paid by physicians would start to outpace ASP updates. However, this phenomenon does not hold true for the initial launch price (Acquatella, Ericson, and Starc 2023).

private prices and suffer declining profits in the private market—*if* they calculate they can make up those lost profits and more from the public market. In addition, because they know physicians earn more money from administering a higher-priced drug, they have an additional incentive related to Part B for raising prices—because the profit motives of providers could increase demand for the product.

The combination of these factors means that the existing Part B procurement rules create the incentives for firms to offer fewer discounts in the private market, resulting in a higher ASP and greater profits from the public market. As a result, Part B rules for purchasing physician administered drugs likely result in higher prices in both public and private markets.

Furthermore, these incentives to raise prices increase with Medicare's market share in each drug, and (given the age and disease profile of Part B enrollees) many high-cost drugs already have a large Medicare market share. A larger Medicare market means the potentially higher reimbursement from the public payers is more important for determining profits than the lost sales in the private market. Figure 17 depicts Medicare's 2015 market share for the 84 drugs that are either in the top 50 for overall Medicare spending or the top 50 for spending per enrollee (the categories overlap). For 22 of these drugs, Medicare is responsible for a majority of sales. As biologics continue to make up a larger share of newly approved products, the Medicare Part B system will become an even larger part of how prices in the pharmaceutical market are determined.

Figure 17. Medicare's Market Share for the 84 Most Expensive Part B Drugs in 2015



Source: Government Accountability Office (2017).

Part B can cause higher prices not only because manufacturers have an incentive to raise private prices to influence the public market, but also because physicians have an incentive to prescribe higher-priced drugs (as they earn more for administering such products).

To address physician incentives, however, we must not create perverse incentives to inappropriately prescribe lower-cost drugs that don't provide sufficient clinical benefit for patients. We also must be careful about creating a situation where it is no longer economically viable for physicians to practice in particular areas or organizational forms. For example, reforming Part B procurement rules to simply pay physicians a flat fee for each administered drug would ignore the fact that physicians face inventory costs for stocking and maintaining a large volume of high-cost drugs. These costs could be particularly acute for small practices, which may lack the liquidity needed to maintain sufficient stock of medications and may make prescription choices to limit these costs. At the extreme, such reforms could push further consolidation of the provider market, which could contribute to pricing and access concerns.

One policy solution is to adopt more of a vendor model for the distribution of physician administered drugs. Such a model would transform the existing buy-and-bill market system to one in which physicians have little financial incentive to prescribe particular medications. The details of such a fundamental shift in the market are important and must be worked out. In doing so, we must better understand why previous attempts to establish a similar model under the Competitive Acquisition Program (CAP) did not successfully attract vendors and providers.

Certainly, this failure came about in part because many providers are dependent on revenues from the buy-and-bill system. This dependency, however, is not a good reason to avoid such policies. If firms obtain an inappropriately large share of revenues from the existing system, that fact is *precisely why* we need reforms.

The political and practical reality is that any successful reform must figure out how to attract physicians and other providers into the system. In addition, such a program would need to be attractive enough to vendors to induce new entrants to the market. Achieving this aim would likely require empowering vendors to walk away from particular drugs to secure greater discounts. Absent such power it would be difficult to make the vendor model sufficiently attractive to potential entrants. This change may limit some patients' access to Medicare drugs, but we must be honest that some degree of reduced access is a necessary part of any price negotiation process.

3.b. Promoting Small-Market Generic Competition

Promoting competition in generics is likely to produce substantial gains for consumers because generics are produced in such large quantities. Reducing barriers to entry is especially important in this market. For example, entrants into the cartelized markets described above faced high costs and long delays before beginning production. While the FDA has introduced reforms to reduce delays, new abbreviated new drug applications (ANDAs) have also grown over time.[31] The financial and time costs reduce returns to entry. In turn, many firms may decide not to enter these markets. Additional reform is necessary, which may require more funding for regulatory agencies or other means of decreasing regulatory costs for firms.

Even so, not all markets will attract new entrants. Small product markets may simply be unable to support more firms. Since firms compete on price, profits are determined by a firm's ability to manufacture products at the lowest marginal cost. Price competition incentivizes entrants to produce enough to reach the minimum efficient scale of their production process. Absent sufficient quantity, entrants will find themselves at a perpetual cost disadvantage relative to incumbent firms. For sufficiently small markets, there is only enough demand for a single manufacturer to reach this scale. A natural monopoly and associated pricing are the result.

In recent years, several firms appear to have recognized the pricing power available to ANDA holders for generic products with sufficiently small potential markets. A good example was the pricing strategies of Turing Pharmaceuticals and its now infamous CEO Martin Shkreli, who dramatically raised the price of a generic drug used mainly to treat toxoplasmosis, a parasite infection. Aspects of this strategy have also been implemented by other firms and documented in media outlets (see, e.g., Hopkins and Martin 2018; Pollack 2015; and Rockoff and Silverman 2015). The number of generic-market monopolies has increased over time. Prices have increased in these markets, although the increases could be due to a range of factors, including the growth of precision medicine, changes in product costs, consolidation, and anticompetitive behavior.

These firms' ability to charge monopoly prices for generic products is not a reflection of the tradeoff between access today and innovation tomorrow; society has long since paid for the innovation from these products. The high prices represent firms taking advantage of a market failure created by the small patient population and

31 An ANDA is the process by which a small-molecule generic firm is able to develop and market a drug in the United States. This process was created as part of the 1984 Hatch-Waxman Act. Rather than requiring generic firms to undertake the entire clinical-trial process required of innovative medicines, these firms must only demonstrate that their products are bioequivalent (i.e., chemically identical) to the reference products. This process was an attempt to lower entry costs for and increase the number of entrants into these generic markets.

relatively high costs of entry. While large pharmaceutical firms were historically either unwilling or unable to exploit this pricing power, the practice of firms charging high prices without fear of entry in small generic markets is now widespread throughout the industry.[32] Solutions to this problem will need to come either from firms being harmed by this practice or through government action.

If high, fixed entry costs make it difficult for multiple firms to profitably produce small-market generics, one potential solution is to lower these fixed costs. Doing so would make it easier for new entrants to reach scale and compete with incumbent manufacturers. In recent years, the FDA has focused on accomplishing this goal through programs such as streamlining and harmonizing the generic application process across developed countries (Gottlieb 2018). There have also been attempts to increase the speed and efficiency of the ANDA process, which would decrease barriers to entry and potentially increase the number of markets that could support multiple firms (Elvidge 2018).

The FDA should continue to evaluate the approval process to look for additional efficiencies that would decrease entry costs. However, even the most efficient process for entering a generic market will require some spending to demonstrate the safety and bioequivalence of the product—and this spending will always represent a meaningful fixed-cost investment. Therefore, another potential solution to promote entry is to increase the size of some generic markets. While such an increase can't be accomplished by finding more patients with relevant conditions, we could consider a broader system of importation across developed countries with similar safety and regulatory systems (i.e., the countries the FDA is currently empowered to turn to in the case of drug shortages). Aggregating demand across these markets would increase the total quantity and the number of products that could successfully be produced by multiple manufacturers.

Even after efforts to decrease costs and increase market sizes, some markets will still be unable to support multiple firms. In these cases, further regulations are likely necessary to reach an efficient outcome. For example, lawmakers could empower the FDA to provide a new form of market exclusivity for generic products with market sizes that do not support multiple competitors.

The specifics of such exclusivity would need to be worked out, but a first step would be to examine how many potential patients are necessary for a market to support multiple generic firms. While most generic prescriptions are for molecules that can support multiple competitors, there are potentially many molecules with small

32 It is important to note that this practice is largely limited to smaller firms at the periphery of the market. While larger biopharma firms do at times sell generic products, they have largely avoided this type of pricing behavior.

patient populations that can't support multiple manufacturers. For example, the number of exits by ANDA holders has increased in recent years, with many firms citing a lack of profitability. The median generic market currently has only two manufacturers, and approximately 40 percent of markets have a single manufacturer, likely due to limited market potential (Berndt, Conti, and Murphy 2017).

The current number of firms participating in a market in equilibrium does not definitively tell us whether the market could support multiple firms. It is the threat of entry and not actual entry that disciplines profits. Inferring the number of firms that a particular generic market could support based on the number of current firms could be particularly problematic given the ongoing allegation of collusion in this market (Silverman 2019). Therefore, it is important for agency economists to determine the market size and structure that would indicate that the market for the generic product is a natural monopoly where the incumbent firms possess significant pricing power. Ideally this investigation would incorporate the potential market-expanding policies of decreasing entry costs and increasing the market size to include some foreign markets.

After establishing the market characteristics likely to lead to natural monopolies, the FDA would undertake a request for proposal (RFP) process for those markets. Any private firm could thereby apply for the rights to be the exclusive manufacturer of a natural-monopoly generic medicine at a certain fixed percentage above manufacturing costs. Firms would compete on the margin they would require to serve the market. The winning firm would be granted the exclusive rights to sell the drug at this regulated price for a time sufficient to recover the fixed costs of entry. At that time, the FDA could reauction market exclusivity. To ensure the efficient operation of this process, the FDA may also need to set a maximum percentage that they will accept before they turn to a nonprofit or government supplier for the product. This cap would limit the ability of firms to collude to divide up the markets they choose to enter.

Creating competition in small-market generics is important to undertake now, as this problem will only grow. Recent scientific advances have allowed for greater personalization of medicine. A well-documented and rising share of clinical trials involve patient-specific biomarkers to determine either efficacy or safety (Chandra, Garthwaite, and Stern 2018). In recent years, trials for these types of products have increased. Almost by definition, personalized medicine will involve products with limited patient populations, and we should be worried about whether robust generic competition will emerge for these products.[33] It will be easier to address the problem

33 The problem of competition for precision medicine will be further complicated in situations where the patented product is a biologic.

of small-market generics now than it will be when the number of powerful interests manufacturing such products increases.

At the same time, it is important to maintain quality. Generic quality for foreign products is especially problematic. If it is not profitable to provide quality, production quality requires rigorous inspection. Such inspection will require additional funding for regulatory agencies, such as the FDA. Research suggests that the consumer benefits of such funding are likely to outweigh their costs. Rather than relying on inspections and enforcement actions, Congress and the FDA should also consider rules that create more transparency about sources and quality in the generic market. Currently, the market is cleared on only one dimension: price. This circumstance rests on the belief that every product in the market is of similar quality and therefore competitive. Several high-profile examples in the generic market suggest that this untested belief may not be true. Introducing more information about product origin and manufacturing would allow generics manufacturers to aim not simply for the cheapest possible production process but for the most *efficient* process, that is, one that provides a specific level of quality at the lowest price. In the current market, where customers have little information about the source of their drugs, this incentive is almost absent.

3.c. Biosimilar Adoption and Rebates

While rebates serve a vital function in drug price negotiations, there are also situations where the structure of the rebate contract could create a barrier to entry for new competing products. For example, rebate contracts sometimes reference rival products, particularly with respect to a rival's placement on the formulary. Depending on the economic context, such rival-referencing contracts could be either anticompetitive or pro-competitive. For example, a manufacturer may offer larger rebates if its product is the only one in a therapeutic area on the preferred tiers of the formulary. If many potential products are competing for the entire market, such a contract could be efficient. In fact, these types of contracts are at the heart of the PBM strategy. In describing his strategy, the chief medical officer of Express Scripts said, "We told [companies], we're going to be pitting you all against each other. Who is going to give us the best price? If you give us the best price, we will move the market share to you. … We'll exclude the other products" (Wehrwein 2015).

In situations where manufacturers are competing for access to the PBM's entire patient population, these types of contracts are likely to be pro-competitive, leading to large discounts and increased welfare. However, large portions of some product markets are not truly contestable, so PBMs will not be able to effectively move patients to lower-price products. For example, patients who are currently medically

stable on a biologic product are unlikely to switch to a competing biosimilar at almost any price. In addition, PBMs might find that plan sponsors would not be happy with strategies that forced their patients to move across biologic products.[34]

When a new entrant cannot effectively compete for a large fraction of patients, a rebate contract for the incumbent product that is contingent on the absence of the rival entrant on the formulary can serve as an almost impenetrable barrier to entry. This situation is sometimes referred to as a rebate "wall" or "trap." Effectively, the new-entrant manufacturer finds that it cannot offer the PBM a large enough rebate on its products (which represent a relatively small share of its sales) to overcome the lost rebate dollars from the incumbent (which represents a majority of the market). In such a situation, the new entrant would find it hard to gain meaningful market share. Perhaps more concerning, rival-referencing contracts may induce potential biosimilar firms never to attempt to create products in the first place. Concerns about the use of rebates in this manner have been raised by many individuals, including FDA chairman Scott Gottlieb and Novartis CEO Vas Narasimhan (Liu 2018; Narasimhan 2018). These concerns were also the subject of antitrust litigation between reference products and biosimilar firms that was recently settled (Biosimilars Council 2018; United States District Court for the Eastern District of Pennsylvania 2017).

Given the potential for the rebates contingent on rival products to block potential entrants, regulators should consider more-careful oversight and monitoring of rebate contracts that reference rivals. In situations where a large portion of the market is not contestable by a new entrant—for example, for a first biosimilar entering against a reference product—regulators may want to create additional restrictions on rebate contracts referencing the position of rival products on the formulary. In particular, it may be necessary to consider separate rules for contracts and rebates based on whether patients are treatment naïve (i.e., have been diagnosed with a condition but not initiated a biologic treatment for it) or medically stable on a particular biologic product, as well as whether the product is for a chronic or acute condition. While it may be hard to write rules for biologic treatments for chronic conditions with a large installed base, doing so should be the goal of such policies.

Some may ask why government intervention is needed here if these rebate walls raise prices in the market. In considering why government intervention may be necessary to address these contract structures, it is important to note that even if exclusive contracts limit entry and raise market-wide prices in equilibrium, for each PBM demanding that contract, they receive a lower price today. As a result, each

34 Plan sponsors are not simply looking for the *lowest*-cost plan, but instead the plan that best balances costs and benefits for their customers or employees.

PBM has an incentive to demand a bid from a manufacturer for exclusive formulary placement. Constructing such an exclusive formulary could maximize the rebate for the PBM and allow for a more competitive product. Any individual PBM would benefit from such a contract and may not be able to influence the individual entry decision for any particular product. This state of affairs could result in a commons problem that might be best solved by government action. Absent a government solution, in the future there will be less product entry, but there is no existing entity that can internalize the externality of the demands for exclusive contracts.

3.d. Addressing Potentially Excessive Cost Sharing and the Value of Insurance

As described above, features of the existing market have resulted in high cost sharing for some of the most expensive medications. This circumstance is in part the result of explicit decisions to raise contractual cost sharing for enrollees. The growing spread between list and net prices interacts with this cost sharing (which is often a function of the list rather than the net price) to further increase cost sharing.

While some of the spread between list and net prices results from more robust negotiation by PBMs, some also appears to be driven by the same economic incentives detailed in the discussion of rebates above. Specifically, that differential cost sharing can transfer resources from sick to healthy patients in the form of lower premiums and decrease the attractiveness of the plan to potentially expensive patients (Geruso, Layton, and Prinz 2019). In that way, high cost sharing undermines the community-rating and guaranteed-issue regulations that are popular among consumers and policymakers, and it does so in a way that may not be obvious to customers until they have purchased the insurance product and suffered a negative health shock. At this point, these customers may find that they have less insurance coverage than they anticipated.

In response to this increasing high cost sharing, pharmaceutical companies have implemented a variety of co-payment assistance and coupon programs. While these programs increase access to expensive pharmaceuticals, they have also been shown to increase overall drug spending (Dafny, Ody, and Schmitt 2017). They are especially likely to do so when coupons are available for products that have a bioequivalent generic product on the market. In such a setting, the coupons undo efficient financial-utilization management and shift customers away from less-expensive generic alternatives.

While it is tempting to view coupon programs as an attempt to undermine utilization management by payers, the reality is more complicated. Manufacturers offer co-payment assistance partly because these payments have gotten so large that they restrict access to medications for liquidity constrained customers—and thus may undermine the very purpose of health insurance in the first place (Besanko,

Dranove, and Garthwaite 2020). This position is not magnanimous on the part of manufacturers; when customers are unable to access drugs because of cost sharing, it decreases their revenue.

Cost sharing is used for a few reasons, including that it can be used to control moral hazard in the form of the overconsumption of drugs that don't provide sufficient value. It can also be used to move patients across products as part of price negotiations. Both rationales can increase the efficiency of health insurance markets.

However, when plan sponsors implement high cost sharing on products that do not have therapeutic substitutes or on all products in a class, their strategies can undermine the generosity of the insurance contract. This circumstance likely decreases the welfare created by the insurance contract. This type of high cost sharing on particular products is particularly concerning if customers are not aware of this incompleteness when they make their purchasing decisions—which is quite possible given the complexity of pharmaceutical products. This lack of awareness is even more apparent if the terms of the formulary—specifically, which products are on which tiers—change during the middle of the contract period.[35]

Excessive cost sharing has historically been particularly problematic in Medicare Part D, where (as we discuss above) patients who use expensive pharmaceuticals face high exposure to the cost of their drugs throughout the catastrophic period. These Medicare patients also are unable to use manufacturer coupons because of federal anti-kickback statutes and as a result, they find themselves trapped between manufacturers and insurers.

A fraction of this excessive exposure was addressed by the payment redesign of Medicare Part D in the IRA, but large amounts of cost sharing in both Part D and commercial plans remain. It does not appear that this cost sharing is about addressing moral hazard or shifting share across competing products. In addition, many manufacturers have offered expanded payment-assistance programs that seem more designed to subvert the negotiation process and blunt PBM bargaining power than to provide access to liquidity-constrained patients.

Therefore, policymakers should jointly address the questions of cost sharing and coupons in the prescription drug market. One possibility would be to create upper limits on both (a) the amount of cost sharing that can be charged to consumers, and (b) co-payment assistance in the commercial market. This compromise could address both sides of this issue and deserves more consideration.

35 Depending on the plan contract, enrollees may be able to switch contracts within the year. For example, Medicare Part D enrollees are able to switch plans each quarter. However, for some commercial and individual market plans, enrollees are unable to switch plans mid-contract.

3.e. Improving the Flow of Information between PBMs and Plan Sponsors

A second concern about the current system of confidential rebates and other payments between manufacturers and PBMs is that it creates an incentive for a PBM to give a preference to a higher-list-price drug that offers greater rebates and other fees—even if it has a higher net price for the plan sponsor. Effectively, the concern is that the PBM will not be a good agent for its principal, the final payer. As we discuss above, this concern reflects a fundamental question about the amount of competition in the market for PBM services.

As we discussed above, in a competitive market the structure of the PBM contract would not matter. PBMs would compete for a payer's business by offering a set of services of specific cost and quality, and fully informed insurers would pick the preferred combination of these characteristics. If we believe PBMs are using rebates to capture a larger share of surplus in this market, this state of affairs reflects a lack of competition for these services rather than an inherent problem with this contractual form. Policies to address this practice should then focus on the market structure for PBMs rather than the contractual form of particular payment arrangements.

Whether or not the PBM market is competitive remains unclear. Even in cases where PBMs are earning excess profit, new competitors are unlikely to successfully enter the market if there are large barriers to entry, perhaps because scale is necessary for competition. Furthermore, strong competition is less likely to emerge given that plan sponsors are unaware of the full scope of surplus created by their prescriptions. Many large firms hire sophisticated benefit consultants and increasingly demand fully transparent contracts that provide them full information on all "rebate" dollars. In theory, this practice provides information about the surplus created by their prescriptions. That said, despite these efforts, payers remain unaware of all the funds flowing between PBMs and manufacturers. In addition to rebates, PBMs receive administrative fees and other payments from manufacturers, as described above. These fees are often structured as a function of the list price, a state of affairs that further calls into question the distinction between a "fee" and a "rebate." Part D plans are often not required to report rebates to CMS. This lack of transparency in the Medicare program has been one area of concern; another has been the competing interests that arise for PBMs and manufacturers when administrative fees are based on WAC prices (Grassley and Wyden 2021: 81).

Sophisticated payers hoping to gather more information about the flow of funds between PBMs and manufacturers often face restrictions on auditing their PBM-payer contracts (Weinberg and Langreth 2017). These constraints may entail excluding particular auditors that are deemed to hold views hostile to PBMs, requirements that

audits be held at the headquarters of the PBM, unwillingness to provide contracts with manufacturers, restricted access to claims data, and strict limitations on the number of years that can be audited (Advisory Council on Employee Welfare and Pension Benefit Plans 2014). While many of these restrictions can be cast as attempts to maintain rebate confidentiality, they also create information asymmetry between PBMs and payers about the amount of available surplus. In turn, such asymmetry negatively affects the efficiency of their bargaining.

Given these concerns, there have been numerous policy efforts to end confidential rebates based on drug price and to shift the market to a series of up-front price discounts and flat fees negotiated between PBMs and manufacturers (United States Department of Health and Human Services 2019). Such a reform would effectively end the confidentiality of negotiated prices while not decreasing the amount of surplus captured by PBMs, since a PBM with market power can calculate a flat fee as easily as it can figure out its take under the current percentage-based rebate system.

Both major political parties are coalescing on ending rebates. Frustrated by rising drug prices, people are looking for a scapegoat, and a system of shrouded prices set by large firms makes a convenient target. However, it would be unwise to limit the ability of PBMs to negotiate large discounts. Instead, we should move to a system where all payments between manufacturers and PBMs flow first to payers before being split with PBMs (Garthwaite and Scott Morton 2017). PBMs and payers would be free to negotiate any split of the rebates, fees, and other funds paid by manufacturers, but such a negotiation would then occur between two parties with equal information about the amount of money at stake. One possible way to move to such a system would be for regulators to end the safe harbor for payments between manufacturers and PBMs and create a separate safe harbor for payments between manufacturers and payers. If the current PBM market is competitive, this proposed solution should have little effect on the distribution of surplus.

3.f. Increased Pharmacy Competition

A recurring theme in our proposals is encouraging robust competition at all stages of the value chain. The retail pharmacy market is increasingly concentrated due to a variety of factors.

1. Independent pharmacies have declined in importance. Today, two-thirds of establishments are retail chains, supermarkets, or mass retailers. Mass retailers can often undercut independent pharmacies by using prescription drugs as a loss leader to drive traffic, increasing sales of other products.

2. The past several decades have been marked by vertical and horizontal consolidation. For example, CVS has been vertically integrated with a PBM for over a decade and has acquired a number of smaller regional chains.

3. The growth of use networks by payers has led to lower generic reimbursement, making it difficult for independent pharmacies to remain financially solvent.

Despite greater concentration, consumers are fairly willing to switch pharmacies. Switching to lower-cost pharmacies can lead to cost savings from selective contracting. Because consumers do not have strong preferences for a particular pharmacy or chain, payers can threaten to exclude pharmacies from their networks. To avoid exclusion, pharmacies must offer substantial discounts.

As a result, the retail pharmacy market is competitive today despite higher levels of concentration throughout the value chain. However, the balance between a small number of buyers and a small number of sellers is fragile, especially given barriers to entry. This fragility is especially problematic given that there are a small number of wholesalers and therefore there is always a possibility of tacit collusion emerging (AmeriSource Bergen, Cardinal Health, and McKesson) in addition to the small number of PBMs.

In focusing on the structure of the pharmacy market, policymakers should separately consider retail and specialty pharmacies. Firms in these two markets generate value for customers in different ways—with independent specialty pharmacies potentially having ways to generate unique value for patients compared to their chain counterparts. As plan sponsors, PBMs, and specialty pharmacies become more vertically integrated, there are concerns about how these relationships may weaken competition and decrease welfare. These risks become particularly acute when independent pharmacies attract patients with particularly expensive conditions—thereby enabling plan sponsors to restrict patient access to specific pharmacies in order to create advantageous selection at the expense of sick people.

Beyond considering market structure and competition between pharmacies, we should continue to encourage the use of lower-cost generic drugs. While most prescriptions are filled with generics, additional savings are possible—perhaps particularly so in government programs that traditionally do less steering of consumers. For example, as more states transferred oversight of Medicaid drug benefits to private firms, private insurers generated savings by shifting patients from branded drugs to their generic equivalents or to closely related generics (Dranove, Starc, and Ody 2021).

Private insurers can negotiate lower point-of-sale prices at pharmacies. We should also encourage competition among retail pharmacies, where savings are achievable. We might, for example, encourage the adoption of preferred pharmacy networks. Prices can vary up to 40 percent for generics across retail pharmacies; preferred networks encourage consumers to fill their prescriptions at locations with the lowest prices. In turn, when insurers have greater bargaining leverage over pharmacies, prices are further reduced (Starc and Swanson 2021). Of course, such arrangements could involve important access tradeoffs. Yet evidence from the Medicare Part D context suggests that patients don't travel substantially farther under these plans and do benefit from reduced out-of-pocket costs at preferred pharmacies.

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The Next Business Tax Regime: What Comes After the TCJA?

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Owen Zidar* and Eric Zwick**

ABSTRACT

This essay presents the case for a better US business tax regime. First, we provide an overview of the business tax base in the United States and describe how business activity is taxed, with special focus on the 2017 Tax Cuts and Jobs Act (TCJA). We then review early evidence of the TCJA's effects on economic activity and compare these effects to policymakers' predictions. We conclude by considering policy implications and make several recommendations for improving the US business tax regime. We propose a future regime that can raise substantial revenue from business without inventing new policy instruments. Our proposal would preserve productive business activity, promote efficiency by harmonizing tax rates across income tax bases, and improve tax progressivity

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1. Introduction

Amid economic recovery from the pandemic, the federal deficit remains historically high as a share of GDP. This fact can be seen in figure 1, which shows federal spending and revenues as a share of GDP from 1980 to the present. There is a post-2000 pattern of persistent deficits even at times when the economy is operating at or beyond full employment. Policymakers are presently debating both spending and tax-based measures to address these imbalances. This essay focuses on the revenue side of the ledger. We draw on insights from our academic research along with that of other scholars on the taxation of business income in the United States to sketch a promising picture for the next business tax regime.

Our focus on business income tax is motivated by three factors. First, given their importance for the overall tax base, taxes on business income will play a key role in upcoming fiscal debates. Second, since a substantial portion of top income and wealth comes from business activity (Smith et al. 2019; Smith, Zidar, and Zwick 2023), efforts to increase tax progressivity also require grappling with how to tax businesses. Third, business tax has been an active area of recent policy reform, notably in the 2017 tax reform law—the Tax Cuts and Jobs Act (TCJA). As a share of GDP, the TCJA was the largest corporate tax cut in US history. This reform law has several expiring business tax provisions that deserve reassessment to help policymakers determine what to extend and what to let expire. Taking stock of what we have learned from these reforms is crucial for guiding evidence-based policy going forward.

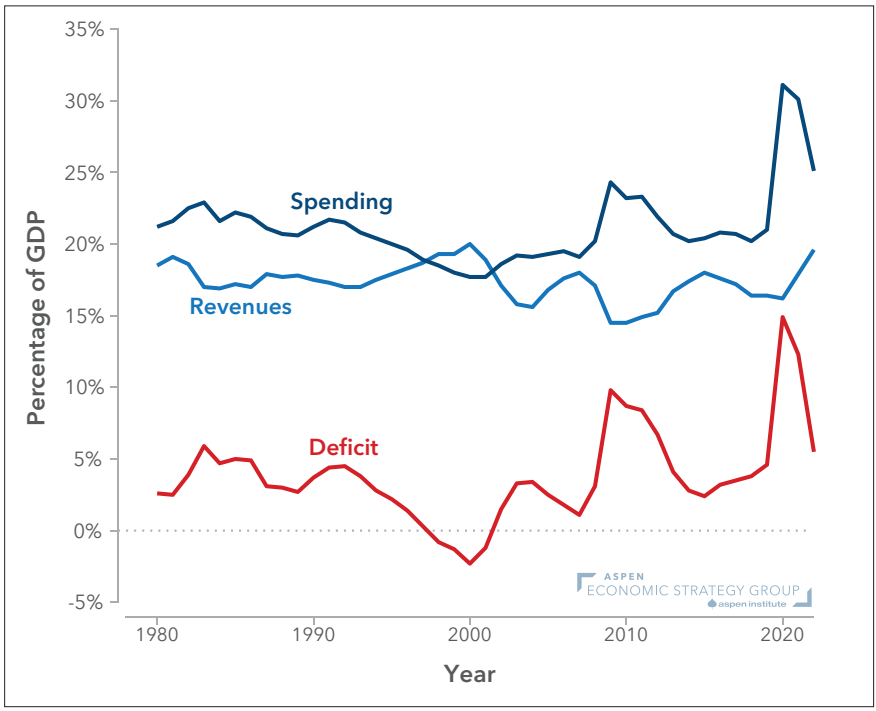
Our proposal would (a) preserve productive business activity, (b) promote efficiency by harmonizing tax rates across income tax bases, and (c) improve progressivity.

We propose a future business tax regime that would raise substantial revenue from business without inventing new policy instruments. Our proposal would (a) preserve productive business activity, (b) promote efficiency by harmonizing tax rates across income tax bases, and (c) improve progressivity. Our reforms recognize that the individual income tax and business tax systems can reinforce or undermine each other depending on whether they are properly integrated. Focusing on individual income taxes alone is problematic because individuals at the top of the income distribution are often able to avoid tax by shifting activity to business income.

This essay has four parts. We begin by providing an overview of the business tax base in the United States and describe how business activity is taxed. Second, we turn to the TCJA and describe how it reformed business taxation. Third, we summarize early evidence of the TCJA's effects on economic activity and compare these effects to

policymakers' predictions. Fourth, we conclude by considering policy implications and making recommendations for the next business tax regime.

Figure 1. Federal Spending and Revenues as a Share of GDP Since 1980



Source: Office of Management and Budget (2023).

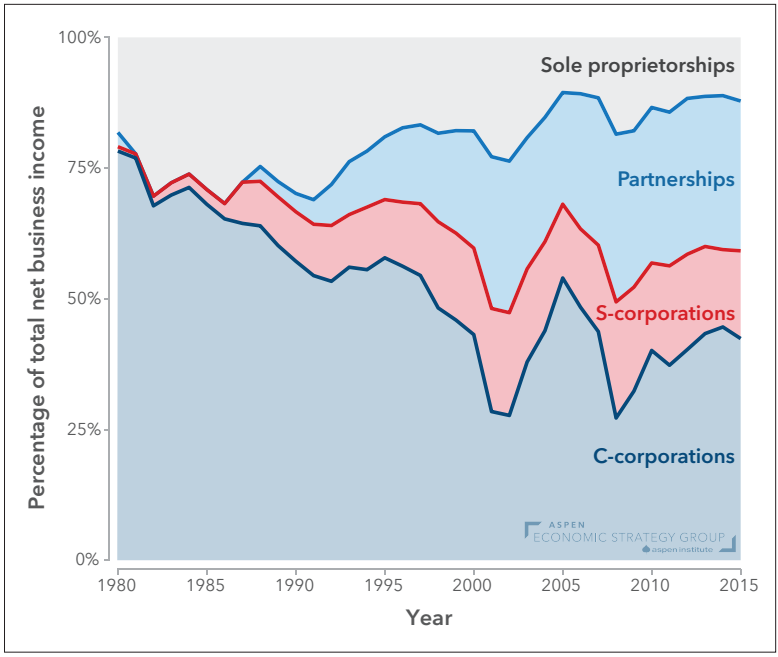
2. Factual overview of business taxation in the United States: Who owns the businesses? Where is the money held? How is it taxed?

To design a business tax regime optimally, it is important to establish where the money is in the economy and who lays claim to it. These facts determine how much can be raised by any given tax and who will bear its mechanical, or statutory, effects.

There are two main types of businesses in the US: *traditional C-corporations*, whose earnings are subject to the corporate income tax, and *pass-through businesses,* whose profits and losses "pass through" to individual owners and are instead subject to those individuals' personal income taxes. These pass-through firms include S-corporations, partnerships, and sole proprietorships. Many firms with individual owners can switch relatively easily between being a C-corporation and being an S-corporation or partnership in response to tax incentives.

Leading up to the TCJA, pass-through income, which had been growing since the Tax Reform Act of 1986 (TRA86), comprised the majority of the business income in the United States. Figure 2 shows the evolution of business income by corporate form. In 1980, most business activity was conducted by traditional corporations, but since individual tax rates were lowered, more activity has migrated outside the traditional C-corporation form and is not subject to corporate tax. Much of the charted rise of pass-through income reflects simple recategorization: to take advantage of lower tax rates, business owners have reclassified C-corporation income as pass-through. While the TCJA changed net incentives (by lowering C-corporation rates more than it lowered top individual income tax rates), history suggests strategy adjustments will take time to evolve, and for now the pass-through form remains attractive to many firms.

Figure 2. The Rise of Pass-Through Businesses

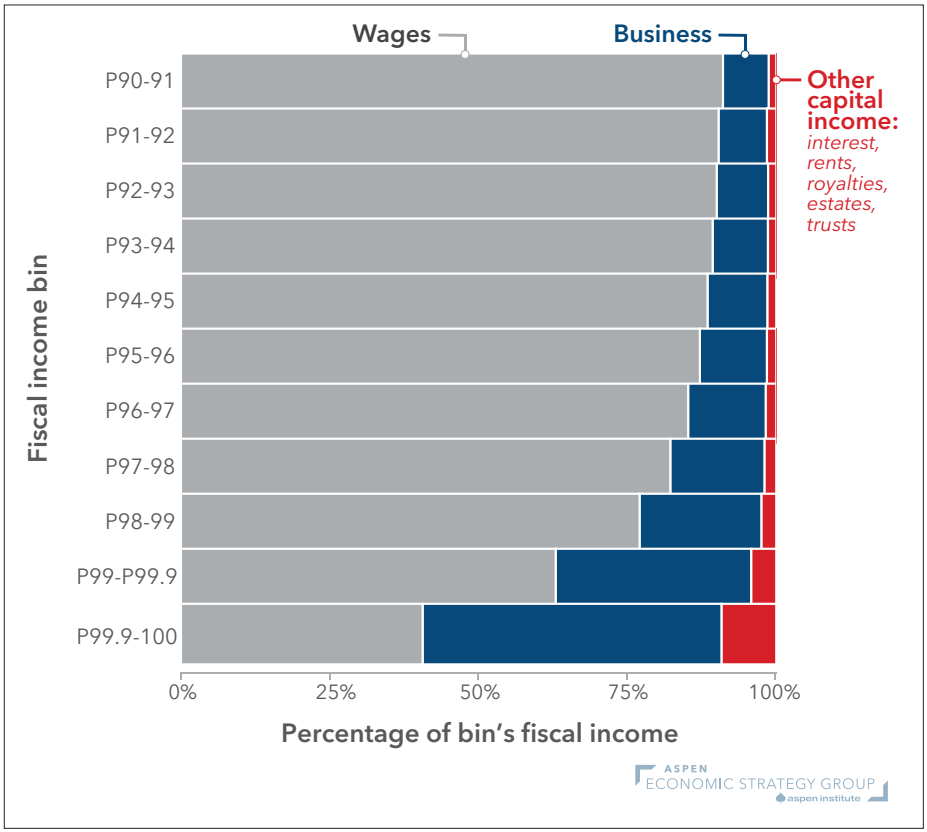


Source: Cooper et al. (2016); updated using public data from the IRS's Statistics of Income program.

Much of this business activity accrues to those at the top of the income distribution. Around two-thirds of every dollar earned by pass-through businesses accrues to the top 1 percent of individual earners. Figure 3 updates data from Smith et al. (2019) to plot the sources of income in the top decile of the income distribution in 2019. It shows that around 60 cents of every dollar of income for top earners comes from nonwage sources. As of 2014, more than 69 percent of the top 1 percent of income

earners and more than 84 percent of the top 0.1 percent of income earners accrued some pass-through business income. In absolute terms, that total amounts to more than 1.1 million pass-through owners with annual incomes of more than $390,000, and 140,000 pass-through owners with annual incomes of more than $1.6 million. In both number and aggregate income, these groups far surpass top public company executives, who have been the focus of much public commentary about inequality.

Figure 3. Top Income Sources in 2019



Source: Smith et al. (2019); updated to (2019).

When we looked at business types prevalent at the top, we found that a one percenter now is typically a doctor, lawyer, or owner-operator of a middle-market business like a car dealership or a beverage distributor. This finding has direct policy implications. Policymakers need to take seriously the nebulous boundary between labor and capital income, especially among business owners who can

flexibly characterize their income either way to minimize taxes (Kopczuk and Zwick 2020). A lot of pass-through income looks like labor income in the sense that the profits decline materially, on average, when the owner dies or retires (Smith et al. 2019). Politicians in both parties, for example, have successfully lowered their taxes through the so-called Gingrich-Edwards loophole—named after former Speaker of the House Newt Gingrich (R-GA) and former senator John Edwards (D-NC)—which involves characterizing compensation for consulting and speaking fees as business profits rather than wages. Eliminating this loophole would raise over $300 billion over the next ten years (US Department of the Treasury 2023).

A substantial amount of top compensation in the form of qualified small-business stock, carried interest, and stock options is more appropriately thought of as labor compensation provided in a tax-advantaged way.

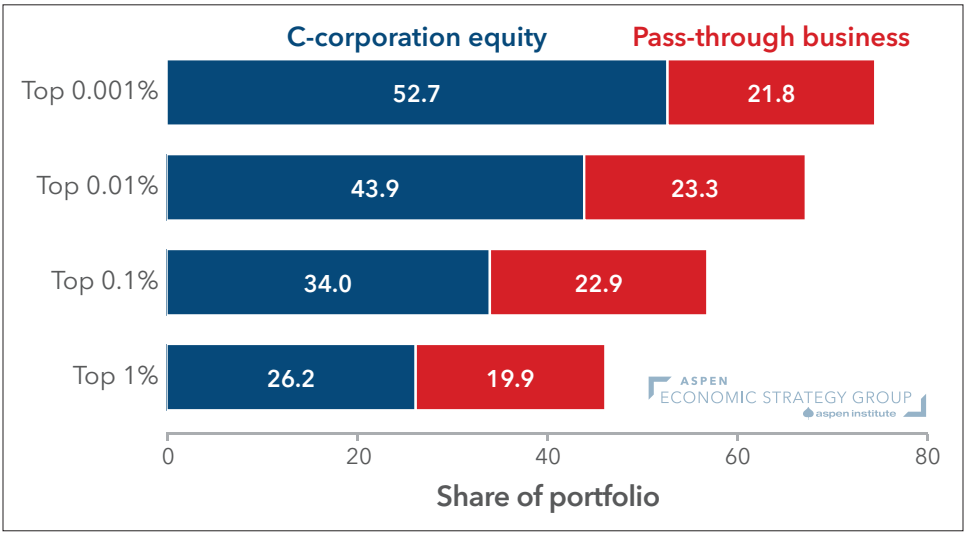
Top earners also respond to tax-code incentives in other ways, such as by deferring labor income as business equity. A substantial amount of top compensation in the form of qualified small-business stock, carried interest, and stock options is more appropriately thought of as labor compensation provided in a tax-advantaged way.

Much of the wealth at the top of the wealth distribution is in business equity. This fact can be seen in figure 4, which reports the share of business equity in top portfolios. This wealth comes in two forms: ownership of pass-through businesses and of traditional C-corporations (including both public and private companies). The graph shows that nearly half the wealth in top-1-percent portfolios is business wealth; this figure rises to 74 percent for the richest top 0.001. Though we should not conflate statutory with economic incidence, the graph suggests business taxes likely contribute to overall tax progressivity, even within top groups.

Two-thirds of estimated pass-through wealth is held by the top 1 percent of the wealth distribution. The ownership distribution of C-corporations is harder to determine due to data limitations. Unlike pass-through ownership, which is easy to identify (as business earnings flow directly to the owners), C-corporation ownership is not always clear from administrative data. While top investors and their ownership shares are listed in public investor filings, C-corporations that do not pay dividends do not generate tax forms that allow researchers to determine who owns them. As a result, researchers estimate the concentration of C-corporation ownership by using the distribution of dividends received from C-corporations and realized capital gains on C-corporation stock. Regardless of the assumptions used, the basic conclusion—that directly held C-corporation equity is disproportionately held at the top—is robust. At the same time, more than two-thirds of overall public C-corporation stock

is held by non-taxable groups, in pensions, and by foreigners, so the C-corporate tax is the primary avenue for taxing these business owners.

Figure 4. Business Wealth as a Component of Top Wealth Portfolios



Source: Smith, Zidar, and Zwick (2023); baseline series.

These facts about the prevalence of business equity at the top are also relevant for capital gains tax proposals. Two points are salient for understanding the tax base. First, 42 percent of all unrealized capital gains are in the form of private business gains, according to data from the Survey of Consumer Finances (Saez, Yagan, and Zucman 2021).[1] At the top of the wealth distribution, the importance of private business grows. For example, among centimillionaires (those with at least $100 million in wealth), two-thirds of unrealized capital gains are in the form of private business equity. Thus, policies that focus on mark-to-market taxation or taxing the wealth of centimillionaires will miss a large amount of top-owned wealth if they do not tax private business in some way. Second, in terms of realized capital gains, pass-through business activity also looms large, especially at the top (Sarin et al. 2022). For instance, venture capitalists and private equity partners derive much of their compensation in the form of capital gains (e.g., carried interest) and typically structure their firms as pass-throughs.

1 These calculations rely on reported business valuations by private business owners in the Survey of Consumer Finances (SCF), which generally exceed the equivalent concept in the US Financial Accounts. Smith, Zidar, and Zwick (2023) present evidence suggesting these valuations may be optimistic relative to true market values and that they entail a fair amount of sampling uncertainty due to small samples in the SCF. Bricker, Moore, and Volz (2023) argue that the SCF's private business values are reasonably informative at the aggregate level.

Similar points also apply to the estate tax base. In estate tax data, about half of the reported value of estates among those with $20 million or more at death is in the form of private business. This fact arises despite the well-known challenges facing valuation for unlisted assets in estate taxation.

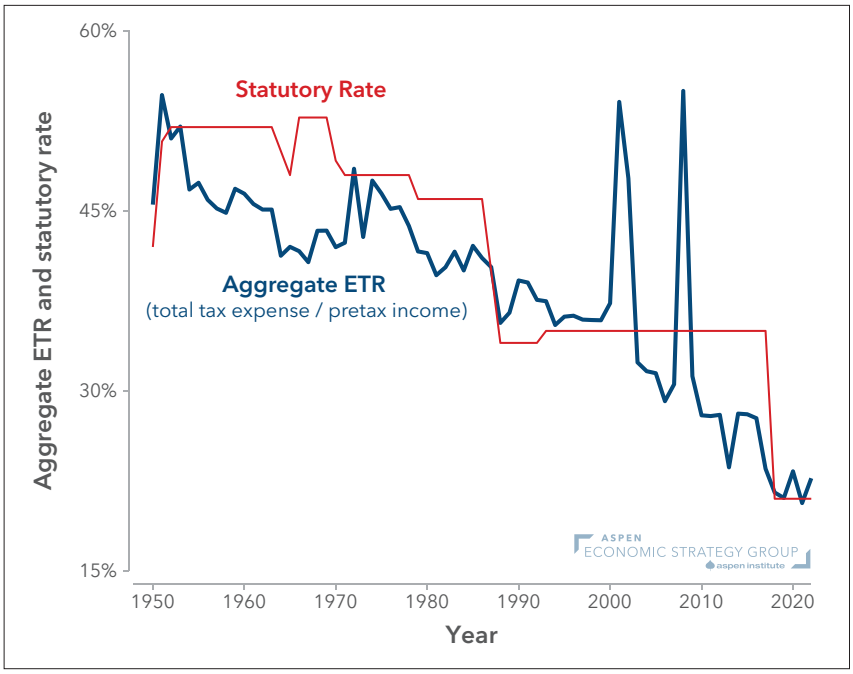
3. The 2017 Tax Cuts and Jobs Act was the largest change in the tax treatment of business income since 1986. What did it do?

The 2017 tax reform law, commonly known as the Tax Cuts and Jobs Act (TCJA), substantially reduced business tax burdens. It lowered statutory corporate tax rates for C-corporations from 35 percent to 21 percent and repealed the corporate Alternative Minimum Tax (AMT). It also enacted immediate expensing for a five-year period, which allows firms to write off equipment investments in the year they are incurred rather than over multiple years. For years six through ten, it phased down these investment incentives toward the prior depreciation schedules. To offset the budgetary impact of lower tax rates and immediate expensing, the reform enacted several provisions including limitations on loss and business-interest deductions, a reduction in the generosity of research and experimentation tax credits, and the elimination of the Domestic Production Activities Deduction (DPAD), which had effectively lowered tax rates for domestic manufacturers and other producers prior to the reform.

The law also dramatically changed international business taxes. It moved the corporate tax regime in the direction of territorial rather than worldwide taxation. This change exempted foreign profits from the 21 percent tax rate and replaced the worldwide system that taxed foreign profits when repatriated. The motivation for this change was the use by multinational companies of deferral to avoid paying taxes on foreign-source income, a practice that led to massive accumulation of corporate savings in offshore subsidiaries. To transition to this new system, the TCJA introduced a lower tax rate on the untaxed earnings from prior years of foreign subsidiaries of US multinationals, with a rate of 15.5 percent for cash and 8 percent for illiquid assets; it gave firms eight years to pay this tax.

To further offset revenue losses from the tax cuts, the TCJA introduced other provisions. These included a new minimum tax on global intangible income (GILTI), set at 10.5 percent through 2025 and 13.125 percent after 2025, as well as a lower tax rate on export income derived from domestic intangibles (FDII). In some circumstances, such as those related to limits on foreign tax credits and other interactions, these rates can be effectively higher than they were before the law was passed. Another provision was the base erosion and anti-abuse tax (BEAT), which imposed a minimum tax on payments between foreign subsidiaries and US parents that would otherwise be deductible.

Figure 5. The Decline of Effective Corporate Tax Rates



Source: Compustat data accessed via WRDS platform in June 2023.

Among publicly traded firms, the TCJA decreased effective corporate tax rates by around 9 percentage points. Figure 5 puts this decline in perspective by using Compustat data to plot the ratio of aggregate taxes paid (in the US and abroad) to aggregate income of publicly traded corporations since 1950. Note that there were some periods, like 2001 and 2008, when recessions generated substantial business losses, which temporarily caused the aggregate effective tax rate (ETR) to spike. These two years aside, the clear trend since 1950 is a dramatically lower effective corporate tax rate.

The TCJA also changed tax rules for pass-through business income. While the deductions for investment and interest operate like those for C-corporations, the tax rate depends on the individual income tax rate faced by individual owners. Many of these owners are in the top of the income distribution, and the TCJA reduced the top marginal income tax rate by 2.6 percentage points from 39.6 to 37 percent. The TCJA also introduced a 20 percent deduction of qualified business income (QBI) that reduces the top tax rate from 37 percent to 29.6 percent in qualified sectors or

for those with sufficiently low income. On net, by lowering the corporate tax rate more substantially, the TCJA returned the system to the pre-1980s regime by making the C-corporation form more favorable again for many business owners, especially those who plan to defer income and accumulate equity in their firms. Despite this incentive, the lower rate on QBI strengthened incentives for eligible pass-through owners to recharacterize wages as profits.[2]

4. Did the TCJA achieve its promises and predictions?

This section describes how the TCJA affected tax revenues and economic activity and compares its actual and predicted effects. Research in this area is active and has not been fully synthesized. Assessing program impact is additionally challenging given the TCJA's coincidence with the pandemic and President Trump's trade wars, as is isolating the role of individual components in that impact. Nevertheless, we draw some provisional conclusions from the existing evidence.

Tax Revenue. The promise of higher corporate tax revenue was not delivered. Despite predictions of some in the Trump administration, in the House, and in the Senate, the corporate tax reforms in the TCJA did not pay for themselves. While corporate revenues increased in the near term relative to some projections, this increase was not large enough to offset the large mechanical declines from lower tax rates. Specifically, corporate tax collections were around $375 billion per year in the middle of the 2010s and fell to below $250 billion per year following the TCJA. As a share of GDP, corporate tax collections were around 1.8 percent in the middle of the 2010s and then fell to around 1 percent after the TCJA. Since the beginning of 2021, they have been ticking back up—reaching around 1.3 percent in 2022—but they remain well below pre-TCJA levels.

Investment. The promise of a 9 percent increase—or around $300 billion—in domestic investment may have come closer to the mark but was likely overstated (Council of Economic Advisors 2018). In terms of domestic investment in equipment and structures, Chodorow-Reich et al. (2018) find substantial investment responses of C-corporations that experienced large tax reductions from the TCJA. Qualitatively, Hanlon, Hoopes, and Slemrod (2019) document that nearly 100 public firms reported plans to increase investment due to the TCJA; however, it is difficult to infer from these plans the extent of marginal investment induced by the reform.

2 Goodman et al. (2022) quantify the distributional burden of the QBI deduction, as well as the impact of the limitation on QBI for specified service providers.

Despite these results, it's important to note that public firms are only one subcomponent of aggregate investment in the United States. The other components of investment are large. For example, in 2016, total US investment was composed of $1,650 billion of equipment and structures, $820 billion of intellectual property products, and $700 billion of residential investment. A substantial portion of the investment in equipment and structures occurred among private C-corporations and pass-throughs, and incentives for IP investment were weakened by the TCJA's reduction in tax incentives to do research and development.

Findings from Kennedy et al. (2022) also suggest that the increase in business investment was smaller than the decline in corporate revenue. Using rich US Treasury Department tax data, they compare how investment evolved between similar C-corporations and S-corporations, noting that C-corporations received a larger tax cut per worker: around $2,200 more than S-corporations (or a 5-point larger cut in marginal tax rates). They find the larger tax cut resulted in an 8 percent increase in the share of firms doing positive investment and a 6 percentage-point increase in the investment-to-capital ratio. While it is hard to estimate aggregate effects since these estimates are relative to S-corporations—which experienced a decline in investment rates and may have been affected by common shocks to both types of firms—we can do some rough calculations that suggest there was around $54 to $81 billion of additional investment among mid-sized C-corporations (i.e., those with at least 100 employees and fewer than 1,000).[3] Despite this investment response, the tax cut resulted in a decline in corporate tax revenue of $88 billion.[4]

Wages and Incidence. Based on the estimates of Kennedy et al. (2022), the promise of wage increases for the average worker of $4,000 to $9,000 as a result of the TCJA was not delivered (Long 2017). Their analysis reveals that payrolls of C-corporations increased by 1.2 percent, and that this increase was largely driven by top employees. An increase of 1.2 percent, evaluated at the mean annual wage of $64,000, corresponds to an average wage increase of $770. They find no effect on median

3 In their summary statistics in table 1, the mean net investment among C-corporations in their sample was $26.6 million and the mean investment-to-capital ratio was 0.15, implying that capital was $177 million on average. Under the assumption of homogeneous effects by firm size, an effect of 0.06 *177 million for the 7,645 C-corporations in their sample amounts to $81 billion. By construction of their sample, their estimates do not permit us to say much about the effects of the reform for large multinationals, for which there are not similarly sized S-corporations available for matching. In addition, the effect is measured relative to S-corporations, which appear to have experienced a decline in net investment rates in figure C.1, panel D. Specifically, the figure shows that the net investment rate (i.e., the investment-to-lagged-capital ratio) was around 6 percent for S-corporations in 2016 and steadily declined to around 3 percent in 2019. C-corporations also had an investment rate of around 6 percent in 2016 but reversed the decline, going from around 4 percent in 2017 up to about 8 percent in 2019. Thus, in differences, the C-corporate investment rate increased by 4 percentage points on its own. Applying the same steps using 4 percent instead of 6 percent for the effect gives $54 billion.

4 They estimate that the mechanical decline in corporate tax revenues in their sample is $101 billion (their table 10); the $88 billion estimate incorporates behavioral responses.

worker wages, while the top-paid workers in the firm and firm executives (some of whom were likely firm owners as well) saw wage increases of around 5 percent. In their sample of top-paid workers, nine out of ten of the executives are men, with an average age of 53 and and average annual earnings over $1 million. Overall, the researchers estimate that firm owners received $54.5 billion, executives received $11.3 billion, workers in the top 10 percent of their firm wage distribution received $31.6 billion, and the bottom 90 percent of workers received no pay increase. This finding contradicts claims that had been made suggesting that the benefits of tax cuts would "go to the middle class, not to the highest earners" (Trump 2017). This promise also turned out not to be true.

5. As many TCJA provisions expire, we can use the lessons learned to create a system that meets the country's revenue needs -- via a more progressive tax code -- without sacrificing the country's business competitiveness.

Considering the emerging evidence on the impacts of the TCJA and related research on the distribution of business income, we recommend the following reforms:

5.a. Party like it's 1997.

As a starting point, we highlight our proposal to return to a 1997-style tax policy (Zidar and Zwick 2020). Simulations from the widely respected Penn Wharton Budget Model (PWBM) show that reverting to the tax code of January 1997 would raise trillions in tax revenue and increase progressivity via modest increases in taxes on dividends, estates, capital gains, and top individual incomes. Economic growth was strong in the 1990s, and deficits turned to surpluses. Our country has lowered taxes considerably since then, but there is limited evidence of meaningful growth impacts from those tax cuts.

The most obvious example of a tax cut that did not yield growth impacts is the 2003 dividend tax cuts. Yagan (2015) compares the investment of C-corporations, which are subject to dividend taxes, to that of S-corporations, which are not, before and after the 2003 dividend tax cut from 38.6 percent to 15 percent. He uses administrative tax data on firm outcomes like the change in tangible capital and dividend payouts to carefully examine behavior at similar firms. For example, he systematically tracks the investment of comparable firms like Menards (which is an S-corporation) and Home Depot (which is a C-corporation). Overall, he finds that this large tax cut had no effect on investment in the firms that benefit from the tax cut, relative to similar firms that did not receive a cut. This evidence suggests that reverting back to taxing dividends at top individual income tax rates would likely have limited effects on competitiveness or economic growth.

Reversing the cuts in top marginal tax rates matters for business taxes since most business income in pass-through form is taxed at the top marginal income tax rate. Returning the rate and bracket structure, adjusted for inflation, to where it was in January 1997 would result in a married couple paying 36 cents instead of 24 cents on their 300,001st dollar. And for those making half a million dollars, marginal rates would increase to 39.6 from 35 percent. Under our proposal, a tax credit like the Making Work Pay tax credit from the 2009 American Recovery and Reinvestment Act would offset tax increases for low- and middle-income earners in a targeted way. Altogether, increasing tax rates on ordinary income in this way would raise $1.8 trillion over ten years, according to the 2020 Penn Wharton estimate.

Recall that up to two-thirds of unrealized capital gains at the top of the wealth distribution are in the form of private business assets. There is some recent evidence that the large responsiveness of economic activity to capital gains tax increases is overstated (Agersnap and Zidar 2021). Going back to the higher dividend tax rate as well as the capital gains rate of 28 percent would raise around $600 billion over ten years, according to the Penn Wharton score from 2020. We have argued elsewhere that there are several reasons to think that the revenue potential of raising capital gains taxes is higher than even this score may suggest (see Sarin et al. 2022 for details).

We should increase estate taxation. Resetting the estate tax to inflation-adjusted parameters of 1997 would return the rate to 55 percent and set the exemption threshold to a bit above $1 million. Today, the rate is 40 percent and the threshold is $13 million. Most estate tax wealth is in the form of either private business assets or publicly traded stock. In 2020, Penn Wharton scored this change as raising $222 billion over ten years. Note that this score assumed a concurrent repeal of the "stepped up" basis provision that exempts bequeathed assets from capital gains tax relative to the original asset basis, which could be accomplished via "constructive realization" at death or carryover of basis at bequest.

Finally, we should restore the IRS to the funding levels and audit rates of the late 1990s and first decade of the 2000s. In 2002, the IRS budget as a share of GDP was nearly 0.09 percent, and it has steadily declined to 0.05 percent in 2020 (US Department of the Treasury 2021). Audit rates, especially of businesses and high-income individuals, have also cratered (Rampell and Zhou 2023). The 2022 Inflation Reduction Act attempted to address this decline by increasing IRS funding, but some of this funding was reduced in the recent debt ceiling deal.

5.b. Reduce tax preferences for pass-through businesses.

Congress should eliminate the so-called Gingrich-Edwards loophole for high-end pass-through owners, which would raise $306 billion over the next ten years. As Yagan (2023) recently testified, the US Treasury Inspector General for Tax Administration

has called this loophole a "multibillion dollar employment tax shelter." Active owners are treated inconsistently in terms of Medicare and payroll taxes, and this proposal would ensure that pass-through owners would consistently face the same treatment (i.e., that they would face the net investment income tax rate of 3.8 percent).[5]

We also recommend allowing the expiration of the qualified business income deduction (QBI), which was introduced by the TCJA. Supporters of this deduction—including 140 trade associations representing millions of Main Street businesses such as the NFIB, the National Restaurant Association, and the American Farm Bureau Federation—argue that it is "necessary to balance out the tax treatment of pass-through businesses with the lower, 21-percent tax rate paid by C corporations" (S-Corp 2023). While we agree that the QBI does lower rates for many pass-through businesses, the best evidence to date shows that it has limited economic benefit. Our recommendation of removing the deduction would raise revenue with limited effects on investment and growth.[6] According to the 2020 Penn Wharton score, this repeal would raise $373 billion over ten years. This provision is set to expire in 2025, so the revenue gains would be lower than projected by this original score (since there are fewer years with QBI remaining now than there were in 2020). More generally, reforming the treatment of large private corporations and eliminating tax preferences for pass-throughs are worth considering seriously, as these are the entities for which the boundary between owner-manager labor and capital income is especially difficult to enforce.

The main point is that we can't just keep taxing individual income and having people avoid tax by shifting money into lower-taxed business activity. In addition, there are a host of ways to avoid ordinary income taxes by deferring income into a form classifiable as capital gains, such as carried interest, qualified small-business stock, and incentive stock options. In our view, these carve-outs generally allow individuals to delay compensation and enjoy a lower tax rate on what is often labor income in its underlying nature. Since much of this activity is labor income, it should not be tax-advantaged relative to that of wage earners.

5.c. *Raise the corporate rate to 28 percent, restore research and development incentives, and limit interest deductions.*

We recommend raising the corporate tax rate to 28 percent. Doing so would raise $1.3 trillion over the next ten years, according to recent US Treasury estimates (US Department of the Treasury 2023: 211). According to estimates from Rosenthal and

5 See US Department of the Treasury (2023: 73) or Yagan (2023) for additional detail.

6 This assessment is based on estimates by Goodman et al. (2022) and the experience of state tax cuts for pass-through businesses, such as the 2013 "real-live experiment" in Kansas (DeBacker et al. 2018; DeBacker et al. 2019).

Burke (2020), three quarters of US corporate stock is held by nontaxable groups, such as foreigners (40 percent), tax-advantaged retirement accounts (30 percent), and nonprofits and others (5 percent). It is not clear that we should subsidize foreign investors or large endowments more than we should domestic investors, especially if the lower rate is paired with strong investment incentives, such as accelerated depreciation, and more generous support for research and development, which was weakened by the TCJA.[7] Moreover, a robust corporate tax is a key component of a progressive tax system that taxes capital income and reduces tax sheltering opportunities for high-earning business owners.

Goodman et al. (2023) have found that the TCJA's limitation on the interest deduction had minor effects on investment, which provides some evidence that there are reasonable ways to offset the costs of providing more targeted investment incentives. Moreover, such limitations are important in a regime with large deductions for new investment, as debt-financed investment can benefit from negative effective tax rates when interest deductions are unlimited. Overall, targeting incentives for responsive activity and activities with large positive externalities like research and development is a better approach than having a low tax rate on everything, including old capital and relatively unresponsive activity. Moreover, to the extent that policymakers are interested in taxing the wealth of tech billionaires, a bolstered corporate income tax is a tried and true (and clearly constitutional) alternative to a direct tax on wealth or accrued gains.

5.d. Reduce the TCJA's incentives to invest abroad by reforming international tax provisions.

We recommend removing incentives to offshore physical investment by reforming the way the TCJA taxes multinational corporations. Effectively, current TCJA rules subsidize the movement by multinationals of capital to other countries—incentives that are not widely appreciated.

The TCJA defines global intangible low taxed income (GILTI) as foreign income in excess of 10 percent of foreign tangible property.[8] Thus, after-tax foreign profits for a GILTI-taxed firm increase when they invest in tangible property abroad, since owning more tangible property reduces total taxable income. Removing the current GILTI deduction for foreign tangible capital and calculating GILTI on a per-country basis would improve this aspect of the current regime.

7 Furman (2020) proposed some related and reasonable reforms along these lines in a recent paper for the Hamilton Project.

8 Corporations can deduct half of GILTI—37.5 percent starting in 2026—and claim a credit for 80 percent of foreign taxes paid. The levy on the remaining income—set at 10.5 percent through 2025 and 13.125 percent after 2025—is also referred to as a minimum tax, since companies are not subject to taxes on GILTI if their foreign tax exceeds 13.1 percent.

The TCJA also includes an adjustment to domestic income from foreign sources, that is, exports. The TCJA defines deemed intangible income (DII) as domestic income in excess of 10 percent of domestic tangible property, and FDII as the foreign part of DII. A corporation can deduct 37.5 percent of FDII against domestic taxable income through 2025, with this share falling to 21.8 percent starting in 2026. Thus, after-tax domestic profits for a firm with sufficient domestic income are lower than they would be without FDII. Having more domestic tangible property in the US reduces FDII deductions. For this reason, FDII also encourages the offshoring of domestic tangible property. Repealing the deduction for FDII would raise around $115 billion over ten years (US Department of the Treasury 2023: 211).

Table 1. Ballpark Revenue Estimates for Tax Reforms

Suggested reform	Ten-year increase in revenues, in dollars
Party like it's 1997: Individual income	$1.8 trillion*
Party like it's 1997: Dividends and capital gains	$600 billion*
Party like it's 1997: Estate tax	$222 billion*
Repeal QBI deduction	$373 billion*
Raise CIT rate to 28 percent	$1.3 trillion
Repeal FDII deduction	$115 billion
Total	$4.4 trillion

Notes: Starred estimates come from the 2020 Penn Wharton Budget Model referenced in the text; unstarred estimates come from US Department of the Treasury (2023).

There are other reasonable reforms to international tax policy worthy of consideration. For example, Devereux et al. (2021) argue for moving toward a destination-based tax system for multinationals to minimize tax avoidance and inefficiency, while Clausing (2020) supports moving to a similar sales-based formulary system to address tax competition and profit-shifting. Setser (2023) further proposes strengthening subpart F of the tax code to discourage the offshoring of intangible income and ensure companies pay tax in the countries where they generate profits. International coordination is key on these fronts, and we recommend aligning our policy with cooperating nations on global minimum taxes.

6. Conclusion

Imagining the contours of the next business tax regime reveals many ways to improve the fiscal position of the United States and increase tax progressivity while maintaining US competitiveness. In reviewing recent research on business taxation and reconsidering provisions in the Tax Cuts and Jobs Act, we have presented a menu of reforms that would collectively raise more than $4 trillion over ten years. Given the secular decline in business taxation in recent decades and the growth of the deficit since 2000, now is an ideal time to start a new business tax regime that raises more revenue while being mindful of effects on competitiveness, innovation, and growth.

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PART II

INVESTING IN AMERICA'S YOUTH

Overcoming Pandemic-Induced Learning Loss
Jonathan Guryan and Jens Ludwig

The Economic Case for Smart Investing in America's Youth
Melissa S. Kearney and Luke Pardue

Overcoming Pandemic-Induced Learning Loss

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ABSTRACT

The global COVID-19 pandemic created not only a once-a-century public health crisis but also a once-a-century public education crisis. Unfortunately, the United States federal government's financial assistance to schools to overcome pandemic-induced learning loss is about to expire – despite the fact that the country has made almost no progress remediating this learning loss. In thinking about where to go next, we first look backward to examine why so little progress was made over the past few years. Changing student learning outcomes requires changing what schools do; that has been hard partly because of the chaos in the wake of the pandemic, but also because change is difficult for all organizations. We illustrate some of the challenges within the context of one specific type of instructional content for which US Secretary of Education Miguel Cardona encouraged schools to prioritize relief funding: high-dosage tutoring, a promising technology that's been known for centuries to help students of all ages. To avoid lifelong negative consequences for a generation of 50 million school-age children, policymakers need to (1) extend the timeline over which federal assistance is available, (2) provide additional resources beyond that, and (3) nudge schools to take difficult steps that will ultimately help students through increased accountability or other means.

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1. Introduction

COVID-19 created not only a once-a-century public health crisis, but also a once-a-century public education crisis. We've made significant progress remedying the public health crisis; in May 2023, the federal government determined that COVID-19 was no longer a public health emergency. The same cannot be said for our public education emergency.

Data from the National Assessment of Educational Progress (NAEP), the "nation's report card," documented the first decline in math test scores ever recorded (for 8th graders in math, for instance, equal to about three-quarters of a grade level). Figures 1 and 2 show the losses are even larger for low-income and minority students, and in districts that stayed remote for longer.

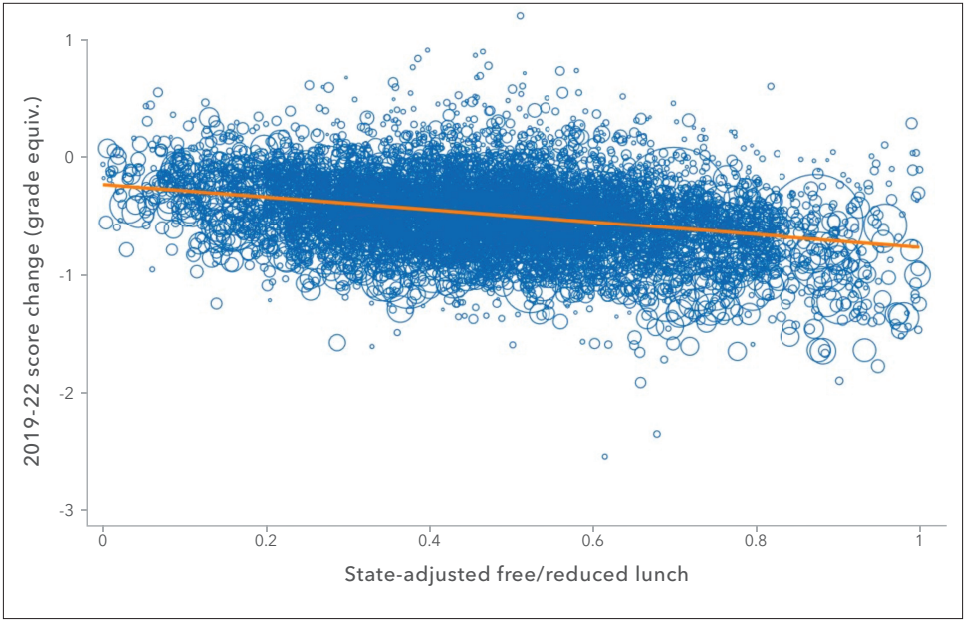
Unfortunately, little has been done to address pandemic-induced learning loss. As a *New York Times* headline put it, "US students' progress stagnated last school year… students are not making up ground in reading and math."[1] One educator noted, "We are actually seeing evidence of backsliding." What happens to the nearly 50 million children enrolled in public K-12 schools if this learning loss goes uncorrected? Hanushek (2023) estimates an average of 2–9 percent lower lifetime income as a result. Kane et al. (2022) estimate that the drop in eighth-grade math learning alone will lead to a collective $900 billion loss in future earnings.

Although little to no progress has been made in remediating pandemic-induced learning loss, the federal government's pandemic relief to school districts is about to expire. Congress sent $189.5 billion to schools through the Elementary and Secondary School Emergency Relief (ESSER) Fund between March 2020 and March 2021. While some of this funding was to replace tax revenue lost due to the pandemic, schools had to set aside at least 20 percent of their funding for evidence-based interventions to address learning loss, including things like tutoring and after-school programs (United States Department of Education 2021a).[2] The last round of ESSER funds must be committed by September 2024 (US Department of Education 2021b) and then the money disappears. It is as if Operation Warp Speed were shut down a few months in, long before the COVID-19 vaccine was developed, because some arbitrary bureaucratic deadline was reached.

1 https://www.nytimes.com/2023/07/11/us/reading-math-test-scores-education-nwea.html

2 The Every Student Succeeds Act of 2015 (ESSA) defines "evidence-based" by four tiers: "strong evidence," "moderate evidence," "promising evidence," and "demonstrate a rationale." The highest tier, "strong evidence," includes large, multi-site randomized controlled trials with statistically significant and positive effects. Interventions that fall into the lowest tier, "demonstrate a rationale," must be based on high-quality research findings and must include efforts to evaluate the intervention's impact. See the Department of Education's guidance on evidence-based interventions for additional details (2016). States were required to submit plans for ESSER fund disbursement to the Department of Education (see United States Department of Education 2023).

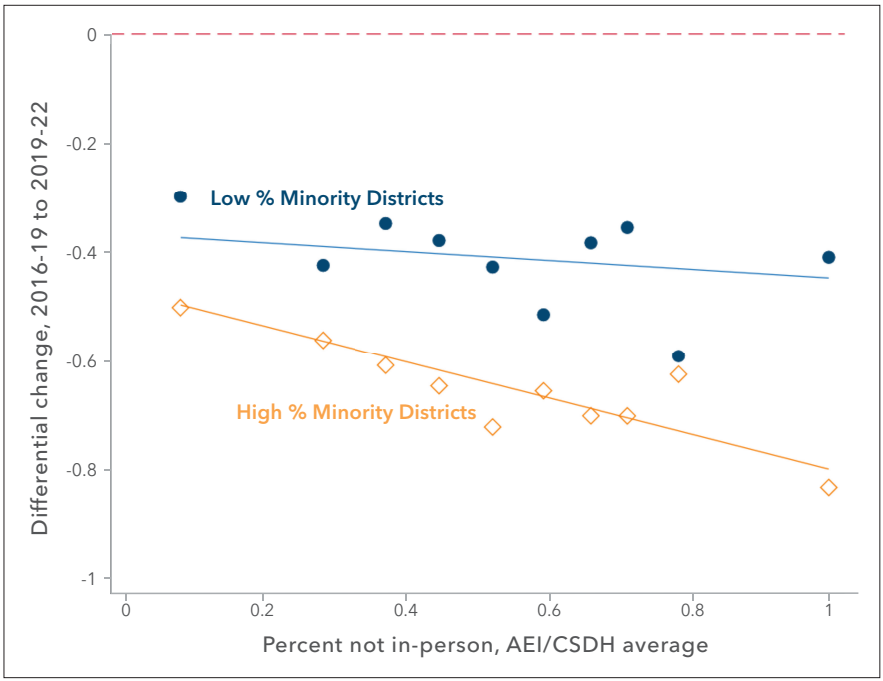
Figure 1. 2019-2022 NAEP Math Score Changes vs. Free or Reduced-Price Lunch Rates



Source: Fahle et al. (2023).

Notes: Figure 1 shows 2019–2022 NAEP math score changes (represented as grade equivalents) vs. state-adjusted free or reduced-price lunch rates.

Figure 2. Pandemic-Induced Learning Loss Higher for Minority School Districts and Share of Students Learning Remotely



Source: Fahle et al. (2023).

Notes: Figure 2 shows average district student math achievement losses vs. percentage of students learning remotely, by percentage of minority enrollment. The percentage of students learning remotely is the average of the remote learning measure from the American Enterprise Institute (AEI) and the remote learning measure from the COVID-19 School Data Hub (CSDH).

Why has so little progress been made? While part of the issue is that the ESSER funding was unlikely to have ever been enough money (even had those dollars been deployed optimally), it's also the case that changing the rate of student learning requires schools to change what they do – and those changes have been slow in coming. For example, US Secretary of Education Miguel Cardona encouraged districts to devote ESSER dollars to high-dosage tutoring programs to help overcome learning loss (Mervosh 2023). That type of tutoring can double or triple the amount of learning students achieve per year (Guryan et al. 2023). Delivering this type of tutoring in a scalable way requires changing the daily schedule to create time during the school day and adopting new human resources practices. Paraprofessionals, for instance, can offer high-quality tutoring at a lower salary than licensed teachers, which holds costs

down thus improving scalability. A combination of the inevitable chaos that came with the end of the pandemic and the change-aversion common in all organizations has led to far too little tutoring delivered nationwide given the scope of the problem.

We argue that school districts across America need (1) more time to spend down their ESSER funding, (2) more resources beyond those allocated in ESSER, and (3) more accountability, to ensure that dollars are spent on the difficult or less popular things that are most effective in helping students learn. While there would still be additional scaling challenges that need to be solved, our own work examining the strategic incorporation of technology to substitute for tutoring resources makes us cautiously optimistic that these challenges can be met – but only if there's more time, money (and nudging) for schools to fully address the challenge.

2. The Nature of the Challenge

It was clear from the very beginning of the pandemic that the combination of the shift to remote learning plus the "digital divide" would wind up further widening disparities in schooling outcomes in America. For example, data from a single week in May 2020 showed that nearly a third of the Chicago Public School system's 350,000 students did not log on to even one Google Classroom or Google Meet (Chicago Public Schools 2020; n.d.). Chronic absenteeism increased dramatically across the country, with student absences fully doubling in high-remote-instruction states like Virginia and California. (Given data limitations, those figures may, if anything, even underestimate the true rise in absenteeism). The US Department of Education estimated that at least 10.1 million students missed at least 10 percent of the 2020–2021 school year (Chang, Balfaz, and Byrnes 2022).

Of course, missing this much school, and the imperfect substitution of remote school for in-person instruction, led to large learning losses, particularly for the most disadvantaged children in America. But the real public policy challenge is not merely short-term learning losses. Because education is intrinsically cumulative, there is the real possibility that pandemic-induced school disruptions may set a whole generation of students off track for the rest of their lives.

To see the problem, just reflect on your own schooling experiences. Schools are organized into grades from K through 12. Within those grades, students are taught in groups of between, say, 20 and 35 (depending on the district, school, grade, subject, etc.), usually by a single teacher. Those teachers are told their job is to teach students grade-level content. That's what their students are tested on at the end of each year, and that's what schools often judge teachers on as well. For perhaps well-intentioned reasons of not wanting some students to be stigmatized or give up

on school altogether, most students get promoted to the next grade whether or not they've mastered the skills of the grade they just finished.

The frequent result: A teacher standing in front of a classroom, trying to teach grade-level content to students whose academic levels vary enormously. Even before the pandemic, the average fifth-grade class, for instance, contained some students working at a third-grade level and some working at an eighth-grade level.[3] That wide range of instructional needs within each classroom has only gotten wider since the pandemic began, since the learning impact of the pandemic fell disproportionately on the most disadvantaged (Lewis et al. 2022) students. Some indications are that teachers target instruction toward something like the 60th percentile of the distribution (Bloom, 1984). So students who are behind grade level – a much larger share of children now thanks to the pandemic – will be getting instruction that's not targeted at what they need, a so-called "academic mismatch."

Even before the pandemic, dealing with this sort of personalization challenge from teaching a classroom of students with heterogeneous academic levels and needs was regularly reported by teachers as one of the hardest parts of teaching (Guryan et al. 2023). Or, as one of our colleagues at the University of Chicago's Committee on Education put it, "dealing with heterogeneity is the problem of education."[4]

The danger is that students who fall behind grade level wind up benefiting less from each subsequent year of classroom instruction because they are increasingly far behind the level of what is being taught in the classroom. While some of the measurement issues become subtle, there is some indication that the variance of student test scores widens as children progress through school (Cascio and Staiger 2012; Nielsen 2023).

The consequences of pandemic-induced learning loss, in other words, are likely to be long-term, and these consequences will be most dire for the most disadvantaged children.

The consequences of pandemic-induced learning loss, in other words, are likely to be long-term, and these consequences will be most dire for the most disadvantaged children. The potential magnitude of the long-term effects can be seen by pre-pandemic data on what happens when children miss key developmental milestones. Students who can't read at grade level by third grade are four times less likely to graduate high school.[5] Ninth graders who

3 The majority of students are one to two years behind (Peters et al. 2017).

4 Private communication, Jens Ludwig with Steve Raudenbush.

5 16 percent of students who are not at grade-level reading proficiency in third grade do not go on to graduate high school, compared to only 4 percent of students who are proficient (see Hernandez 2011).

have not yet passed their required entry-level math class (Algebra I) are five times less likely to graduate.[6]

Something desperately needs to be done. Why hasn't it been done yet?

3. A Case Study: Tutoring

To see both what *could* be done to overcome pandemic-induced learning loss, and why that hasn't been done yet, we consider the case study of one specific instructional technology. With the distribution of federal ESSER funding, US Secretary of Education Miguel Cardona encouraged districts to prioritize resources for an approach that is promising for accelerating learning of students of any age: intensive or "high-dosage" tutoring (Belsha 2022).

3.a. Empirical Support for Tutoring

High-dosage tutoring (HDT) dates back at least to the fifteenth century at Oxford University, where one or two students at a time would meet with their instructor for several hours per week. (One could think of this practice as extreme class-size reduction). High-dosage tutoring helps address what teachers report in surveys to be the two most difficult, and perhaps related, challenges of classroom teaching: variability in students' academic levels (and hence their needs); and classroom management. These challenges are more difficult with older students because as students age, their academic levels become increasingly variable (students become more and more different from one another) and disruptive behaviors get more prevalent.

Modern statistical analysis has confirmed the wisdom of the Oxford dons hundreds of years ago: the data suggest that tutoring is indeed the best way to teach anyone anything. A series of demonstration projects in the 1980s found that compared to regular classroom instruction, students tutored one-to-one spend almost 40 percent more time on-task. Students in tutoring learned fully 2 standard deviations (SDs) more than their peers in traditional classroom settings (Bloom 1984). As a way to benchmark the enormous magnitude of that learning gain, the average test-score gain over the course of a student's high school career is about 0.6–0.7 SDs, and the test-score gap between high- and low-income eighth graders is 1.4 SDs (Reardon 2011; Loveless 2012). Another way to get a sense of the magnitude here is that a student who improved their test score by 2 SDs would move approximately from the 15th to the 85th percentile.

6 80 percent of students who do not pass algebra do not go on to graduate high school, compared to only 15 percent of students who do pass algebra (see Schachter 2013).

We also see large gains from tutoring outside of controlled lab conditions, in real-world school settings. A review of more than 90 randomized controlled trials (RCTs) of smaller-scale tutoring programs showed an average effect of 0.37 SDs (Nickow, Oreopoulos, and Quan 2020).[7] Our own RCT of high-dosage high-school math tutoring in partnership with the Chicago Public Schools (CPS) and the non-governmental organization (NGO) Saga Education, involved 2,633 ninth- and tenth-grade students in low-performing schools in economically under-resourced areas on the south and west sides of Chicago. We found two-on-one tutoring for 45-50 minutes a day in school every day increased math test scores by 0.16 SDs and reduced math-course failures by 49 percent (Guryan et al. 2023).

A replication RCT in the 2014–2015 academic year with 2,710 ninth and tenth graders found even larger impacts, with test score gains of 0.37 SDs and grade impacts comparable to the first study. When the studies were pooled together, the overall effect on math test scores in eleventh grade was 0.23 SDs—the equivalent of an additional 1.5 years of learning (and, coincidentally, the same size as the drop in eighth-grade math test scores in 2021) (Guryan et al. 2023). As Nickow, Oreopoulos, and Quan (2020) described the results from the two RCTs we reference here, these effect sizes are "exceptional relative to the potential alternatives at the secondary level."

A separate analysis compared potential learning loss policy solutions, including high-impact tutoring (Kraft and Falken 2021).[8] Overall, the learning gains from HDT are much closer to offsetting the average learning loss experienced during the pandemic than other potential policy measures are. HDT is plausibly the intervention most up to the task of meeting the scale of our current learning-loss challenge. As one education expert put it, tutoring sessions are "the best learning conditions we can devise" (Bloom 1984).[9]

3.b. Change Requires Change

If tutoring is so helpful to children, why haven't schools been doing more of this on the heels of the pandemic?

7 The review, which covered tutoring programs ranging in dosage from 1–2 days per week to every day of the week, found that the more time students spent in tutoring, the better. In-school programs were also nearly twice as effective as after-school programs. However, paraprofessional tutoring programs generated effect sizes nearly as large (0.4 standard deviations) as professional teachers (0.5 standard deviations), indicating that who performs the tutoring is not as large a determining factor for program success as might be expected. See Nickow, Oreopoulos, and Quan 2020.

8 Kraft and Falken (2021) includes an excellent discussion of the measured impact of alternate policies such as class-size reduction, additional school hours, additional school days, and summer school. All these alternatives show relatively lower impact than HIT.

9 As we discuss below, our research to date suggests that tutoring is effective when it's done in schools at a ratio of two students per full-time, dedicated adult tutor; meets daily; and follows a set curriculum. Whether tutoring might be equally effective at higher student ratios, or with peer tutors, or when face-to-face instruction is supplemented with computer time—these remain open questions.

Part of the issue is that the ESSER funding was probably not enough to start with. Total school spending for the academic year 2019-20 (setting aside capital outlays and debt interest) was $757 billion. The ESSER money, which was intended to be spread out over multiple years, represents a mere 6 percent increase in funding.[10] There are also signs that a lot of this money went to simply replacing lost tax revenue, rather than to new initiatives to remediate learning loss.

But schools have also had a hard time modifying standard operating procedures to incorporate tutoring. In fairness, school systems across the country had to manage all sorts of exceptional challenges as in-person school started up again on the heels of the pandemic (like, for instance, contingency plans for what to do if a student gets COVID-19, what to do if there is a new COVID-19 outbreak, etc.) But there have been other reasons schools have struggled to do tutoring as well.

For starters, it has been hard for schools to find dedicated time during the school day itself to incorporate tutoring. Past research (and our own experiences working with different districts around the country) suggest it is enormously difficult to get students to participate at large scale in either after-school tutoring or virtual tutoring at home. Having this happen during the school day while children are in the building seems to be a key feature of successful tutoring programs. Presumably, that's been hard for schools to do in part because all organizations suffer from a general change-aversion. In our discussions with educators, resistance also sometimes is motivated by an assumption that reducing the time spent on the things that children like (including art, music, gym, etc.) and make them enthusiastic about school could cause students to become disengaged. What that reasoning misses is that being behind grade level in reading or math creates frustration and boredom that can also lead to disengagement from school. So anything that helps students better engage with their core academic classes has a countervailing effect to help reduce frustration and disengagement. The data confirm this view: Carving out time to give students more time on core academic tutoring (like in math) does not on net reduce attendance (Guryan et al. 2023).

Delivering high-dosage tutoring at scale in a way that's both truly high-dosage and scalable also requires using a different sort of human resources model than schools are necessarily used to. The key insight behind tutoring is that once "class size" gets small enough, the nature of teaching becomes qualitatively different. In a regular classroom setting with 20-35 students, teachers need a great deal of prior

10 This figure assumes distribution of funds over four years (May 2020 through September 2024) and annual school spending of approximately $757B on instructional expenses such as teacher salaries and benefits. Total school spending is actually closer to $870B when including non-instructional expenses such as capital outlays and debt service. See National Center for Education Statistics 2023.

pedagogical training and on-the-job learning to successfully personalize instruction and handle classroom management. But once class size is reduced to just 1 or 2 students those two tasks become fundamentally different, and easier. In our own work in partnership with the Chicago Public Schools and the NGO Saga Education, we see that paraprofessionals with little prior educational background who are willing to work for one year as a tutor for a modest stipend ($20-30,000 per year) can be remarkably successful. Using fully certified teachers as tutors, who cost two or three times as much as paraprofessionals, is both unnecessary for a tutoring program to succeed and winds up greatly increasing costs. And in terms of efforts to scale high-dosage tutoring, cost is the enemy of both high-dosage and scale.

This is all to say that to change student learning requires schools to change what they're doing and that's hard under the best of circumstances. For schools to do the kind of high-dosage tutoring Saga implemented in Chicago—using paraprofessionals (to hold costs down), a structured curriculum (not just homework help), and a high dosage of tutoring (several hours per week delivered in school)—requires lots of things to be different. This is also true of setting up summer schools, as Harvard's Tom Kane and others have called for, and other useful programs.

What we have seen in practice is that when schools are faced with the possibility of change, they tend to do fewer of the hard things that will help students and more of the easier things that are likely to have fewer learning benefits for children. For example, in our experiences working with districts around the country, many have punted on the problem of trying to find time during the school day and instead relied on after-school programs or tried virtual tutoring at home in the evenings or on weekends. None of those efforts that we have seen firsthand led to a high "dosage" of tutoring delivered to students at any sort of scale.

As another example, a different district we worked with tried a decentralized approach to tutoring, giving individual schools lots of discretion over how they deployed their tutors. Often, the tutors wound up simply serving as teachers' aides, which the research suggests have little impact on student learning in part because these aides wind up being assigned to largely do the parts of the teacher's job teachers like least (grading, making copies, etc.) (Krueger 1990; Hemelt et al. 2021).

4. A Different Path Forward

If America wants to avoid lifelong harm to the current generation of 50 million school-age children across the country, we need to change course. What should we do instead?

We need to provide schools with:

- An extension (more time) to spend down federal pandemic assistance.
- More resources beyond the initial federal ESSER allocations, given the scale of need.
- More accountability and other nudges to push schools to make the hard changes that will actually change student learning.

Even with these three necessary ingredients in place, astute observers of US social policy will note that very few social policies succeed at massive scale. We think that is a solvable problem partly because of encouraging recent evidence that technology can partly substitute for tutor time, at least to some degree, to reduce cost and increase scalability. There is the very real possibility, in our view, to build a new at-scale component of the American education system that not only overcomes pandemic-induced learning loss but also helps address the large disparities in academic outcomes that even pre-dated the pandemic.

4.a. More Time, More Money, More Accountability

It seems unarguable that the federal government should provide school districts with more time to spend their existing ESSER funding. Schools have made remarkably little progress remediating pandemic-induced learning loss. Schools didn't have any infrastructure in place to introduce high-dosage tutoring into standard operating procedures, so most needed to build that from scratch. Worse still, they were trying to build tutoring programs from scratch amid national labor shortages (Belsha 2021). Only now are even some of these districts really starting to put that infrastructure in place. Pulling their federal funding at the end of the 2023-24 academic year would be like calling it quits before the real work even begins.

We believe there is also an argument to provide additional resources beyond what the initial federal government ESSER money provided. The ESSER funding initially averaged out to about a 6 percent increase in annual K-12 public spending, with a lot of that available to districts to overcome tax revenue lost due to the pandemic. What's the argument for providing more resources beyond that, focused exclusively and relentlessly on solving pandemic-induced learning loss? Our previous estimates suggest that every dollar put into some version of tutoring described above (and below in the next section) can return $2 to $13 in social value in return.[11]

11 Guryan et al. (2023) shows that the benefit-cost ratio of high-dosage tutoring ranges from 2.4 to 8. If it's really possible to reduce costs by 30 percent using technology without compromising effectiveness, the benefit-cost ratio could be as high as 13 (dividing the highest benefit cost ratio of regular tutoring, 8:1, by 0.7).

What sort of resources are we talking about, exactly? In the short term, school administrators estimate almost half of students are behind grade level in at least one subject.[12] That's about 25 million students. We can conservatively assume each of those students needs a year of tutoring to get back up to grade level, although because tutoring can accelerate learning by up to an extra 1.5 years or more in a single year, in practice a lower dosage of tutoring might wind up being sufficient. If it were possible to deliver a package of tailored tutor-plus- computer-assisted learning (CAL) personalized instruction to students at an average cost of $3,000 per student (a reasonable estimate based on our own past work), the cost of remediating the remaining pandemic-induced learning loss would be on the order of $75 billion.

But that $75 billion will only lead to improved student learning if and only if schools change standard operating procedure to faithfully implement the type of tutoring that will genuinely help students. To ensure schools do that with the additional resources, additional accountability (and perhaps other types of nudges) are likely to be required.

4.b. Solving the Scale-Up Challenge

The history of US social policy is one of challenges to scale. Even if we can get schools more time, more money, and more accountability to do the hard things that will help students, how do we know we can solve the perennial scale-up problem?

One version of the scale-up problem stems from the fact that so much of social policy involves hiring one person to work with another person (caseworkers, teachers, etc.). Typically, that type of work is highly contingent – on the context, on what's going on with the person that day, etc. To solve that contingency, the human provider is given a great deal of discretion in what they choose to do in the program at any given moment. That in turn requires a large amount of skill. Writing down the "formula" or "recipe" for how to use that discretion optimally is challenging partly because the space of contingencies is enormous, and partly because so much of what skilled people do in a given circumstance stems from tacit knowledge that cannot be communicated explicitly (because even we as people cannot consciously access what we do in those circumstances). Luckily, this does not seem to be a key challenge in tutoring because the task is simplified enough for a broad class of people to succeed as tutors.

12 This estimate is drawn from a 2022 survey of school administrators (National Center for Education Statistics 2022a); however, 2022 eighth-grade NAEP scores indicate that the true level may be higher, given that fully 74 percent of students were testing below proficiency in math and fully 69 percent were testing below proficiency in reading (National Assessment of Educational Progress n.d.a; n.d.b).

The scaling challenges here seem to stem instead from a combination of limited money and limited labor supply (i.e. a finite supply of tutors). Luckily there's a lower-cost (indeed, zero marginal cost) way of providing the same sort of high-time-on-task, personalized instruction that tutoring provides, one that doesn't require hiring people to deliver. That way is technology. We think the selective, strategic use of technology in tutoring programs can help reduce costs and improve scalability.

The selective, strategic use of technology in tutoring programs can help reduce costs and improve scalability.

High-quality computer-assisted learning (CAL) platforms—just like tutoring—are designed to help students at the academic level they're currently operating at, and to progress at their own pace. It also maximizes time on-task free from the disruption and management challenges that can come with regular classroom teaching. There have been enormous venture-capital investments in CAL in recent years, with the industry reaching $20 billion in funding in 2021 (Fittes 2022). There is every reason to believe that the capabilities of CAL platforms to provide personalized instruction and feedback to students will only get better over time with the advent of new and better tools from artificial intelligence.

A key insight is that CAL can be a near-perfect substitute for tutoring, but only on the margin. Previous research has shown that CAL has diminishing marginal returns (Bettinger et al. 2023). When people think of diminishing marginal returns they usually think about the "diminishing" part of the curve where returns start to flatten out. (For CAL specifically, every parent of a child during the pandemic thinks immediately of a kid sitting bored for the week's 25th hour on a computer screen.) The focus on the flat part of the curve has the tendency to divert our attention from the part of the curve where returns on the margin can be quite high.

An illustration of the opportunities the steep part of the curve provides comes from some research our team did in partnership with Saga Education and the Chicago Public Schools (CPS). In the CPS, Saga tried a variant of their tutoring program in which, rather than spending every day working with a tutor two-on-one, students spent only *every other day* with a tutor and spent the *off days* on a high-quality CAL platform (like ALEKS). The result was to cut costs by about one-third relative to daily tutoring and to cut in half the number of tutors needed to serve a given number of students.

Yet the benefits to student learning from every-other-day tutoring (with off days on CAL) were almost the same as every-day tutoring. A series of randomized evaluations during the 2018–2019 and 2019–2020 academic years across seven high schools in CPS and the NYC Department of Education showed that the gains were nearly identical to what we see from daily two-on-one tutoring, with effects of 0.23

standard deviations on math scores (Bhatt et al. 2023), basically the effect of everyday tutoring (0.26 SD in Guryan et al. 2023).

If it's possible to replace 50 percent of tutor time with CAL time without sacrificing student learning, how much further can we go? The answer might be: It depends on the student. CAL only helps students learn if they use it, and data from previous studies show enormous variation across students in their level of engagement with CAL. While around 20 percent of students never utilized the assigned CAL platform at all, 36 percent attempted all the CAL learning modules they were assigned (Lab for Economic Opportunities 2022). Moreover, the students who differ so much in their willingness to use CAL seem to be observably different. Those who use CAL more tend to already have had higher grades, higher test scores, higher attendance, and less misconduct (Bhatt et al. 2023).

In principle it should be possible to offer these students a tutoring package that is relatively lighter on tutor time and heavier on CAL time, which would free up scarce, costly tutor time to give to the students who are less inclined to engage with CAL. This type of "personalizing the instructional personalization," so to speak, would help hold down costs and ensure that a given budget helps as many students learn as much as possible. Where is the tipping point for a given student in how much CAL time (relative to tutor time) to give them before learning benefits start to decline? Go too far in replacing tutor time with CAL and learning gains will surely be reduced; stop too soon in substituting CAL for tutor time and we miss an opportunity to free up resources by doing something cheaper rather than more expensive, to serve more students.

4.c. A Positive Legacy of the Pandemic?

If we can overcome pandemic-induced learning loss, we'd expect the academic status quo to look a bit more like it did pre-pandemic. Even with no more learning loss, that involves lots of variation across students in their learning levels and needs, and lots of students who remain behind grade level and so may not be benefiting from regular classroom as much as anyone might wish.

One could imagine there being great benefits to sustaining a system of high-dosage tutoring in schools to intervene whenever any student falls behind grade level, to get them back on track so they can benefit from regular classroom settings. What might that cost?

In 2019, school administrators estimated that 36 percent of students were behind grade level (Institute of Education Sciences n.d.). If we assume that under "normal" conditions each student in need requires closer to half a year of tutoring rather than

a full year (and acknowledging that early intervention would help prevent students from falling behind and staying behind, thereby reducing the amount of tutoring required overall), then the US education system would want about nine million student-years of tutoring capacity in place every year to meet student needs moving forward. That might cost something like $27 billion annually; or put differently, for a 3.6 percent[13] increase in annual public K-12 spending, we could reduce the disparities that pre-dated the pandemic and increase the productivity of student time in school (because now they are getting more from grade-level lectures from teachers).

Many policy debates in the US are, at their heart, about how to tradeoff efficiency versus equity. The reimagined public education system we propose here has the great advantage of offering the potential for substantial progress on both fronts. By helping millions more students reach their potential, the result would be substantially improved long-term economic growth (efficiency). The fact that the millions of students who would benefit the most are disproportionately lower-income students and students of color means disparities in educational opportunities would be substantially reduced (equity). Building this reimagined public education system is a difficult—but, in our view, critical—endeavor.

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The Economic Case for Smart Investing in America's Youth

AUTHORS

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ABSTRACT

The United States spends a relatively small sum on children, both on a per capita basis and as a share of all spending. In 2019, the federal government spent an estimated $5,595 per child on programs benefiting children under 18, compared to $29,189 per elderly American on entitlement programs alone—a gap that remains wide even after state and local and private charitable giving are accounted for. These patterns of federal spending run counter, however, to patterns of social returns. Research has consistently found that public spending on young Americans yields high social returns, often resulting in increased tax revenue and lower government spending on other assistance programs in adulthood. Creating a more resilient economy requires building a healthy, productive next generation. Investing in kids—specifically with evidence-based programs targeted at youth raised in disadvantaged settings—is an effective way to achieve that goal.

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1. Introduction

Rigorous research has found, time and time again, that specific types of spending on children yield high social returns, including spending in the form of health, nutrition, and education targeted to children in low-income families. These forms of spending generate large social benefits and often lead to government savings over time. In general, the social returns on programs aimed at children are much larger than those targeting older individuals.

Federal spending patterns, however, run counter to patterns of social returns. The federal government spends less on kids than on adults aged 18 to 64 or the elderly, both as a share of all outlays and on a per capita basis. Though accounting for spending by state and local governments and through private philanthropy narrows these spending disparities, the gap between overall spending on children and on adults is still large. Furthermore, even as there remains significant material need among low-income children, and as millions of American children live with the burdens of poverty, spending on youth has become *less* targeted over time, with the share of transfers going to middle-class families increasing.

This paper lays out the landscape of public spending on youth, summarizes prior research on the long-term effects of these investments, and proposes a refocusing of the federal budget toward targeted investments in children. This spending should be allocated with the goal of benefiting children of all ages, but there are types of spending that have been demonstrated to be particularly effective at improving children's outcomes, including spending on child health, nutrition, and education. To be sure, a focus on expanding investments in children should not be limited to public programs. Ideally, government spending would be bolstered by broader resource support for community programs with demonstrated evidence of effectiveness.

Evidence-based targeted spending on America's youth should rightly be considered a smart investment in a healthy, skilled, and productive next generation.

Targeted spending on children from families with low incomes should not be considered a "giveaway," nor should it be deliberately meager on account of the notion that alleviating the material need of families might lead to some reduction in parental work effort. Rather, evidence-based targeted spending on America's youth should rightly be considered a smart investment in a healthy, skilled, and productive next generation.

2. America's Spending on Children

2.a. The federal government spends a relatively small amount on children.

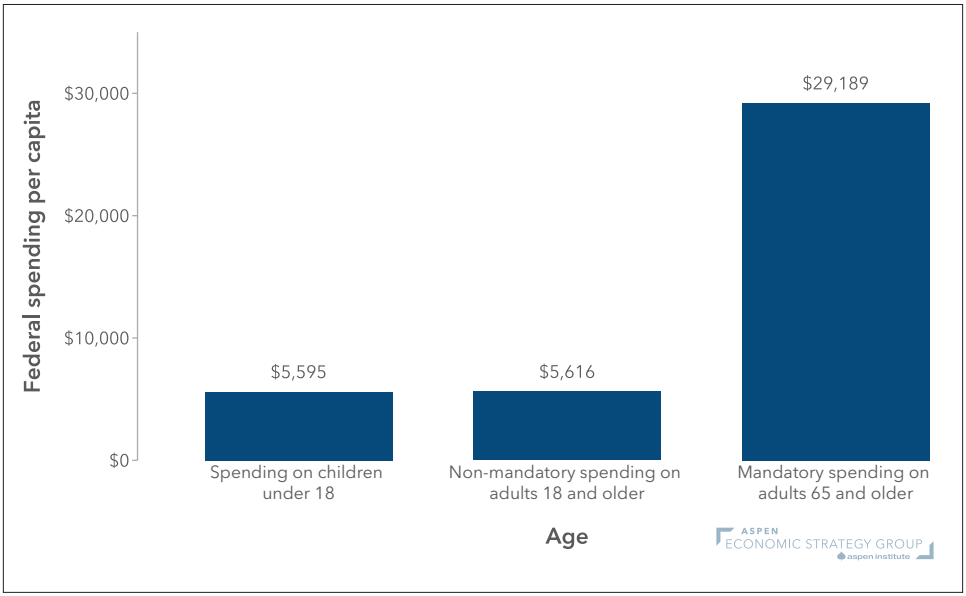
Figure 1 charts per capita federal spending in 2019 for children under 18 years old, for adults between the ages of 18 and 64, and for Americans aged 65 and older.[1] In 2019, US spending on programs directly allocated to children totaled $408 billion, or $5,595 per child, the lowest among any age group (Hahn et al. 2020). [2] Spending was higher among adults, at $5,616 per person 18–64, and was the highest among the elderly, at $29,189 per American 65 or older. On a per capita basis, the federal government spent $5.20 on elderly Americans per $1 spent on children.[3]

1 We examine spending patterns in 2019 because large, temporary increases in federal spending in 2020 and 2021 aimed at pandemic relief do not reflect historical patterns of spending across age groups. Applying the same methods to 2021 data, we calculate that in that year, the federal government spent $8,725 per child, and $32,139 per elderly adult, or $3.68 spent on the elderly per dollar on youth. Figures for spending on Americans 65 or older include only mandatory spending on Social Security, federal retirement payments, Medicare, and Medicaid, which in the prior research have been found to make up 90 percent of all spending on elderly Americans (CBO 2000).

2 Estimates of total spending on children in 2019 come from the Urban Institute's "Kids' Share 2020" report (Hahn et al. 2020). The researchers identify programs (including tax refunds and credits) that directly benefit children or households with children, and they then estimate children's share of that program (or tax credit). They draw on expenditure data from federal sources, particularly data from the Office of Management and Budget. A program is considered to directly benefit children or households with children if it meets any of the following criteria: (1) Benefits or services are provided entirely to children (e.g., K–12 education programs; Head Start) or deliver a portion of benefits directly to children (e.g., SSI; Medicaid); (2) Family benefit levels increase with family size (e.g., SNAP; low-rent public housing); or (3) Children are necessary for a family to qualify for any benefits (e.g., Temporary Assistance to Needy Families (TANF) and the Child Tax Credit). To calculate a program's share of spending going to children when the program provides benefits to families without any delineation of parents' and children's shares, they generally assume equal benefits per capita within the family (e.g., TANF and the Supplemental Nutrition Assistance Program). Per capita spending is updated with recent population estimates from the US Census Bureau (Census 2022).

3 This discrepancy likely reflects the different implicit social contracts the federal government has with adults and children. Many people are inclined to view Social Security benefits as something they are owed since they contributed to the system. In contrast, children have not paid into any system and there is no similar promise—either implicit or explicit—from our federal government to provide materially for children. Kearney (2020) made this point in a Brookings essay titled "We Could Abolish Child Poverty in the U.S. with Social Security Benefits for Poor Kids." She noted in that essay that if each child living in poverty in the US were given the average Social Security benefit received by a Social Security recipient aged 65 and over, which is $17,112 annually, the number of children living in poverty would fall from over ten million to about 413,000.

Figure 1. 2019 Federal Spending Per Capita, by Age

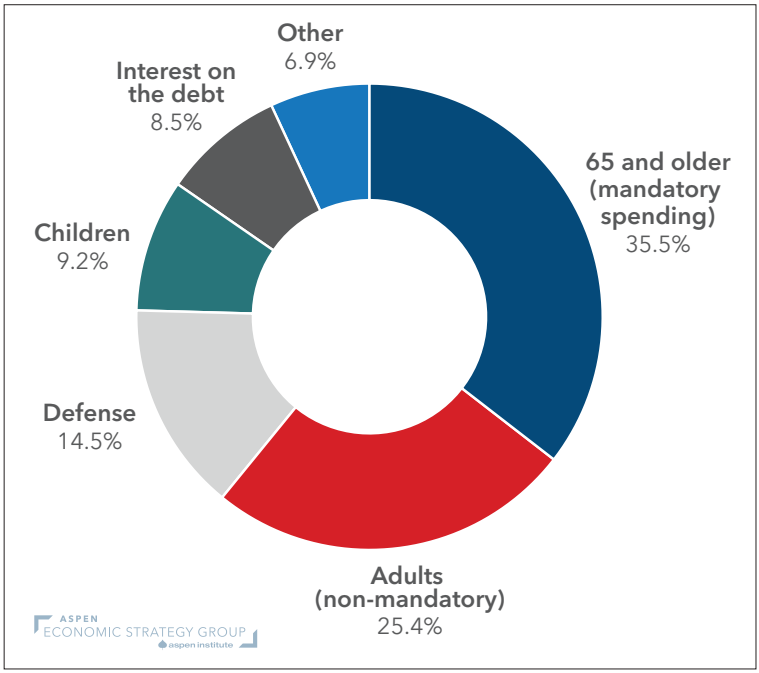


Notes: Federal spending numbers include direct spending from federal programs, as well as the portions of refundable tax credits that exceed tax liability and are paid out to families. Tax reductions resulting from tax exclusions, deductions, and credits below tax liability amounts are not included. Spending on adults includes federal spending on individuals older than 18, excluding mandatory spending on those 65 and older through Social Security, Medicare, and Medicaid.

Sources: Total spending on children and adults from Hahn et al. (2020); population estimates from Census (2022); estimates of mandatory spending on adults 65 and older through Social Security from Social Security Administration (2020) and through Medicare and Medicaid from Congressional Budget Office (2020a).

This disparity is also apparent when examining spending as a share of all federal outlays. Figure 2 depicts selected categories of federal spending as a share of the $4.4 trillion in total outlays in 2019. The US devoted 9.2 percent of federal outlays to children, less than the 14.5 percent spent on defense. In contrast, spending on adults (excluding mandatory spending on those 65 or older) comprised 25.4 percent of all outlays, and mandatory spending on the elderly, at 35.5 percent, made up the largest share of federal outlays.

Figure 2. Share of Federal Outlays by Category, 2019



Sources: Total outlays from the Congressional Budget Office (2020b); outlays on children and adults from Hahn et al. (2020); estimates of mandatory Social Security and Medicare spending on adults aged 65 and older from Social Security Administration (SSA 2020) and CBO (2020a).

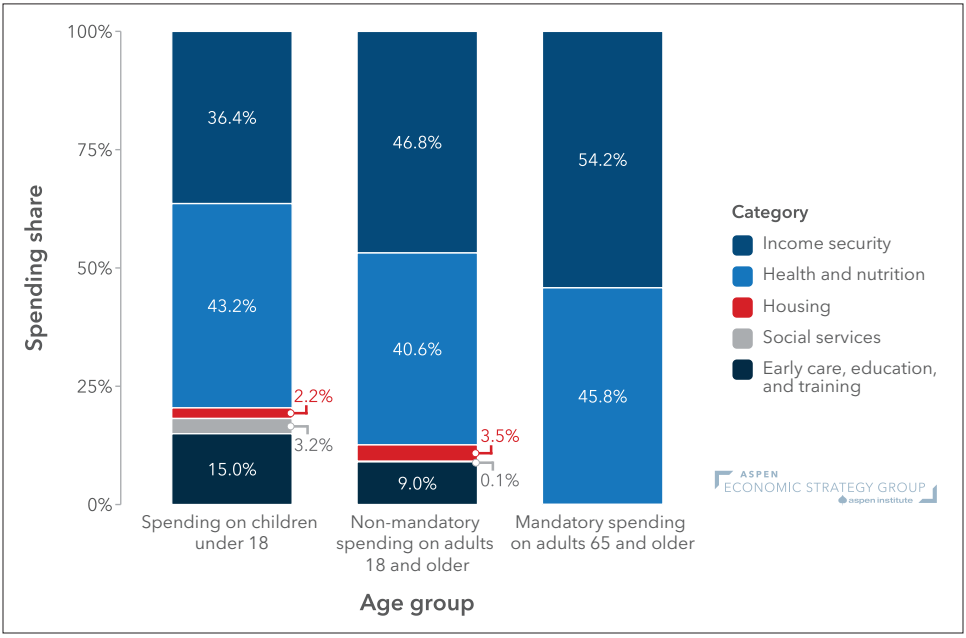
Figure 3 plots the distribution of spending within each age group by major category. Among children, 43.2 percent of federal funds were spent on health and nutrition. Medicaid spending on children alone accounted for 24.0 percent of all outlays ($98 billion), with the Supplemental Nutrition Assistance Program (SNAP) comprising another 6.7 percent of spending on kids ($28 billion on children).

Early care, education, and training comprised 15.0 percent of all outlays. The main permanent programs in this category include Title 1 spending, which provides funding to school districts to support low-income students (3.9 percent of spending on kids, at $16 billion) and Head Start, which funds preschool for low-income families (2.3 percent of spending on kids, at $10 billion).[4]

4 In 2021, the largest single source of education spending in 2021 was the Education Stabilization Fund, which provided $34 billion for school districts to make up for local revenue shortfalls caused by the COVID-19 pandemic and to remediate the large learning losses induced by schooling disruptions in 2020 and 2021. As Jonathan Guryan and Jens Ludwig (2023: p. 150-170 of this volume) discuss in this volume, these learning losses persist even as these funds are set to expire.

Income support programs accounted for 36.4 percent of spending on children. A large portion came through refundable portions of the Earned Income Tax Credit (EITC) and the Child Tax Credit (CTC). The EITC accounted for 12.8 percent ($53 billion) of spending on kids and the CTC for 9.4 percent ($39 billion).[5] Spending on children within the Supplemental Security Income (SSI) program now outstrips expenditures from Temporary Assistance for Needy Families (TANF), the modern-day successor to cash welfare. In 2019, SSI spending on children totaled $10 billion, compared to $4 billion in TANF cash assistance, but made up just 2.5 percent of overall spending on children. Income assistance programs make up a larger share of spending on older groups, with unemployment insurance, the Old Age Security and Disability Insurance program (OASDI, or Social Security), and veterans' benefits comprising significant portions of spending on older adults.

Figure 3. Government Spending Shares Within Age Groups, by Major Category, 2019



Notes: Federal spending numbers include direct spending from federal programs, as well as the portions of refundable tax credits that exceed tax liability and are paid out to families. Estimates of spending on Americans 65+ are restricted to mandatory spending on health and income security programs.

Sources: Total spending on children and adults from Hahn et al. (2020); population estimates from Census (2022); estimates of mandatory spending on 65 and older from Social Security Administration (2020) and Congressional Budget Office (2020a).

5 Again, during the COVID-19 pandemic, spending through the CTC rose, since Congress expanded the credit amount and raised refundability limits, with spending at $70.4 billion in 2021. Those provisions expired at the end of 2021.

The share of federal spending on children rose during the COVID-19 pandemic, but it is projected to decline over the next decade. From estimates in the Urban Institute's "Kids' Share 2022" report, in 2010 the portion of federal spending on children reached its highest point since at least 1960, at 10.5 percent, but then experienced a continual decline through 2019 (Lou et al. 2022). At the onset of the COVID-19 pandemic, relief spending programs—primarily the Child Tax Credit expansion, the Education Stabilization Fund, and increases to SNAP's generosity—caused the share of spending dedicated to children to spike. As these forms of spending have already ended or soon will end, spending on children is declining again.

By 2024, the federal government will once again devote more resources to interest payments on the debt than to spending on children.

By 2024, the federal government will once again devote more resources to interest payments on the debt than to spending on children. As interest payments on the debt and spending on entitlement programs benefiting older Americans are set to balloon, by 2032 the share of outlays on children is projected to fall to 6.4 percent, the lowest level since 1993. This trend is a concrete demonstration of the point made in this volume by Karen Dynan that a failure to control budget deficits and reform entitlement programs will likely crowd out other valuable spending priorities (Dynan 2023).

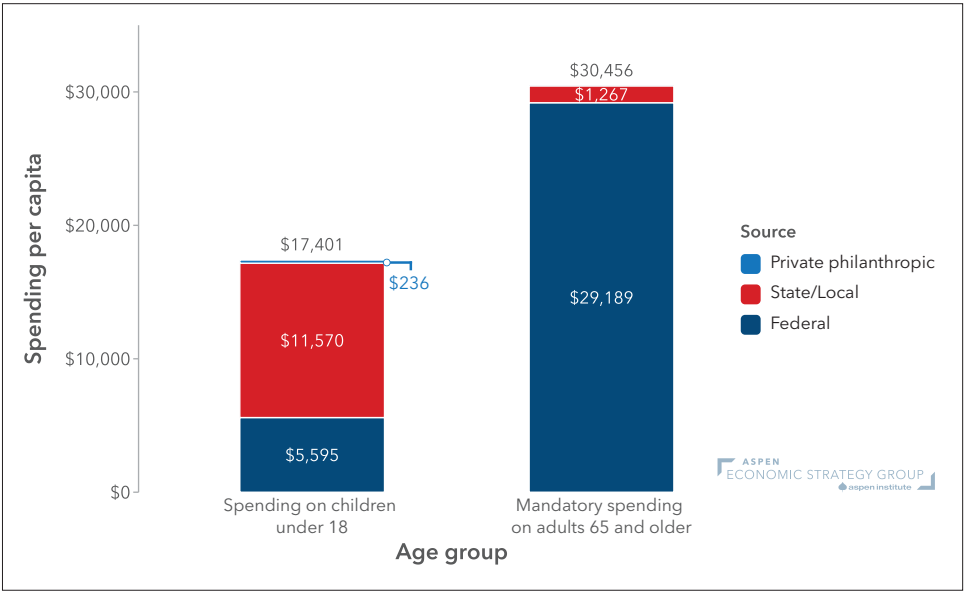
2.b. Accounting for both state and local and philanthropic spending only partially narrows the spending gap between adults and children.

Of course, the federal government is not the only source of spending on children in America. A large portion of spending on youth comes from state and local governments in the form of K–12 education spending, and these governments spend a much larger share of their budgets on children than on older adults. This facet of spending partially closes the large gap in total spending between children and older adults that exists within the federal budget. In 2019, state and local governments spent a total of $851 billion on children, or $11,570 per child, compared to the $71 billion these groups spent on adults ($1,267 per capita).

Finally, to provide a more complete view of the country's spending, we include private philanthropic spending on children. Gathering comprehensive data on private philanthropic efforts targeted toward children is complicated by both a lack of comprehensive data sources on charitable giving and the fact that much charitable spending can benefit children and adults in a community (including giving to environmental funds and general donations to hospitals, for instance). Nevertheless, data on giving directly targeting children's causes can offer a picture into how the nation's spending priorities change when private spending is considered.

The University of Michigan's Panel Study of Income Dynamics asks households each year about private charitable giving, along with several domains of purpose, including religious, health, or medical research and youth or family services (PSID 2023).[6] We tabulate data from the 2019 study, which asks about giving in 2018.

Figure 4. Federal, State/Local, and Private Philanthropic Spending Per Capita, by Age Group, 2019



Note: Private philanthropic spending calculated only for children under 18.

Sources: Total spending on children at the federal and state/local level and adults at state/local level from Hahn et al. (2020); estimates of federal spending on adults 65 and older from the Social Security Administration (2020) and the Congressional Budget Office (2020a); philanthropic spending on children from the Panel Study of Income Dynamics (PSID 2023); population estimates from the Census (2022).

From this nationally representative sample of American households, we estimate that in 2018, a total of $250 billion was donated to charities of any cause.[7] Among

6 The study asks respondents if they have donated at least $25 in the reference year to charity and, if so, asks them to select the main domain of purpose among 18 possible choices. For more information, see PSID 2017.

7 This total is lower than those reported by other sources on charitable giving, such as the Giving USA report, which estimates that Americans gave $428 billion to US charities in 2018 (Giving USA 2019). The discrepancy is likely due in large part to the significant portion of charitable donations accounted for by the wealthiest families, who are underrepresented in the PSID sample (Pfeffer et al. 2016). With that caveat in mind, however, other sources indicate that the bias toward measuring donations made directly toward children might be small: only a small portion of total charitable giving among the wealthiest families is directed toward children. On Indiana University's "Million Dollar List" of publicly announced private donations of $1 million or more, only $75 million of all large donations in 2014—the latest year for which data is presently available—was given to children-focused causes (Indiana University Lilly School of Philanthropy 2023).

these donations, $18.5 billion was directed to youth or family services. Adjusting for inflation, an estimated $18.8 billion—or $236 per child—was donated to such children's charities in 2019.[8]

As presented in figure 4, after incorporating these additional sources, total per capita spending is still much higher on the elderly than on children.[9] Total spending in 2019 across all four sources – federal, state, local, and estimated philanthropic outlays – comes to $17,401 per child, compared to $30,456 for Americans over age 65. That is a ratio of $1.75 spent on the elderly for every $1 spent on children.

2.c. Spending on children has become less targeted to low-income families as middle-class transfers have risen.

Public spending on youth has become less targeted toward lower-income children over time. Since the early 2000s, universal programs and tax provisions available to families regardless of income have come to make up a larger share of spending on children. Furthermore, spending on means-tested programs (those with income limits) is increasingly going to families with higher levels of income. In 1995, 36 percent of all federal spending on children was through universal programs or universal tax provisions, such as the dependent tax exemption and Social Security survivor's benefits (Lou et al. 2022). By 2021, that share rose to 53 percent, particularly as universal tax provisions increased as a share of spending—although the enhanced CTC, which contributed to the increase, expired at the end of 2021.

It is also the case that middle-class families are taking a larger share of means-tested programs originally targeted to low-income children. As reported in the 2020 AESG paper by Looney, Larrimore, and Splinter, the middle class—defined as households in the middle 60 percent of the income distribution—received 27 percent of means-tested transfers that went to non-elderly households in 1979. By 2016, the middle class received 49 percent of these transfers. This increase was driven by expanded eligibility for Medicaid and the Children's Health Insurance Program (CHIP), as well as by the increased generosity of the Earned Income Tax Credit.

8 Adjusted using the 1.8 percent change in the Consumer Price Index (CPI-U) between the 2018 and 2019 annual averages.

9 Figure 4 presents spending per capita on children and mandatory spending on elderly adults, leaving out adults 18-64 because here we rely on estimates of state and local spending from Hahn et al. (2020), which only include data for those two age groups. Additionally, data on philanthropic spending by age of beneficiary is only available for spending on children's services, so figure 4 also omits philanthropic spending on the elderly. This omission will (in a very small way) overestimate the extent to which these additional sources narrow the spending gap.

3. Public Spending on Children as Social Impact Investing

3.a. Research documents large, long-term net social benefits from targeted spending on children's nutrition, health, and education.

Research has consistently found significant long-run returns to spending programs aimed at alleviating the material needs of children from low-income families. We begin by highlighting some key pieces of evidence of the high social returns to public spending on childhood nutrition, health, and education, specifically by highlighting evidence from spending on the Food Stamp Program (which is now the Supplemental Nutritional Assistance Program, or SNAP), Medicaid, and Head Start. We then review evidence that the social return to spending on programs aimed at children—especially programs that directly invest in children's nutrition, health, and education—is often very high, and often well in excess of one.

Briefly, SNAP provides monthly vouchers to low-income households to purchase eligible food items. Benefit amounts depend on income, with more voucher money given to those with lower levels of income. Medicaid is the country's public health-insurance program; it is jointly funded by the federal government and state governments and is available to individuals and families who have low levels of income. The program was created in 1965 and was initially linked with cash welfare for low-income families with children. Eligibility for the program has been expanded many times since then.

Head Start was established in 1965 to promote school readiness for children in low-income families through educational, nutritional, health, social, and other services. Head Start is not an entitlement program; rather, the US Congress authorizes the amount of federal spending for Head Start each year. The US Department of Health and Human Services' (HHS) Administration for Children and Families (ACF) administers the program, awarding federal grants directly to public agencies, private nonprofit and for-profit organizations, tribal governments, and school systems to operate local Head Start programs. Congress typically appropriates about $10 billion annually for Head Start to serve about ten million children. Eligibility is restricted to children whose family income is below the federal poverty threshold.

Academic research has consistently found that children from poor or low-income families who had access to food-stamp benefits during childhood experienced sustained improvements in health and human capital, as compared to children from comparably poor or low-income families who did not. Bailey et al. (2023) build on earlier work showing long-term benefits of childhood exposure to food stamps. Linking rich individual-level Census and Social Security data across children's lives, they study the long-term effects of the county-level rollout of the Food Stamps

Program between 1961 and 1975. These researchers find that children who gained access to benefits during early childhood (before age five) experienced a significant increase in human capital and economic self-sufficiency in adulthood, as compared to similar children who were not exposed to the policy rollout.

The authors' estimates imply that the allocation of Food Stamp Program benefits to children is a highly cost-effective investment in young children, yielding a marginal value of public funds (MVPF) of 56. The MVPF is a measure in public finance calculated as the ratio of the benefit of the policy to its recipients (in this case, childhood Food Stamps Program beneficiaries) to the net cost to the government. This extremely high MVPF implies that this targeted spending allocated toward children has a benefit-to-public-cost ratio much higher than one.

With large-scale administrative datasets and rigorous research designs, economists have also documented the long-term benefits of childhood eligibility for the public health-insurance program Medicaid. For instance, Miller and Wherry (2019) and Wherry et al. (2018) document that infants and children who gained access to Medicaid during their childhood, or who had more years of childhood eligibility after policy changes, had better health and fewer hospitalizations as adults.

Additional research has established that spending on Medicaid for children saves the government money in the long run, as childhood access to Medicaid leads to better long-term health and human capital, and ultimately higher earnings, more tax revenue, and less reliance on government programs later in life. Brown, Kowalski, and Lurie (2020) examine the long-term impact of Medicaid and CHIP expansions during the 1980s and 1990s on adult wages, income, and tax payments using IRS administrative data on all tax returns from 1996 to 2014. Their study covers over ten million children born in the early 1980s. They find that children who gained eligibility for Medicaid paid more in cumulative taxes and collected less in EITC payments by age 28.

Goodman-Bacon (2021) estimates even longer-term effects of childhood Medicaid eligibility by making use of administrative data on the original cohort of children who obtained access during the program's original introduction in the late 1960s. He documents that early childhood Medicaid eligibility reduces-later life mortality and disability, increases employment, and reduces receipt of disability transfer programs up to 50 years later. The stunning conclusion of his research is that Medicaid has saved the government more than its original cost and saved more than ten million quality-adjusted life-years. Goodman-Bacon calculates that, on average, each dollar spent on expanding Medicaid to young children in the 1970s saved the government $1.17 in the long term.

The positive benefits of high-quality early-childhood education programs have also been well-established. There are many credible research papers on the long-term benefits of the federal Head Start program, our nation's public preschool program that serves a subset of eligible children. To mention a few examples, Deming (2009) examines differences in outcomes for pairs of siblings in which one attended Head Start and the other did not. Using longitudinal data from the National Longitudinal Survey of Youth (NLSY), he finds that siblings who attended Head Start have better long-term adult outcomes than their siblings who did not. He further finds that the positive effects of Head Start attendance on long-term outcomes are observed even though effects on academic test scores fade out, suggesting that Head Start benefits children in ways not captured by academic test performance.

Using a different methodology, Thompson (2017) also finds long-term benefits of Head Start for participating children. From NLSY data and archival records on early Head Start funding levels, he compares the long-term outcomes of children who were too old for Head Start when the program was introduced in their county with the outcomes of children who were sufficiently young to be eligible. He finds that individuals from counties that had an average-sized program when they were in Head Start's target age range completed more schooling, had significantly higher annual earnings, and were significantly less likely to report a health limitation at age 40. The estimated effects of the program are largest among Black students, children of less-educated parents, and children exposed to better-funded Head Start programs.

In addition, Johnson and Jackson (2019) document a "dynamic complementarity" between spending on early childhood education through the Head Start program and subsequent school years. Put another way, the more one spends on schooling later, the greater the benefits of early investments, and vice versa. Their research implies that there is a positive compounding effect between improved early childhood education and higher-quality education in later years. Their analysis shows that children from low-income families who were exposed to higher public spending on Head Start and then again at K–12 schools experience increased educational attainment and earnings as adults.

Taking an even longer-term view, a recent paper by Barr and Gibbs (2022) finds evidence of second-generation benefits of Head Start participation. The authors examine the outcomes of children whose mothers were exposed as young children to the initial rollout of the Head Start program in the 1960s and 1970s, also using data from the NLSY. They find evidence of intergenerational transmission of beneficial effects in the form of increased educational attainment, reduced teen

pregnancy, and reduced criminal engagement in the second generation. In terms of mechanisms, they find suggestive evidence that mothers exposed to Head Start showed improvements in parenting approaches and social-emotional channels.

3.b. Direct income assistance to low-income families with children yields wide-ranging long-term benefits.

Supplementing the income of low-income parents often leads to improved outcomes for children. Growing up in poverty involves not only material deprivation but also often comes with living in an environment filled with familial stress that imparts substantial negative physical, mental, and emotional effects. Economists have documented that cash assistance programs can relieve some of that income constraint for low-income families and, in turn, improve parental health, children's health, and children's test scores. For instance, expansions of the EITC in 1993 significantly improved reported maternal mental health and biomarkers of stress and also improved infant health outcomes (Evans and Garthwaite 2014; Hoynes, Miller, and Simon 2015). EITC payments also increased math and reading test scores among children (Dahl and Lochner 2012).

Researchers examining other forms of payment, such as payments to tribal families from casino profits, have documented similar if not larger benefits to children from cash assistance programs: such payments raised the likelihood of college completion and lowered rates of criminality in adulthood among children in families receiving these payments (Akee et al. 2010). This research bolsters the case for expanding cash allowances or tax credits for low-income families with children.

During the recent COVID-19 pandemic, Congress expanded the Child Tax Credit, making it temporarily more generous and fully refundable (this expansion contributed to the spike in spending on children in 2020 and 2021 as discussed above). This expanded child tax credit considerably reduced material hardship among US children. Remarkably, child poverty in the US *fell* during the economic downturn of 2020 and 2021, on account of generous government support for families (Creamer et al. 2022).

Estimates suggest that the enhanced CTC alone cut food insufficiency among families with children by 2.4 percentage points, or 20 percent, based on microdata from the Census Household Pulse Survey from April 2021 through May 2022 (Parolin et al. 2023). Despite the reduction in child poverty and food insecurity, Congress let the expanded Child Tax Credit expire. Dominant concerns included the large fiscal cost of the expansion[10] and the concern that such large cash transfers would discourage parents from working.

10 The Joint Committee on Taxation estimates that the one-year expansion of the CTC cost the federal government $109.5 billion (JCT 2021).

Given the preponderance of evidence showing that income supplements for low-income families improve outcomes for children, we should expand the CTC in a targeted way. This can be done with a credit design structured to alleviate concerns about discouraging work and unnecessarily high fiscal costs.

Edelberg and Kearney (2023) propose a redesigned CTC that maintains the fully refundable credit amount available in 2021 ($3,600 for children under 6 or $3,000 for children 6 to 17) just for families with low but positive income, while providing half that amount to parents with no earnings and phasing it in steeply. Such a program would encourage parents to enter the work force. The authors also propose phasing out the CTC more quickly among higher-income parents, which would reduce the fiscal cost. The experiment with an expanded CTC taught us that a sizable reduction in US child poverty is within reach, if Congress can come to a bipartisan agreement on the specific policy features of an expanded child tax credit or a new child allowance.

3.c. Smart investing in youth has a high social return.

Taking a more sweeping picture of the landscape of spending, Hendren and Sprung-Keyser (2020) draw on more than a 100 studies to systematically examine and compare the economic returns to a wide range of public spending programs. They compare the benefits to program recipients with a program's net cost to the government over a long-term horizon by drawing on research identifying causal effects of the program. For each policy, they calculate the ratio of recipients' net benefits to the net cost to the government. Recall that in the academic public finance literature, this ratio is referred to as the *marginal value of public funds* (MVPF). A policy that is calculated to have zero net cost to government—by bringing in additional tax revenue or saving future tax payments over a longer time horizon—is calculated to have an infinite MVPF, since the ratio puts zero in the denominator.

The MVPF is a measure of the benefits delivered to policy beneficiaries per dollar of expense to the government. Conceptually, it is related to Arthur Okun's (1975) concept of a "leaky bucket," used to illustrate the idea that redistributive policies often deliver benefits below their costs, due to administrative costs and induced reductions in labor supply among both those who are taxed and those who receive transfers. The leakier the bucket is by which the government transfers money to recipients, the lower the MVPF. Conversely, for a similar amount of benefits delivered, a higher MVPF implies less efficiency loss or administrative cost. An infinite MVPF implies a policy with no efficiency loss and potentially an efficiency gain.

The MVPF measure facilitates a comparison of spending across programs. If program A has an MVPF of 2 and program B has an MVPF of 1, then one should prefer to allocate spending toward program A if they prefer to give $2 to program A recipients

over $1 to program B recipients (at the same cost to the government). If program C has an infinite MVPF and program D has an MVPF of 1, then spending a dollar on program D instead of C can only be justified in a social welfare sense by placing greater weight on the welfare of program D's recipients—that is, by a political preference for giving $1 to the beneficiaries of program D (say, people over age 65) over a cost-saving measure that benefits the recipients of program C (say, children).

Across the 133 public tax and spending programs they examine under this unified framework, these researchers find that spending programs that primarily serve children have the highest MVPFs. Figure 5 charts the MVPF estimates for different programs color-coded by major category of spending, plotted by the age of the program's main beneficiaries. Each category comprises multiple programs.

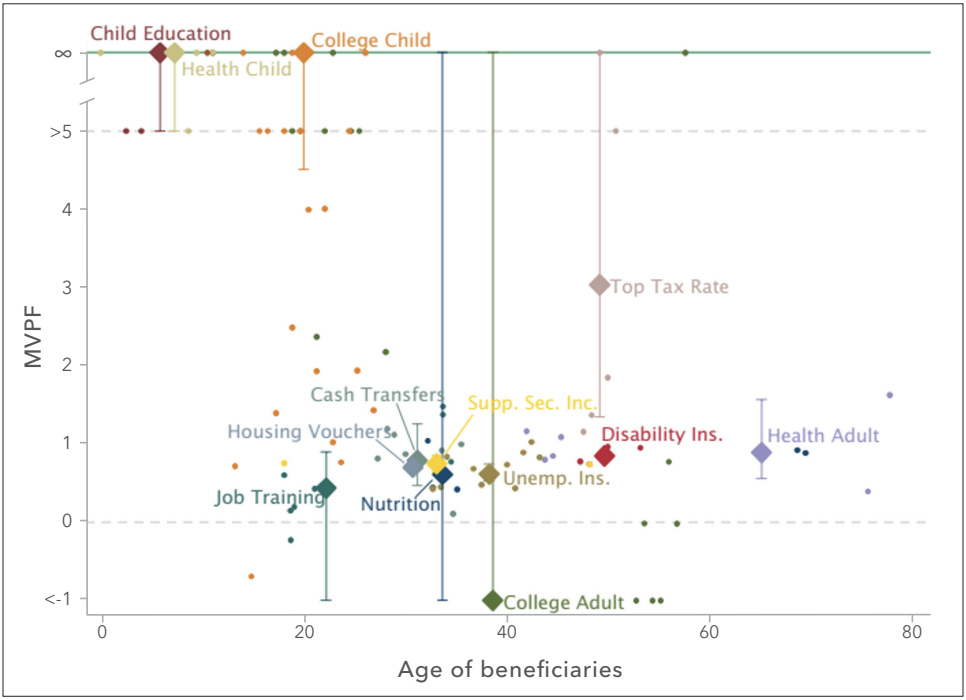
To give a few examples, the category "child education" includes studies of Head Start, K–12 school spending reforms, and the Perry Preschool Program, among others; "college adult" includes studies of the American Opportunity Tax Credit, the Hope Tax Credit, and the tax deduction for postsecondary tuition, among others; "college child" includes various policy reforms and programs targeting full-time college students, including admissions criteria for state flagship universities and community college tuition changes in multiple states; and "adult health" includes insurance subsidies for health insurance purchase in Massachusetts, the expansion of Medicaid to adults in Oregon, and the introduction of Medicare. There is a clear pattern among the estimates: spending on children yields the highest social value per cost and spending on adults consistently yields lower social returns.

The type of spending – not just the age of the target beneficiary – matters for the social return. Spending on children's health and education — from a very young age through age 20 —consistently yields a very high MVPF. There is also evidence that the Moving to Opportunity project that provided housing vouchers for parents to move from high-poverty to low-poverty neighborhoods generated enough government savings through improved outcomes for children to pay for itself (Chetty, Hendren, and Katz 2016).

3.d. The federal government spends the least where the social returns are highest.

Charting these benefits along with federal spending across age groups, reveals how our spending patterns have fallen out of line with these patterns of social returns. See figure 6. The federal government spends $3.68 on elderly Americans for each dollar spent on young children, even though each dollar spent on adults over 18 largely generates less than $1 in benefits, compared to far larger benefits, on average, when that dollar is spent on kids.

Figure 5. Marginal Value of Public Funds (Ratio of Benefits to Net Government Costs), by Age of Beneficiary



Source: This figure is taken from Hendren and Sprung-Keyser (2020).

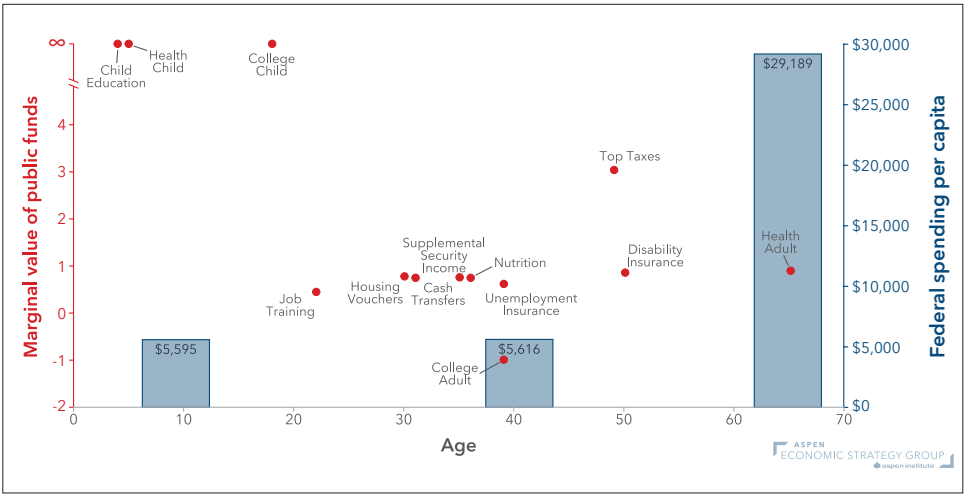
In general, programs serving people above age 20 yield lower and sometimes negative returns. Even similar programs have quite different MVPFs when they serve adults instead of children. For instance, Medicaid expansions that expanded access to health insurance for children in low-income families are estimated to have an infinite MVPF (practically speaking, a zero net cost to the government), but expansions of health insurance to older populations are found to have much smaller MVPFs. The difference is because improved health among children results in lower health care spending and higher earnings capacity in adulthood, which is what generates the net savings to the government.

3.d. Spending on older children can be just as cost effective as spending on young children, and not all public spending on youth yields high social returns.

The average returns across categories plotted in figure 6 masks substantial variation in the returns to different spending programs, even within the set of programs aimed at children. First, spending on the youngest children (under five years old) often,

but not always, generates high returns. Second, there are many programs aimed at older children that generate the same level of returns as the most beneficial early childhood programs.

Figure 6. MVPF vs. Per Capita Spending, by Age



Notes: The marginal value of public funds (MVPF) is the ratio of a program's benefits to its net government cost. Estimates are plotted by program category (i.e., child education programs) at the average age of that category's recipients. Programs in each category can be found in Hendren and Sprung-Keyser (2020). Spending per capita estimated in 2019 for children under 5, adults, and mandatory spending on adults 65 and older. Federal spending numbers include direct spending from federal programs, as well as the portions of refundable tax credits that exceed tax liability and are paid out to families, but they exclude tax reductions.

Sources: MVPF estimates by age and category from Hendren and Sprung-Keyser (2020); total spending on children and adults from Hahn et al. (2020); population estimates from Census (2022); estimates of mandatory spending on adults 65 and older from Social Security Administration (2020) and Congressional Budget Office (2020a).

Programs supporting very young children's health and education generally yield the highest returns among the various types of public spending. For instance, expansions of Medicaid coverage to low-income pregnant women and infants improved those children's health enough to pay for itself, generating an infinite MVPF (Miller and Wherry 2019). High-quality preschool provided to children from low-income families through the Perry Preschool and Abecedarian programs are estimated to generate $44 and $7 per dollar spent, respectively.

There are, however, funds spent on children with lower returns. Publicly funded childcare programs, for example, have been found to have negative effects for children from high-income families who would have otherwise spent time in highly

enriched environments (see, for instance, Havnes and Mogstad 2015).[11] Similarly, among Head Start participants, the long-term benefits are significantly lower for children who likely would have attended another preschool program (Kline and Walters 2016).

The research evidence does not support the notion that only programs targeted at very young children have high social returns. There is evidence of the cost-effectiveness of various programs for teens, for example. For example, job programs for teenagers across several cities have been found to significantly reduce participating teenagers' likelihood of incarceration, with effects lasting months after the program ends (Heller 2014; Gelber, Isen, and Kessler 2016; Modestino 2019). The social benefits of these youth job programs exceed the cost based on the reduction in criminality alone.

As another example of the positive return of investing in older youth, economists have found that expanding college financial assistance to low-income students through Pell Grants increases college completion, generating savings (through tax revenues from increased earnings) large enough to pay for the program outlays (Denning et al. 2019). Though it is important to note here too that not all spending on college-aged students is cost-effective; spending can generate lower social returns if it is not wisely spent and does not raise college completion rates (Deming and Walters 2017).

In sum, to effectively spend public funds, it is crucial to focus on specifics and evidence, rather than on rules of thumb, which may draw funding to inefficient and even harmful efforts.

4. A Call for Smarter Investing in America's Youth

In an ideal society, no child would go without health care, nutritious food, or a quality education due to the circumstances of their birth. But even setting moral ideals or social values aside, as a matter of economics, as reported above, money spent providing access to these goods for children from low-income families has been found to have a net positive return. In some instances, the government recoups the money spent, and then some. Despite ample evidence demonstrating that targeted spending on youth tends to offer the highest returns, the United States devotes relatively few public dollars to investments in youth. This practice is a mistake that will result in a less healthy, less productive future population.

11 Havnes and Mogstad (2015) examine the effects of a large-scale expansion of subsidized childcare in Norway. They find that the effects on long-term outcomes for exposed children were positive for those who came from families in the lower and middle parts of the earnings distribution, but negative for children from families in the top part of the income distribution. They interpret their results as suggesting that the benefits of providing subsidized childcare to middle- and upper-class children are unlikely to exceed the costs, in contrast to the benefits for children from low-income families.

Though early childhood programs garner much attention, and though the case for investing in early childhood is exceptionally strong, targeted investments made in disadvantaged children throughout adolescence and into young adulthood have also been shown to be cost-effective in many instances, as described above.

Even after high school, programs that raise students' likelihood of completing a college degree are some of the best investments in a skilled workforce the country can make (see Ganz et al. 2018). Workforce training programs focused on re-skilled adult workers show mixed results, making the need to build these skills earlier in these workers' careers all the more urgent (Andersson 2023, Holzer 2023). The significantly smaller benefits documented to these adult programs do not mean they are not worth investing in, but they do highlight the benefit of investing in skill development during youth.

Our call for expanded investments in children is not limited to strengthening and expanding public programs that invest in kids but is also for enhanced support to community programs with evidence of success.[12] Such efforts should align with rigorous research that has demonstrated program effectiveness. Community programs should be studied using credible research designs. Fortunately, academic research labs like the Urban Labs at the University of Chicago and the Lab for Economic Opportunity (LEO) at Notre Dame are working with community partners to build evidence around the effectiveness (or lack thereof) of locally implemented, often privately-funded programs. As the evidence builds around such programs, those showing evidence of cost effectiveness would ideally be scaled up.

5. Conclusion

Creating a resilient economy requires not only stabilizing America's fiscal outlook—by ensuring spending and revenues are more aligned—but also ensuring our budget priorities reflect the most effective use of those funds. Today's spending priorities, across federal, state, local, and private sources, are far out of line with patterns of social returns: we spend $1.75 on elderly Americans for each $1 spent on youth, when targeted expenditures on children often more than pay for themselves in the long term. Investing in America's children, in their families, and in the communities that support them is an investment in our country's future.

12 As one example of an area where community-based programs have proven quite cost effective, we point to mentorship programs. Community-based mentorship programs that take place out of the classroom can have large impacts on academic outcomes and student achievement. High-quality programs such as Big Brothers Big Sisters of America, where mentors undergo background checks, are trained extensively, and start mentorship under supervision, have been found to improve student GPAs by 0.08 points on average (Tierney, Grossman, and Resch 1995). The estimated benefits to this higher GPA—in the form of higher educational attainment and lifetime earnings—can exceed five times the $1,600 cost of such a mentor (Levine 2014).

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PART III

NAVIGATING SHIFTS IN THE GLOBAL ECONOMY

Manufacturing Resilience: The US Drive to Reorder Global Supply Chains
Mary E. Lovely

Where Is China's Economy Headed?
Hanming Fang

Manufacturing Resilience: The US Drive to Reorder Global Supply Chains

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ABSTRACT

Global supply chains—the network through which products and services move from initial producers to final consumers—have become increasingly complex over the past several decades. Recent disruptions caused by the COVID-19 pandemic, along with the threat of further interruptions from rising geopolitical risks, have exposed the fragility of today's supply chains. To build more resilient networks, US policymakers have taken three main approaches: increasing domestic manufacturing capacity ("reshoring"), building new supply chains among foreign partners aligned with US interests ("friendshoring"), and reducing dependence on trade partners considered untrustworthy ("derisking"). This paper evaluates these strategies, weighing the likelihood that each will reduce the potential of future disruptions against the costs to taxpayers and consumers. Reshoring builds domestic capacity but is costly and only tenable in a few critical sectors. Friendshoring balances the efficiencies of trade while preventing reliance on rival states but can ultimately result in longer and less transparent networks. Finally, derisking our relationship with China will allow the US to diversify critical supply chains but is complicated by the country's dominant role in world trade and by ongoing political tensions.

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1. Introduction

Spurred by technological advances in shipping and communications and aided by a liberal world-trading environment, deepening global supply chains (GSCs) have for four decades lowered costs and increased the variety of goods available to consumers around the world. GSCs are complex networks of manufacturers, suppliers, warehouses, distributors, and shippers who move products and services from one location to another. Supporting these activities are orchestrated flows of blueprints, technology, people, and data across multiple countries and organizations. According to the World Trade Organization (2019), prior to the COVID-19 pandemic, more than two-thirds of world trade occurred through supply chains in which production crossed at least one border, and typically many borders, before final assembly.

Since the onset of the COVID-19 pandemic, however, supply chains once seen as exemplars of economic efficiency are increasingly portrayed as unacceptable sources of collective risk.

Since the onset of the COVID-19 pandemic, however, supply chains once seen as exemplars of economic efficiency are increasingly portrayed as unacceptable sources of collective risk. Concerns about their resilience deepened as a series of external shocks continued to disrupt trade in the pandemic's wake. Fragmentation has made GSCs long and thus subject to shocks emanating anywhere along the chain, while geographic concentration has made them heavily dependent on certain locations (and thus to shocks hitting specific parts of the world). In contrast to idiosyncratic shocks like the 2011 Tōhoku earthquake and tsunami, headline supply shocks since 2020 have been global and cross-sectional—hitting many countries and industries simultaneously. Adding to concerns about exogenous shocks, the weaponization of trade by China and Russia has raised the geopolitical risks of overdependence on unfriendly countries. In concert, public demands have grown louder for both government and private-sector actions to reduce supply vulnerabilities.

In the United States, the federal government has responded to widespread demands for domestic government action with new industrial and trade policies that promise a more resilient economy, defined as one that can better adapt to shocks and withstand geopolitical turmoil. Since taking office in 2020, President Joe Biden has prioritized efforts to enhance supply resilience. His administration has pursued policies designed to move some production onshore, expand commerce with "like-minded" countries, and reduce reliance on unfriendly states. This paper focuses on the administration's efforts to "reshore, friendshore, and derisk" the supply chains that serve American businesses and households. Now that two major federal statutes

promoting reshoring have passed a divided Congress, and the administration is deeply engaged in forming new partnerships, we may ask how effective these efforts are likely to be at reducing the risk of supply disruptions; what this new insurance will cost American taxpayers, businesses, and consumers; and how compatible they are with other US commitments. My early assessment suggests that supply chains are malleable and can be shifted in limited ways but that doing so is costly and often in conflict with other US objectives.

The US is in the early stages of efforts to boost supply resilience, and policies related to supply chains are taking shape in real time through the promulgation of implementation rules, ongoing international negotiations, and review of existing trade and investment policies. In this paper, I describe efforts to reorder the global supply chains that serve US importers, omitting discussion of export controls and investment restrictions. This omission does not imply that such efforts are unrelated to economic resilience, only that they are grounded in national security concerns and, thus, more appropriate for discussion in that context.

2. Shortages Sound the Alarm on Supply Resilience

Since taking office during a global pandemic, President Biden has used the power of the federal government to advance policies aimed at strengthening American economic resilience. The foundation of his push for resilience is an industrial strategy prioritizing American manufacturing, transitioning to cleaner energy sources, and US technological leadership in economically critical sectors.[1] He has prioritized American manufacturing by championing major public investments in infrastructure, workforce development, the domestic semiconductor industry, and renewable energy systems.

A core premise of the Biden resilience strategy is that reliance on foreign suppliers, especially from China, has undermined American manufacturing and made the US economy more vulnerable to external shocks.[2] His administration has stepped away from open trade (defined as nondiscriminatory trade with other members of the World Trade Organization [WTO]). In its place, the administration argues for deeper engagement with "like-minded" countries and for the imposition of "guardrails" on relations with countries that do not share American values. By shifting access to American markets away from countries viewed as hostile, the administration hopes

1 Then-director of the National Economic Council Brian Deese outlined the new "modern industrial strategy" in a major speech in April 2022.

2 Referring to a speech by National Security Council director Jake Sullivan (2023), US trade representative Katherine Tai (2023) noted her agreement with the conclusion that "the pursuit of efficiency and low costs above all else has led to vulnerable and high-risk supply chains."

to reduce exposure to geopolitical supply shocks while building networks with partners that share American labor and environmental standards.

President Biden's efforts to address supply vulnerabilities respond to domestic shortages experienced during the COVID-19 pandemic—shortages stemming from surges in demand, factory closures, and ruptures in transportation networks. As the virus spread silently through local communities in 2020, Americans were alarmed by daily reports of severe shortages of personal protective equipment (PPE) for front-line health workers. Televised interviews provided vivid images of exhausted doctors, nurses, and emergency personnel forced to reuse face shields, eye protection, gowns, and medical gloves as hospital stocks were depleted. With health-care workers falling victim to the virus, pressure mounted for government officials to fix America's broken supply chains.

Excessive dependence on imports from China became a common explanation for the domestic supply crisis.[3] Indeed, before the pandemic, China supplied 47 percent of the world's imports of PPE. Facing its own domestic health crisis in early 2020, China increased imports and decreased exports of PPE, making it more difficult for others to obtain supplies. In response, some countries banned exports of domestically produced PPE, threatening descent into an "every man for himself" situation.

PPE is not the only product that focused the public's attention on the need for enhanced supply resilience. Beginning in 2021, a worldwide semiconductor shortage became one of the biggest stories in the automotive industry. Manufacturers were forced to slash production schedules and bear massive revenue losses as dealers' lots were depleted of inventory. Auto buyers faced a set of unattractive choices: pony up for inflated markups on the few new cars available, get lucky in a raging used-car market, or give up. Semiconductor manufacturers, who had turned their factories over to make chips for the deluge of electronic devices demanded by those suddenly forced to work from home, faced intense scrutiny. Why were there so few manufacturers, and why were there so few factories in the United States?

Across the Atlantic, Russia's invasion of Ukraine in February 2022 immediately raised the specter of crippling energy shortages in Germany. Before the war, Europe's largest economy got as much as half of its supply of natural gas by pipeline from Russia (Fix and Kapp 2023). As sanctions took hold, Russia cut the supply to Germany, and then an explosion blew up one of the gas pipelines that had carried it. The lesson was clear: Germany had become too reliant on an untrustworthy trade partner. In the US,

3 As documented by Bown (2021b), China's net exports regained pre-pandemic levels for most PPE products by April 2020. Bown shows that China's export volumes for most products remained elevated through the remainder of 2020.

as concerns mounted about China's more aggressive military stance toward Taiwan, the Russian invasion heightened already-widely-held concerns about American overdependence on the region, especially for key inputs such as semiconductors, critical minerals, and renewable energy equipment.

While ample evidence indicates that businesses were already adjusting to the altered security environment (BCI 2021), each new shortage suggested that private-industry decisions had created GSCs that have too many nodes and are too vulnerable to breakdowns in any one location. "Just in time" inventory strategies left customers high and dry when supplies were delayed. Shih (2022), writing in the *Harvard Business Review*, raised the question that was implicit in such criticisms: had the risks of global supply chains started to outweigh the rewards? Calls for government action stressed the desirability of reshoring production or, if that proved infeasible, trading with those close to the US physically or politically. "The dominant policy rhetoric," as noted by Baldwin and Freeman (2022), reflects the belief that "shortages would have been less severe in the past or would be less severe in the future if GSCs were either shorter and more domestic or more diversified".

The Biden administration has embraced the view that the risks of supply disruption outweigh the efficiency gains that come from aligning economic activities with countries' individual comparative advantages. Trade of the sort embraced by the United States in years past through the WTO, one of the foundational principles of which is nondiscrimination, has been depicted by both the president's national security advisor and his trade representative as a dangerous source of instability. Moreover, the president's team implicitly rejects multilateral solutions to supply concerns, taking its efforts outside the WTO.[4] In the WTO's place, the administration is shaping US trade policy to complement efforts to build domestic manufacturing capacity, create networks that offer alternatives to current links in supply chains, and reduce exposure to China.

3. Policy Tools to Enhance Supply Resilience: Reshoring, Friendshoring, Derisking

Through major legislative achievements and trade-policy diplomacy, the Biden administration has merged its efforts at domestic economic renewal with attempts to reorder global supply chains. The US is deploying three policy objectives to meet

4 Tensions between WTO disciplines and US policy were on full display in recent rulings on American tariffs on steel and aluminum imports. These tariffs have been ruled WTO-inconsistent but the US refuses to remove the measures, citing national security concerns. See Assistant United States Trade Representative Adam Hodge's statement in response to the WTO's final public reports on the dispute: https://ustr.gov/about-us/policy-offices/press-office/press-releases/2022/december/statement-ustr-spokesperson-adam-hodge

these goals: reshoring, friendshoring, and derisking.[5] To further these objectives, the US is undertaking a host of new initiatives, examples of which are listed in table 1. Although the initiatives are new or in the process of being negotiated with foreign partners, we can consider the potential for each to significantly enhance supply resilience as well as the cost each is likely to have for American taxpayers, businesses, and consumers. This evaluation is based on the design of each initiative, evidence we have of the impact of policies that have already been enacted, and assessments of similar policies used in the past.

Table 1. Policies to Reshape Global Supply Chains

	Reshore	Friendshore	Derisk
Policy tools	Use subsidy, tax, and regulatory policy to enhance domestic production in specific sectors.	Negotiate "high standard" agreements in effort to encourage supply chain reorientation and trade diversification.	Use sanctions and tariffs to reduce US reliance on suppliers located in countries that pose a security risk.
Intended objectives	Reduce reliance on foreign suppliers; increase American manufacturing base.	Encourage supply-chain linkages to countries other than China; raise social standards in partner countries.	Divert US purchases away from countries that pose security risks; diversify US import sources.
Current examples	CHIPS Act subsidies to semiconductor industry; domestic content requirements in the IRA.	Indo-Pacific Economic Framework; USMCA; Americas Partnership for Economic Prosperity.	Maintenance of Trump-era tariffs on US imports from China; export controls and investment restrictions.

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5 Grossman, Helpman, and Lhuillier (2021) find that surprisingly little academic research has addressed the optimal design of government policy to promote resilience or to encourage sourcing from safer locations. They offer a simple model with exogenous shocks to supply of a critical input and provide two lessons: (1) if firms mark up prices over cost, the government may need two instruments to intervene optimally; and (2) if the government cannot intervene optimally, the second-best policy may be a subsidy or a tax to encourage or discourage sourcing diversification. Obviously, as the authors note, more research is needed in this area.

Altering the arrangement of global supply chains is no easy task, calling into question the likely effectiveness of government attempts to move them. Production fragmentation allows multinational companies to assign tasks according to the comparative advantage of different host countries, thus lowering costs. Geographic concentration of production results from the cost-reducing benefits of concentrating production in one location, with suppliers clustered nearby. Especially in high-tech sectors, both multinational firms and their suppliers make significant relationship-specific investments that cannot be easily replicated in alternate locations. In short, the factors that make GSCs efficient also make them difficult and costly to alter.

3.a. Reshoring

Reshoring is the practice of transferring a business operation that was moved overseas back to the country from which it was originally relocated. Both Japan and South Korea have programs designed to encourage reshoring by offering public subsidies to companies returning operations they previously moved to China.[6] However, the term "reshoring" is often used in a prospective context, as it is applied to operations that have not started yet or were never moved offshore, such as production of electric vehicles. In this sense, reshoring is prospective import substitution—ensuring that production of critical goods that would otherwise be imported happens at home instead. Reshoring pushes against market forces, and thus, its success depends on marshalling public incentives large enough to generate sufficient new private investment in the desired sectors.[7] Activities targeted for reshoring are generally those that lie at the core of production ecosystems deemed critical for economic resilience and growth. Such activities typically require a diverse set of co-located suppliers and promise to generate the domestic job creation needed to justify their big price tag for taxpayers.

Reshoring plays a crucial role in US efforts to build supply chain resilience. Indeed, as described by National Security Advisor Jake Sullivan, building the American economy is the first plank of the Biden administration's international economic policy. As discussed above, an important element of this plank is recovering parts of supply chains now located abroad or ensuring that new supply chains are built onshore. In 2022, the Biden administration and the US Congress agreed that there would be significant

6 The Japanese program was launched in response to pandemic related supply problems (see Denyer 2020). South Korea offers a variety of subsidies for companies who want to reshore manufacturing. See "Investment Guide: Support for Reshoring Companies," Invest Korea, accessed September 8, 2023, https://www.investkorea.org/jnbk-en/cntnts/i-2537/web.do.

7 In its coverage of the Japanese effort to reshore some activities from China, the New York Times notes that "the government's challenge is vast: It is as though Japan is tossing pennies to hold back economic tides." See Dooley and Inoue 2020.

value in investing in two critical, rapidly evolving sectors: semiconductors and new energy. Together, the CHIPS (Creating Helpful Incentives to Produce Semiconductors) and Science Act and the Inflation Reduction Act (IRA) created a menu of subsidies, tax credits, and domestic content rules that are now being used to promote private investment in onshore research, development, and manufacturing.

In evaluating the potential impact of these blockbuster pieces of legislation, we must consider their effectiveness in reducing supply risk, their budgetary cost, and their likely effect on domestic availability and prices. Given the importance of US allies and partners to supply chain restructuring, we must also consider each initiative's compatibility with other US objectives and commitments. Such an assessment must be viewed as preliminary, as the policies—and the responses of the private sector to them—are just taking shape. Further complicating assessment is that the US turn toward industrial policy and away from open trade has no easy comparisons in recent history.[8] A summary of these preliminary assessments is provided in table 2.

Table 2. Evaluating Policies to Reshape Global Supply Chains

	Reshore	Friendshore	Derisk
Effectiveness	**High.** Induces investment via subsidies. Can lead to ecosystem development.	**Low.** Relies on coordination. No new market access or public investment.	**Moderate.** Moves final assembly but value added may remain concentrated in China.
Cost	**High.** Requires investment subsidies and tax credits; may also require user subsidies or tariffs.	**Low.** Lacks complementary development assistance and overseas project financing.	**Moderate.** Passes burden of higher-priced goods onto consumers. Reduces competitiveness of domestic manufacturers.
Compatibility with other objectives	**Problematic.** Incites subsidy race; may lead to supply glut. Violates WTO domestic-content rules.	**Favorable.** Encourages harmonization of labor, environment, digital, and product standards.	**Problematic.** Erodes US compliance with WTO disciplines. Creates tensions with partners who trade heavily with China.

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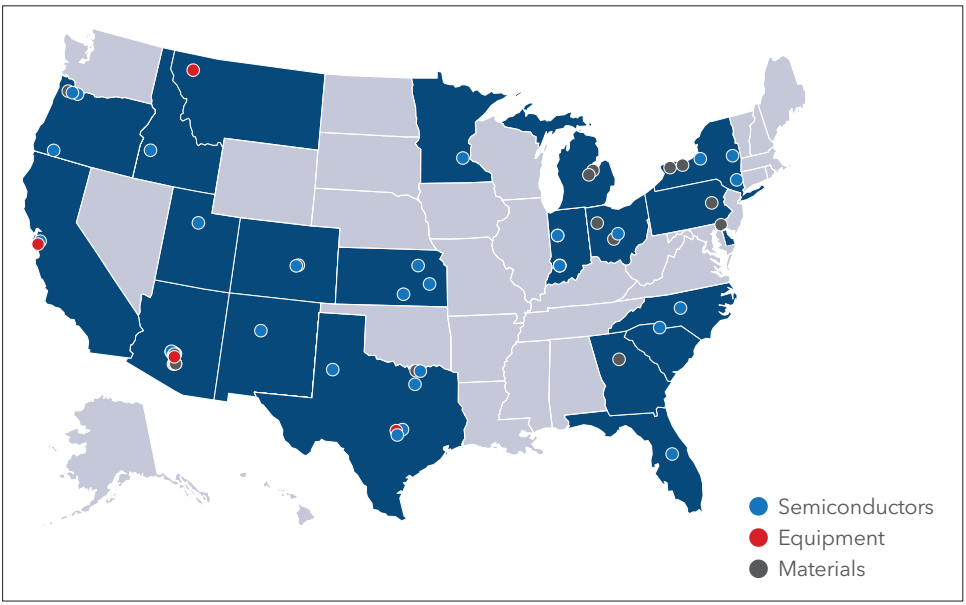
8 For example, the CHIPS Act is sometimes compared to the US response to Japanese industrial successes in the 1980s. Such comparisons must account for the vastly different global context in which today's semiconductor production occurs, rendering them of dubious value.

The CHIPS Act is designed to "bring back" to the US semiconductor manufacturing that is now concentrated in Asia. It provides roughly $53 billion in new funding for research on and manufacturing of semiconductors and workforce development, receiving bipartisan congressional support in line with the industry's unique character.[9] Semiconductors are vital to civilian and military technology, but in recent decades a growing share of their fabrication has moved to China, South Korea, and Taiwan, leaving the US dependent on geopolitically vulnerable locations.

The CHIPS Act subsidizes investment in semiconductor manufacturing, promising $39 billion of manufacturing incentives on top of 25 percent investment tax credits. This level of support appears to be attracting the industry's major fabricators and their suppliers to invest in the US. According to the Semiconductor Industry Association, between the bill's introduction in spring 2020 and June 2023, there were 67 announced new projects and expansions to existing US facilities in research and development, intellectual property and chip design software providers, chip design, semiconductor fabrication, and manufacturing by suppliers of semiconductor manufacturing equipment and materials. As seen in figure 1, these announced investments are spread across all regions of the US. Assessing how many of these projects are attracted because of CHIPS Act subsidies is difficult, in part because these funds have yet to be allocated, but also because some of these investments might have been otherwise made. And US controls on exports to China of advanced chips and the equipment and supplies needed to produce them have undoubtedly affected location decisions within the industry because they limit the materials that can be sent to China for fabricators there.

9 CHIPS Act funding described in White House Briefing Room fact sheet (2023).

Figure 1. Semiconductor Supply Chain Investments Announced from May 2020 to June 2023



Source: Semiconductor Industry Association (2023).

The mammoth IRA has multiple objectives aimed at enhancing economic resilience, including domestic production of clean energy supplies. Its allocation of $369 billion to clean energy and decarbonization projects is primarily focused on the production and implementation of clean energy technologies in the United States. Of note in the context of reshoring is the provision of subsidies to purchasers of electric vehicles (EVs) assembled in North America, a policy intended to ensure the maintenance of an American auto industry. The IRA encourages domestic development of the full EV supply chain by linking additional subsidies to the domestic sourcing of battery components and the critical minerals used in them.[10]

The White House reports that private companies have announced $133 billion in battery and EV manufacturing investment and another $103 billion in clean energy, including some funding committed prior to the bill's passage.[11] These investments reflect, in part, extensions of consumer tax credits and manufacturing tax credits

10 For details on the complex EV tax credits offered by the IRA, see Minott and Nguyen 2023.

11 The White House tally can be found at "President Joe Biden: Investing in America," Invest.gov, last updated August 29, 2023, Independent tracking of investments in the EV manufacturing supply chain are provided by Turner, Abliadzhyieva, and Chintalapudi (2023). https://www.whitehouse.gov/invest/?utm_source=www.invest.gov.

that already were spurring domestic activity. The Infrastructure Investment and Jobs Act, for example, allocated $7 billion to support battery and critical mineral supply chains in the US. The IRA builds on these efforts, adding substantial new funding and new investment credits and loan programs.

The government's initial outlays, under both the CHIPS Act and the IRA, may induce further private-sector investment by upstream suppliers (such as critical minerals mining and refining) and by downstream users (such as households installing solar panels on rooftops). Both Acts include incentives for innovation in the targeted sectors, and thus may lead to investment in new products and processes. Tracing through such effects will be difficult, but the legislation's supporters clearly hoped to ignite a virtuous cycle of investment in semiconductor-related activities and clean energy.

While onshore supplies of semiconductors, EVs, batteries, and critical materials offer some shelter from external shocks and geopolitical risks, reshoring offers little insurance against shocks that originate at home. Baby formula offers a powerful cautionary tale about relying only on domestic production to provide resilience. Formula became difficult to find on supermarket shelves in February 2022, following the closure of an Abbott Nutrition plant due to safety concerns raised by the Food and Drug Administration. The shortage reached a head in July, when more than 20 percent of all formula products—including more than 30 percent of powdered formulas—were missing from store shelves, according to industry data.[12] Unlike the shortage in PPE, however, import dependence played no role in the baby-formula crisis. Indeed, the shortage was exacerbated by lack of access to foreign suppliers. Attempts to buy formula made in foreign plants were stymied by public-procurement rules, regulatory differences across countries, and import tariffs, all of which had effectively isolated the US market and left it largely reliant on two domestic manufacturers. In response, the Biden administration invoked the Defense Production Act, temporarily waived regulatory red tape, and deployed government facilities to transport emergency shipments from foreign factories into the US. Where dependence on foreign suppliers was a destabilizing force in the market for PPE, dependence on a limited number of domestic suppliers was at the core of the baby-formula crisis.[13]

Despite the promise of the CHIPs Act and the IRA to build robust domestic supplies, the US will remain tied to foreign partners for product varieties not made at home, for

12 Industry data reported by McPhillips (2023).

13 It is important to note that imports of PPE helped to reduce the extent of the crisis. As Bown (2021b) documents, by April 2020 China's exports had mostly resumed, and over the rest of the year its export volumes of some products surged, more than doubling compared to pre-pandemic levels.

raw materials, and for imported manufactured components. Both statutes contain elements that restrict the global engagement of firms that receive federal subsidies, elements intended mainly to reduce US reliance on Chinese producers. Although they aim to reduce US vulnerabilities, these provisions reduce the set of suppliers able to meet American demands when there is a domestic shortage. Reshoring thus diminishes some sources of risk while introducing others.

The budgetary cost of reshoring initiatives is high and, as an expenditure on industrial policy by the US, largely unprecedented.[14] Together, the CHIPS Act and the IRA, in addition to the earlier infrastructure law, may permit nearly $100 billion in annual spending on industrial policy over the next five years.[15] Total spending under the CHIPS Act is expected to exceed $200 billion to support semiconductor industry and research in other fields. The IRA allocates $370 billion to combat climate change, directing nearly $400 billion in federal funding to clean energy, with the goal of substantially lowering the nation's carbon emissions by the end of this decade. Of the total, an estimated $23.4 billion will be used to develop a clean transportation industry.[16] Some observers consider estimates for the revenue and expenditure impact of the IRA as lower bounds because certain tax and investment credits are uncapped and total expenditures depend on take-up by firms and consumers.[17]

Visions vary widely for how these government interventions will affect the semiconductor, battery, and EV market over the near term. Once US activity reaches its full scale, the price of American-made products may be competitive with those made overseas. However, given higher labor, land, and regulatory costs in the US, there is concern that these industries will not be viable without long-term government support.

Similarly, it is likely that US-assembled EVs will be more costly to produce than those made in lower-cost locations. Although the IRA's subsidy, which can return rebates of up to $7500 to EV buyers if requisite sourcing conditions are met, can compensate for a higher retail price on US-made vehicles, it is unclear how the industry will fare when such subsidies are eliminated. It is reasonable to expect that there will be domestic political pressure to raise the tariff on imported vehicles if user subsidies are removed.

14 Particularly noteworthy is the use of "place-based" policies, which directs spending to distressed places. Bartik, Asquith and Bolter (2022) described the unprecedented use of such policy direction in the CHIPS Act.

15 See "Joe Biden's Industrial Policy is Big, Bold, and Fraught with Difficulty," *Economist*, September 13, 2022, https://www.economist.com/united-states/2022/09/13/joe-bidens-industrial-policy-is-big-bold-and-fraught-with-difficulty.

16 Revenue estimates compiled by McKinsey and Company, based on analysis by the Congressional Budget Office and the Joint Committee on Taxation. See "The Inflation Reduction Act: Here's What's In It," McKinsey and Company, October 24, 2022, https://www.mckinsey.com/industries/public-sector/our-insights/the-inflation-reduction-act-heres-whats-in-it.

17 One such concern is uncapped subsidies for battery production, where some independent estimates of federal budgetary outlays far exceed those estimated by the Congressional Budget Office (see McDaniel 2023).

As these new policies are being put into action, America's allies have raised loud objections, even though they share many of the same policy goals. They see the new industrial policy as an effort to move investment to the US at the expense of investment in their own economies. Subsidies in the CHIPS Act are only available to semiconductor fabricators located in the United States. The full IRA EV tax credit is only available to buyers of cars that are assembled in North America and whose batteries meet content requirements (or, given current Treasury implementation rules, to those who can lease the vehicle). Half the credit is contingent on the critical minerals for those batteries being extracted or processed in a country with which the United States has a free-trade agreement or made with materials recycled in North America, and the other half requires that increasing percentages of the batteries over time be manufactured or assembled in North America.

The CHIPS Act explicitly pulls investment by global semiconductor companies into the United States. It raises fears in other countries and regions that American industrial policy will hollow out their own tech industries. In response to the CHIPS Act, the EU, Taiwan, Japan, and South Korea have initiated or extended subsidy programs of their own. In 2022, the European Union launched the European Chips Act to ease government funding rules for semiconductor plants. In August 2023, TSMC announced plans to build a $11 billion chip manufacturing plant in Germany, in a deal that reportedly includes up to $5.5 billion in government subsidies.[18] Such investments heighten fears of a subsidy race, a glut of semiconductors, and falling world prices, even as the costs of production in the US exceed those in other locations.

Similar fears of a subsidy race have been raised regarding IRA subsidies for investments in new energy sectors, and in even louder tones. With over $300 billion worth of tax breaks and subsidies designed to boost green technology and deployment in the US, the IRA threatens to pull clean-energy companies away from other locations. The EU expressed its displeasure with what it saw as a challenge to its leading position in some clean-energy sectors and the beginning of a subsidy race that would unnecessarily raise the cost of its energy transition. In early 2023, the EU responded with its Green Deal Industrial Plan, combining regulatory reform, faster access to public financing, new investments in labor force development, and trade measures aimed at developing export markets for European producers. The European plan pointedly avoided domestic content requirements of the type objected to in the IRA, as the plan was designed to be consistent with WTO rules prohibiting them.

The IRA has also created significant concerns for South Korea, which views access to the US market as essential to the future of its own EV sector. Hyundai Motor Group is building Metaplant America, a 300,000-unit-per-year electric-vehicle factory in the

18 The plant will be the first for TSMC in Europe (see Bermingham 2023).

state of Georgia, to produce EVs for three brands—Hyundai, Kia, and Genesis. Until this factory comes online, its vehicles will not be eligible for the new EV tax credit unless customers lease instead of purchase.[19] Meanwhile, South Korea has implemented production incentives of its own at home: a consumer tax credit, expanded investment tax credits for EV manufacturers, and incentives for domestic battery production.

Despite these international responses, new semiconductor, EV, and battery factories are being built in the US. However, the approach is unlikely to be replicated in other sectors. The public subsidies and tax credits used to promote these industries are large, and uncapped incentives are expected to grow over time. Outlays of such magnitude necessarily limit the administration's ability to use public funds to reshore other industries, as additional compelling cases for government action must be made to a divided Congress. Moreover, it is not likely that long-term reshoring of domestic manufacturing will continue without further subsidies, as they are needed to alter firms' private location decisions based on comparative costs. Further, subsidy programs enacted by key US partners raise the potential for supply gluts in these highly cyclical industries. Finally, the domestic content requirements of the IRA as well as limits on critical mineral sourcing may violate the WTO obligations of the US, further distancing American policy from allies in Europe and Asia who want to maintain WTO protocols.

These features of reshoring imply that its ability to recapture activities now performed in China is limited. Even if federal subsidies were sufficiently large to move more manufacturing to the US, adding additional supported sectors is unlikely to provide tangible benefits to American workers. US imports from China are concentrated in activity with relatively low wages and low productivity. US production of these products would not be competitive in any markets outside its own, assuming tariffs on third countries created a protected home market. For this reason, it is in friendshoring, not reshoring, that the US places its hopes for diverting trade away from China.

3.b. Friendshoring

US Treasury secretary Janet Yellen coined the term "friendshoring" in a speech, referring to it as a way to reduce supply chain risks linked to "unreliable countries (Yellen 2022)." She describes friendshoring as "deepening relationships and diversifying US supply chains with a greater number of trusted partners." Friendshoring is an explicit recognition that not all domestic needs can be met by

19 Bown (2023b) offers a cogent analysis of the problems posed by the IRA for South Korean automakers and how US Treasury implementation rules eased their pain by omitting content requirements for leased vehicles. The paper also discusses the tensions between accommodation of Korean concerns and Congressional intentions for including domestic production incentives in the legislation.

American production, that is, by reshoring pieces of supply chains. Unlike reshoring, friendshoring leverages trade to enhance resilience. Unlike open trade, however, friendshoring is based on the view that trade enhances resilience only when it is confined to a designated circle of "trusted partners."

Defining the criteria used to determine which states are trustworthy remains fraught with tradeoffs. Use of the term "like-minded" suggests an attempt to reduce geopolitical risks. This objective is greatly complicated by the reality that confining supply chains to democratic countries alone is impossible or unreasonable. If the Indo-Pacific Economic Framework (IPEF) excluded Vietnam, for example, based on its communist system of government, it would exclude the leading destination for investment in supply alternatives to China.

Current applications of the friendshoring strategy avoid this conundrum by focusing on regional network creation (IPEF in Southeast Asia; the Americas Partnership for Economic Prosperity in Central and South America; and the US-Mexico-Canada Agreement [USMCA] for North America) rather than systems of governance. This strategy may diversify supply lines away from China, but it also incidentally could increase risk arising from geographically concentrated production. For example, if medical device production becomes more concentrated in the Americas, a natural disaster that strikes the region may lead to a supply shortage of these critical products.

The promise and limitations of friendshoring are exemplified by US efforts to negotiate IPEF, one of the examples of friendshoring listed in table 1. The Biden administration's signature initiative in Asia, IPEF seeks to create a club of trusted suppliers committed to high labor, environmental, and social standards; to improved supply chain management; to the clean-energy transition; and to anti-corruption and fair taxation. The US hopes this club will provide alternatives to China's manufacturing capabilities and serve to reduce dependence on its exports.

Although IPEF only launched in late 2022, by May 2023 negotiators announced substantial conclusion of a supply chain agreement. Key pieces of the agreement position IPEF as an early warning system for potential disruptions. Specifically, the agreement promises to build a "collective understanding of significant supply chain risks, supported by each partner's identification and monitoring of its own critical sectors and key goods." It also seeks to "improve crisis coordination and response to supply chain disruptions and work together to support the timely delivery of affected goods during a crisis." To achieve these goals, the agreement sets up three councils to facilitate cooperation among IPEF members.[20]

20 The text of the IPEF supply chain agreement was released on September 7, 2023: https://www.commerce.gov/sites/default/files/2023-09/2023-09-07-IPEF-Pillar-II-Final-Text-Public-Release.pdf.

While the Biden administration can claim that it has concluded the first international supply-chain agreement, many question whether its provisions, even if faithfully implemented, can substantially improve supply chain resilience. The identification and monitoring of risk rely on the voluntary provision by private companies of information about their own operations. No IPEF provisions bind the actions of participating governments. In the event of a sudden supply shortage, governments will be under no obligation to abstain from the use of export bans that threatened to disrupt trade flows during the pandemic.

Whether success can be achieved in negotiating other parts of IPEF remains to be seen. The framework seeks to unite a diverse set of countries—Australia, Brunei, Fiji, India, Indonesia, Japan, the Republic of Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand, the United States, and Vietnam—separated by level of development, form of government, and intensity of ties to China. Some of the commitments desired by American negotiators, particularly on labor standards and digital rules, may be more than its less developed participants believe they can deliver.

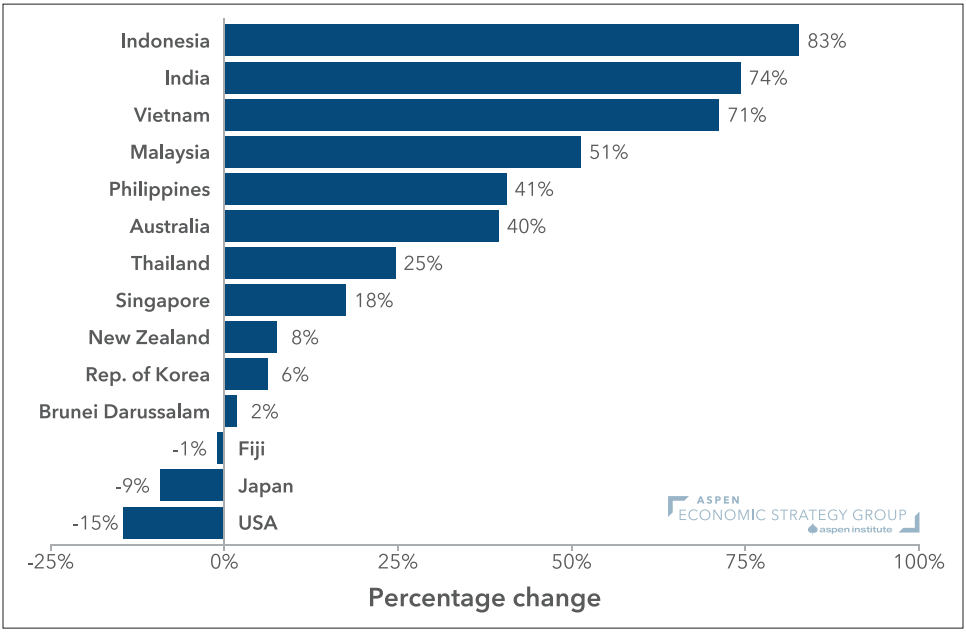
What IPEF won't contain is any new commitments to lower tariffs. South and Southeast Asian nations joined IPEF negotiations because they are eager for deeper economic engagement with the US. Many are also eager to reduce their dependence on China. However, without some tangible reward in the form of US tariff concessions and no obvious cost for failing to meet US demands, leaders in these countries have little leverage to overcome their own domestic opposition to US-preferred standards, which are likely to be viewed as eroding both their sovereignty and their competitiveness. Already, India has chosen to sit on the sidelines of the trade talks, anticipating that it will be unwilling to meet the conditions ultimately attached to participation by the US.

It is doubtful that such an agreement offers a sufficient incentive to move multinational production. With no new binding commitments, IPEF does little to change conditions that determine a region's ability to attract new investment. Moreover, reducing the extent to which global supply chains depend on China will not be simple. Most IPEF countries rely on both China and the US as trade partners. An essential but often overlooked feature of exports from IPEF nations is that they rely on intermediates and materials sourced from China.

Attempts to diversify trade flows in the region must confront China's dominance as the world's largest exporter of manufactured goods and as a central node in Asian production networks. Dahlman and Lovely (2023) calculate concentration indexes for the United States and its IPEF partners and find that import sources have become far less diverse since 2010 for almost all members. Only the two largest economies, the United States and Japan, as well as Fiji, experienced a decrease in

the concentration of their imports. Figure 2 illustrates these changes in measure of import concentration since 2010 for IPEF countries.[21] US diversification reflects a lower market share for China after 2018, when then-president Donald Trump's tariffs on many Chinese imports were put in place. Japan's diversification also reflects a lower market share for China, but the change was confined to labor intensive goods, such as apparel and footwear. The concentration index for all other IPEF countries rose. The import concentration index for Malaysia, Vietnam, India, and Indonesia increased by more than 50 percent. These changes mainly reflect an increase in the share of imports sourced from China.

Figure 2. Percentage Change in Concentration of Import Sources of IPEF Countries, 2010-2021



Source: Dahlman and Lovely (2023).

Because of its failure to include commitments that alter the relative costs of sourcing from China, IPEF is unlikely to be effective in expanding "friendshoring"; hence the summary assessment provided in table 2. The agreement is designed so that it will not need Congressional approval or budgetary outlays, and its cost to Americans is also low. Details of the agreement remain thin, however, and there is a possibility

21 Import concentration is calculated for each country in each year using a Herfindahl–Hirschman index, with the percentage change in concentration measured between 2010 and 2021.

that simply by setting common standards and procedures for trade and formal mechanisms for coordination, the agreement will expand trade among the partners. Indeed, some observers, such as South Korea's former trade minister Yeo Han-Koo, believe that with proper implementation of its general rules and institutional arrangements, IPEF can become an effective mechanism for enhancing supply chain resilience (see Yeo 2023).

3.c. Derisking

US National Security Advisor Jake Sullivan (2023) has argued that current levels of integration with China are a major challenge to economic security and resilience. Beyond the White House, calls to reduce dependence on China come from within Congress and from both sides of the aisle as well as from allies abroad. In place of efforts to "decouple" from China, Biden administration officials now follow the lead of EU president Ursula von der Leyen and speak about the need to "derisk" the US relationship with China.[22] This new terminology reflects a desire to reduce bilateral tensions with China by diversifying trade flows rather than excluding China; it also reflects a change in focus away from all imports toward those where the risks from overdependence are most acute.

Three main economic (exclusive of national security) arguments are typically made to support the view that China's role in US supply chains must be reduced to increase economic resilience. The first concern is that China's dominating presence in global markets is itself a source of economic risk. China now accounts for about 17 percent of the world's manufactured good exports, with its share of some individual products exceeding three-quarters of the world total.[23] This geographic concentration of supply exposes all trade partners to economic shocks hitting the Chinese economy, with the PPE shortage a vivid example. At the G7 Leaders' meeting in Hiroshima in May 2023, without explicit mention of China, members established the diversification of trade relationships as an essential principle for resilient supply chains.

Secondly, despite China's compliance with most WTO dispute settlement rulings, US officials frequently state that China abuses the norms of the international trading

22 In addition to diversification of trade flows, EU president von der Leyen's (2023) description of derisking covers a broad set of strategies, including what the US calls reshoring and friendshoring. She also mentions the use of policies to combat unfair trade, defensive tools such as export controls, and alignment with partners through the Trade and Technology Council and other alliances.

23 Trade shares based on author's calculation using information on trade flows from the CEPII BACI dataset. China is defined to include Mainland China, Hong Kong, and Macao. See Gaulier and Zignago (2010) for details on the dataset.

system in ways that reduce the resilience of partner economies.[24] Because of the important role played by the state, both through state-owned enterprises and by state purchasing behavior and regulatory action, China's economy is increasingly directed by nonmarket practices rather than market forces, a point that Hanming Fang makes in his 2023 AESG paper. Foreign firms in sectors with such state dominance are unable to compete against Chinese firms, both at home and abroad, based on underlying capabilities and market conditions.

China is also accused of subsidizing its producers in ways that lack transparency and rig market signals in favor of Chinese firms. A further complaint is that China benefits unfairly from forced technology transfer and theft of intellectual property, both of which reduce the return to foreign innovation. Each of these claims of unfair practices is a serious charge that undermines the case for mutually gainful trade with China. Trade under these conditions is seen as predatory; economies are shaped not by comparative advantage but by the industrial policies of their trade partners.

A third argument sees the Chinese government itself as a source of supply shocks. Concern about the concentration of production in China has grown along with its propensity to use trade as an instrument of economic statecraft. In recent years, a growing number of US partners have been on the receiving end of China's leveraging trade to further its political goals.[25] In 2019, Canada was the target when China refused to accept its exports of canola oil following the arrest in Vancouver of a Huawei Technologies Co. executive. Australia was met with a ban on its exports of wine, coal, and barley after calling for inquiries into China's COVID-19 response in 2020. Most recently, Lithuania's 2022 decision to allow Taiwan to open a representative office was met with not only a Chinese ban on its exports but also pressure on EU companies operating out of other EU member states to remove Lithuanian inputs from their supply chains when exporting to China, a demand seen as a threat to the integrity of the EU single market. Although these headline cases of coercion have not changed targeted-government policies, they proved costly to exporters summarily removed from the Chinese market. They have led many countries to prioritize the identification of supply chain risks and the development of strategies to mitigate them.

24 A recent example of US views on the impact of China's economic policies on other economies is the statement released by the Office of the US Trade Representative following a WTO dispute settlement panel's rejection of China's argument that US Section 232 tariffs on steel and aluminum imports are permissible under WTO rules. United States Trade Representative spokesperson Sam Miche (2023) writes that "the United States condemns China's refusal to correct its severe and persistent nonmarket excess capacity for steel and aluminum that is at the heart of a global crisis that led to the U.C.S. Section 232 national security actions." The statement fails to note that a WTO panel found that US Section 203 tariffs on steel and aluminum could not be justified on national security grounds and were therefore impermissible under the terms of the General Agreement on Tariffs and Trade 1944. More details on that ruling can be found at "Dispute Settlement 544: United States—Certain Measures on Steel and Aluminium Products," World Trade Organization, panel report under appeal on January 26, 2023, https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds544_e.htm.

25 A recent study by Reynolds and Goodman (2023) of eight cases of Chinese economic coercion directed at foreign governments identifies five cases in which China chose to restrict trade in response to a partner's policy decisions.

Finding ways to reduce the economic risks flowing from these behaviors is complicated by China's dominant role in global value chains. China is deeply embedded into the complex webs of cross-border transactions that characterize modern, fragmented production. Production of many goods subject to excess demand during the pandemic, such as personal protective equipment and electronic devices, was concentrated in China.

Identifying and reducing supply chain risks is a priority for many countries that trade with the US. Indeed, enhancing supply chain resilience was a major theme of the trilateral summit of President Biden, Japanese president Fumio Kishida, and South Korean president Yoon Suk Yeol at Camp David on August 18th, 2023.[26] One stumbling block for furthering cooperation, however, is US opposition to Chinese participation in supply chains. All three presidents at the Camp David summit stressed in their joint press conference that their efforts were not anti-China.[27]

Such tensions, however, are difficult to avoid. The pull of both the US and China are seen in Indonesia's bid to sign a free trade agreement with the US related to critical minerals supply. Without such an agreement, nickel from Indonesia will not meet US requirements for battery sourcing needed for a vehicle purchaser to receive the full $7500 subsidy offered by the IRA. A major barrier to a bilateral agreement between Indonesia and the US is China's role in Indonesian nickel processing and refining.

America's import sourcing became more diversified after 2017, when the US-China trade war reduced US imports of newly taxed goods from China. That experience is instructive as it shows the extent to which strong price signals may be needed to make meaningful changes in China's position in global supply chains. Reducing US reliance on imports from China was among the many objectives cited by the Trump administration for its trade war. After four rounds of tit-for-tat hikes, by the end of 2019, each side had levied average duties of around 20 percent against each other, with tariffs covering almost two-thirds of US imports from China and about 58 percent of Chinese imports from the United States, as listed in table 3.

26 See David E. Sanger's contemporaneous reporting from the summit, posted in "Camp David Summit," *New York Times,* August 18, 2023, https://www.nytimes.com/live/2023/08/18/us/biden-news-camp-david/76722c03-8390-5294-8fa3-5c700d17a9f9?smid=url-share.

27 See Edward Wong's contemporaneous reporting from the summit, posted in "Camp David Summit."

Table 3. US-China Trade War by the Numbers

Share of Chinese exports covered by US tariffs	Average tariff levied by US on Chinese exports	Average tariff levied by the US on exports from other countries	Share of US exports covered by Chinese tariffs	Average tariff levied by China on US exports	Average tariff levied by China on exports from other countries
66.4%	19.3%	3.0%	58.3%	21.1%	6.5%

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Source: Numbers taken from Bown (2023a).

The trade war has been effective in reducing US reliance on direct imports from China, but also costly for US consumers and businesses, as reflected in the summary assessment in table 2. According to an influential academic study of the trade war, the value of newly taxed US imports fell by an estimated 32 percent.[28] To date, US Customs and Border Protection has collected $186 billion in tariff revenue from imports taxed by the trade war, an amount largely borne by American businesses and consumers.[29, 30] One effect of this burden is reduced competitiveness of US exporters who rely on Chinese imported intermediates. Handley, Kamal, and Monarch (2020) estimate that the burden on affected firms is equivalent to new duties of $900 per worker. The trade war shows how costly it would be to further reduce US imports from China using higher tariff rates.

The current US policy mix toward China implicitly relies on the private sector to decide how to alter supply chains given tariff levels, export controls, and other restrictions. The strategy leaves firms free to choose substitute sites for production, while initiatives like IPEF try to pave the way for investment in partners willing to accept certain obligations. These actions, plus heightened uncertainty about the future of US-China relations, are accelerating the movement of final assembly of electronics, textiles and apparel, toys, footwear, and other labor-intensive products toward alternative locations.

While the US may be willing to bear the cost of significant reduction in exposure to China, reducing direct US imports from China does not guard against risks originating there. China is the most important trade partner for almost all countries joining

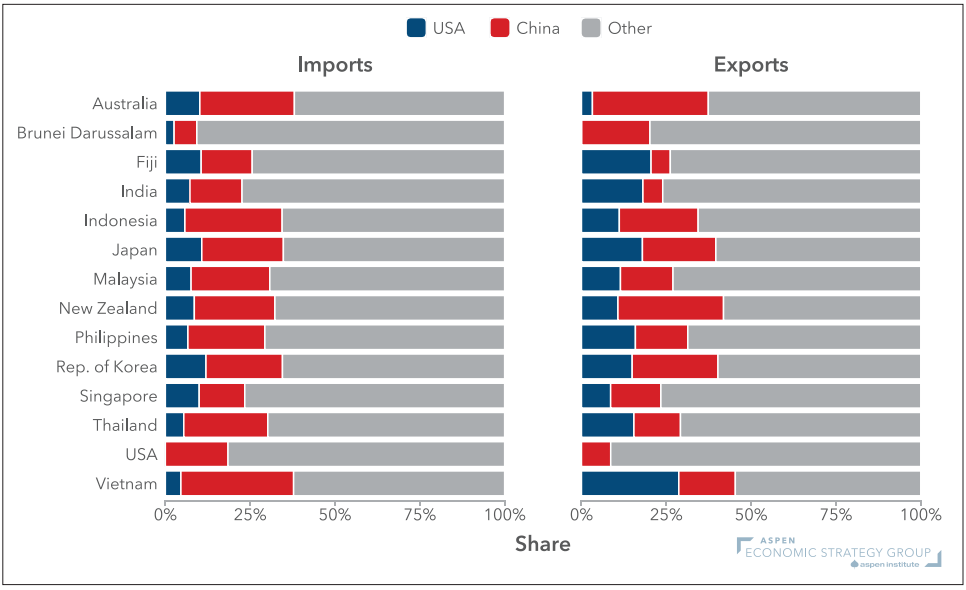
28 The reduction in US import value from trade-war tariffs is estimated by Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2020). A discussion of economic studies of the trade war appears in Fajgelbaum and Khandelwal (2022).

29 Customs and Border reports revenue collected on imports from China under Section 301 separately. See "Trade Statistics," US Customs and Border Protection, accessed September 11, 2023, https://www.cbp.gov/newsroom/stats/trade.

30 Economists have used a diversity of data and methods to assess the impacts of the trade war on the United States, China, and other countries. Fajgelbaum and Khandelwal (2022) review what has been learned from this work.

the US in IPEF negotiations, as seen in figure 3. Indeed, 11 of these 13 countries are already members of the Association of Southeast Asian Nations–led Regional Comprehensive Economic Partnership (RCEP), which binds them to China through a preferential trade agreement. Importantly, generous rules of origin contained in RCEP encourage development of supply relations among its members. The upshot is that as the US relies more on IPEF partners, it continues to rely on China because of the intermediate goods IPEF countries use to produce the goods they ship to America.

Figure 3. Import and Export Shares for IPEF Countries, by Selected Partners, 2021

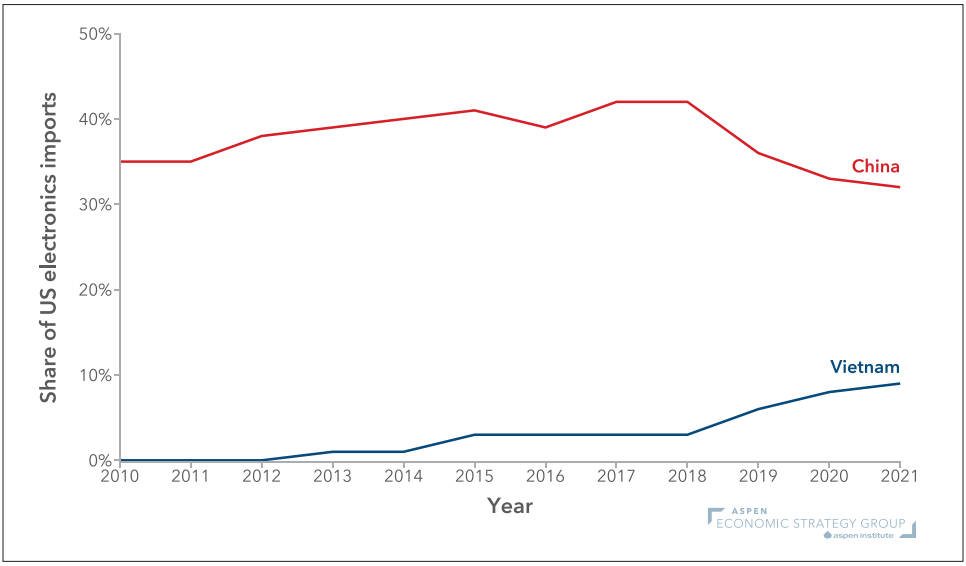


Source: UN Comtrade Database, calculations by author.

Tariffs reduced US imports directly but created longer supply chains linking China to countries such as Vietnam, which now assemble goods destined for the US using Chinese inputs. As shown in figure 4, as the Chinese share of the US market for electronics fell following the onset of the trade war in 2018, Vietnam's share rose almost in sync. At the same time, Chinese exports to Vietnam of intermediates used in the production of these goods also increased. China's share of Vietnam's imports of semiconductors, telephone parts, and other electronic components is now more than twice that of its closest rival, South Korea.[31] How much risk reduction is achieved by high tariffs on China when they create longer, less opaque but still China-dependent supply chains is thus in question, even if their costs to American consumers are not.

31 These trade shares for Vietnam's imports are for 2021 and are drawn from the Observatory of Economic Complexity: https://oec.world/profile/country/vnm?yearlyTradeFlowSelector=flow1.

Figure 4. Share of US Electronics Imports for China and Vietnam, 2010-2021



Source: US Census Bureau via USA Trade Online; calculations by author. "Electronics" is defined as HS Chapter 85.

Over time, as alternative sources of supply develop, America's Asian partners may reduce their reliance on China for parts and components as their own industrialization proceeds. Raising the domestic value added of manufactured exports is a key development goal across middle-income Asia, as well as in Latin America and Africa. With the US turning away from China, these countries seem ready to work with American negotiators to create conditions for expanding their manufacturing sectors. India, already benefiting from new investment from Apple, Goldman Sachs, IBM, and others, is participating in the supply chain pillar of IPEF talks and could rejoin the trade pillar once its obligations become clear. Helping these nations raise productivity and meet higher labor and environmental standards can be a valuable offshoot of diversifying GSCs.

4. Toward a More Friend-Friendly and Targeted Approach

While the Biden approach to resilience is still taking shape, we can begin to assess its potential to reduce risks emanating from global supply chains. No policy can insulate a country from every possible shock, but the US is taking action to reduce exposure to some sources of instability. Reshoring builds domestic capacity and, to the extent that the supply chain is located within the US, reduces exposure to shocks disturbing

the productive capacities of other partners. For critical materials, such as semiconductors and batteries, the case for reducing supply risk is persuasive and has garnered extraordinary federal support for reshoring.

No policy can insulate a country from every possible shock, but the US is taking action to reduce exposure to some sources of instability.

Reshoring cannot eliminate all risk, however, as supply chains are complex and rely on thousands of intermediate goods produced abroad. The budding US semiconductor industry will rely on the Netherlands and Japan, exclusive providers of the photolithography equipment necessary for mass-production of advanced chips. Silicon is produced by a larger set of countries, but the largest supplier by far is China. Even if the US completely removes China from the supply chains that serve domestic chip fabricators, it will remain connected by imports of legacy chips from foreign partners that trade with China.

The cost of self-reliance is high and only tenable in a few critical sectors. Friendshoring implicitly recognizes that the US cannot go it alone, as it attempts to balance the efficiencies of trade with trusted partners while preventing reliance on rival states that may do long-term harm. But the US has not yet fully embraced a cooperative approach with its allies to building supply resilience, in part because reshoring's promise of domestic investment and employment was necessary to garner congressional support for both the IRA and the CHIPS Act. Lack of cooperation with partners, however, has raised the risk of a self-defeating subsidy race. Indeed, even though they actively coordinate with the US through the Trade and Technology Council, the EU quickly responded to new US subsidies by permitting member states to offer investors "matching aid" to compete with outside countries.

A more cooperative approach would reduce pressures for a subsidy race by allowing the adoption of critical technology produced outside the US, even if that scope is limited to technology produced by "friends." Kamin and Kysar (2023) note that most of the IRA's clean energy production and investment tax credits already reflect this approach, as they are available to US producers regardless of where those producers get the technology they use. Opening the US clean energy drive to foreign technology may seem risky or even contrary to development of a domestic industry. But without such openness, the US risks failing to adopt the most promising technology, while raising the cost of the energy transition.

In addition to providing a clear role for allies, the effectiveness of US efforts to reduce supply risks would be enhanced by better targeting policy toward the supply chains it seeks to move. To date, the Biden administration has refused to place limits on its

desire to alter supply chains, leaving open-ended the US push to alter its commercial policies. US Treasury secretary Janet Yellen, an official known for her support for international engagement, notably has failed to provide insight into the extent of the administration's ambition. During her visit to India in November 2022, Secretary Yellen said, "The United States is pursuing an approach called 'friend-shoring' to diversify away from countries that present geopolitical and security risks to our supply chain," offering no insights into whether boundaries would be set on this attempt to alter supply chains (Rappeport and Swanson 2022). This stance creates uncertainty about the future of US trade policy, at the cost of reduced investment by the private sector and growing anxiety among trade partners.

The recent promise of a 10 percent across-the-board tariff by former president Donald Trump, if he is reelected, feeds into fears that the US is closing itself off. In recent months, as they seek to reduce tensions with China, Biden administration officials have softened their rhetoric. Notably, during her July 2023 visit to China, Yellen sought to allay China's concerns that the United States wanted to decouple, avoiding any mention of derisking. "There is an important distinction between decoupling, on the one hand, and on the other hand, diversifying critical supply chains or taking targeted national security actions," she said (Bradsher 2023).

A meaningful way in which the US can clearly signal its desire to diversify, rather than decouple, would be to reform the Trump administration's tariffs on China. These tariffs tax flows of all kinds of goods, from household sundries to electronics, with no clear link to any of the issues the US claims to want China to address. While politically difficult, tariff reform could be done in the context of bilateral negotiations that simultaneously reduce Chinese tariffs on US exports. Tariffs could be retained where the US identifies an overdependence on Chinese suppliers.

China is not sitting idly by as the US campaigns for supply chain reordering. At the August summit of BRICS countries in South Africa, Chinese president Xi Jinping urged the gathered leaders to work together and reject efforts to isolate China (Grove and Ramzy 2023). Unless the US works more cooperatively with allies and clarifies the extent to which it wants to move supply chains away from China, it will face increasing resistance from countries it wishes to include as new suppliers. Even as China's share of US trade has fallen, its share of world trade has not. America's partners wait to see how far the US wants to diverge from a global economy of which China is an integral part.

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Where Is China's Economy Headed?

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ABSTRACT

The arc of the Chinese economy over the next 10 to 15 years will depend on three sets of forces, each of which interacts with the others: (1) Domestically, the internal political economy will determine the relationship between the state and the market. (2) Externally, the relationship between China as a nation and the US-led West will determine China's access to foreign technology, finances, and markets. (3) Traditional economic forces such as total factor productivity (TFP), population and human capital, and capital and investment will determine China's growth potential. Even though most studies focus on this third set of traditional economic forces—the ones determining growth potential—the first two sets of forces will ultimately determine how close the Chinese economy can come to *realizing* that potential. This paper examines the range of outcomes for China's economy through this lens: growth rates could reach 6 percent if China focuses on market-oriented reforms, or they could stagnate if, in response to external or internal pressures, leaders instead continue to turn to more centralized decision-making and to top-down planned resource allocation.

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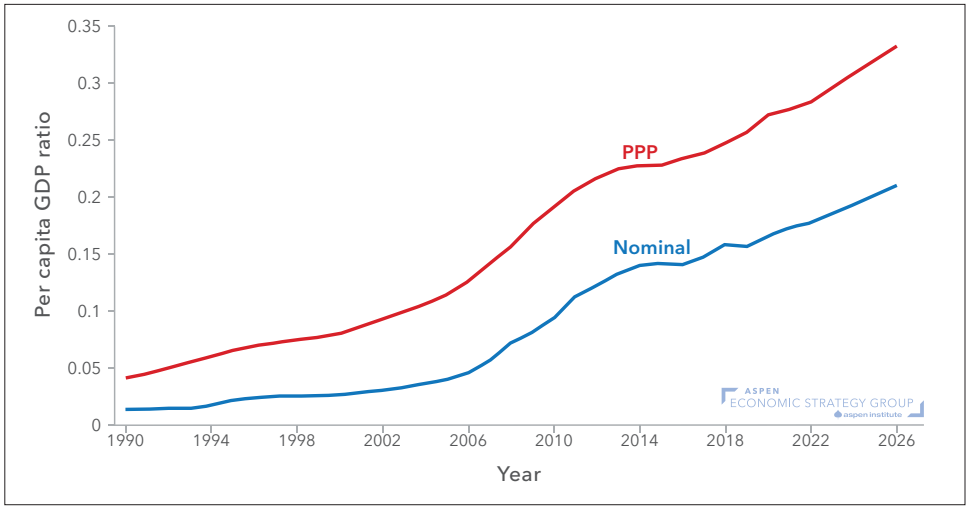
1. Introduction

This paper examines China's economic prospects over the next 10 to 15 years primarily through the lens of the country's international environment and domestic political economy because they are the key to understanding where the Chinese economy is headed. While I discuss economic factors that are frequent topics of debate—such as productivity, population aging, and capital investment versus consumption—I contend that the main uncertainties in China's economic growth rates are the internal political economy and the external environment, which react to each other in unpredictable ways.

Figure 1. Per Capita GDP Ratio (China/US)



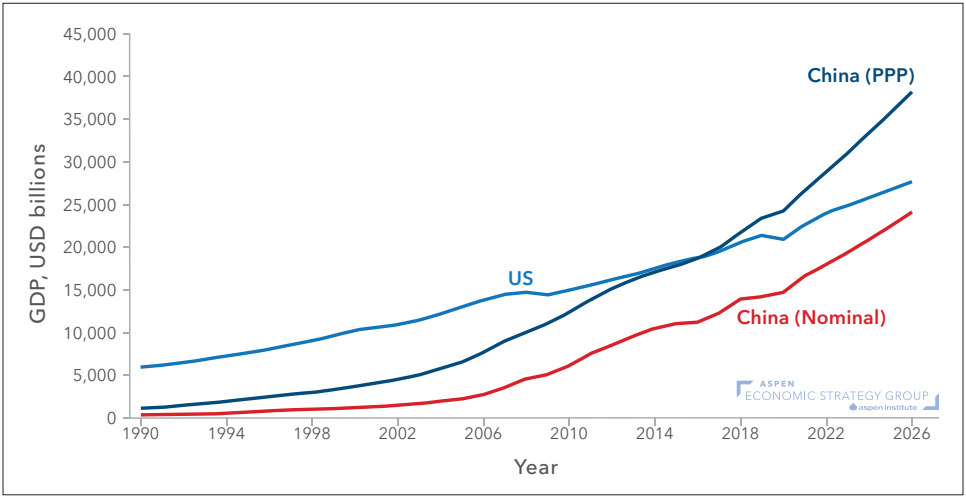
Sources: GDP per capita estimates over 1990-2022 are by World Bank (World Bank 2023a, 2023b). Forecasts over 2023-2026 are by International Monetary Fund (IMF 2021).

The growth of the Chinese economy over the last four decades is one of the most transformative events of global economic history in centuries, especially considering the country's population size, sweeping territory, and vast heterogeneity. According to national income criteria established by the World Bank, China became a lower-middle-income country in 2001 and transformed into an upper-middle-income country in 2010. Figure 1 plots China's real per capita GDP compared to the United States'. In purchasing power parity (PPP) terms, this ratio has grown from 4.1 percent of the US per capita GDP level in 1990 to 28.4 percent of the US level in 2022, according to World Bank data (World Bank 2023a). In nominal terms, China's per capita GDP

was only 1.33 percent of that of the US in 1990, and it rose to 17.75 percent in 2022 (World Bank 2023b).

According to per capita GDP, mainland China was in 2022 ranked 64th (measured nominally) or 73rd (measured according to PPP), among separately administered economies (IMF 2023a, IMF 2023b). China is clearly still a developing country. China's large population, however, makes the total size of its economy much more significant globally than its per capita GDP would suggest. In 2022, China's nominal GDP was 18 trillion USD, or three-quarters the size of the US economy at 24 trillion USD. In PPP terms, however, China's economy took over that of the United States between 2016 and 2017 as largest in the world. In 2022, China's GDP in PPP terms was 28.8 trillion USD, about 20 percent larger than that of the US, as shown in figure 2.

Figure 2. United States vs. China by GDP, 1990-2006



Source: GDP estimates over 1990-2022 are by World Bank (World Bank 2023c, 2023d). Forecasts over 2023-2026 are by International Monetary Fund (IMF 2021).

It is worth pointing out at the outset that the Chinese economic growth miracle is not a productivity miracle. As we will elaborate in section 5.1, at similar levels of development (as measured by per capita GDP relative to the US), Chinese productivity growth appears to have underperformed by a wide margin when compared to that of East Asian miracle economies such as Japan, South Korea, Singapore, Taiwan, and Hong Kong. Thus, China's historically strong productivity performance appears more to reflect its low starting point, the deep inefficiencies plaguing its centrally planned economy, and the large catch-up dividends unleashed over the ensuing decades by gradual market-oriented reforms. Where the Chinese economy heads in

the next decade will depend on whether deeper reforms are implemented to further reduce the current system's inefficiencies.

The Chinese economic growth miracle of the last four decades was a result of the country's embrace of market-oriented reforms and globalization. In 1979, when these reforms began, the US-led West had a warm relationship with China and welcomed it into the global economic system. However, the next decade is likely to look very different. National security concerns—or, more accurately, *regime* security concerns, as I argue below— will have a profound impact on the direction of Chinese economic and foreign policies and thus on the country's economic growth. As Alfred Wu recently wrote, "The stark reality in China…is that security now trumps everything, from economy to diplomacy" (Tian and Pomfret 2023). President Xi Jinping, in his speech to the 20th National Congress of the Chinese Communist Party (CCP) in October 2022, also singled out national security as an area of concern—a broad concept incorporating issues ranging from politics and economics to technology and territorial disputes. Through this lens it becomes relatively straightforward to understand the seemingly mixed messages sent in recent years by Chinese leadership regarding economic policy.

The Chinese economic growth miracle of the last four decades was a result of the country's embrace of market-oriented reforms and globalization.

In this brief, I argue that the arc of the Chinese economy over the next 10 to 15 years will depend on three sets of forces, each of which interacts with the others: (1) Domestically, the internal political economy will determine the relationship between the state and the market. (2) Externally, the relationship between China as a nation and the US-led West will determine China's access to foreign technology, finances, and markets. (3) Traditional economic forces such as total factor productivity (TFP), population and human capital, and capital and investment will determine China's growth potential. Even though most studies focus on this third set of traditional economic forces—the ones determining growth potential—the first two sets of forces will ultimately determine how close the Chinese economy can come to *realizing* that potential.

2. Chinese Economic Growth: Past, Present, and Future

2.a. China's Growth from 1979 to 2022

At the dawn of China's "reform and opening up" in December 1978, China was one of the poorest countries in the world, having just emerged from the Cultural Revolution. The country's nominal per capita GDP was only 156 USD, and the World Bank ranked it at 172nd globally. At that time, the per capita GDP of China was only at 1.5 percent of the US level, lower than India's and many sub-Saharan countries', less than a third of the Philippines' and Ghana's, and one-tenth of Brazil's. Most of the population lived in poverty, earning less than 1 USD per day.

Agriculture accounted for almost 30 percent of China's GDP in 1978, and industry accounted for 48 percent; the services sector was underdeveloped. More than 80 percent of the Chinese population lived in rural areas; labor mobility from rural to urban areas, or from one region to another, was severely restricted under the hukou system.

China's economic system in 1978 was one of classic central planning, with private commercial activity either banned or limited. State planning agencies decided on production plans, resource allocations, and distribution of goods and services. There was no financial system in a modern sense; there were no commercial banks, no securities, no insurance companies, and no financial markets. China was isolated from the rest of the world with no foreign investment and no foreign businesses. China's trade accounted for less than 1 percent of total world trade, and its exports were mostly primary products such as food and coal, sold to obtain foreign currency needed to import machinery and materials that it could not produce domestically.

However, China also had several advantages in 1978. First, China scored significantly better on human-development indicators than did countries at a similar stage of development at the time. According to World Bank development indicators, China's life expectancy was 66 years in 1978 compared with 53 years for India and 60 years for the average middle-income country; its adult literacy rate was 65.5 percent in 1982 compared with India's 40.1 percent.[1] China's population was large, growing, and young: it had grown rapidly in the two decades prior to 1980 to about one billion, with 46 percent of the population under the age of 20 in 1982.[2]

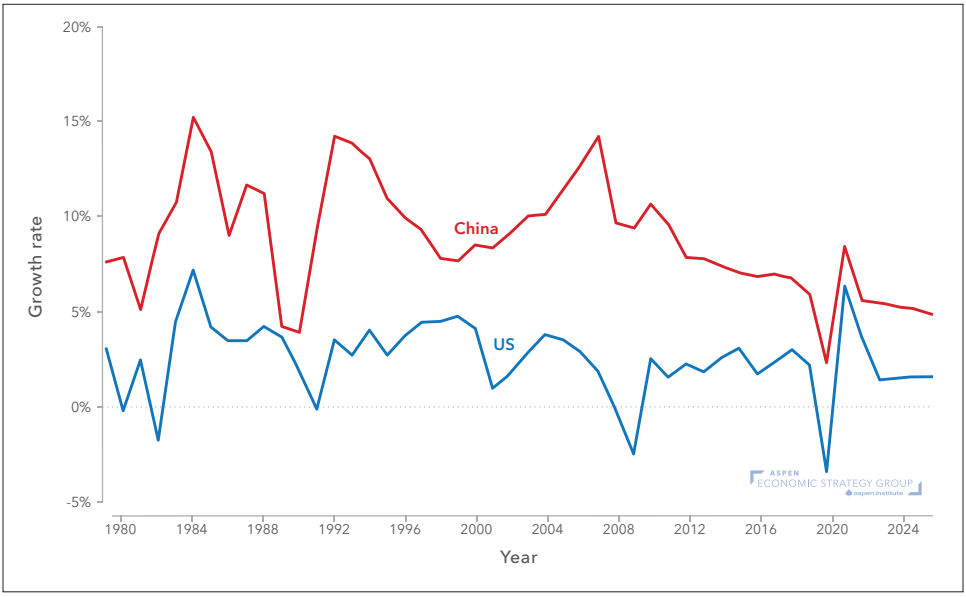
1 See World Bank DataBank, s.v. "World Development Indicators," accessed June 24, 2023, https://databank.worldbank.org/source/world-development-indicators; and UNESCO Institute for Statistics: http://data.uis.unesco.org/.

2 China initiated its stringent family-planning policies in the early 1970s with a campaign known as "Later, Longer, Fewer," which preceded the well-known one-child policy that came into effect in 1979. The total fertility rate of Chinese women declined drastically from 5.7 in 1969 to 2.7 in 1978. See Chen and Fang 2021.

China's most important advantage in 1978, however, was the normalization of its relationship with the US. The United States and China signed an agreement on December 16, 1978, that paved the way to the establishment of formal diplomatic relations on January 1, 1979—when the US shifted its diplomatic recognition from Taipei to Beijing, acknowledging the People's Republic of China (PRC) as the country's sole legal government. The architect of Chinese economic reform, then–vice premier Deng Xiaoping, visited the United States in January 1979; his visit was seen as a crucial step toward opening up China to the world and initiating economic reforms.[3]

This warming relationship with the US-led West was the key factor that led to China's reform, both in its internal governance and in its eventual embrace of its market economy with Chinese characteristics. Deng's gradual decentralization of decision-making powers to individuals and firms was possible because of the virtuous cycle created by the warming relationship with the West in general and the United States in particular.

Figure 3. Annual Economic Growth Rate of US and China, 1980-2026



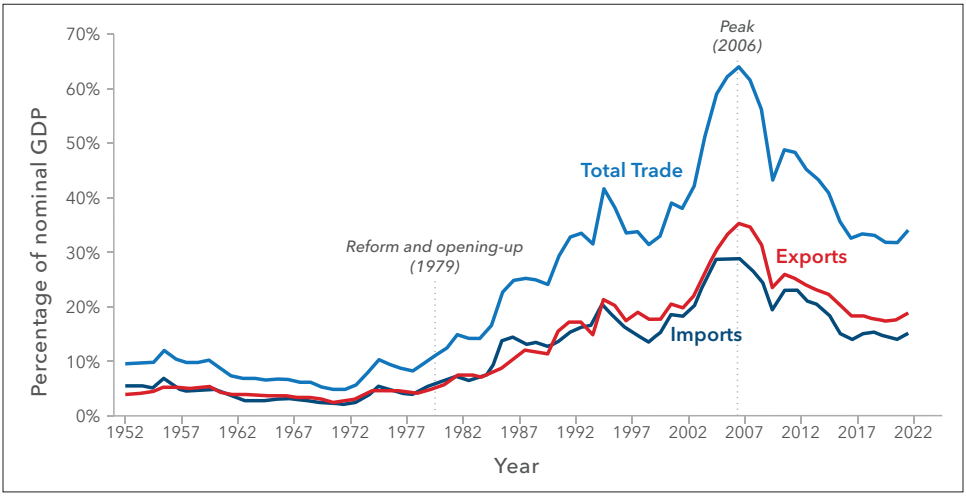
Source: GDP growth estimates over 1990-2022 are by World Bank (World Bank 2023c, 2023d). Forecasts over 2023-2026 are by International Monetary Fund (IMF 2021).

3 "Chronology of U.S.-China Relations, 1784–2000," Office of the Historian, US Department of State, accessed June 24, 2023, https://history.state.gov/countries/issues/china-us-relations.

Between 1980 and 2012, China averaged an astonishing annual growth rate of about 10 percent. Its growth rate did start to slow down after 2005, but even in 2020 when the COVID-19 pandemic broke out, the Chinese economic growth rate remained positive; indeed, China's was the only major economy with positive growth in that year. Figure 3 plots annual economic growth rates in China, together with those of the US, for the four decades following 1980.

During that time span, the Chinese economy radically transformed from an agrarian economy to an economy dominated by service and industry. By 2021, agriculture accounted for just 7 percent of China's GDP, while the service sector accounted for 53.3 percent. In addition, by 2013, China had become the world's top trading nation. Figure 4 shows the remarkable transformation of China into a global trade powerhouse. At its peak in 2006, Chinese total trade accounted for close to 60 percent of the country's GDP.

Figure 4. China's Exports, Imports, and Total Trade Relative to GDP, 1952-2022



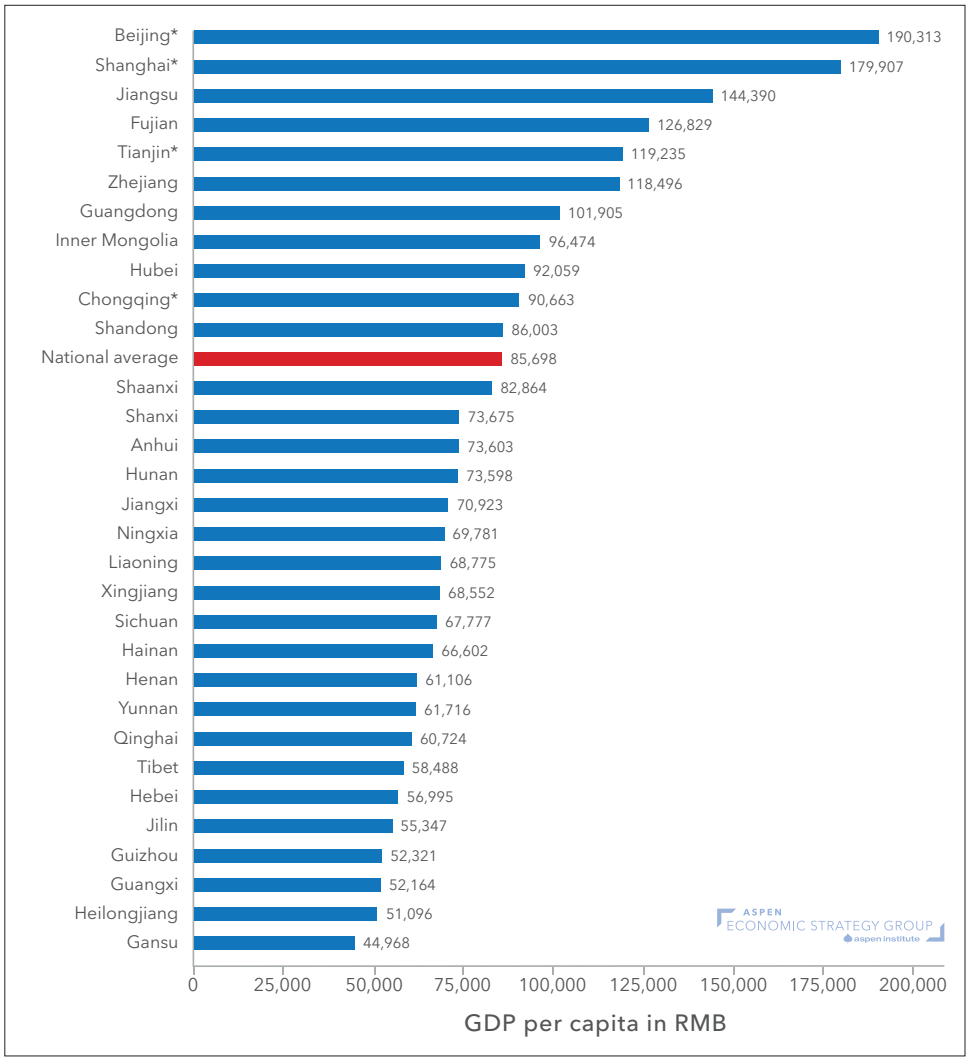
Source: Wei and Yu (2023).

Despite its impressive growth since 1979, the Chinese economy is full of paradoxes. First, though China's is the world's largest economy by PPP, the average living standard for Chinese people (as measured by per capita GDP) is still only just above one-quarter that of the United States, Japan, and Western Europe. Living standards

also vary greatly by region. Gross regional product (GRP) varies enormously across provinces, as documented in figure 5. In 2022, GRP per capita in Beijing (190,313 RMB, more than twice China's national average per capita GDP) was about 4.23 times that in Gansu (44,968 RMB, about half China's national average). China's top cities—including Shanghai, Beijing, Guangzhou, and Shenzhen—boast world-class, state-of-the-art infrastructure, while many inland regions are still very poor.

Second, the Chinese economic system features vibrant and sometimes "Wild West–style" markets and firms alongside giant state-owned enterprises (SOEs), all operating under the long shadows of various levels of government. Most importantly, China is a clumsy "new kid on the block" with its newly acquired economic influence, and it is seemingly falling into Thucydides' Trap. As articulated by Graham Allison (2017), this term refers to a deadly pattern of structural stress that results when a rising power (China) challenges a ruling one (the US). In the US, anti-China attitudes are becoming a rare point of bipartisan and public-opinion consensus. According to a Pew Research Center survey, between 2018 and 2022 the share of US adults expressing an unfavorable opinion of China rose from 47 percent to 82 percent (Silver 2022). I argue below that these facts have shaped and will continue to shape China's external environment. This environment, in turn, impacts the nation's domestic policy choices.

Figure 5. Per Capita Gross Regional Product in China in 2022, by Province or Region



Source: National Bureau of Statistics of China data, as listed in Statista (2023).

2.b. Forecasting the Growth Rate of the Chinese Economy

Where the Chinese economy will head in the *medium term*, say by 2035, and in the longer run, say by 2050, has enormous implications for both China and the rest of the world. While it is now well accepted that double-digit annual growth rates in China are a thing of the past, analysts predict future annual growth rates ranging anywhere from 1 percent to 8 percent over the next 10 to 15 years.

On the most optimistic end of the spectrum is Justin Lin, former chief economist of the World Bank. He argues that China could *potentially* sustain an annual per capita growth rate of 8 percent until 2035; and he asserts that China will most likely be able to achieve an annual growth rate of 5–6 percent, barring black-swan events such as a systematic financial crisis, a major geopolitical conflict, or another global pandemic. Lin's main argument for his bullish assessment is that China still enjoys a large latecomers' advantage, in the sense that the nation is still far from the world's technological frontier and thus still has a lot of catching up to do. According to the Penn World Table (PWT), China's per capita GDP was 22.6 percent that of the US in 2019 (Feenstra et al. 2015). This ratio was similar to Germany's in 1946, Japan's in 1956, and Korea's in 1985. Germany enjoyed an annual per capita GDP growth rate of 8.6 percent from 1946 to 1962; Japan also achieved an annual per capita GDP growth rate of 8.6 percent from 1956 to 1972; and Korea's annual per capita GDP growth rate was 8.1 percent from 1985 to 2001. If China follows this pattern, it has the potential to grow at 8 percent per annum from 2019 to 2035.

Lin argues that China will most likely achieve a 5–6 percent annual growth rate (instead of reaching its 8 percent potential rate) because the country also needs to address issues such as climate change and environmental sustainability, regional and urban-rural income disparity, and the needs of other social programs—all of which will inevitably compete for investment. Lin further argues that investment should remain the key engine of Chinese economic growth, but that the investment that will drive future Chinese growth needs to be in innovation and industrial upgrading aimed at improving productivity, generating jobs, and raising wages and household income (thereby increasing domestic consumption).[4]

On the other hand, Roland Rajah and Alyssa Leng (2022) predict that annual average Chinese economic growth can be expected to decelerate sharply to roughly 3 percent by 2030 and 2 percent by 2040 and that, while 5 percent or greater growth is possible, China does not have a track record of improving productivity to suggest such growth is likely.[5]

Analysts on the pessimistic end have highlighted headwinds China faces currently and in the foreseeable future:

1. The core drivers of China's "miracle" growth have been heavy infrastructure, property development, and urbanization. By the end of this decade those drivers will have been largely exhausted (Overholt 2023).[6]

4 See section 5.3 for further discussion.

5 Roland and Leng (2022) also summarize 20 other forecasts of Chinese economic growth for 2020–2030 or 2020–2050, ranging from 9 percent to 3 percent annual growth.

6 See also Overholt 1993; 2018.

2. The recent evolution of private-sector policies—exemplified by the calling-off of Ant Group's IPO and the hefty fines against Didi Global, Alibaba, Tencent, Meituan, and other e-commerce giants—indicates that economic growth will be sacrificed whenever necessary to maintain regime stability and the CCP's absolute power (Xu 2023).[7]
3. China is unlikely to escape the "middle-income trap" (Rozelle and Hell 2022).
4. Chinese economic growth will likely suffer reversion to the mean, slowing down to a rate of a little less than 4 percent a year and possibly as low as 2 percent (Pritchett and Summers 2014).
5. China's total factor productivity growth slowed down drastically from 2007, suggesting that its catching-up growth is unlikely to continue. China's relative per capita GDP level will asymptote to about 41 percent (from about 25 percent in 2019) of the US level around 2050; given China's declining workforce, the US economy will likely be growing faster (at 2.19 percent) than China's (at 2.06 percent) by 2036; and if so, the US economy will again be larger than China's in PPP terms by 2100 (Fernández-Villaverde, Ohanian, and Yao 2023).

Forecast bases tend to differ by source. Most predictions extrapolate from past growth rates, either of China or of other economies. Investment banks tend to focus on annual or even quarterly growth rates instead of medium- or long-run rates, and they tend to pay more attention to the fiscal and monetary policy stances of the Chinese government than they do to more fundamental forces that will shape the trajectory of the Chinese economy.[8] Commentators associated with the US defense establishment tend to project higher Chinese growth, perhaps as a way to make the case for diverting more US resources to American defense (e.g., Allison, Kiersznowski, and Fitzek 2022). And forecasts from economists tend to focus on economic fundamentals, such as China's declining workforce, returns to investment, productivity growth, and the consequences of potential technological decoupling from the West.

2.c. The Arc of the Chinese Economy

I believe the arc of the Chinese economy over the next 10 to 15 years will depend on three sets of forces, each of which interacts with the others:

- **Domestically**, the internal political economy will determine the relationship between the state and the market.

7 Xu also notes that, on average, official growth statistics exaggerate the actual growth rate by 2 percentage points; he thus cites a current growth rate of 3.5 percent. Chen et al. (2019) argue that China's official statistics overstate GDP growth by about 1.8 percentage points per annum over the period 2010–2016.

8 See, as an exception, Wang 2023.

- **Externally**, the relationship between China as a nation and the US-led West will determine China's access to foreign technology, finances, and markets.
- **Traditional economic forces** such as total factor productivity (TFP), population (L) and human capital (HC), and capital and investment (K) will determine China's growth potential.

Even though most studies focus on this third set of traditional economic forces—the ones determining growth potential—the first two sets of forces will ultimately determine how close the Chinese economy can come to *realizing* that potential. I see three main reasons for this argument:

1. *The primary objective for the Chinese Communist Party is maintaining its power.* This ideal is one of the "Four Cardinal Principles" enshrined in China's constitution, and the regime's stability arguably is the guiding principle for all of China's policymaking.[9] Many analysts considered Xi's anti-corruption campaign (which commenced immediately after he took office in November 2012) an effort to consolidate power, but a more accurate interpretation is likely that he perceived corruption as the most serious threat to the regime's stability.[10] In this light, economic growth and other policies are secondary objectives to maintaining stability.
2. *The external relationship between China and the US-led West is at a 40-year low and could get worse.* The action-reaction cycle of external environment and internal political economy is self-reinforcing, unfortunately, and has formed a negative feedback loop over the last 10 years. Unless cool heads prevail in both Beijing and Washington, the relationship between China and the West is likely to stay tense or even become openly hostile.
3. *A negative external environment will make China's internal political economy more centralized and less market-oriented.* Lower-level government officials care more about promotion than about regime stability per se (unless regime loyalty is the key to promotion), and market forces are harder to control than direct central planning.

These action-reaction dynamics between China's internal political economy and its external geopolitical environment worked in the opposite direction in 1978. Emerging from the Cultural Revolution, CCP leadership decided that "reform and

9 The "Four Cardinal Principles" were put forward by Deng Xiaoping: adherence to the socialist road; adherence to the people's democratic dictatorship; adherence to the leadership of the Communist Party of China; and adherence to Marxism-Leninism and Mao Zedong Thought. See "'Four Cardinal Principles' (Mar. 1979)," *China.org.cn*, June 22, 2011, http://www.china.org.cn/china/CPC_90_anniversary/2011-06/22/content_22838756.htm.

10 In fact, in his very first speech to the Chinese Communist Party's elite Politburo, Xi "denounced the prevalence of corruption and said officials needed to guard against its spread or it would 'doom the party and the state'" (Wong 2012).

opening up" could rescue the Chinese economy and best prevent the CCP from collapsing. President Jiang Zemin's signature "Three Represents" expansion of CCP membership to include private entrepreneurs was a reaction to the decline in party membership after 1989; it also aimed to boost regime stability. The same can be said of recent seeming reversals of many reform measures—reversals that President Xi saw as necessary to combat internal threats to CCP power in the form of rampant corruption and weakening party ideology. And the CCP has seen an increasing threat from the West, exemplified by President Obama's 2012 identification of China as America's major strategic threat (this occurring just weeks before Xi took power) and by President Trump's more insidious rhetoric and anti-China policies.

In the next section, I describe how this worsening external geopolitical environment allows one to make sense of a recent series of seemingly contradictory economic-policy moves by Chinese authorities. The CCP leadership clearly sees a storm looming on the horizon, in the form of real or perceived external threats from the US-led West. In reaction, it is seeking to maintain regime stability, primarily by suppressing any perceived internal threats and thereby getting the "house in order." If necessary, it may even choose to "board up the house," that is, decouple from the US-led West.

While China does face some serious challenges to traditional economic factors—for example, an aging population and declining workforce, a bubbly real estate sector ready to implode, and drastic income inequality that may impede transition to a consumption-driven growth model—I argue that these issues can be addressed by appropriate reform measures. The risk is that necessary reform efforts may be blocked by vested interests spurred by perceived external threats to China's national security and perceived internal threats to social stability. These vested interests include executives and workers of SOEs, local governments, and the military, among others.

3. Internal Political Economy: The Evolving Relationship between the State and the Market

3.a. Market-Oriented Reforms until 2007

China's miraculous growth from 1979 to 2007 was driven by the gradual decentralization of decision-making powers from government bureaucrats to individuals and firms, by increasing the market's role in allocating resources, and by using competition to improve efficiency.

The first major reform in the late 1970s was the introduction of the household responsibility system, which gave farmers greater autonomy in decision-making. In the 1980s, special economic zones were established in coastal areas. Together with

new "open-door" policies, these zones attracted foreign investment and experimented with market-oriented policies. Township and village enterprises (TVEs) then emerged in large numbers; these enterprises accounted for one-third of China's industrial production by the early to mid-1990s. Price reforms were gradually implemented, starting in 1979. China's top leadership pushed for full price liberalization in 1987 and 1988; the resulting inflation led the government to pause reforms and impose more controls on the economy.

The pause proved to be short-lived, as Deng Xiaoping pushed for additional bold, market-oriented reforms in his famous "Southern Tour" in January 1992. Later that year, in its 14th National Congress, the CCP formally incorporated the idea of a market economy into China's socialist ideology. New reforms—including changes to state ownership of enterprise, the legal system, the fiscal policy, and the central bank, as well as the establishment of factor markets, a social safety net, and a personal income tax—made a hybrid market system the economy's main operating system rather than a mere supplement to central planning.

These sweeping and historic market-oriented reform measures led to China's 2001 accession to the World Trade Organization (WTO), which further committed China to additional market liberalization and integration into the global economy. China's global trade soared (see figure 4). By 2007, China's exports had risen to 32 percent of GDP and its current-account surplus had ballooned to about 10 percent of GDP, with net exports contributing 2.5–3 percentage points a year to GDP growth in the three years immediately prior. In the first decade of the 2000s, we also witnessed rapid growth of the private sector, which in turn drove economic growth. The employment share of the state and collector sector dropped from nearly 100 percent in 1978 to 23.9 percent in 2007, and the share of state-owned firms in industrial output declined from 50 percent in 1998 to less than 30 percent by 2007 (see Cai, Du, and Wang 2009; Hsieh and Song 2015).

The most consequential political reform has been Jiang's "Three Represents" theory of 2001, which promoted CCP membership for entrepreneurs and private businesspeople and led to a "de facto alliance between the CCP and China's business class" (Naughton 2023). Capitalist representation in the National People's Congress and the Chinese People's Political Consultative Conference, although always limited, followed.[11]

Despite these reforms, the Chinese government still cast a shadow—or rather multiple shadows at the state, local, and national levels—on Chinese firms and individuals. Firms operate in these sometimes-conflicting shadows, managing them via connections, bribes, and personnel arrangements.

11 In 2018, the *New York Times* reported that "the net worth of the 153 members of China's Parliament and its advisory body that it deems 'super-rich' amounts to $650 billion" (Wee 2018).

China's reforms could be described as lightening these shadows. In the central-planning era, the shadow was a suffocating blanket, with reforms providing more breathing room for firms and individuals and showing that markets are more efficient in resource allocation than government is. But government is still needed to correct market failures, provide public goods, and address inequality and externalities such as environmental damage.

3.b. The Global Financial Crisis and the "60 Reform Items"

The global financial crisis of 2007–2009, which originated from the large-scale default of subprime mortgages in the US housing market, shook China's confidence in the Western-style financial system. China's global exports as a percentage of GDP plummeted and never recovered, partly because of weak external demand but also because of rising Chinese labor costs. To stimulate the economy, China rolled out a 4 trillion RMB stimulus package to support domestic growth and offset the unprecedented external-demand shock. This move ushered in an infrastructure-investment boom led by local government and fueled by bank lending. China's economy continued to grow throughout the global financial crisis at close to 10 percent annually.

The global financial crisis may have catalyzed the rise of SOEs. First, after the global financial crisis, there was a broad understanding that China had done things right in its economic development under the CCP, and that the market system had its own flaws and could not address some of the country's central domestic challenges. Chinese leaders gained confidence in the country's hybrid, state-led market system. Second, the four trillion RMB stimulus package was fueled by debt, and SOEs received favorable credit terms.[12] However, most analysts expected deeper market-oriented reforms to eventually continue.

Indeed, in November 2013, the CCP unveiled an ambitious agenda for economic, social, and political reforms known as the "60 Reform Items." The agenda emphasized economic growth as the central goal of the Chinese government and, for the first time, called for the market to play a "decisive role" in resource allocation.[13]

12 Cong et al. (2019) document that the credit stimulus of 2009–2010 favored state-owned firms and firms with lower returns to capital.

13 "Market to Play 'Decisive' Role in Allocating Resources," China.org.cn, November 12, 2013, http://www.china.org.cn/china/third_plenary_session/2013-11/12/content_30577689.htm. International reactions to the Third Plenum of the 18th CPC Congress were positive. Commentary in *Foreign Affairs* claimed that "most analysts have focused on the meeting's wide-ranging economic reform agenda. No wonder; the announced economic changes are more sweeping than most people expected and, if implemented, could usher in yet another run of sustained economic growth. The reforms include allowing private ownership stakes in state companies, reducing regulatory hurdles for commercial enterprises, handing rural residents greater control over their land, liberalizing the financial sector, and much more" (Li 2014). Brookings Institution China expert Cheng Li said: "This is another turning point in China's economic development. If in the previous decade we did not see the expansion of the middle class, this is the beginning of another wave of private sector development. There is no question about that. Because party leadership embraced the idea. This is already being seen as the mandate of the Xi Jinping administration" (Dews 2013).

While the agenda laid out in the 60 Reform Items was widely acclaimed as "unprecedented," it is by now broadly agreed that this ambitious plan, particularly in its economic and political reforms, was at best partially fulfilled (Yao and Blanchard 2013). The aspiration of making the market "decisive" in resource allocation definitely remains unfulfilled; if anything, since 2013 there has been a sense that the state is "striking back" (see Lardy 2019; Rudd and Rosen 2020). Regulatory tightening in the summer of 2021, described below, has further enhanced such beliefs.

3.c. Market vs. State: The Pendulum Swings Back

State influence over markets has clearly increased since the 60 Reform Items were introduced. The government has taken (and continues to take) several approaches to expanding its influence over private firms' governance and decisions.

First, the state increasingly uses mixed ownership to leverage state capital to exert state presence (and thus some control) over private firms. Allen et al. (2022) used the information contained in China's firm-registration data to study ownership networks of 40 million firms for 1990–2017. They found that declarations of firm ownership mask the influence of the state on firms via indirect equity ownership. They propose to measure state ownership based on firm-to-firm equity investment relationships—thereby accounting for multiple ownership layers as when, for example, an SOE invests in a firm that subsequently invests in another firm.

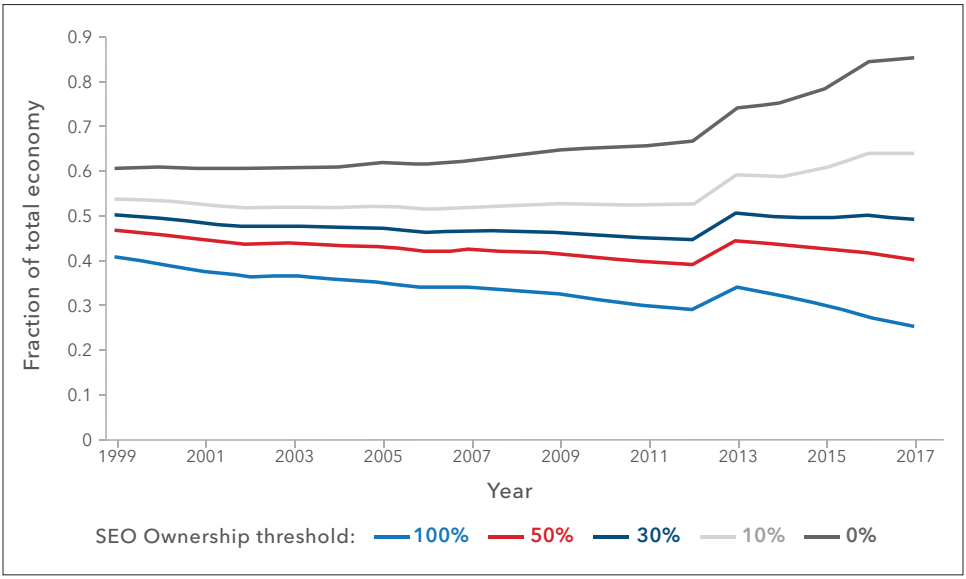
Figure 6, from Allen et al. (2022), summarizes their key findings. Panel A plots the proportion of the aggregated capital of all SOEs over total capital in the Chinese economy from 1999 to 2017, using different equity thresholds to define SOEs. For example, a threshold of 100 percent means that only firms owned entirely by the state are considered SOEs; a threshold of 0 percent means that firms with any positive state equity are considered SOEs, and so on. Allen et al. first trace the ownership trees of all SOEs that receive either direct or indirect investment from various government levels. They set multiple ownership thresholds (0 percent, 10 percent, 30 percent, 50 percent, and 100 percent) and then, for each threshold, calculate the proportion of total registered capital of all SOEs over total registered capital of all registered firms in China. The figure shows that when the ownership threshold is set at or above 30 percent, the total capital of all SOEs has been declining from 1999 to 2017, while for thresholds set below 30 percent, the total capital of all SOEs has been increasing.

Panel B plots the total capital of all SOEs and partial SOEs owned by various levels of government (central, provincial, and city) when the ownership threshold is set at zero (i.e., any presence of state capital qualifies a firm for SOE status). The figure shows that local-government investment in SOEs across the economy increased continuously from 1999 to 2017, while central-government investment declined.

The interpretation of the above findings is nuanced. If one uses the traditional definition of a controlling shareholder as one who owns more than 50 percent of a corporation's stock—or as the largest shareholder owning more than 25 percent of stock—then the state is not a controlling shareholder in most firms. Instead, the state seems to be investing more broadly over a larger share of Chinese firms. A low and mostly indirect state-equity presence does not necessarily imply state control or even state influence, at least not in normal times; but it does make state intervention more likely in unusual circumstances, as when, for example, regime stability or national security is at stake.[14]

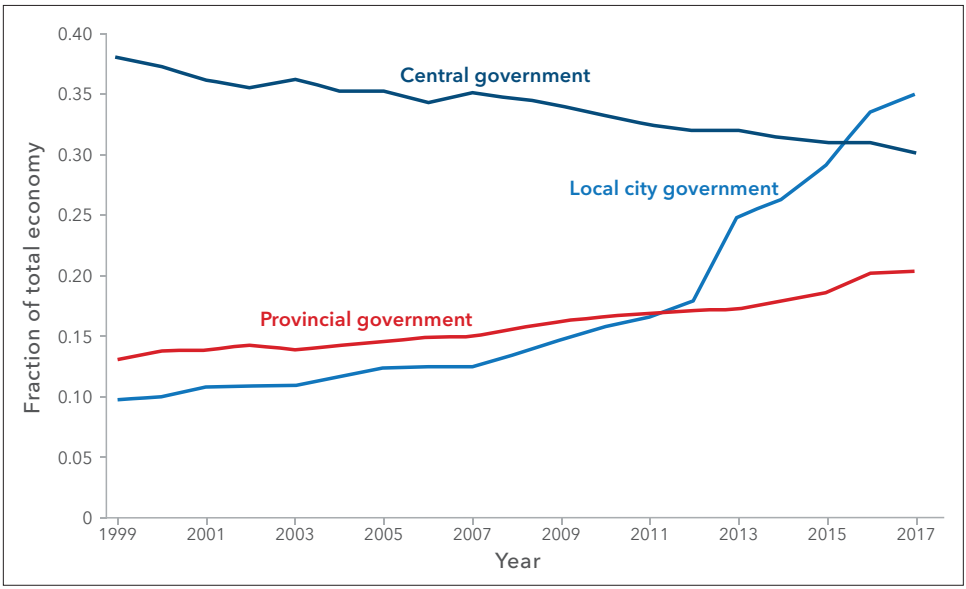
Figure 6. Presence of State Capital in the Chinese Economy

Panel A. Fraction of the Chinese economy occupied by SOEs, at different ownership thresholds



14 Bai et al. (2021) use the same firm-registration data to find that the largest privately owned firms have direct equity ties with state-owned firms; the next-largest privately owned firms have equity ties with privately owned firms that themselves have equity ties with state owners; and the smallest privately owned firms do not have any ties with state ownership. The network of "state-connected" private owners has expanded over the last two decades. The share of registered capital of "state-connected" private owners in China increased by almost 20 percentage points between 2000 and 2019.

Panel B. Fraction of the Chinese economy occupied by SOEs (0% ownership threshold), by government investment level



Source: Allen et al. (2022).

A second avenue for state control over private enterprise is political. According to the CCP constitution, any organization with three or more CCP members should establish a Party cell. While CCP cells have always been encouraged in the private sector, most companies were allowed to operate in an environment of benign neglect for the past few decades. In 2002, less than 27 percent of private companies contained a party cell. But by 2018, China's regulators made establishment of Party cells a requirement for any company to be listed on domestic stock exchanges. Around that time, Party cells within companies began advocating to their boards for greater say in corporate governance. China's top leaders have become increasingly explicit about their expectations for increased Party engagement in private companies, calling for CCP cells to better understand and interact with private companies and to help "improve their corporate governance structure" (Livingston 2021).

The third control approach has been the heightened regulation of private firms, which was notable in late 2020 and through the summer of 2021 (Naughton 2023). Under President Jiang, business elites such as Jack Ma (Alibaba), Pony Ma (Tencent), Xu Jiayin (Evergrand), and other top private businesspeople were celebrities and national champions who wielded enormous political influence as they forged strong

connections with powerful top officials in the Chinese government.[15] As described in detail in Naughton (2023), Chinese regulators in 2020 introduced tough new rules for Chinese real estate developers, known as the "three red lines," to rein in the highly indebted property-development sector and cool down the bubbly real estate sector.[16] This episode demonstrated a willingness to take a much tougher line with Chinese domestic businesses than had previously been evident. Then, on November 3, 2020, the IPO of Ant Financial was abruptly suspended following a speech by Alibaba chairman Jack Ma that criticized China's financial regulators for being too conservative. Table 1 summarizes the list of regulatory crackdowns on prominent private businesses in the summer of 2021.

Naughton notes that "there were regulatory rationales to nearly every facet of this crackdown." For example, Ant Financial was operating on the basis of a single license from the city of Chongqing, and several of its financial activities operated in gaps in the financial regulatory framework. Regulations against market power to limit competition and promote data security were also reasonable. However, these regulations were not rolled out with China's usual deliberation and were seen as arbitrary by many in selectively targeting certain sectors and firms, primarily private firms rather than SOEs. I argue below that concern for regime stability and internal security is likely a more plausible explanation for the sudden surge in regulation.

15 For a detailed discussion of this business-government fusion, see Hou 2019.

16 The "three red lines" stated that property owners should adhere to the following rules: (1) liabilities should not exceed 70 percent of assets (excluding advance proceeds from projects sold on contract); (2) net debt should not be greater than 100 percent equity; and (3) money reserves must be at least 100 percent of short-term debt.

Table 1. The Regulatory Storm: Major Milestones

Regulatory action began	Target company	Official rationale	Outcome
November 2020	Ant Financial (Fintech)	– Financial risk – Control of payments network	– IPO cancelled – Ongoing regulatory reform
April 2021	Alibaba (eCommerce)	Antitrust violations	– 2.8 billion USD fine – Ongoing antitrust campaign
July 2021	Didi Chuxing (Ridesharing)	Data security	– Suspension of downloads – Regulatory crackdown; massive losses
July 2021	New Oriental (Private education)	– Reduce social burdens – Social equity	– Abolish for-profit status – Limit weekend classes and foreign teachers and material
July 2021	Meituan (Food delivery)	Social equity	Guidelines for gig workers
August 2021	Tencent (eCommerce, gaming)	Social morality	Gaming targeted; outcomes uncertain

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Source: Naughton (2023).

Fourth, government procurement and subsidies are being increasingly used to wield influence over private firms. Governmental five-year plans have been a staple of China from its founding and are not conceptually different from strategic economic guidance issued by the US government. The difference is mainly in the implementation of such industrial plans, as the Chinese government can be more hands-on than its Western counterparts. Industrial policy remains a controversial topic; US analysts have often pointed toward "Made in China 2025" as an indication that the Chinese government may somehow be planning itself into technological advantage over the US in strategic industries (Naughton 2021).

I am generally skeptical of this view, as history has repeatedly taught us that no one, let alone bureaucrats, can predict technological revolutions. Academic research has repeatedly shown that industrial policy subsidies are likely to be exploited by entrepreneurs but often fail to yield results. For example, Chen et al. (2021; 2017) showed that when the Chinese government, to encourage innovation, gave tax incentives to firms whose R&D investment exceeded a designated threshold, many firms simply relabeled administrative expenditures as R&D in order to qualify. Branstetter, Li, and Ren (2022) found little evidence that the Chinese government has consistently picked winners when allocating subsidies; on the contrary, they found that firms' ex ante productivity correlated negatively with subsidy receipt.

These findings suggest that China's increasingly prescriptive industrial policies may have had limited success in promoting productivity; their more likely role has been to increase government influence over private firms. My personal view—shared by academics who have studied Japanese economic history—is that industrial policy may be effective when a country is trying to catch up, but it is unlikely to be effective when a country aims to lead the frontier.[17]

Finally, my own research (Fang et al. 2022) shows that President Xi Jinping's anti-corruption campaign may have also contributed to the resurgence of Chinese SOEs. Doing business with privately owned enterprises (POEs) has become stigmatized because POEs are more likely to be involved in bribery. Government officials, even and especially those who are still "clean," have strong incentives to avoid dealing with POEs in order to preserve their reputations and avoid investigation.

3.d. Recent Developments

Indeed, the Chinese economy has slowed down, with an anemic post-pandemic rebound. Domestic consumption following the lifting of the zero-COVID policy appeared in the service sector only; investment growth, particularly private investment, was also weak. The Chinese National Bureau of Statistics (NBS) reported strong year-to-year growth (8.9 percent) for the month of April 2023, but for May it reported 7.5 percent and 4.5 percent year-to-year declines for exports and imports respectively (National Bureau of Statistics of China 2023; Cheng and Tan 2023). The weakening private sector prompted the new government to reaffirm its support for private business (Baptista and Tian 2023). Confidence, a major driver of any long-term investment, is presently lacking. The official NBS Manufacturing Purchasing Manager Index (PMI)—analysts' most relied-upon measure of business confidence—unexpectedly fell to a five-month low of 48.8 in May of 2023 from 49.2 in April,

17 See Callon 1995.

missing market estimates of 49.4.[18] The latest PMI measure also pointed to the second straight month of contraction—when PMI drops below 50—in factory activity, amid weak domestic and global demand. The Chinese government's recent tendency to rapidly engineer policy U-turns hurts confidence and makes it more difficult for businesses to attract foreign investment.[19] In general, there is a sense that the CCP and the Chinese state have too much power over businesses and individuals to be able to credibly commit to staying "hands off" in the affairs of Chinese firms, whether state-owned or private. This perception is becoming a key barrier to the international-market expansion of Chinese firms like TikTok and Huawei.

The tension between national security and economic growth will ultimately shape China's domestic political economic environment. Recent reports of China's crackdown on overseas consulting firms—and the restriction of overseas research scholars' access to Chinese datasets (including commonly used Wind data on stocks and other business information)—suggest that this tension will continue in the foreseeable future. It is implausible to think that the Chinese government is unaware of the wider implications of the aforementioned foreign-investment measures.[20]

4. External Relationship with the US-Led West

4.a. How Did the US-China Relationship Go from Warm to Cold to Freezing?

Most analysts were puzzled by the drastic swings toward state intervention described in section 3. Some suggest that China has a long-run strategy to supplant the US as a superpower (e.g., Doshi 2021). I disagree; evidence suggests that the CCP was still very much committed to market-deepening reforms as of November 2013. But it is evident that the government's market interventions are casting longer shadows over the economy. I believe that these swings are driven by regime stability concerns and are, in part, responses to changes in the geopolitical environment, particularly China's worsening relationship with the US-led West since 2011. Anti-China rhetoric and actions in the form of trade, investment, and export restrictions accentuated the perceived external threat to the CCP. When real or perceived external threats from the West loom, CCP leadership try to "get the house in order," suppress any perceived internal threats, and take even more extreme action to maintain their own power. In this section, I describe how a benign relationship with the US-led

18 See Trading Economics, s.v. "China NBS Manufacturing PMI," May 2023, https://tradingeconomics.com/china/business-confidence.

19 See "China's Deepening Selloff Shows Investors Are Losing Confidence," Bloomberg News, April 25, 2023, https://www.bloomberg.com/news/articles/2023-04-25/china-s-deepening-selloff-shows-investors-are-losing-confidence?sref=nhO5Kxq6#xj4y7vzkg.

20 See, e.g., Weiss 2023a and 2023b.

West was responsible for the array of audacious market-oriented reforms and decentralization described in section 3.1, and how, as that relationship became more tense, the domestic political economic pendulum swung in the other direction.

From 1979 to 2008, the US and China were engaged and friendly. Occasional flare-ups (e.g., the sanctions that followed the 1989 student protests; and the May 1999 Belgrade embassy bombing incident) were dealt with diplomatically and did little damage to the long-term warm bilateral relationship. Today, however, the US-China relationship is at its lowest point in the last 40 years. The decline might have originated with the Global Financial Crisis, after which China called for reforms to increase the representation of emerging economies in international financial institutions and proposed alternatives to the US dollar as the primary global reserve currency. These efforts were perceived by the US as a challenge to the existing global order. After President Obama announced his "pivot to Asia" in 2011, President Xi advocated a more assertive foreign policy stance than Deng's "hide your shine and bide your time" policy. In late 2013, China began planning to establish an Asian Infrastructure Investment Bank (AIIB) as an alternative platform; the Obama administration declined an invitation to the US to join as a founding member.

The political stress that roiled the 2016 presidential election in part reflected the US electorate's skepticism of globalization. China watched the 2016 US election in horror and tried its best to calibrate its own response to US political developments, including President Trump's escalating trade wars. COVID-19 then disrupted global markets in 2020, and President Biden has continued the Trump administration's (demonstrably incoherent) China policy. Russia's invasion of Ukraine further heightened tensions. After the 2023 balloon incident and the cancellation of Secretary of State Anthony Blinken's planned visit to China, it was reported that the US and China did not talk for months. Jessica Weiss has warned that the "American approach could lock both countries into an escalatory spiral"—and tensions between the United States and China determine China's relationship with the world more broadly (Weiss 2023b).

4.b. Intertwining of Economic Relationships and National Security

The US-China economic relationship is now intertwined with national security concerns. The days of the "flat world," as articulated in Thomas L. Friedman's 2005 bestseller, are long gone, and the world is round again. In 2023, Treasury Secretary Janet Yellen said:

> Our economic approach to China has three principal objectives. *First, we will secure our national security interests and those of our allies and partners, and we will protect human rights.* We will clearly communicate to the PRC [People's Republic of China] our concerns about its behavior. And we will

> not hesitate to defend our vital interests. Even as our targeted actions may have economic impacts, they are motivated solely by our concerns about our security and values. Our goal is not to use these tools to gain competitive economic advantage.
>
> *Second, we seek a healthy economic relationship with China: one that fosters growth and innovation in both countries.* A growing China that plays by international rules is good for the United States and the world. Both countries can benefit from healthy competition in the economic sphere. But healthy economic competition—where both sides benefit—is only sustainable if that competition is fair. We will continue to partner with our allies to respond to China's unfair economic practices. And we will continue to make critical investments at home—while engaging with the world to advance our vision for an open, fair, and rules-based global economic order.
>
> *Third, we seek cooperation on the urgent global challenges of our day.* Since last year's meeting between Presidents Biden and Xi, both countries have agreed to enhance communication around the macroeconomy and cooperation on issues like climate and debt distress. But more needs to be done. We call on China to follow through on its promise to work with us on these issues—not as a favor to us, but out of our joint duty and obligation to the world. Tackling these issues together will also advance the national interests of both of our countries. (Yellen 2023, emphasis added)

Notice that national security interests are listed as the first principle in US economic engagement with China. Economic relationship and national security are now closely tied together—a tie that marks a significant departure from prior eras, in which countries could choose the US as their national-security ally while remaining close to China economically. The Trump administration initiated its trade war in 2018, citing the bilateral trade imbalance and accusations of intellectual property theft, but it quickly became clear that these policy aggressions were motivated by more than economic issues and that national security concerns on the US side were a much bigger factor than initially articulated publicly.

Figure 4 shows that China's overall trade was almost balanced around 2018, despite the country's large bilateral trade surplus with the US. In her speech, Secretary Yellen noted that "when necessary, we [the US] will take *narrowly targeted* [italics added] actions"; such actions may include export controls, restrictions on Chinese military entities' access to tech, or other sanctions to address cybersecurity threats and China's military-civil fusion. However, the reality is that national security concerns impact China much more broadly than simply by limiting Chinese military

access to advanced technologies; security concerns also significantly shape both countries' approaches to supply-chain security for food, energy, essential medical supplies, and rare earth minerals vital to the production of advanced technology and infrastructure. The US has pushed to move global supply chains out of China to the US or allied countries, though the impact of these changes is not yet clearly reflected in Chinese export statistics—as total bilateral trade between the US and China reached a historic high of $690.59 billion in 2022, up from $536.6 billion in 2012. Sadly, national security concerns are making both China and the US more inward-looking and protectionist.

Politicians in both parties try to one-up each other to stoke public fears and score political points. The urgent global challenges of the day—such as climate change, preventing the next global pandemic, or promoting development in the global South—are relegated to the back burner. Unfortunately, both countries are assuming the worst of each other.

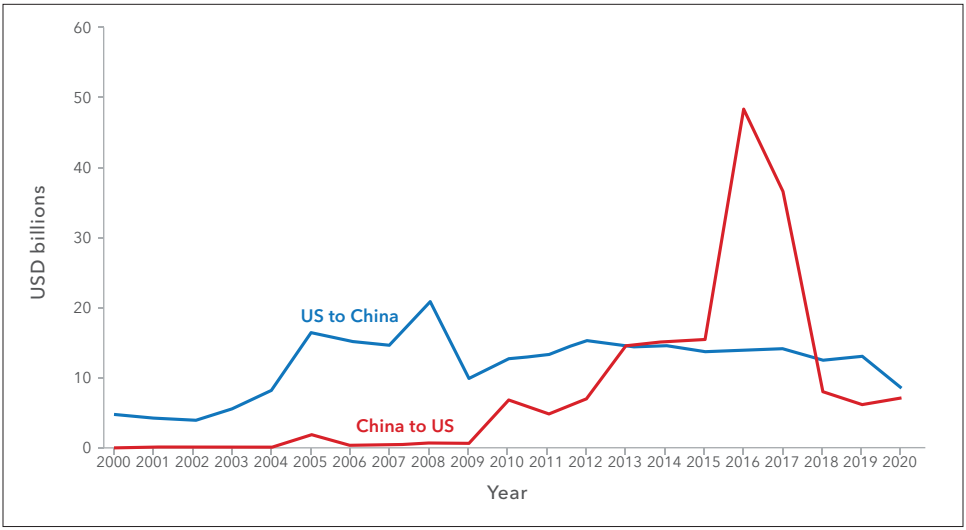
4.c. US Export Control and Investment Restrictions

Technological supremacy is the key to the US-China rivalry. At present, the US is the clear global technology leader; to protect its lead, the United States regulates the export of goods, technologies, and services that are considered sensitive or have potential military applications.

Several recent developments in this area are notable. In October 2022, the Bureau of Industry and Security (BIS) issued interim final rules significantly enhancing US export controls of advanced integrated circuit (IC) technology, related manufacturing products, and supercomputers whose destination or ultimate end use is China. The rules set new, stricter licensing requirements for a broad swath of items destined for China, and they greatly limit previously available license exceptions. That same month, the BIS issued another new rule with potentially even further-reaching implications: it restricts "US persons" from certain activities supporting the development or production of specified ICs in China.

The US government has also implemented restrictive review by the Committee on Foreign Investment in the United States (CFIUS) for any inbound investment from abroad to determine the effect of such transactions on US national security. The 2018 passage of the Foreign Investment Risk Review Modernization Act expanded CFIUS's jurisdiction and enhanced its authority. New US Treasury Department regulations target critical and emerging technologies and certain transactions involving Chinese investors.

Figure 7. Annual Value of Foreign Direct Investment Transactions between the US and China, 2000–2020



Source: Hanemann et al. (2021).

Figure 7, from Rhodium Group, shows a rapid rise in outbound foreign direct investment (FDI) from China to the United States, peaking at around 50 billion USD in 2016 before collapsing to less than 4 billion dollars in 2019 and 2020 (Hanemann et al. 2021). The total bilateral FDI between the US and China fell to $15.9 billion in 2020 amid pandemic-related disruptions and rising tensions in the US-China relationship. This point marked the lowest level for two-way flows since 2009.

In addition to existing CFIUS restrictions, the US government has recently moved toward developing a new "reverse CFIUS" process to give it the authority to screen and monitor outbound investment from the United States to "countries of concern"—most notably China—in order to review the flow of US capital that would directly support the use of critical technologies by China's military or civil sector.[21] The European Union may follow suit. A March 2023 joint statement from President Biden and European Commission president Ursula von der Leyen indicates that both parties "have a common interest in preventing our companies' capital, expertise, and knowledge from fueling technological advances that will enhance the military and intelligence capabilities of our strategic rivals, including through outbound investment" (Benson and Putnam 2023).

21 See President Biden's August 9, 2023 Executive Order on Addressing Unites States Investment in Certain National Security Technologies and Products in Countries of Concern: https://www.whitehouse.gov/briefing-room/presidential-actions/2023/08/09/executive-order-on-addressing-united-states-investments-in-certain-national-security-technologies-and-products-in-countries-of-concern/

China is now on the defensive, facing the barrage of US-led technological embargos. One of China's national champions, Huawei, had to give up its once-dominant cell phone production because of chip embargos imposed by the US. China is forced to be self-reliant or to turn to other countries, though the US has pressured its allies not to provide China with advanced technology. Such restrictions are complicated by the fact that China controls critical mineral production and production capacity for key goods such as electric vehicle batteries (Chang and Bradsher 2023). But the areas in which China can claim to be a leader are few.

4.d. The Future of RMB

Some may argue the relationship between the US (the incumbent power) and China (the rising power) was destined to deteriorate at some point, and some suspect that the immediate genesis of that deterioration may have been the global financial crisis and China's proposition of alternatives to the US dollar as the primary global reserve currency. Has the Chinese RMB made any progress toward becoming a reserve currency? Not much. According to the International Monetary Fund, only 2.8 percent of foreign reserves of all reporting countries were in RMB as of late 2022, a substantial increase from about 1 percent in 2016 but still far behind USD, EUR, JPY, and GBP levels. Even though the share of total foreign reserves in USD dropped from 65 percent to about 60 percent between 2016 and 2022, the USD is still the dominant reserve currency (Wei and Yue 2023).

Odds that the RMB will replace the USD as the dominant reserve currency are low. One of the biggest obstacles to such replacement is the RMB's lack of full convertibility into other currencies. The Chinese government stalled capital account convertibility reform, considering it advantageous to maintain some capital controls; these controls restrict the free flow of RMB in and out of the country. Another major obstacle is the limited depth and liquidity of RMB-denominated financial markets—a limitation that makes it difficult for investors to trade and hedge RMB-denominated assets. Third, the perception of political risk is also an important limiting factor, as the Chinese government's control over the economy and financial markets can make some investors and businesses perceive RMB as a risky currency to hold or use in international transactions. Finally, the relative newness of the RMB as an international currency means that some investors and businesses may not yet trust how the People's Bank of China (PBOC) manages its monetary policy.

China is aware that any major reserve currency requires full convertibility, and thus that the RMB, if it is to achieve such status, will require better tools and auxiliary institutions to deal with flighty capital and financial market volatility.

The RMB has had more success in becoming an international settlement currency. Many countries, including some of China's largest trading partners, have started to settle their trade transactions in RMB, and global financial institutions are increasingly offering RMB-denominated products and services. Cross-border trade settlement in RMB has expanded substantially from a minuscule level in 2009 to nearly 8 trillion RMB in 2021, accounting for about 20 percent of China's total external trade. China also established bilateral currency-swap agreements with 40 central banks or monetary authorities between 2009 and 2022, notionally totaling about 3 trillion RMB.

I believe that at best, the RMB will be a reserve currency in a subset of countries, if the global economy continues breaking into separate blocs. If, for some reason, the RMB does become a major international reserve currency, this development will likely not be due to China's own internationalization effort but rather to US abuse of the dollar's "exorbitant privilege"—as by over-sanctioning countries off the SWIFT system or setting its monetary policy at the expense of other economies.

5. Traditional Economic Factors

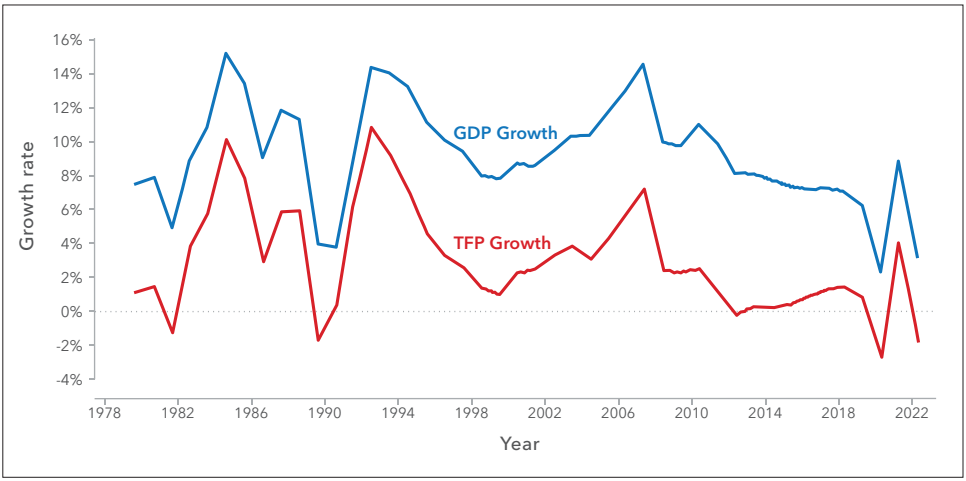
I have maintained that China's internal political economy and its relationship with the US-led West will be key to shaping the arc of the Chinese economy over the next 10 to 15 years. This is not to say that traditional economic factors are not important or that China does not face challenges in these areas—but if these were the nation's only challenges, China would be able to overcome them.[22]

5.a. Total Factor Productivity Growth

Total factor productivity (TFP) growth was the Chinese economy's main engine until 2007. Xiaodong Zhu calculated that, between 1990 and 2007, China's TFP grew at an average rate of 4.5 percent per year. This fast TFP growth contributed to GDP growth both directly and indirectly, by allowing capital to accumulate faster for the same rates of investment. His simulation results show clearly that TFP growth, not increases in investment rate or employment, was the main driver of China's GDP growth from 1990 to 2007.

22 For a book-length discussion of these challenges, see Dollar, Huang, and Yao 2020.

Figure 8. GDP and TFP Growth in China, 1978–2022



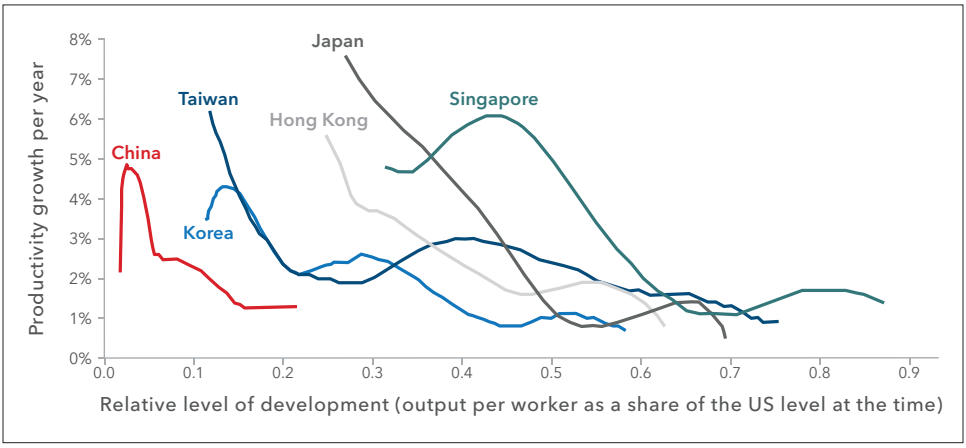
Source: Zhu (2023).

As shown in figure 8, which plots China's GDP and TFP growth rates between 1978 and 2022, episodes of accelerating GDP growth were invariably associated with rising TFP growth, and periods of growth slowdown are also periods of declining TFP growth. During the fast growth period of 1978–2007, China's TFP growth rate averaged more than 4 percent a year. In the last 15 years of growth slowdown, however, the TFP growth rate averaged only 1 percent (Zhu 2023).

Figure 8 also shows that the periods with the fastest TFP growth coincide with the rapid growth of town and village enterprises in the mid-1980s, the SOE reform in mid-1990s, and the explosion of Chinese foreign trade and inbound FDI following China's WTO entry in 2001. Since 2013, China's TFP growth rate has slowed significantly.

This finding is consistent with the view that the Chinese economic miracle is not a productivity miracle. Figure 9, from Rajah and Leng (2022), compares China's productivity performance to that of the East Asian miracle economies when each was at a comparable level of development relative to the United States. The figure reveals that, at comparable levels of development, Chinese productivity growth appears to have underperformed by a wide margin. China is not really a "miracle" economy when it comes to productivity. Instead, China's historically strong productivity performance appears more to reflect its low starting point, the deep inefficiencies plaguing its centrally planned economy, and the large catch-up dividends unleashed over the ensuing decades by gradual market-oriented reforms.

Figure 9. Evolutions of TFP Growth Rates for Selective Economies as a Function of Their Relative Per Capita GDP to the US



Source: Rajah and Leng (2022).

What sources may have contributed to China's rapid TFP growth before 2007, and what has caused its slowdown? Zhu (2023) and others have found that domestic reforms reducing barriers to internal trade and internal migration have had a significant positive impact on productivity growth. Bottom-up institutional change and market-based technological diffusion and innovation (aided by international trade), both spurred by economic reform and decentralization, were the driving forces behind China's impressive pre-2007 productivity growth—and they were spurred by economic reform and decentralization. Surprisingly, despite years of banking and financial market reforms, capital reallocation has had little or even negative impact on China's productivity growth. The contribution to the growth of export expansion per se following China's accession to the WTO has also been limited.

After 2007, probably due to the long shadow cast by the 4 trillion RMB stimulus and the Chinese government's slow shift away from the bottom-up approach (with a greater emphasis on top-level policy design and mobilization of national resources), China's TFP growth stalled at just about 1 percent per annum (Bai, Hsieh, and Song 2016).[23] The shift to centralization has resulted in fewer policy reforms and institutional changes initiated from below; various top-down industrial policies aimed at boosting China's technological capabilities have not achieved the desired results. Some authors also find that internal trade costs increased slightly after 2007 (Hao et al. 2020).

23 See also Huang, Pagano, and Panizza (forthcoming).

What possible sources might restart the engine of TFP growth? First and foremost would be reforms to improve the efficiency of resource allocation or reallocation. Zhu and others find that capital reallocation contribution to China's TFP growth has been minor until now. Chinese banks tend to favor SOEs, which are less efficient than private firms and have very low return on investment (see below); small and medium enterprises (SMEs) face serious credit constraints. Deepening the reform of capital markets and exploiting big-data financial technology to reduce borrowing costs for SMEs without collateral will enhance the efficiency of capital allocation and increase economic dynamism (see, e.g., Frost et al. 2019).

A second potential source of TFP growth is to lower barriers to labor and capital mobility across regions. The main barriers to labor mobility are the *hukou* system and the lack of market reforms for rural land, which also lower productivity (see Ngai, Pissarides, and Wang 2017; 2018). There is also growing evidence in China of local protectionism. Facing strong incentives to get promoted, local government officials often limit capital investment from their own region to others' (see Fang, Li, and Wu 2022). Cross-regional investment could lead to technological diffusion across regions and become an important source of overall TFP growth. Figure 5 shows large development heterogeneity across Chinese provinces. Revitalizing the northeastern provinces (Liaoning, Jilin, and Heilongjiang), formerly China's industrial heartland, could spur productivity growth.

Since 2007, China has favored a whole-nation, top-down approach to innovation. This approach has not been effective.

Indigenous innovation will have to play a more important role, as the prospect of technological decoupling with the US-led West becomes more likely. Since 2007, China has favored a whole-nation, top-down approach to innovation. This approach has not been effective. Reforming the innovation and entrepreneurship ecosystem to encourage bottom-up innovation is key to the vitality of the Chinese economy.

5.*b. Declining Labor Force and Aging Population*

China's aging population results from increasing life expectancy and declining fertility rates. The two forces pose different challenges, have different policy implications, and call for different policy responses.

Between 1970 and 2020, life expectancy at birth increased by 21.1 years—and, happily, most of that increase is in *healthy* life expectancy. At the same time, total fertility in China has declined: between 2019 and 2022 alone, the birth rate per 1000 people dropped from 10.41 to 6.77, and the number of women of childbearing age

(ages 15–49) fell by more than four million. National fertility survey data suggest that women still childless in 2017 intend to have fewer children (1.60, as compared to a population-wide figure of 1.76), indicating room for a further decline. Moreover, according to official statistics, in 2022 China's total population declined by 850,000 for the first time since the Great Chinese Famine of 1958–1961. Correspondingly, China's workforce peaked in 2014–2015 with about 801 million workers and has been declining ever since. In 2021, the workforce declined to 780 million. The decline in workforce is expected to continue over the next 10 to 15 years, barring reforms to the retirement age or, less likely, large-scale immigration. This forecast has caused significant concern among Chinese analysts.

For three reasons, I believe that workforce decline is unlikely to be a major drag on Chinese economic growth, particularly per capita GDP growth.[24] First, there is an important distinction between *quantity* and *quality* of labor force. The current generation of retirees, born in the 1950s and 1960s, tends to have low levels of human capital and thus to have been among the least productive workers, while younger cohorts are much better educated. Thus, lower-skilled retirees are being replaced by relatively fewer but much better-skilled young workers. The quality of labor partially offsets the decline in numbers, enabling Chinese economic growth to remain strong. [25]

Second, China has a lower retirement age, either 50 or 55 for women and 60 for men, than any other OECD country. If strong opposition to raising the retirement age can be overcome, a well-designed reform of the pension system, together with job redesigns and a transition to a more service-oriented economy, can facilitate bringing near-retirees back to the workforce.

Third, we are on the cusp of a fourth Industrial Revolution due to automation and artificial intelligence. The impact of aging can be partially solved by the adoption of a range of labor-replacing technologies, including robotics and AI (see Acemoglu and Restrepo 2017). Indeed, China is the country with the largest number of industrial robots already, though the robot density in China is still lower than that in Korea and Japan.

The other implication of rising life expectancy and declining fertility is the fiscal pressure on China's pay-as-you-go pension system. This concern is more serious. Without policy responses, the rising elderly population will create challenges to funding health care, pensions, and long-term care, especially as China transitions

24 Indeed, recent official news that Chinese youth (ages 16–24) unemployment hit 20.8 percent in May 2023—a historic high—suggests that the size of the labor force per se is unlikely the binding factor for China's economic growth. See Cheng 2023.

25 This claim is consistent with cross-country evidence presented in Acemoglu and Restrepo 2017.

from its traditional family-based care system. The question is, who will pay for the retirement of the Chinese elderly? Here it is important to differentiate the urban and rural elderly. Urban households have accumulated a lot of wealth over the last 40 years, with housing now accounting for more than 70 percent of Chinese household wealth. This housing wealth needs to be tapped to pay for the elderly's health care, long-term care, and other needs. Introducing reverse-mortgage products that account for the specific concerns of Chinese households is an idea worth exploring for urban elderly.[26]

Few if any pro-natal policies have proven to be effective in raising fertility, and 80 percent of Chinese women say their main reason for not wanting to have more children is the expense of raising them. This news is actually good, as it suggests that higher fertility rates may be achievable if the cost of raising children declines to a more reasonable level.

I would also urge the Chinese government to invest resources in rural education to improve the human capital of millions of rural children (see Rozelle and Hell 2022). The quantity-quality tradeoff previously mentioned should be leveraged in any strategy to soften the negative impact of declining fertility.

5.c. *Investment-Driven vs. Consumption-Driven Growth*

There is intense debate within China about whether the future of Chinese economic growth should be driven by consumption or investment. This is not the right way to frame the debate. Economic growth ultimately comes from TFP and factor input growth. Some investments contribute to TFP growth, while others contribute to capital growth. Consumption, however, makes growth sustainable, since what is produced must be consumed, invested, or exported.

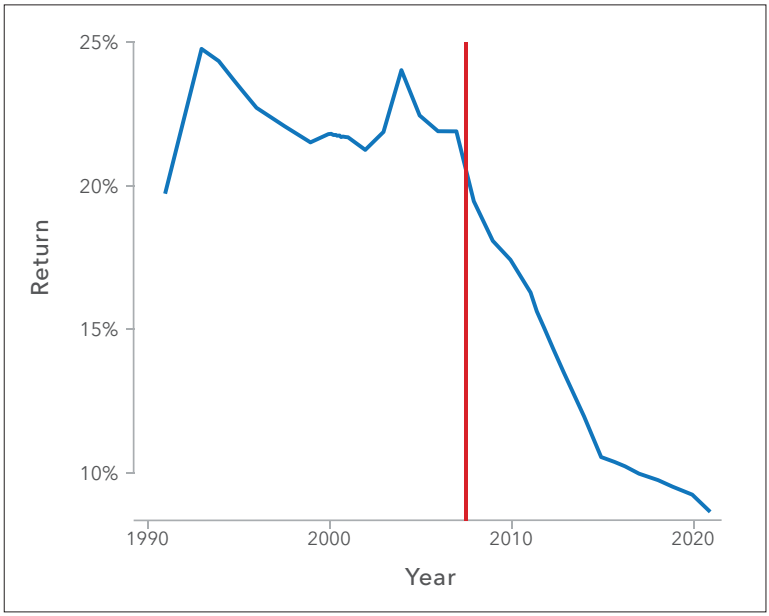
My view is that current debt-financed investment, which has been targeted at infrastructure and housing, will not continue to drive future economic growth.

My view is that current debt-financed investment, which has been targeted at infrastructure and housing, will not continue to drive future economic growth. However, I agree with Justin Lin that investment focusing on innovation, new production capacity, and human capital—including health—must be part of future sources of growth for the Chinese economy. At the same time, domestic consumption as a share of GDP must increase, as it is no longer plausible to expect Chinese export growth to make up for weak domestic consumption.[27]

26 For a reverse-mortgage product design with "Chinese characteristics," see Fang, Hanewald, Bateman, and Wu 2020.

27 For a discussion of risk in the Chinese real estate sector, see Xiong 2023.

Figure 10. Annual Return to Capital (%), 1990–2021



Source: Song (2023).

Figure 10, from Michael Song (2023), plots the annual return to capital estimated for the period 1990 to 2021. It shows rapid decline since 2008, when the 4 trillion RMB stimulus was implemented. Low returns to capital are signs of wasteful investment. The return to capital was stable and consistently above 20 percent before 2008, despite high investment rates; however, after 2008, the return to capital dropped by half and got lower over time. The main culprit, Song points out, is that the local governments became drivers of investment after 2008. Before 2008, Chinese local governments were not allowed to borrow; but the 4 trillion RMB stimulus allowed local governments to borrow via local government financing vehicles. Local governments became creative at engineering financial products that allowed them to binge-borrow and invest, crowding out private-sector investment. After 2008, aggregate financing for the real economy over GDP rose from about 100 percent to about 300 percent. However, the rise of the debt ratio was mostly driven by the government bond/GDP ratio, which increased from 34 percent in 2017 to 50 percent in 2022, while the corporate bond/GDP ratio remained roughly constant.

Why is private investment weak? I think the key is confidence about the future. Government investment can be directed, while private investment must be induced by positive expected returns.

The investment boom was necessary to absorb the weak external demand for Chinese goods following the global financial crisis (see figure 5). Exports as a share of GDP steadily declined after China's share of global exports reached 15 percent in 2006. Given the current populist anti-globalization backlash in developed countries and growing protectionism against Chinese exports in major markets, export-led growth is not sustainable. As a matter of accounting, that leaves investment and consumption to pick up the slack to balance supply and demand. There is no conflict between investment and consumption; they can complement each other if investment increases productivity, which can raise wages and consumption.

China's consumption as a percentage of GDP has grown rapidly since 2010, when its household consumption was just 34 percent of the GDP. Despite now having the second-largest retail market in the world behind the US, China's domestic consumption is still weak. In 2019, China's consumption as a share of GDP was 55 percent in 2019, with household consumption less than 40 percent of GDP. China's household consumption ratio in 201, at 34 percent, was among the lowest in the world, compared with 68 percent in the United States, 60 percent in India, 49 percent in South Korea, and the OECD average of 60 percent (see Wang 2023: 149, fig. 8.3).

Increasing household consumption is necessary for the future of Chinese economic growth. China can do a lot to boost domestic consumption, including (1) increasing the labor-income share in the primary distribution of national product, and (2) redistributing income through tax and transfer schemes. China's income tax and social transfer systems are overall regressive and have no wealth tax; this state of affairs helped push China's Gini coefficient even higher than the US's (see Jain-Chandra et al. 2018). To achieve the stated goal of "common prosperity," China should provide large income transfers to low-income households and strengthen the social safety net, especially for rural households; doing so will lower household savings rates and boost domestic consumption.[28]

Real estate and infrastructure investment have been a major source of Chinese economic growth over the last two decades. Real estate clearly will no longer be a key engine. Candidates to take its place include renewable energy, green building and infrastructure retrofitting, electric vehicles, and pollution remediation, given China's ambitious national goal of achieving carbon neutrality by 2060. Health care and elder care will have to grow rapidly to care for an increasingly silver population. Finally, food security has a new meaning in the face of climate change, and I expect that climate-adaptable agriculture, including new seeds that can adapt to new soil and climate, will have huge growth potential.

28 See Huang 2023 for a different perspective on common prosperity.

6. Conclusion

In this brief, I have stipulated that China's greatest economic challenges come not in the form of traditional factors—such as a slowdown of TFP growth and a shrinking labor force—but, rather, in the form of domestic political economy challenges and the external geopolitical environment, specifically its relationship with the US-led West.

Where China and its economy go from here will largely be determined by rising geopolitical tension, especially worsening US–China relations. This tension will negatively impact China's access to the international market for exports, to technology and advanced intermediate inputs, and to foreign investment. The US is pressuring its allies to decouple from China. The direct impacts on the Chinese economy of these adverse actions will be compounded by heightened uncertainty about the prospects of future Chinese economic growth, which are likely to weaken confidence and business investment in general. These tensions are also causing enormous damage to the US economy, but they are unlikely to ease anytime soon.

Is a limited decoupling between the US and China inevitable? The Biden administration's 2023 ban on the sale of American technology, including 4G chips, to Huawei effectively forced China to prepare for a complete technological decoupling from the US (Sevastopulo and Hille 2023). China does not have a choice in the matter. Whether the decoupling will also include other areas of trade or finance is not clear, and much depends on whether the US adjusts its China policy in the coming years. But it would be naïve to underestimate China's resolve to chart its own course of development in the face of a hostile external environment.

Technology embargos, trade tariffs, and investment restrictions will slow down China's growth, but the greater risk of damage from geopolitical tension is, in my view, the impact it might have on the course of China's domestic political economy and economic policy. Will China stay the course and undertake further market-deepening reforms to improve the allocative efficiency of its economy, open to the world, and improve the lives of Chinese citizens? Or will it become more inward-looking, more nationalistic, and more centralized as a response to external threats? Will China continue to demonstrate its pragmaticism, as it did in the 1970s and after 1989 as it navigated much tougher external and internal environments? Finally, will its system be robust enough to correct for errors and adjust course if necessary? No one knows the answers yet.

There are openings for China and the US to repair their damaged relationship. Plenty of global challenges call for China, the US, and the rest of the world to work together, whether to combat climate change, end the Russia-Ukraine War, or prevent the next global pandemic. But I am pessimistic that these openings will be exploited in the near future.

Where the Chinese economy is headed has enormous implications for US businesses, investors, and policymakers. China is already the world's second-largest retail market with a consumption/GDP share of just over 50 percent; even a 2 or 3 percent economic growth rate would account for 15 to 20 percent of global growth. Investors will want to have Chinese firms in their portfolios to benefit from this higher growth. American policymakers will need to collaborate and coordinate with their Chinese counterparts when the next financial crisis hits. The geopolitical tension between the US and China puts all these possibilities at risk.

I hesitate to estimate China's growth rate over the next 10 to 15 years. If—and it's a big "if"—China focuses on its internal market-deepening reforms, thereby increasing its TFP growth rate to 4 percent annually, then the Chinese economy as a whole could grow by 6 percent annually. This would be the best-case scenario. If China instead stops its market-oriented reform in favor of centralized decision-making, top-down planned resource allocation, and marginalizing private businesses, then TFP and economic growth could grind to zero. China, the US, and the world would all suffer as a result.

Again, in between the best- and worst-case scenarios, much depends on whether the US and China can adjust their bilateral relationship. One needs to be realistic instead of engaging in wishful thinking. But we can hope. Jessica Weiss (2023), whom I quoted earlier, said it best:

> There is no doubt that China—whatever its trajectory—poses a huge and complex policy challenge for America. But exaggerating fears of an "existential struggle" increases the likelihood of conflict, crowds out efforts to tackle shared challenges like climate change, and creates a with-us-or-against-us framing that could alienate the United States from allies and much of the world. Worse, reflexively maneuvering to outcompete or thwart China only validates hard-liners in Beijing who believe that America is implacably hostile and that the only response lies in undermining the United States. By continuing on that road, the world's two most powerful countries may end up turning each other into the enemies that they fear.

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The Aspen Economic Strategy Group (AESG), a program of the Aspen Institute, is composed of a diverse, bipartisan group of distinguished leaders and thinkers with the goal of promoting evidence-based solutions to significant US economic challenges. Co-chaired by Henry M. Paulson, Jr. and Timothy F. Geithner, the AESG fosters the exchange of economic policy ideas and seeks to clarify the lines of debate on emerging economic issues while promoting bipartisan relationship-building among current and future generations of policy leaders in Washington.

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