

# The Reporter

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## *The Fiscal Future*

N. Gregory Mankiw<sup>1</sup>

17th Annual Martin Feldstein Lecture, 2025



It is a great honor and delight to deliver this year's Feldstein Lecture. I was never one of Marty's students—I was educated not at Harvard, but at Princeton and MIT. Yet Marty nonetheless had a profound influence on my life and career.

As a freshman at Princeton in 1977, I took introductory microeconomics from the superb teacher Harvey Rosen, who later hired me to be his research assistant. Harvey was a recent PhD student of Marty's, so even though I did not know it at the time, I entered the economics profession as Marty's grandstudent.

Four years later, as a first-year

student in MIT's PhD program, I took a couple of courses from a promising, young assistant professor named Larry Summers, making me Marty's grandstudent yet again. Then, in the summer of 1982, when President Reagan nominated Marty to chair the Council of Economic Advisers, I got a call from Marty—this was the first time we spoke. On Larry's recommendation, Marty offered me a job on the Council staff. I quickly accepted and spent the academic year 1982–83 in Washington.

I worked for Marty a second time in 1985, after joining the Harvard faculty. Marty was then the head of Ec 10, Harvard's full-year introductory course in economics. At the time, it was standard practice for new assistant professors to teach a section of Ec 10. Many assistant professors disliked the assignment, and the practice was soon abandoned. But I loved it. By covering the basics of micro and macro over the course of a year, Ec 10 served as a great reminder of why I fell in love with economics in the first place.

Years later, when I sat down to write my introductory textbook, Marty's approach to the subject was firmly planted in my brain. In many ways, I wrote the book that Marty would have written if he had ever taken the time to do so.

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After my book was published in 1997, I was delighted that Marty's Ec 10 was among the first courses to adopt it.

### The Problem Ahead

The topic I would like to talk about today was close to Marty's heart: the stance of fiscal policy and the path of government debt. Throughout his career, Marty advocated for greater saving, both private and public. As President Reagan's chief economist, he warned about the adverse effects of large budget deficits, much to the chagrin of some other Reagan administration officials. If he were here with us today, I have no doubt that he would be concerned about the fiscal path the United States is now on.

Some years ago, *The Wall Street Journal* ran a cartoon that goes to the essence of the matter. A small child is coming home after getting off a school bus. As he opens the door to his house, he shouts to his parents, "What's this I hear about you adults mortgaging my future?"

I like this cartoon not because it's funny (it's not, really) but because it succinctly summarizes the economics of government debt. Courses in macroeconomics examine how government debt affects interest rates, capital accumulation, trade deficits,

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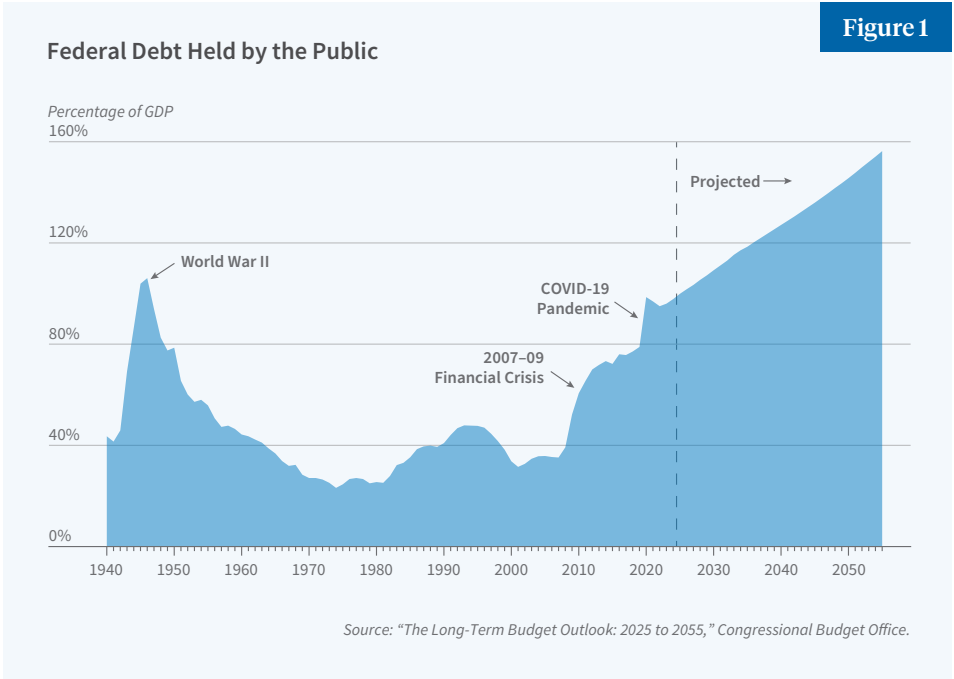
and so on. But the starting point for all that analysis is a transfer of income between generations. In their personal capacity, parents cannot choose to live beyond their means and leave negative bequests to their children. As voters and citizens, however, parents can do exactly that, and Americans are now doing so in a big way.

Historically, large changes in the debt-to-GDP ratio follow a simple pattern. The debt typically spikes upward during crises, such as major wars, deep economic downturns, or the COVID-19 pandemic. Then, when normalcy returns, the debt-to-GDP ratio gradually declines. This approach seems reasonable. Debt-financed spending during crises makes sense because it both provides some stabilization of aggregate demand and prevents large, temporary tax increases when spending needs are extraordinary. The policy also ensures that the cost of crises is shared among current and future generations.

The situation we now face differs substantially from this historical pattern. For those who follow economic policy debates, it is all too familiar. After massive budget deficits during the Great Recession of 2008–09 and the COVID-19 pandemic of 2020–21, the government debt as a percentage of GDP is near the historic high reached at the end of World War II. By itself, that is not necessarily alarming. In the few decades after 1945, the country managed to significantly reduce debt relative to income through a combination of economic growth, some inflation, and fiscal prudence.

But the trajectory ahead of us is not so benign. According to the 2025 projections of the Congressional Budget Office (CBO), the debt-to-GDP ratio will, under current law, continue to rise over the next three decades and reach 156 percent in 2055. There is, moreover, no end in sight to this increasing indebtedness.

Even more worrisome, this projection is optimistic. It assumes that the US economy will experience normal economic growth without a crisis like a major war, a deep recession, or another pandemic, which would push debt



even higher. And it does not account for the so-called “Big Beautiful Bill” that President Trump just signed into law, which will steepen the ascent of government debt.

Herbert Stein once wisely said that “if something cannot go on forever, it will stop.” And I have no doubt that this path of a rising debt-to-GDP ratio will stop at some point. The open questions are how and when it will stop. That is what I would like to discuss with you today.

There are only five ways to stop this upward trajectory. They are (1) extraordinary economic growth, (2) government default, (3) large-scale money creation, (4) substantial cuts in government spending, and (5) large tax increases. I would encourage you to try to assign probabilities to these possible outcomes. Individually, each of these outcomes seems highly unlikely. But the probabilities you assign must sum to at least one. I say “at least” because more than one of these outcomes could occur.

Let’s consider each of these possibilities in turn.

Possibility 1: Extraordinary Growth

We begin with extraordinary economic growth. That would surely be the

most benign of the possible outcomes. When the CBO makes its debt projections, it assumes future productivity will grow at about the rate we have experienced historically. Is it possible that we are entering a new golden age of more rapid growth due to new technologies like artificial intelligence and advances in biotechnology?

Yes, it’s possible. For example, the money manager Cathie Wood, CEO of ARK Invest, has suggested that because of these new developments, economic growth will soon accelerate from the 3 percent historical average to 6 to 8 percent going forward.<sup>2</sup> Some people call this possibility the “technological singularity.”

My first thought when hearing such projections is, “that’s nuts.” Over the past few decades, we have seen the internet revolutionize how people work and lead their lives, yet economic growth has not been extraordinary. The effects of today’s nascent technologies will likely be similar: life-changing but not so transformative as to establish an entirely new growth path. In reaching this conclusion, I have been influenced—perhaps too much so—by the work of Robert Gordon on the rise and fall of American growth and Nicholas Bloom et al. on the hypothesis that ideas are getting harder to find.<sup>3,4</sup> I hope I’m wrong and Cathie Wood is right, but I wouldn’t bet on it. It would

surely be imprudent for fiscal policy-makers to assume that rapid growth will come to their rescue.

Possibility 2: Government Default

The next possibility is that the government will default on its debts. For many people, such an event seems inconceivable. US government bonds are often considered among the safest of assets. But that view is, I believe, much too sanguine.

History offers many examples of sovereign default. Spain defaulted more than a dozen times between 1500 and 1800. More recently, we have seen defaults in Russia in 1998, Greece in 2015, Venezuela in 2017, and Argentina in 2001, 2014, and 2020.

The United States is not immune to the political and economic forces that can make default an attractive option. Recall that Alexander Hamilton, the first Secretary of the Treasury, argued forcefully and successfully against default on Revolutionary War debts. But other prominent figures at the time opposed Hamilton’s plans and were more open to the possibility of partial default. James Madison thought that speculators, who had purchased the debt from the original lenders at a deep discount, should not be rewarded with full repayment.

More importantly, the United States, in fact, once defaulted on its debt. As Sebastian Edwards discusses in his brilliant book *American Default*, many US bonds in the 1930s had gold clauses that ensured their value in gold bullion.<sup>5</sup> When President Franklin Roosevelt decided to pull the nation off the gold standard, he recognized how expensive these gold clauses would be. So, he decided to abrogate them. Not surprisingly, the decision to unilaterally rewrite these bond contracts led to a court battle that went all the way to the Supreme Court. In a 5–4 vote, the court sided with Roosevelt. In the midst of the Great Depression, that outcome may have been desirable. But without doubt, it was a partial default, as the title of Edwards’s book suggests.



You might naturally ask, What about today? Might any modern-day president ever entertain the possibility of default? Here is Donald Trump back in 2016 when he was initially a candidate for president and a journalist asked him about how he would handle the government debt.<sup>6</sup>

“I’m the king of debt. I’m great with debt. Nobody knows debt better than me. I’ve made a fortune by using debt, and if things don’t work out, I renegotiate the debt. I mean, that’s a smart thing, not a stupid thing.”

“How do you renegotiate the debt?” the journalist asked.

“You go back and you say, hey guess what, the economy crashed. I’m going to give you back half.”

If President Trump’s second term has proved anything, it is that he is willing to expand the Overton Window (the range of policies and arguments deemed acceptable in political discourse). Remember this exchange the next time someone says that a default on US government debt is unimaginable.

Possibility 3: Large-Scale Money Creation

It is sometimes said that a nation with debt denominated in its own currency never needs to default because it can always print money to repay its creditors. That’s true, but I don’t find the thought nearly as reassuring as some who advance it.

We have lots of historical experience with what happens when central banks use monetary expansion to finance reckless fiscal policy. The German hyperinflation of the 1920s is the most famous example. More recently, a similar story played out in Zimbabwe. From 2006 to 2009, the typical unit of currency in the country went from 50 Zimbabwe dollars to 100 trillion Zimbabwe dollars. And even the Z\$100 trillion notes were soon worthless. I recall seeing a picture from the time taken in a Zimbabwe restroom cautioning people not to use the toilets to flush newspapers, cardboard, or Zim dollars. It is a well-known theorem of monetary



economics that when people must be told not to flush their cash down the toilet, monetary policy is not optimal.

Such hyperinflation is, of course, a form of default in the sense that bond holders are paid back in worthless currency. But it is an especially destructive way to default. High inflation wreaks havoc throughout the economy. Given the choice, it may be better for a government to default explicitly rather than embark on an implicit default in the form of hyperinflation.

Nonetheless, hyperinflations occur when fiscal policymakers don’t want to come to grips with their own folly and monetary policymakers are too weak to resist the pressures from fiscal policy. Such a regime, sometimes called “fiscal dominance,” doesn’t always lead to hyperinflation like that in Germany and Zimbabwe. There are more moderate cases, such as the 75 percent annual inflation that Turkey has experienced in recent years. That outcome is better than hyperinflation, but it is hardly desirable.

It is worth noting that Donald Trump has made clear that he believes the president should have more authority over monetary policy—an idea most economists reject. Last month, Mr. Trump even publicly mused about appointing himself to the Fed. And he has consistently pushed for more expan-

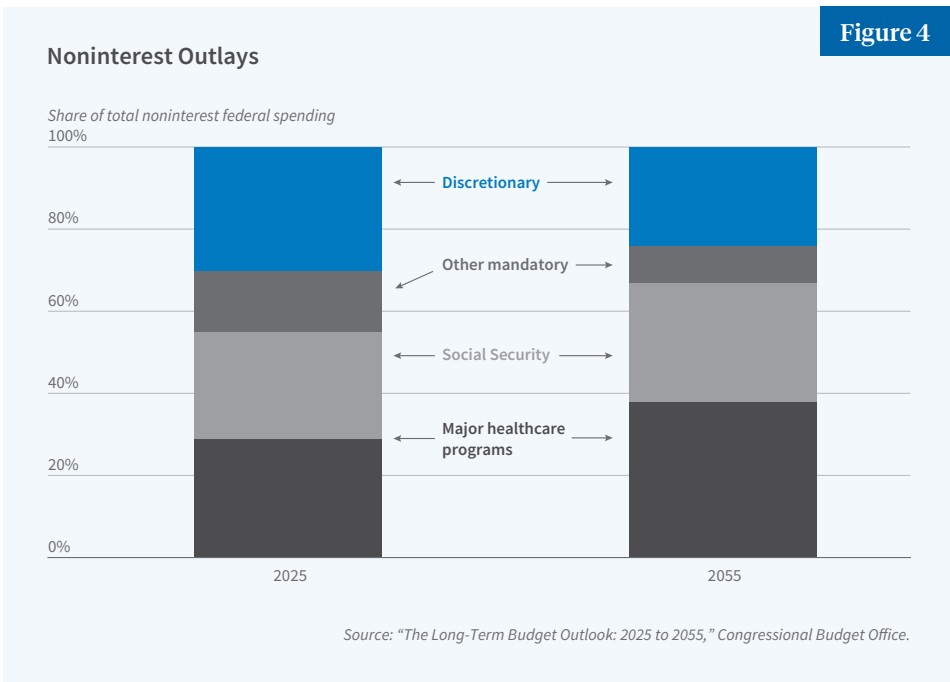
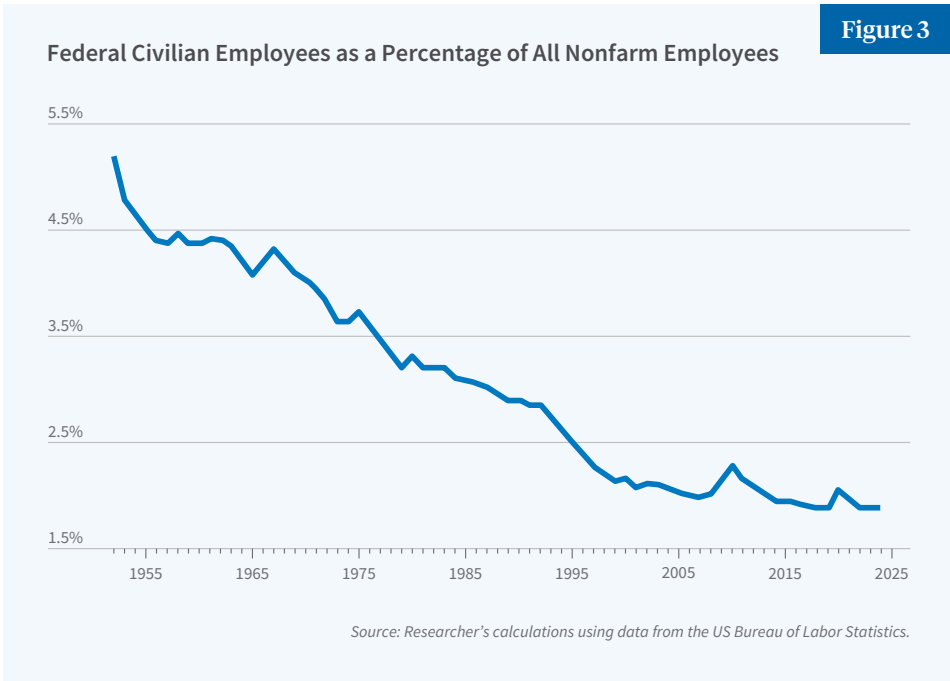
sionary monetary policy. Over the next several years, the conflict between fiscal and monetary policymakers could well become a defining event. It is unclear whether future Federal Reserves will have the fortitude to stand up to a demanding and belligerent president. So, I wouldn’t rule out the high-inflation scenario.

Possibility 4: Substantial Spending Cuts

The next way to put fiscal policy on a sustainable path is to enact a substantial cut in government spending. Many people favor this alternative, at least until they consider the details of what it means.

President Trump began his second term by empowering Elon Musk and the newly created Department of Government Efficiency (DOGE). That initiative has led to one of the largest reductions in the federal workforce in US history. I am personally troubled by the chaotic approach that DOGE has taken. It seems to be following the famous Silicon Valley injunction, coined by Mark Zuckerberg, to “move fast and break things.” This mantra may work for a startup, but it’s not the right approach to running one of the world’s largest and most important governments.

Regardless of one’s views of the



DOGE downsizing initiative, there was always reason to believe that its impact on the overall budget would be limited. The compensation of civilian government employees makes up only about 4 percent of the federal budget. Moreover, contrary to some people’s perceptions, the size of the federal workforce is not bloated by historical standards. Federal civilian employees made up about 4.5 percent of the economy’s total nonfarm employment in the 1950s. Today, it’s under 2 percent.

When thinking about the federal budget, it is best to recall a quip from

Peter Fisher, a Treasury official in the George W. Bush administration, who once called the federal government “an insurance company with an army.” Defense spending constitutes about 13 percent of the federal budget. More than half of federal spending is on Social Security and health programs. That percentage has risen over time and is projected to continue rising in the years to come as more of the baby boom generation retires and starts drawing benefits.

Enacting large cuts in these entitlement programs is politically treacher-

ous. When Paul Ryan was Speaker of the House, he endorsed some modest cuts in these programs. In response, the opposition party ran television ads showing an actor who resembled Ryan pushing a grandmother in a wheelchair off a cliff. My sense is that this ad campaign was largely successful. That explains why President Trump has said throughout his political career, including as recently as February 2025, that Social Security and Medicare benefits are not going to be touched, other than to investigate fraud.

All this leads me to conclude that in light of what Americans expect from their government, substantial spending cuts are probably out of the question.

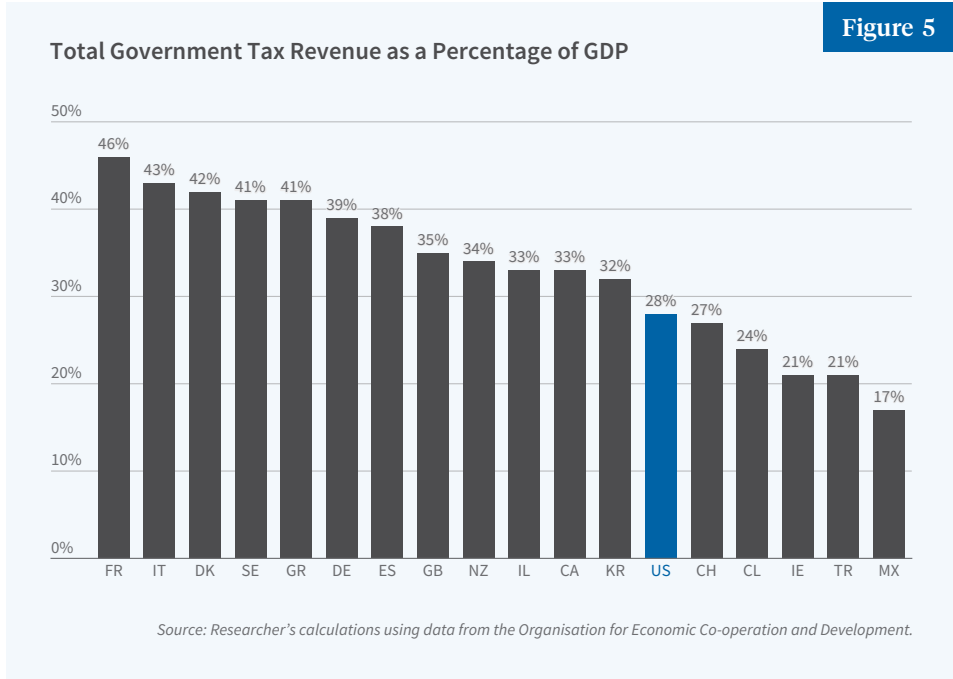
Possibility 5: Large Tax Hikes

This brings me to the last way that the United States might respond to its unsustainable fiscal trajectory: raising taxes. I view this as the most likely outcome in the long run, for two reasons.

First, each of the first four ways out of this problem—extraordinary growth, government default, high inflation, or massive spending cuts—seems either implausible or unacceptable. We might well get some of these, but we won’t get enough of them to put fiscal policy on a sustainable path.

Second, the United States is now a low-tax country compared with its peers. In most aspects of life, regression toward the mean is a strong and pervasive force, and this context could be no different. According to OECD data (for 2022), governments at all levels in the United States collect only about 28 percent of GDP in tax revenue, compared with 35 percent in the United Kingdom, 41 percent in Sweden, 43 percent in Italy, and 46 percent in France. The OECD average is 34 percent.

A natural question is how much US taxes must increase to close the impending fiscal gap. Larry Kotlikoff looks at the present value of the infinite future of spending and taxes and estimates a gap of about 7 percent of GDP.<sup>7</sup> My own rough calculation suggests a somewhat smaller number. The CBO estimates that the primary



deficit will average 2 percent of GDP over the next 30 years.<sup>8</sup> Add to that about 1 percent of GDP for the Big Beautiful Bill that was just signed into law. And assuming the interest on government debt exceeds the growth rate by 1 percentage point, add another 1 percent of GDP to service the existing debt (roughly 100 percent of GDP) and stabilize the debt-to-GDP ratio. That yields a fiscal gap of roughly 4 percent of GDP.

This gives us some sense of the magnitude of the task ahead. To close a fiscal gap of 4 percent of GDP with only increased revenue, the United States would need to raise overall tax revenue by about 14 percent. That is a huge tax hike, but it would bring us only about halfway toward the level of taxation that prevails in the United Kingdom. US taxes would remain below the OECD average and well below the levels in France, Italy, and Sweden. From a strictly economic standpoint, that is entirely feasible.

To be sure, most European nations use their higher tax revenue to pay for public services that Americans often finance privately. The most significant example is healthcare. If the United States were to both close its fiscal gap and provide universal healthcare, a much larger tax increase would be required, bringing the US tax burden close to the levels in countries like It-

aly and Sweden. In this sense, the future of fiscal policy is intertwined with the future of health policy. But for now, let's set aside the possibility of major reform of the US healthcare system.

The big question is whether a tax hike large enough to close the fiscal gap is politically possible. I am reminded of an old chestnut about Washington politics. It has been said that the United States has two political parties—the stupid party and the evil party. Sometimes, the two parties get together and do something that is both stupid and evil. They call that bipartisanship.

In that vein, there is now a bipartisan consensus about a central tenet of tax policy. The Republicans don't want to raise taxes on anyone (except universities with large endowments). The Democrats want to raise taxes only on the richest 1 percent. So, the two parties essentially agree that 99 percent of Americans should not have to endure higher taxes. This bipartisan consensus is the roadblock between where we are and where we need to go.

If a sizable tax increase is inevitable, as I believe it is, we must look beyond the top 1 percent of the income distribution. Typical high-income taxpayers living in places like New York or California (where many reside) are already taxed very heavily. Adding together

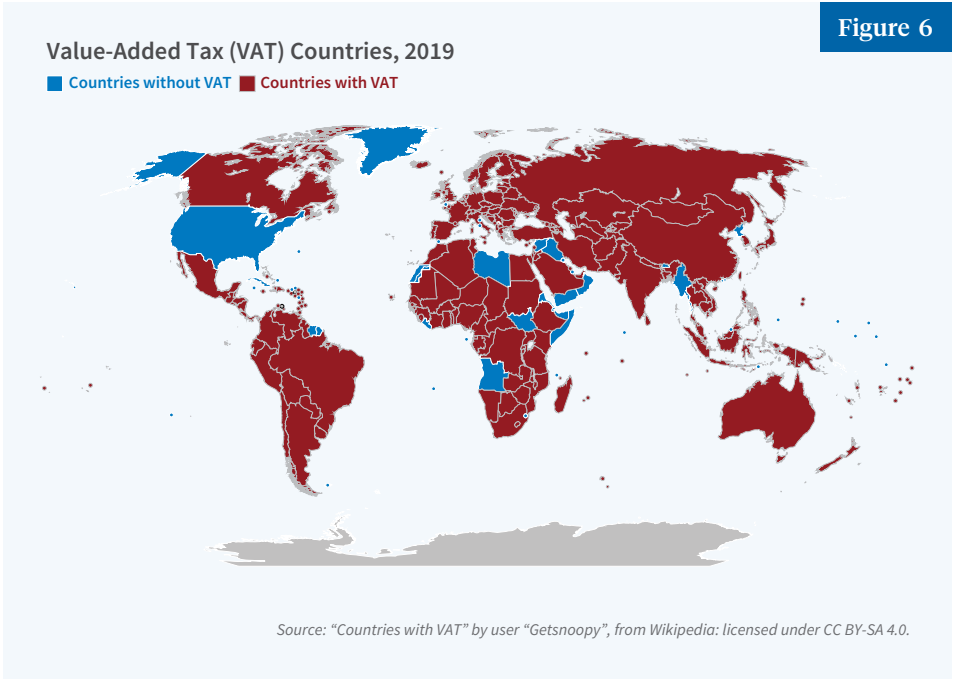
federal income taxes, state income taxes, payroll taxes, and sales taxes, the marginal tax rate on the ordinary income of the highest earners is about 55 percent. Of course, some loopholes that benefit the richest Americans are natural targets for reform. Examples include the taxation of carried interest, the treatment of capital gains in opportunity-zone investments and qualified small business stock, and the Section 199A deduction for certain pass-through businesses. But we shouldn't expect to get 4 percent of GDP in additional revenue just from those at the top of the income pyramid. Attempting to do so would be highly inefficient given the high marginal rates most of them already face.

It is probably not even feasible to raise enough revenue from this small group. According to my back-of-the-envelope calculations, increasing the marginal tax rate on the richest 1 percent by 15 percentage points (so the top rate goes from 55 to 70 percent) would raise only about a quarter of the revenue needed. And this calculation assumes, optimistically and unrealistically, that people won't change their behavior in response to higher tax rates. In practice, increasing taxes on only the most affluent would raise much less revenue. That's why closing the fiscal gap will require broadly shared sacrifice.

### For a Solution, Look Abroad

The natural candidate is a value-added tax (VAT). Most nations around the world have value-added taxes, and these taxes have shown themselves to be remarkably efficient. Among OECD countries, VAT revenues average about 7 percent of GDP, which is more than enough to close the US fiscal gap. One virtue of a VAT is that it taxes consumption rather than income. My reading of the vast literature on optimal taxation is that consumption is the better tax base because taxing it does not distort the margin between consumption today and consumption in the future.<sup>9</sup>

A VAT would, however, increase the distortion at the labor-leisure margin. But absent lump-sum taxes, that



can't be avoided if the government is to raise more revenue. Ed Prescott suggested that higher tax rates in Europe are the main reason that Europeans work less than Americans—a view I find plausible.<sup>10</sup> Yet others have proposed other explanations for the high level of European leisure. Alberto Alesina, Ed Glaeser, and Bruce Sacerdote emphasize the role of unions, and Olivier Blanchard says that there are different preferences on the two sides of the Atlantic.<sup>11,12</sup> If the United States ever institutes a sizable VAT, it will provide a natural experiment to test Prescott's hypothesis. If he is right and Americans start working less, we'll need a somewhat larger tax increase than I have estimated.

As of now, there is no obvious support among our nation's political leaders for a VAT. But the idea is not completely beyond the pale. Back in 2009, Nancy Pelosi briefly floated the idea when she was Speaker of the House, though no legislation was ever introduced.<sup>13</sup> And in 2016, when Paul Ryan was Speaker of the House, he advocated for a destination-based cash flow tax, based on work by Alan Auerbach and Michael Devereux, which in some ways resembles a VAT.<sup>14,15</sup>

At times, I have even wondered whether Donald Trump's unconventional views on economics might lead him to favor a VAT, though not for the

reasons I would advance. He has argued that the value-added taxes of other nations are a trade barrier like a tariff. That's not true, of course. Back in 1989, Marty Feldstein and Paul Krugman wrote a paper debunking this common fallacy—and they weren't the first to do so.<sup>16</sup> Put simply, a VAT is trade neutral because it applies equally to imports and domestically produced goods.<sup>17</sup> Nonetheless, Mr. Trump's misunderstanding, together with his affection for tariffs, might make him open to a US VAT.

For a VAT proposal to make its way through Congress and onto the president's desk, the minds of many politicians would need to change. In an ideal, well-functioning democracy, a blue-ribbon commission would study the unyielding budget arithmetic, offer a menu of realistic solutions, and convince voters that there are no easy choices. Once the voters were persuaded, our elected leaders would quickly follow.

In the democracy we have, the path to fiscal reform could well be less deliberate and more painful. Change might occur only when the bond market loses faith in American political institutions. If one day the bond vigilantes wake up and start viewing the United States as a large version of Greece or Argentina, they will stop buying US debt at normal rates of interest. Congress will have no

choice but to face the music, regardless of the political consequences.

### The Day of Reckoning

So how soon might this day of reckoning arrive? Back in 2011, I wrote about these issues in *The New York Times*.<sup>18</sup> The article took the form of a presidential speech that might be given during a future debt crisis. The United States was about to accept a bailout from the International Monetary Fund, whose headquarters had relocated to Beijing. The conditions for the bailout consisted of substantial and painful cuts in government spending together with higher taxes on all but the poorest Americans.

I set the date for this hypothetical speech 15 years in the future—that is, in 2026. That date was somewhat arbitrary. Like many economists at the time, I saw that US fiscal policy was unsustainable, but I did not see any evidence that the bond market was about to hold policymakers' feet to the fire. So 15 years seemed a reasonable guess.

Soon after the *Times* published the article, I received an email from Alice Rivlin, the great policy economist and founding director of the CBO. She wrote, "Great piece in the NYT on the Debt. But I doubt the market will give us 15 years. Maybe 5?"

With the benefit of hindsight, we can say that Alice was wrong. Fourteen years have now passed without a US debt crisis. As Rudi Dornbusch famously remarked, "In economics, things take longer to happen than you think they will, and then happen faster than you thought they could." Ernest Hemingway made a similar point. In his novel *The Sun Also Rises*, a character is asked how he went bankrupt. He replied, "Two ways. Gradually and then suddenly."

I wouldn't be shocked if the United States continued along the path of a gradually rising debt-to-GDP ratio for another 15 years. But I also wouldn't be shocked if the bond vigilantes suddenly attack much sooner. Cracks in the fiscal foundation have already started to appear. In May of this year,



Moody’s downgraded US government debt below AAA status, citing large deficits and rising interest costs. Now, none of the major credit rating agencies gives US debt its top rating.

A Concluding Thought

I began this lecture with a cartoon. Let me conclude with another, one of my favorites from *The New Yorker*. It takes place in the Oval Office, with the president’s advisers huddling around the Resolute Desk. They tell him, “Our deficit-reduction plan is simple, but it will require a great deal of money.”

This is the situation we now confront. Putting the federal government on a sustainable path is, from a purely economic standpoint, relatively simple. If a random group of NBER research associates could be appointed as a committee of monarchs, they could solve the problem in a long weekend.

In the real world, the solution must come from our elected representatives, who know that any solution will impose significant pain on the current generation of voters. For most politicians, getting reelected is their highest priority. Enacting good policy is farther down the list. It is possible, perhaps even likely, that a solution won’t come until the financial markets leave policymakers with no other choice. That scenario would be unpleasant for nearly everyone.

But if Marty Feldstein were here with us today, he would likely give us reason to be more optimistic. His copious body of op-eds—many written with Kate—was premised on the conviction that a better-educated public would embrace a more rational economic policy. Perhaps that can occur this time. The United States experienced substantial declines in

government debt relative to GDP, without major economic disruptions, from 1790 to 1830, from 1870 to 1910, and from 1945 to 1975. Maybe the fiscal future will indeed be so benign. I don’t yet see the path from here to there through the political thicket, but I hope it is out there somewhere, ready to be found.

<sup>1</sup> I am grateful to Larry Ball, Alan Blinder, Charlie Covic, Karen Dynan, Doug Elmendorf, Deborah Mankiw, and Jane Tufts for helpful comments. [Return to Text](#)

<sup>2</sup> “[The Journey from Monetary Shock to an Innovation-Led Economic Boom](#),” Wood C. ARK Invest Market Commentary, March 7, 2024. [Return to Text](#)

<sup>3</sup> *The Rise and Fall of American Growth: The US Standard of Living since the Civil War*, Gordon RJ. Princeton University Press, 2016. [Return to Text](#)

<sup>4</sup> “[Are Ideas Getting Harder to Find?](#)” Bloom N, Jones CI, Van Reenen J, Webb M. *American Economic Review* 110(4), April 2020, pp. 1104–1144. [Return to Text](#)

<sup>5</sup> *American Default: The Untold Story of FDR, the Supreme Court, and the Battle over Gold*, Edwards S. Princeton University Press, 2018. [Return to Text](#)

<sup>6</sup> “[Trump: ‘I’m the King of Debt’](#),” Nelson L. POLITICO, June 22, 2016. [Return to Text](#)

<sup>7</sup> “[Fiscal Child Abuse](#),” Kotlikoff L. Economic Matters by Laurence Kotlikoff, May 27, 2025. [Return to Text](#)

<sup>8</sup> “[The Long-Term Budget Outlook: 2025 to 2055](#),” Congressional Budget Office, March 27, 2025. [Return to Text](#)

<sup>9</sup> “[Optimal Taxation in Theory and Practice](#),” Mankiw NG, Weinzierl

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<sup>10</sup> “[Why Do Americans Work So Much More Than Europeans?](#)” Prescott EC. *Federal Reserve Bank of Minneapolis Quarterly Review* 28(1), July 2004, pp. 2–13. [Return to Text](#)

<sup>11</sup> “[Work and Leisure in the US and Europe: Why So Different?](#)” Alesina AF, Glaeser EL, Sacerdote B. *NBER Macroeconomic Annual* 2005 20, April 2006, pp. 1–64. [Return to Text](#)

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Global Value Chains: A Firm Level Approach

Pol Antràs, Teresa C. Fort, and Felix Tintelnot

Global value chains have come under severe scrutiny in the past few years. Pandemic-era shortages, geopolitical concerns, and new industrial strategies have all revived an old worry: have firms become too dependent on a handful of foreign suppliers and assembly hubs? Should governments use policy tools such as tariffs or subsidies to promote domestic manufacturing employment and capabilities?

The heart of this debate centers around a firm’s decisions about whether and how to participate in global value chains: which countries will supply its components, where should it open assembly plants, and what foreign markets shall it enter to sell its goods?

Our research starts from the premise that the right unit of analysis for understanding this system is not the country or the industry, but the firm. Over the past decade we have studied the firm’s problem from several angles, guided by confidential US firm-level data and by a simple economic mechanism: fixed costs paid at the level of the firm-country pair generate economies of scope that knit together activities that conventional models often examine in isolation.

The Global Sourcing Decision

Our research agenda initially focused on firms’ global input-sourcing decision and emphasized that the ability to import from foreign markets is constrained by the need to incur nontrivial upfront fixed costs to find suitable suppliers, build distributional networks, and understand the institutional aspects of the source country.<sup>1</sup> Although fixed costs also feature prominently in workhorse models of exporting, the canonical firm-level export model assumes that a firm’s decision to serve a given market, say France, has no bearing on its decision to sell in a different market, say Japan, because exporting is assumed to leave marginal costs unchanged. Importing is different precisely because it is motivated by the firm’s desire to reduce its

marginal cost of production.

As a result, the combination of fixed costs and marginal-cost-reducing benefits from importing induces interdependencies in a firm’s sourcing strategy. Moreover, when comparing countries in terms of how expensive it is to find suppliers, or in other aspects that shape the fixed costs to source from them, against the marginal-cost benefits once such fixed costs have been incurred, there is no clear ranking of countries in terms of their overall input-sourcing appeal. Indeed, using 2007 US import data, we find that countries’ import ranks based on the number of US manufacturing importers differ from their ranks based on the amount of imports by those manufacturing firms. For instance, China might offer the most marginal-cost savings in terms of lower-price inputs, but it may require a higher fixed cost to find a reliable supplier in China relative to other countries.

Our multicountry model of global sourcing shows that whether sourcing decisions are complements or substitutes depends on a simple parametric condition: if demand is relatively elastic and input productivity differences across countries are sufficiently dispersed, then sourcing from one country raises the marginal return to sourcing from another. In this case, optimal sourcing decisions follow a strict hierarchy in which more productive firms source from more countries. These complementarities also amplify existing productivity differences: high-productivity firms disproportionately expand their sourcing networks and grow larger, increasing the skewness in the firm size distribution. In our work, we also develop an iterative algorithm to solve the firm-level extensive margin of sourcing, which, in our framework, is a combinatorial problem of dimensionality two times the number of countries under consideration.

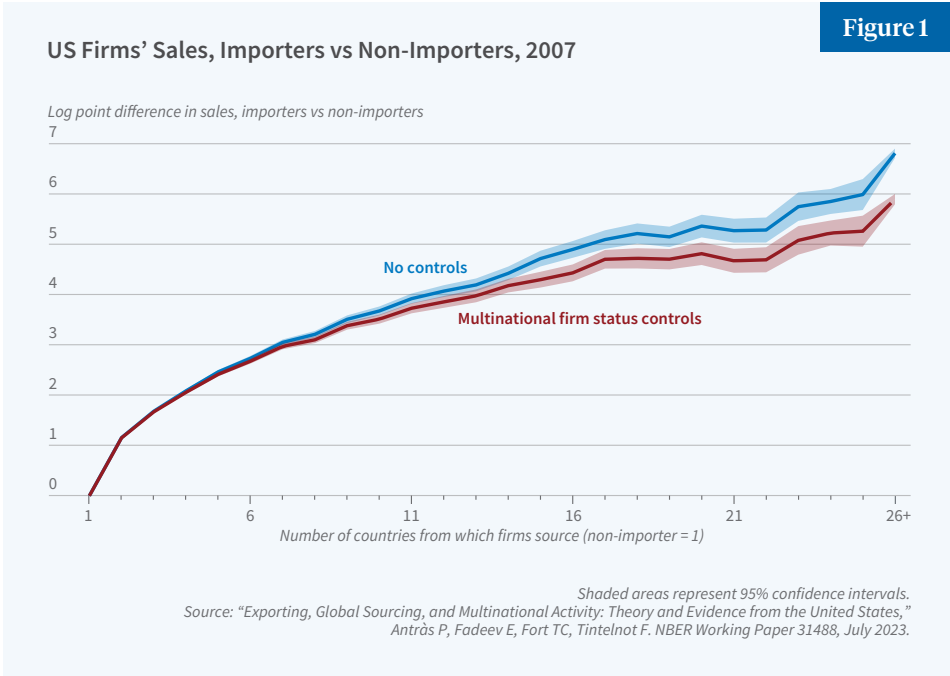
We provide empirical evidence that US firms’ sourcing decisions are indeed complementary using plausibly exogenous variation in sourcing costs

due to China’s 2001 accession to the World Trade Organization. Firms that increased their sourcing from China in response to the shock also increased their imports from other countries, including the US. These results stand in sharp contrast to the assumptions in much of the current policy debate, in which the presumption seems to be that input countries are substitutes for each other so that raising the cost to source from one country will induce firms to source more from others.

Our model implies that new tariffs on US imports from China will raise US manufacturing firms’ costs and reduce aggregate productivity in the sector. Although domestic manufacturing employment will rise, it will do so in smaller, less productive firms and entail higher prices and lower welfare for US consumers.

Our microlevel dataset unveils additional interesting facts. The data show a strong, monotonic relationship between firm size and the number of countries from which a firm sources. In 2007, US firms that imported from one country were, on average, more than twice the size of non-importers; those importing from 13 countries were four log points larger, and those sourcing from 25 or more countries were over six log points larger (see Figure 1). This size gradient can be interpreted as supporting the relevance of fixed costs of importing, which naturally limit the profitability of importing for relatively small firms. But this pattern also supports the complementarity forces in our framework: more productive firms can more easily amortize the cost of operating in multiple countries, which reduces their marginal costs, and thus endogenously grow larger.

Furthermore, we find that, in 2007, US firms typically sourced each ten-digit product from just one country. The observed patterns, which anticipated the current debates about the lack of diversification and resiliency of global value chains, are again consistent with the existence of sizable fixed costs paid at the firm-country level.



**Number of Source Countries per Imported Product**

	Mean countries per product	Median countries per product	Maximum countries per product
Mean of firms	1.11	1.00	1.61
Median of firms	1.03	1.00	1.00
95th percentile of firms	1.78	1.00	4.00

Table reports on the number of countries from which a firm imports the same HS10 product.  
Source: "The Margins of Global Sourcing: Theory and Evidence from US Firms," Antràs P, Fort TC, Tintelnot F. NBER Working Paper 20772, July 2016, and American Economic Review 107(9), September 2017, pp. 2514–2564.

Firms did not concentrate their sourcing locations because they were naïve: it is simply costly for them to diversify. Recent changes in policy uncertainty and other supply disruptions have increased the benefits of supply chain diversification. We estimate that fixed costs are large and vary systematically with observable features such as distance, common language, or institutional quality.

## Complementary Margins and the Rise of Multinationals

The complementarities we document in firms' sourcing patterns demonstrate the importance of combining theory and data to analyze how policy will affect global production patterns. Although canonical models of

foreign direct investment (FDI) tend to predict that exporting and FDI are substitutes for each other—a firm may

**Multinational Enterprises in US Manufacturing**

	Number of firms	Employment (% total)	Sales (% total)	US imports (% total)	US exports (% total)
Non-MNE manufacturing	242,000	10%	9%	9%	12%
US affiliates of foreign-based manufacturing MNEs	2,200	3%	10%	26%	21%
US-based manufacturing MNEs	1,550	10%	19%	32%	46%
MNEs/total manufacturing	1.5%	57%	76%	87%	85%

Source: "Exporting, Global Sourcing, and Multinational Activity: Theory and Evidence from the United States," Antràs P, Fadeev E, Fort TC, Tintelnot F. NBER Working Paper 31488, July 2023.

serve a particular foreign market either by opening an assembly plant there or by exporting—we consider the possibility that such decisions might instead be complementary. More generally, we develop a framework in which US firm-level decisions to open foreign production plants could interact with their US import and export decisions. To guide our theory, we construct a comprehensive new dataset that links Census production records, transaction-level trade data, and the universe of outward-FDI filings for the year 2007.<sup>2</sup>

The new data reveal a systematic relationship between the countries from which US firms import, the markets to which they export, and their foreign manufacturing locations. Not only are US multinational enterprises (MNEs) more likely to trade with countries in which they have affiliates, they are also more likely to trade with countries that are proximate to their foreign manufacturing plants. These results point to further complementarities across firms' global sourcing, production, and marketing decisions. Instead of substituting for domestic production, US multinationals' US plants are more likely to export to foreign markets that are proximate (in terms of distance and free trade agreements) to their foreign assembly plants.

Our merged dataset also highlights the sheer dominance of multinational firms in US trade. There were around 1,550 US MNEs that manufactured in

the United States in 2007 and 2,200 US affiliates of foreign-based manufacturing firms. Despite comprising only 1.5 percent of US manufacturers, these MNEs operating in the US accounted for 57 percent of manufacturing employment, 76 percent of sales by manufacturers, 87 percent of manufacturers' imports, and 85 percent of their exports (see Table 2).

We also show that traders' well-known size premia relate to their foreign production decisions. Figure 1 shows that the size premium associated with importing from more markets is lower when controlling for a firm's MNE status. Similarly, firm size increases with the number of markets to which firms export, but less so when controlling for MNE status. Finally, US MNEs' considerable US size premia increase with the number of countries in which they manufacture. These patterns are suggestive of the quantitative importance of fixed costs of importing, exporting, and foreign assembly, and they also hint at the possibility that plants belonging to MNEs face lower fixed costs to import or export.

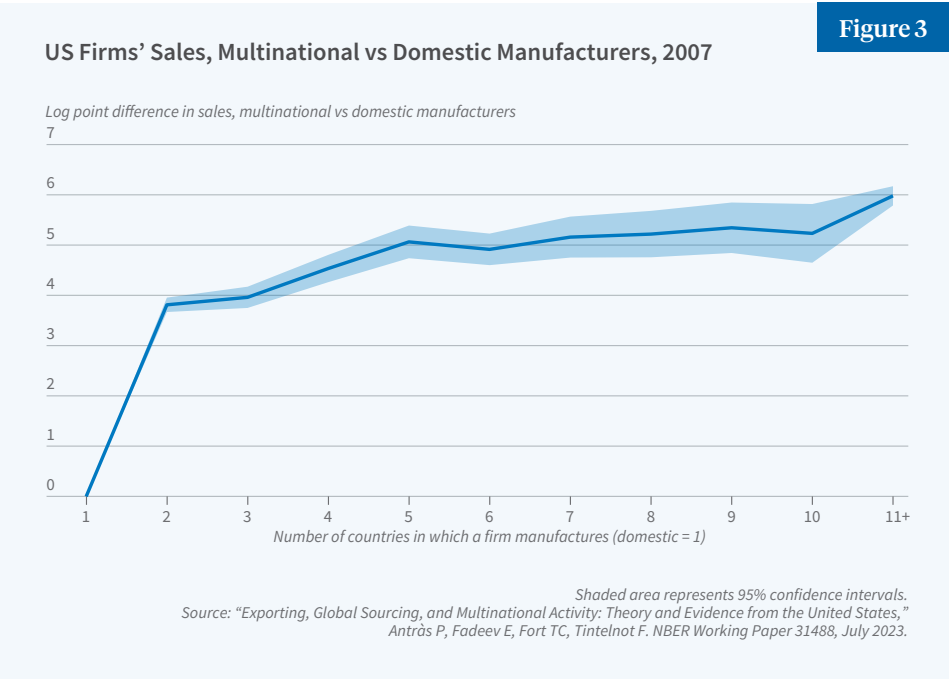
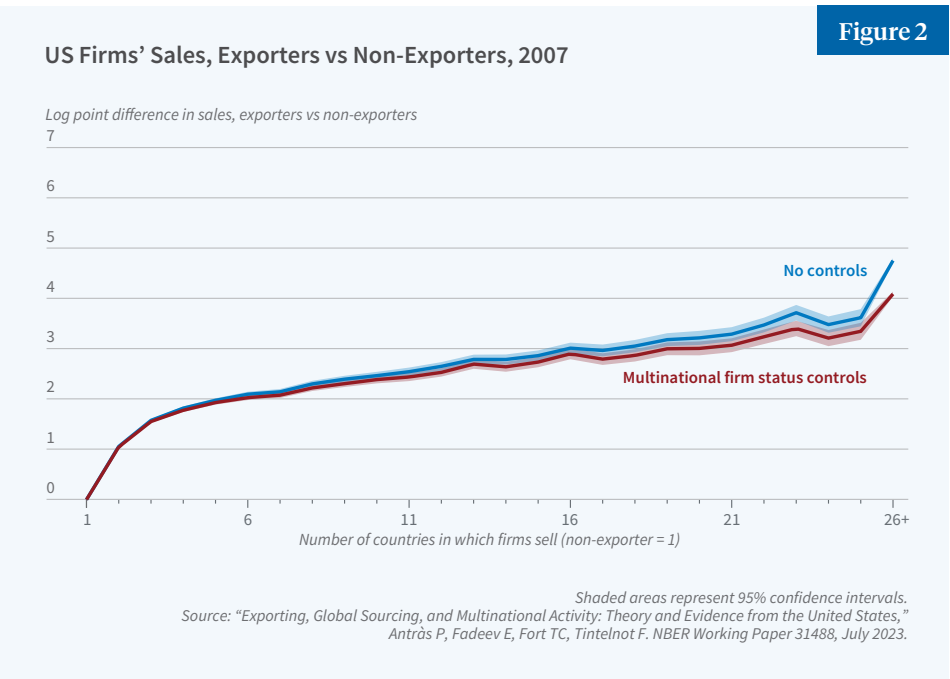
We provide a theoretical rationale for why multinational firms are more likely to trade with countries that are proximate to their affiliates, drawing on a new source of firm-level scale economies. In our model, heterogeneous firms choose where to produce, where to sell, and the countries from which to source inputs. To sell in a particular country, a firm must incur a country-specific marketing fixed cost that is shared across all of the firm's plants. Once the firm pays the cost to enter a destination market, any of its plants may serve that market. Similarly, once the firm pays the fixed cost to source from a given country, all of its plants can access suppliers there. These firm-level fixed costs imply that the marginal benefit of activating a destination or input market rises with the number of plants the firm operates—particularly when that market is proximate, as it faces lower bilateral trade costs.

The model introduces new complementarities between FDI and trade that carry distinct implications for policy. To illustrate these implications,

we examine a partial-equilibrium example in which firms in one country (the United States) respond to a trade agreement between two others (North and South). While traditional models predict that such liberalization diverts trade away from the United States, we show that US exports and imports may instead increase due to new FDI. The agreement raises the profitability of investing in North or South, making US firms more likely to open plants there. These new plants, in turn, increase the profitability of activating the same countries as sales destinations or

sourcing locations, which in turn weakly raises US import and export levels.

While our framework illustrates a natural complementarity between international trade participation and foreign assembly decisions, it is less clear whether foreign assembly decisions in particular countries are complements or substitutes for assembly decisions in other markets. Traditional export-platform models assume that cost savings at one site “cannibalize” sales from another, but to accommodate contrasting empirical evidence,





we have relaxed this restriction.<sup>3</sup> A simple extension of our framework yields a clean condition: plants are complements whenever the cross-firm elasticity of demand the MNE faces for its goods is lower than the within-firm elasticity of labor substitution across the MNE's plants. Shared marketing and sourcing costs again widen the parameter region in which complements prevail. Higher trade barriers faced by a US MNE's foreign affiliates may decrease its domestic activities if its plants are complements.

A Fresh Look at Tariff Escalation

The economies of scope and scale highlighted in our work are relevant not only for firm-level decisions, but also for governments in their design of trade policies. In recent work, we study how scale economies can explain the fact that tariffs on final consumer goods routinely exceed those on imported inputs both across countries and over time, a pattern dubbed tariff escalation.<sup>4</sup> Neoclassical frameworks with constant returns to scale tend to predict that optimal tariffs are uniform across sectors. We show, however, that in general equilibrium, tariff escalation can raise welfare when certain types of production subsidies are infeasible and final-good production features increasing returns to scale. This result is almost automatic when inputs are produced under constant returns to scale. More notably, however, we show that tariff escalation tends to raise welfare even when both inputs and final goods

are produced under the same degree of increasing returns. Relatively lower input tariffs are optimal since, despite making inputs cheaper by boosting the size of the sector, an input tariff necessarily pulls labor away from final-good production, which in turn lowers final-good productivity. By contrast, a final-good tariff increases final-good productivity and raises demand for domestic inputs. These results highlight the importance of considering general equilibrium forces when assessing the implications of current tariffs.

In a setting in which US manufacturers face labor shortages, raising tariffs on one industry may have negative consequences for other sectors as they must now pay even higher wages to find workers.

Taking Stock

Calls for reshoring and “friend-shoring” must grapple with a world economy shaped by the interdependencies highlighted in our work. Efforts to pull certain segments of supply chains back home may backfire and instead lead firms to relocate more activity abroad as they seek to maintain stable, reliable, and efficient cost structures. Indeed, the evidence we document for the United States suggests that multinational firms dominate US manufacturing and that their foreign operations are complementary to their domestic activities. In such a case, raising their costs to source from and export to foreign markets will also harm their US activities.

Global value chains will not become less central to policy any time soon. They channel the shocks of pandemics and wars; they condition the diffusion of green technologies; they shape who pays tariffs and who pockets rents. Understanding the microeconomic architecture that underlies those chains is a prerequisite for steering them—toward resilience, toward shared prosperity, or toward whatever goal the next crisis will thrust upon us.

<sup>1</sup> “The Margins of Global Sourcing: Theory and Evidence from US Firms,” Antràs P, Fort TC, Tintelnot F. NBER Working Paper 20772, July 2016, and *American Economic Review* 107(9), September 2017, pp. 2514–2564. [Return to text](#)

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# Firms’ Discount Rates and Investment

Niels Gormsen and Kilian Huber

Discount rates play a key role in firms’ investment decisions. In standard theory and in practice, firms undertake an investment project if the expected return of the project exceeds a required return, which is known as the “discount rate” or “hurdle rate.” A large body of research has studied how firms *should* set discount rates, but relatively little work has explored how real-world discount rates change over time and whether discount rate dynamics shed light on the behavior of firms and the aggregate economy.

In a recent set of papers, we analyze new hand-collected data on the discount rates used by large corporations. The data confirm that discount rates determine investment. But the real-world behavior of discount rates deviates substantially from standard theory. Discount rate dynamics help us understand several economic phenomena, including long-run “missing investment,” monetary non-neutrality, business cycle comovement, capital misallocation, and the real impact of sustainable investing.

## Standard Theory

The standard view is that firms should base their discount rates on the cost of capital. This approach is widely taught to business practitioners since, in standard models, one-to-one incorporation ensures that firms maximize their value. The assumption of one-to-one incorporation is prevalent among policymakers (including those at central banks and treasuries) and in academic fields studying firm behavior, such as finance, macro, labor, and industrial organization. In all these fields, shocks to the cost of capital—such as shocks to stock prices, monetary policy, and credit supply—directly change firms’ discount rates and thereby investment.

However, there are conceptual reasons why discount rates may deviate from the cost of capital. First, the cost of capital is unobserved, depends on complex risk adjustments, and needs

to be estimated using financial market models and subjective estimation choices. Hence, the “perceived cost of capital,” as determined by firms, may deviate substantially from the true cost of capital. Second, firms have full discretion over their discount rate. They may consciously not equate their cost of capital and discount rate. For instance, firms may keep their discount rate constant for long periods to maintain clear and stable investment rules.

Seminal surveys, including those cited in Poterba and Summers, Jagannathan et al., and Graham, suggest that the practical behavior of firms diverges from that of standard models.<sup>1</sup> However, these surveys do not reveal whether discount rates move with the cost of capital or whether they determine investment. To understand how firms make decisions—in particular, why firm investment often appears puzzling through the lens of standard theory—we needed to remeasure discount rate dynamics and link them to investment.

## New Data

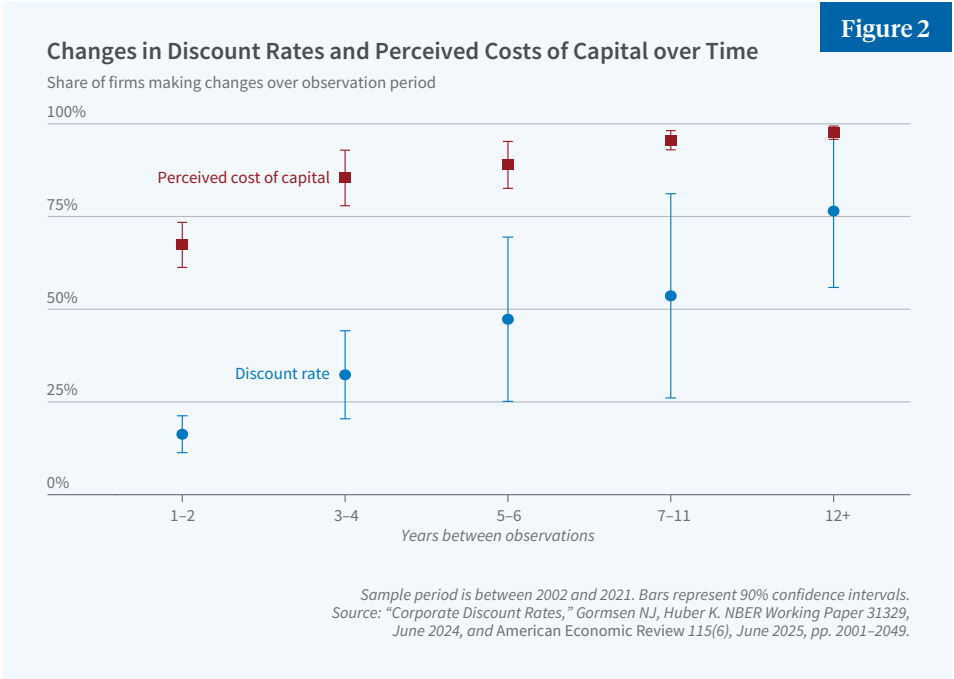
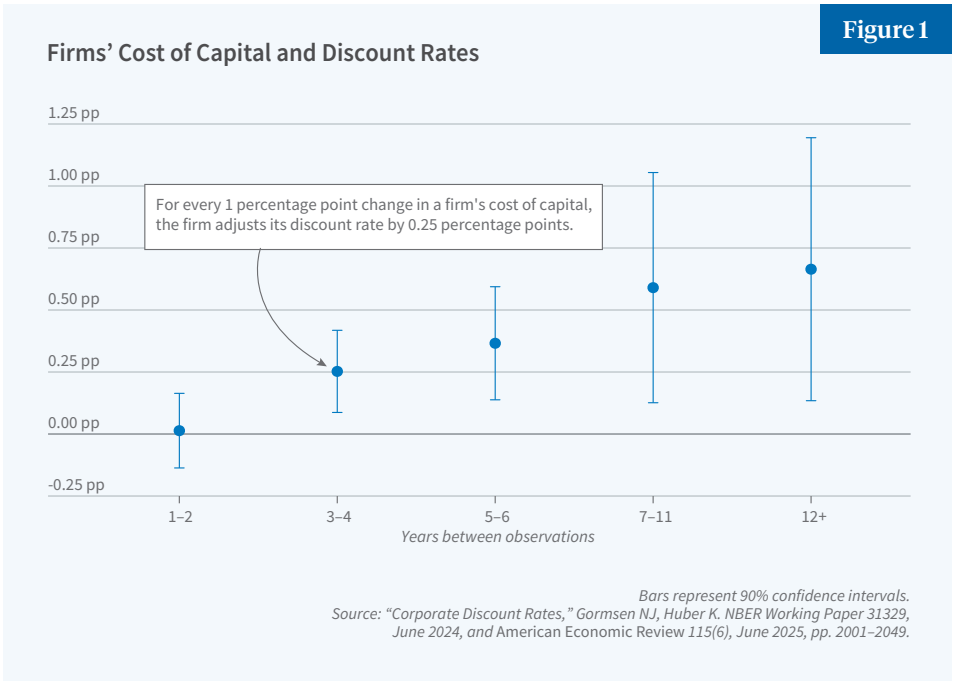
Firms sometimes discuss discount rates on their conference calls, which are quarterly conversations with analysts. By manually reading call transcripts with a team of research assistants, we have been recording firms’ discount rates and perceived cost of capital over the past five years. So far, we have recorded 7,000 observations of discount rates and the perceived cost of capital for 3,000 distinct firms. The current database covers 20 countries going back to 2001, as detailed on [costofcapital.org](https://costofcapital.org). We continue to collect new data.

We verify the reported data. When a firm increases its discount rate, its investment rate in the subsequent year falls. The magnitude is quantitatively consistent with a standard model. In addition, we find that a firm with a higher discount rate achieves higher realized returns on its future projects.

These findings corroborate the idea that the measured discount rates and wedges capture required returns and shape investment demand.

Roughly 90 percent of large firms use discount rates to make investment decisions.<sup>2</sup> However, we do not observe every firm because an explicit mention of the discount rate is just one way firms can communicate their investment strategy. Firms with at least one reported discount rate or perceived cost of capital account for roughly 50 percent of the total assets of firms in Compustat. Included firms are larger but otherwise similar to other listed firms in observable characteristics, including investment rates, bankruptcy risk, and profitability.

Discount rates behave differently from the standard view in four dimensions. First, discount rates are sticky with respect to the cost of capital. Over horizons within two years, changes in the cost of capital are hardly transmitted into discount rates. Over horizons beyond five years, changes in the cost of capital are transmitted close to one-to-one (see Figure 1). Most firms update their discount rates less than once every five years (see Figure 2). Second, firms’ perceptions of their cost of capital change more regularly, with most firms adjusting every year. Revisions in firms’ perceived cost of capital incorporate changes in interest rates and risk premia. The stickiness of discount rates is thus the result of a conscious decision of firms and not driven by ignorance about the cost of capital. Third, discount rates are, on average, 3 percentage points higher than the cost of capital. The gap is higher for firms facing little competition, financial and organizational constraints, and idiosyncratic risk. Finally, although in textbooks a firm’s true cost of capital is defined as the expected return on the firm’s outstanding debt and equity in financial markets, in practice, the level of firms’ perceived cost of capital deviates substantially from this standard definition. These persistent firm-level deviations ultimately influence discount rates and capital allocation.



## Economic Consequences

Discount rates are at the heart of firm behavior, so their nonstandard behavior shapes firm growth and aggregate dynamics. We summarize a few of the implications we have explored so far.

## Rising Discount Rate Wedges and “Missing Investment”

The average wedge between US firms’ discount rates and their per-

ceived cost of capital has increased from 3 percent in 2002 to 5 percent in 2020. This increase is large relative to typical fluctuations in the cost of capital, for example, the secular decline in the cost of capital between 2002 and 2020.<sup>3</sup> The rising wedge implies that firms have been holding back investment relative to what standard theory would predict. Over the same period, US investment has indeed been puzzlingly low even when accounting for intangibles and mismeasurement.<sup>4</sup> In 2019, the shortfall in investment

amounted to 20 percent of the US capital stock through the lens of a standard Tobin’s q model (see Figure 3).

The new data reveal that larger discount rate wedges account for much of the missing investment. An adjusted q model—incorporating the observed wedges—implies little missing investment (see Figure 3). The increase in the wedge is thus large enough to materially influence capital formation. Why has the discount rate wedge increased so dramatically? The increase can be explained, in part, by stickiness with respect to changes in the cost of capital: the cost of capital dropped substantially from 2002 to 2020 while discount rates were more stable, generating rising wedges. In addition to stickiness, market power and risk contributed to the rising wedge.

## Business Cycles, Monetary Non-Neutrality, and Sticky Discount Rates

Stickiness in discount rates influences how firm investment responds to shocks. First, the stickiness dampens investment responses to changes in the cost of capital. In the data, short-run investment is relatively insensitive to the cost of capital, which is often rationalized with high adjustment costs or inattention. Sticky discount rates mitigate the need for high adjustment costs, although the two are not isomorphic. Under sticky discount rates, investment responds identically to cash flow shocks, more strongly to expected inflation, and less strongly to the cost of capital, relative to the textbook example. Under high adjustment costs or inattention, investment responds weakly in general.

Firms’ discount rates are sticky with respect to expected inflation, causing investment to directly respond to changes in expected inflation.<sup>5</sup> In standard models, real investment depends only on the real cost of capital and investment opportunities, not directly on inflation. In contrast, under sticky discount rates, increases in expected inflation raise investment by effectively lowering firms’ real discount rates. The data support this mechanism, as firms



with stickier discount rates invest more when expected inflation increases.

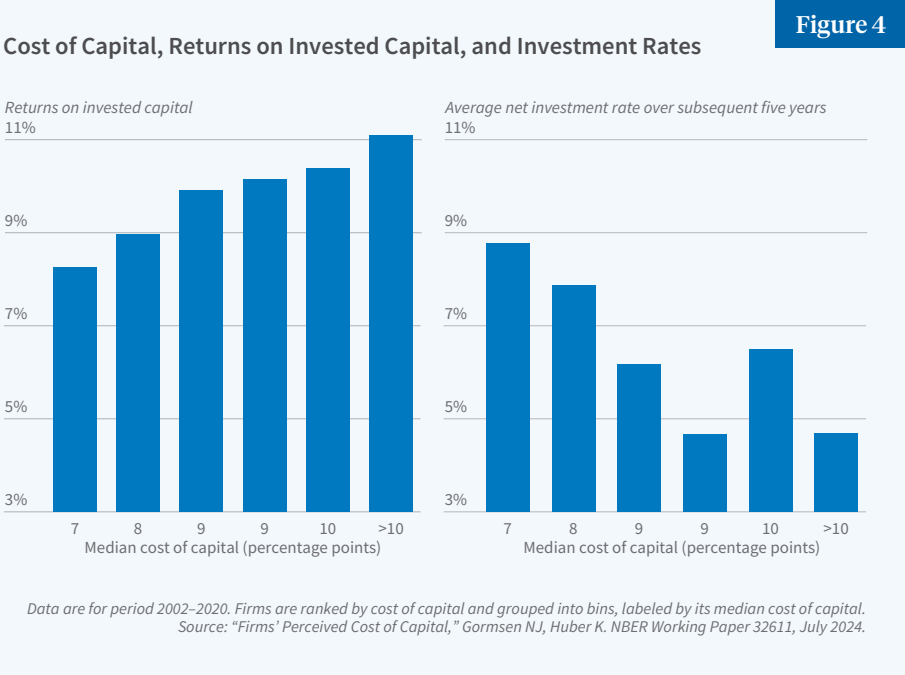
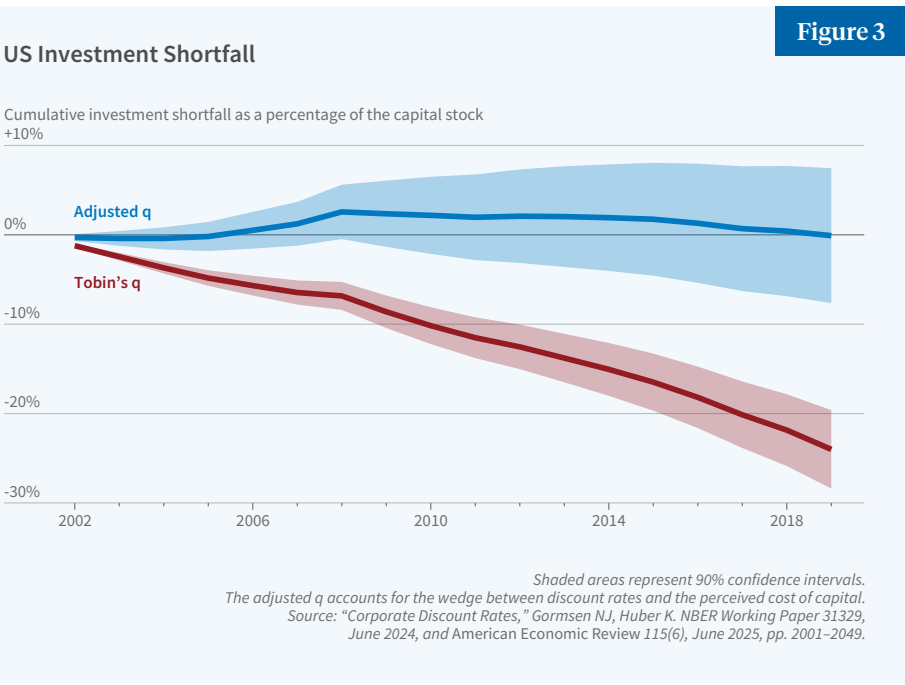
We develop a general equilibrium model with sticky discount rates and study the impact on business cycle dynamics. Sticky discount rates generate unique predictions for business cycles. The new mechanisms operate when other prices are sticky, as in the textbook New Keynesian model, and in otherwise frictionless models, as in the neoclassical benchmark. We find that sticky discount rates represent a novel source of monetary non-neutrality, generate positive comovement between consumption and investment (addressing the long-standing challenge of explaining the investment-consumption comovement observed in the data), and change optimal monetary policy.

Capital Misallocation and the Perceived Cost of Capital

In the long run, firms’ discount rates move almost one-to-one with the cost of capital (see Figure 1). Indeed, firms with a higher perceived cost of capital have a higher return on invested capital and a lower investment rate in the long run (see Figure 4).<sup>6</sup> To understand the allocation of capital across firms, we therefore need to understand firms’ perceived cost of capital.

A bedrock assumption throughout economics is that firms perfectly know their cost of capital. The new data allow us to explore this assumption because we observe how firms perceive their cost of capital. We find that firms’ perceived cost of capital deviates substantially from the standard assumption: the perceived cost of capital incorporates interest rates in line with standard theory, but there are large firm-level deviations in the perceived cost of equity not justified by standard theory. The deviations can partly be explained by firms using the capital asset pricing model (CAPM), but not fully. A key takeaway is that firms incorporate idiosyncratic terms not explained by standard finance models, potentially driven by the biased views of analysts or managers.

These results have first-order

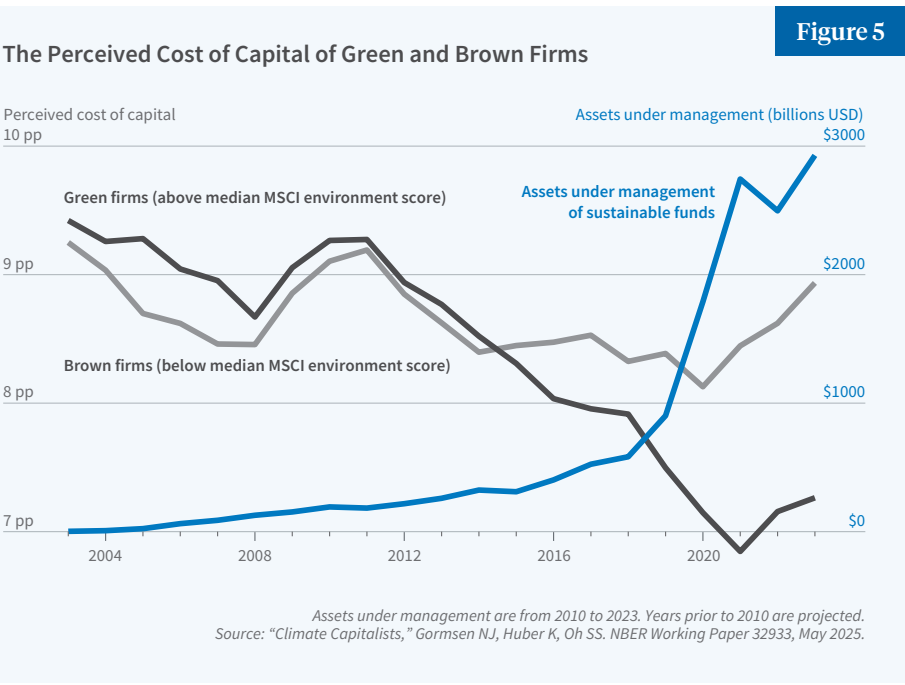


implications for aggregate efficiency. Firms with a distorted perceived cost of capital invest too much or too little relative to the optimum. Through the lens of a standard capital allocation model, aggregate productivity is 5 percent lower as a result.<sup>7</sup> The results imply that either economists have been making entirely the wrong assumptions about firms’ objectives or that economists can substantially improve aggregate efficiency by changing firms’ perceived cost of capital.

Climate-Friendly Investments and the Cost of Capital

Climate change has generated a controversial debate about how to incentivize green investment by firms. Economists have suggested a “cost of capital channel”: financial investors could provide capital to green projects, for example, by purchasing green stocks and bonds, thereby lowering the cost of green capital and facilitating green investments.

A key question is whether this cost-of-capital approach can work in



practice. Ideally, it requires (1) *across firms*, that the cost of capital perceived by greener firms be lower and (2) *within firms*, that they apply a lower cost of capital to greener divisions.

We find that the perceived cost of capital of green firms fell substantially relative to that of brown firms (see Figure 5).<sup>8</sup> The difference opened up after 2016, as climate concerns of investors and governments surged and sustainable funds in financial markets experienced strong inflows (indicated by assets under management). Within firms, some of the largest energy firms have started applying a lower perceived cost of capital and discount rate to their greener divisions, such as renewable energy, since 2016.

Together, the results suggest that

a cost-of-capital channel can incentivize the reallocation of capital to green firms. Firms are willing to adjust the relative cost of green capital over time, implying that large-scale changes in financial markets impact firm behavior. Moreover, a few key firms use within-firm variation, so firms are in principle sophisticated enough to become greener through within-firm adjustments.

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<sup>8</sup> “Climate Capitalists,” Gormsen NJ, Huber K, Oh SS. NBER Working Paper 32933, May 2025. [Return to text](#)



Niels Joachim Gormsen

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# The Effects of High-Skilled Immigration

Amir Kermani and Timothy McQuade

High-skilled immigration remains at the forefront of the policy debate in the United States. While the economic consequences of high-skilled immigration are multifaceted and complex, there is significant suggestive evidence that immigrants play an important role in US innovation and firm creation. For example, immigrants comprised 23 percent of the total workforce in STEM occupations in 2016 and account for 26 percent of US-based Nobel Prize winners from 1990 through 2000.<sup>1</sup> As of 2022, the four most valuable private, venture-backed US companies had immigrant founders, as well as three of the most valuable public companies globally.<sup>2</sup> In fact, approximately one-quarter of new employer companies in the United States are started by immigrants.<sup>3,4</sup> Motivated by these facts, in recent research we have sought to understand and quantify the role that immigrants play in US-based innovation and entrepreneurship. A particular focus of this agenda, which we detail below, has been to understand whether immigrants generate positive spillovers on their native counterparts and vice versa.

While skilled migrants may provide value to their destination countries, existing survey evidence suggests that return migration is a common phenomenon, with a significant fraction of international migrants returning to their origin (home) countries within five years.<sup>5</sup> By participating in US economic activity, including the innovative and entrepreneurial activities described above, and by building up their professional networks, high-skilled immigrants may accumulate human capital they otherwise would not have. To the extent that migrants can transfer that acquired human capital to their origin countries through return migration, concerns surrounding brain drain may be mitigated. In a separate line of research, we have brought new data to bear in order to quantify the global migration and return migration flows of skilled workers across countries, understand the determinants of return migration, and study the accumulation of human capital by emerging-market skilled workers in advanced economies.

## Immigrant Contributions to US Innovation

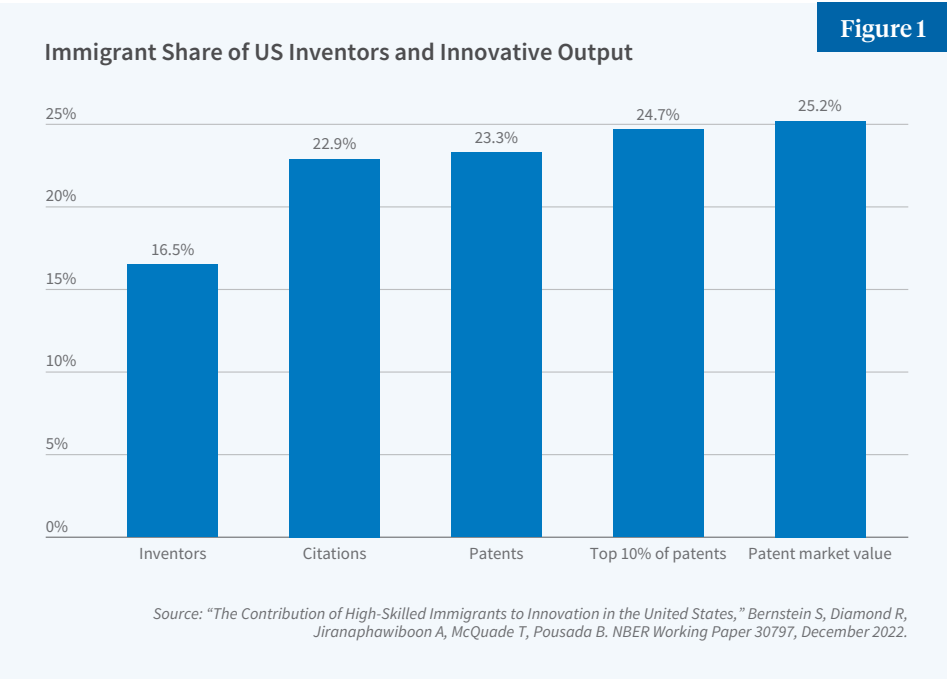
In joint work with Shai Bernstein, Rebecca Diamond, Abhisit Jiranaphawiboon, and Beatriz Pousada, McQuade characterizes the contributions of immigrants to US innovation as measured by patenting output.<sup>6</sup> The analysis relies on the Infutor database, which provides the exact address histories of more than 300 million adults living in the US over the past 30 years. Beyond the exact address histories, the data also include the individuals' names, years of birth, and the first five digits of their Social Security numbers. The data are linked to the universe of patents from 1990 to 2016 based on a merge of first and last names, as well as the city and state of residence as of the date of the patent. Immigrant status is then inferred by combining the first five digits of the Social Security number, which pins down the assignment year, with information on the year of birth.

Between 1990 and 2016, immigrants who came to the United States when they were 20 years old or older make up 11 percent of the US population and 16 percent of all US-based inventors. As shown in Figure 1, immigrant inventors produced roughly 23 percent of all patents during this period, over 40 percent more relative

to their share of the US-based inventor population and over 100 percent more relative to their share of the total US population. Immigrant patents do not appear to be of lower impact. Using the number of patents weighted by the number of forward citations, we find that the immigrant contribution is slightly higher at 24 percent. Using the stock market reaction measure of economic value developed by Leonid Kogan et al. and an imputation procedure for private firms, we find the immigrant contribution is 25 percent.<sup>7</sup>

Our paper further provides suggestive reduced-form evidence that immigrant inventors foster the importation of foreign ideas and technologies into the United States and facilitate the diffusion of global knowledge. During their careers, immigrant inventors rely more heavily on foreign technologies, as illustrated by their higher shares of backward foreign citations. Immigrants are twice as likely to collaborate with foreign inventors as with US-born inventors, and foreign inventors are about 10 percentage points more likely to cite the patents of US-based immigrant inventors than patents of US-born inventors.

Do immigrant inventors, through collaboration, make other US-based inventors more productive in their patenting? To construct causal estimates





of productivity spillovers, we examine the premature deaths of inventor collaborators. The patenting behavior of inventors who had coauthored a patent with a deceased inventor is compared to the behavior of a matched control group of inventors who did not experience the premature death of a coauthor.

Premature death leads to a 10 percent decline in the innovative productivity of co-inventors, as measured by patents and top patents. This decline takes place gradually and has a long-lasting impact. Strikingly, the disruption caused by an immigrant inventor death leads to a significantly larger decline in the productivity of the co-inventors than that of a US-born inventor death. The death of an immigrant lowers co-inventor productivity by approximately 16 percent, while a US-born inventor's death lowers productivity by approximately 9 percent. These gaps are large and persistent and take place across all measures of innovative productivity.

The analysis suggests that 32 percent of total US innovative output since 1990 can be ascribed to US-based immigrants, although they make up 16 percent of the inventor workforce and directly author 23 percent of patents. The additional 9 percentage points of innovation, over and beyond immigrants' direct output, is due to immigrants' substantial human capital externalities on US-born inventors. This decomposition highlights the importance of the two-way spillovers between immigrant inventors and US-born inventors, with one-quarter of US innovation attributable to this source.

### Native-Immigrant Entrepreneurial Synergies

In recent work with Zhao Jin, we shift attention from immigrant inventors to immigrant entrepreneurs.<sup>8</sup> Specifically, we focus on mixed entrepreneurial teams, that is, on firms that are created by both immigrant and US-born cofounders. Our research combines data from Revelio Labs and Crunchbase. The Crunchbase database provides comprehensive information on startups, including founding date, funding history, investors, acquisitions, and IPO status. The data are linked to Revelio Labs, which sources data from the LinkedIn

profiles of more than 850 million individuals in over 200 countries. We identify immigrant entrepreneurs and workers in the United States using information on the initial country that appears in the LinkedIn profile, based on either education or job position.

As with innovation, immigrants play a significant role in US firm creation. Between 2000 and 2017, 33 percent of the startups in our sample had an immigrant founder. Moreover, collaboration between immigrants and US natives is common. Twenty-two percent of the startups in our sample had both immigrant and US-born cofounders. Immigrants provide an important source of labor for US startups. In our sample, about 30 percent of the average startup's workforce consists of migrant employees.

Startups founded by native-migrant teams outperform startups founded solely by natives or migrants. As shown in Figure 2, three years after inception, startups with native-migrant teams have 23 percent more employees than native-only teams. While migrant-only startups outperform native-only startups, the effect is only 15 percent. Native-migrant startups are also significantly more likely to receive funding than native-only startups and raise substantially more capital than both native-only and migrant-only startups. Startups with native-migrant teams are also more likely to be acquired and more likely to exit through an IPO than either native-only

or migrant-only startups.

What causes native-migrant startups to outperform native-only or migrant-only startups? We show that startups founded by immigrant-native teams hire more diverse, better-quality labor, have greater access to investor capital, and have access to wider product markets. Specifically, native-migrant startups hire 27.1 percent more migrant employees than native-only startups, while hiring slightly fewer migrant workers than migrant-only startups. Using internal and external promotions as a proxy for labor quality, we additionally find that native-migrant startups hire better quality workers than both native-only and migrant-only firms.

Similarly, startups founded by native-migrant teams are 7.7 percent more likely to be funded by non-US investors relative to startups without a migrant cofounder. Proxying for venture capital (VC) quality with the number of deals and the number of successful exits, we find that native-migrant teams disproportionately access capital from higher quality VCs relative to both native-only and migrant-only teams. We proxy for domestic and foreign product market access using patents filed both in and outside the United States and find that native-migrant firms have 117 percent more total granted patents than migrant-only firms and 28.4 percent more granted patents than native-only firms. Native-migrant teams are more

likely to receive both US and non-US patents than both migrant-only and native-only startups.

The causal interpretation of our baseline empirical results is challenged by selection concerns. The greater performance of native-migrant startups could be driven by high-productivity entrepreneurs endogenously sorting into native-migrant teams, rather than productivity benefits created by the native-migrant combination itself. To address this concern, we develop an instrumental variables strategy exploiting plausibly exogenous variation in the year-over-year immigrant composition within the university-degree programs attended by startup founders. Intuitively, the proportion of native students in the degree program the native founder attends should impact the likelihood that an individual collaborates with migrants when forming a startup. Our first-stage regression results confirm this when controlling for year and university-by-degree fixed effects.

Our two-stage least squares (2SLS) estimates generally confirm the ordinary least squares analysis. Relative to native-only startups, native-migrant startups are 44 percent larger in terms of employment size three years following inception, are 35 percentage points more likely to receive funding within three years, and raise substantially more funding than native-only startups. A similar analysis within a sample of startups with at least one migrant cofounder confirms the superior performance of native-migrant startups over migrant-only startups.

Our 2SLS results also provide supporting evidence for the underlying mechanisms. Relative to native-only teams, native-migrant teams are more likely to hire migrant workers, hire higher-quality migrant workers, access foreign VC capital, and source capital from top VCs, as measured by the number of deals and the number of successful exits. Relative to migrant-only teams, native-migrant teams hire more native workers and higher-quality native workers, and are more likely to source capital from top domestic VCs and be granted a US patent.

### Return Migration and Human Capital Accumulation

In addition to focusing on immigrants' contributions to US-based innovation

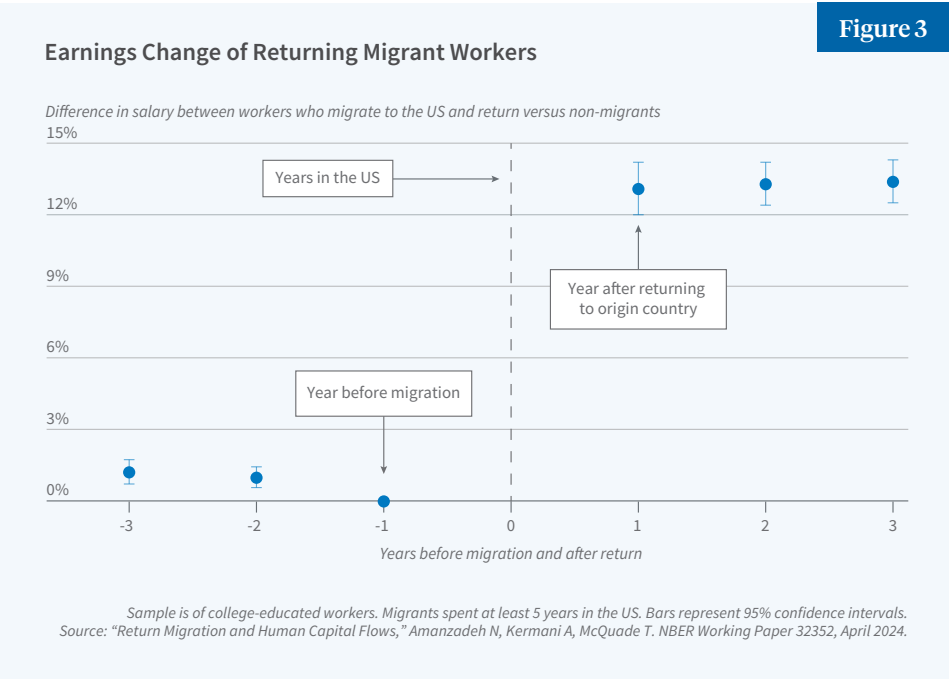
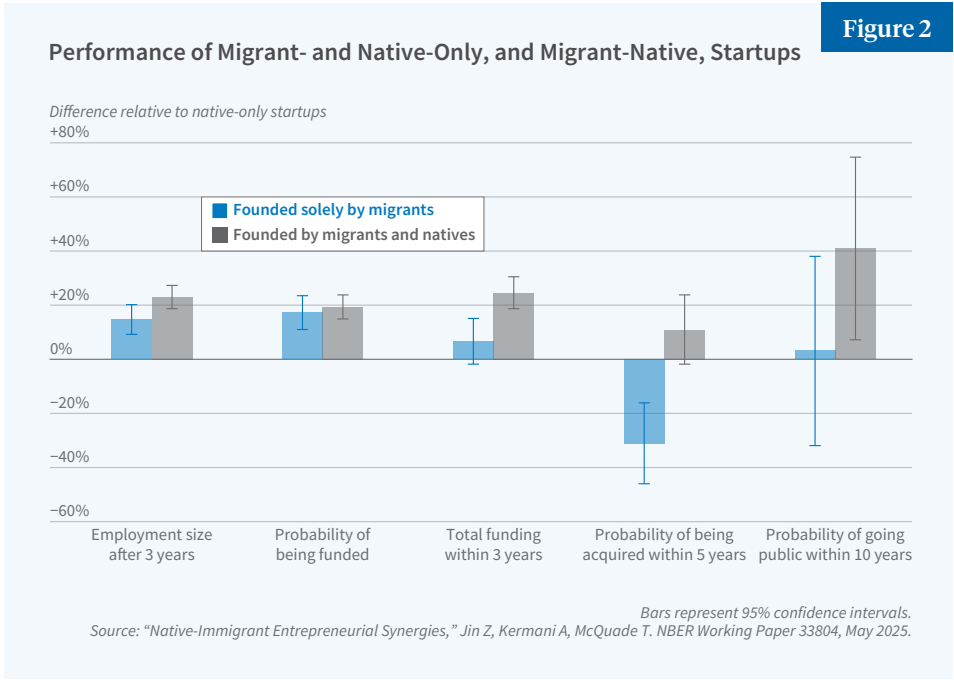
and entrepreneurship, we also study return migration and the potential benefits of migration for migrants' countries of origin. In collaboration with Naser Amanzadeh, we use a uniquely rich dataset from Revelio Labs covering the employment histories of roughly 450 million individuals across 180 countries, supplemented with wage data from Revelio and Glassdoor.<sup>9</sup> These records trace each worker's education, jobs, location, and industry over time, enabling precise measurement of international moves, returns, and post-migration career trajectories.

Return migration is a common feature of the skilled labor market. Across all migrants, 10 percent return to their country of origin within a year, 33 percent within five years, and 38 percent within a decade. Rates vary widely; the US and advanced European economies see higher return rates, while large emerging markets such as India experience relatively low levels. Return behavior is closely tied to economic conditions—strong industry growth in the origin country raises the probability of return, while growth in the destination country reduces it—and is particularly sensitive to negative employment shocks at the migrant's firm. A 20 percent drop in firm employment increases the likelihood of return by nearly 5 percent.

To assess the human capital consequences of these moves, we embed migration histories in a development-accounting framework that extends the

Abowd–Kramarz–Margolis wage decomposition to allow for location-specific returns to experience. US experience commands striking premiums in origin countries, especially for workers from emerging markets. A year in the US raises subsequent wages in the home country by between 59 and 204 percent more than a year of domestic experience, depending on the specification we use, even after controlling for firm fixed effects. Experience in other advanced economies also carries a premium, but at lower levels.

To address concerns that these differential returns might reflect differences in migrant and stayer characteristics rather than true causal effects, we employ an exact-matching design. Each return migrant is matched to a non-migrant from the same country, education cohort, and firm, and with the same position and pre-migration wage and experience profile. In these matched samples, returnees from the US to emerging markets earn about 8 percent more than their counterparts upon return, and those with at least five years in the United States earn about 13 percent more. These effects hold when restricting the sample to migrants whose return was triggered by large layoffs in their US firm, suggesting they are not driven by unobserved positive shocks to ability. Figure 3 illustrates these wage dynamics: Event-study estimates show a sharp post-return earnings divergence from matched peers, with no evidence of differential pre-trends. Gains are largest for long-



tenured US returnees, consistent with the cumulative human-capital benefits of US experience.

We also study selection into migration and return. Migrants, especially those to the US, are positively selected on intrinsic human capital relative to non-migrants. Among US migrants, returnees have somewhat lower measured ability than those who remain abroad, though still above the average for non-migrants in their origin country. This suggests that return migration partly offsets, but does not fully reverse, the “brain drain” from developing economies. Counterfactual simulations reveal wide heterogeneity in the impact of skilled migration flows on national human capital stocks, with the largest losses in Gulf Cooperation Council countries that rely heavily on foreign talent and the largest gains in countries that currently lose many of their most skilled workers. The results underscore that migration and return migration are integral to the global circulation of skills and shape not only the innovative capacity of host economies like the US but also the development trajectories of migrants’ home countries.

<sup>1</sup> Data are from the 2016 American Community Survey. STEM occupations are defined as engineers, mathematical and computer scientists, natural scientists, and physicians.  
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<sup>2</sup> “Immigrant Entrepreneurship: New Estimates and a Research Agenda,” Chodavadia SA, Kerr SP, Kerr WR, Maiden LJ. NBER Working Paper 32400, May 2024.  
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<sup>3</sup> “Immigrant Entrepreneurship,” Kerr SP, Kerr WR. In *Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*, Haltiwanger J, Hurst E, Miranda J, Schoar A, editors, pp. 187–249. Chicago: University of Chicago Press, 2016.  
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<sup>4</sup> “Immigration and Entrepreneurship in the United States,” Azoulay P, Jones B, Kim JD, Miranda J. NBER Working Paper 27778, September 2020, and *American Economic Review: Insights* 4(1), March 2022, pp. 71–88.  
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<sup>5</sup> “Return Migration Around the World: An Integrated Agenda for Future

Research,” Hagan JM, Wassink JT. *Annual Review of Sociology* 46, August 2020, pp. 533–552.  
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<sup>6</sup> “The Contribution of High-Skilled Immigrants to Innovation in the United States,” Bernstein S, Diamond R, Jiranaphawiboon A, McQuade T, Pou-sada B. NBER Working Paper 30797, August 2025.  
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<sup>7</sup> “Technological Innovation, Resource Allocation, and Growth,” Kogan L, Papanikolaou D, Seru A, Stoffman N. *The Quarterly Journal of Economics* 132(2), May 2017, pp. 665–712.  
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<sup>8</sup> “Native-Immigrant Entrepreneurial Synergies,” Jin Z, Kermani A, McQuade T. NBER Working Paper 33804, May 2025.  
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<sup>9</sup> “Return Migration and Human Capital Flows,” Amanzadeh N, Kermani A, McQuade T. NBER Working Paper 32352, April 2024.  
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# New Developments in Financial Markets: The Digital Revolution; Fintechs; Buy Now, Pay Later; and Geopolitics

Manju Puri

We are witnessing a transformative era in financial markets, driven by the digital revolution and the proliferation of data. Digital footprints now accompany virtually every financial transaction, creating new opportunities for data collection and analysis across individuals, firms, and governments. This surge in data availability is reshaping how financial products are offered, how risk is assessed, and how policies are designed.

This summary highlights four strands of recent research that illustrate these shifts. The first explores how the public provision of a digital payment infrastructure can expand access to formal credit—particularly for underserved populations. The second examines how private sector innovation, such as Buy Now, Pay Later (BNPL) lending, leverages digital data to reshape consumer credit. The third investigates how traditional banks are responding to financial technology (fintech) disruption through venture capital (VC) investments in startups, often leading to strategic partnerships. Finally, the fourth looks at government innovation—through the digital euro—and presents new evidence on how geopolitical considerations are beginning to shape financial innovation. Collectively, this research suggests that the creation of new dynamics among financial service providers, consumers, and policymakers is readjusting the old order.

## The Digital Revolution in Credit

The past decade has seen massive growth in financial technology (fintech) and fintech companies. Fintechs have attracted more than \$1 trillion in investment between 2010 and 2021. This raises questions about whether the use of new technologies such as alternate credit scoring mechanisms might improve access to credit. My work with Tobias Berg, Valentin Burg, and Ana

Gombović highlights the information content of digital footprints for predicting consumer default.<sup>1</sup> We show that even a bare-bones digital footprint has as much information as a credit bureau score, that it complements credit bureau information, and that the use of digital footprints affects access to credit and reduces default rates.

Digital footprints can have real effects on credit access: Customers who fare poorly on traditional credit bureau score metrics can gain access to credit if their digital footprint conveys positive information, while the opposite situation can emerge for customers in the middle of the credit bureau score distribution when digital footprint information is negative. While this work shows the potential of digital footprints for lending decisions and financial inclusion, several questions emerge. How do you facilitate digital footprint creation for the underserved? Digital payment infrastructure, such as Unified Payments Interface (UPI), provides a possible answer. UPI is a public infrastructure that allows cross-platform digital payments, enabling customers

to seamlessly transact across any banking or third-party application. Studying the link between UPI and credit is important as it can highlight a distinct macrolinkage: can payment infrastructure improve overall financial deepening?

In recent work, Shashwat Alok, Pulak Ghosh, Nirupama Kulkarni, and I use India’s 2016 launch of UPI, one of the world’s most ambitious and large-scale digital public payment infrastructures, as a natural experiment to study these questions.<sup>2</sup> To fix ideas, a customer on Google Pay, a popular UPI payment application, can move funds from bank A to a customer or merchant account at Bank B without having to log into the respective banks’ native applications, and regardless of whether the counterparty has Google Pay. Specifically, users are not locked within an app, unlike users of Venmo, PayPal, or some other apps in the US, and can make payments across platforms using a unified interface. Within a brief period, UPI became the dominant means of digital payments in India, with over 300 million individuals



### Amir Kermani

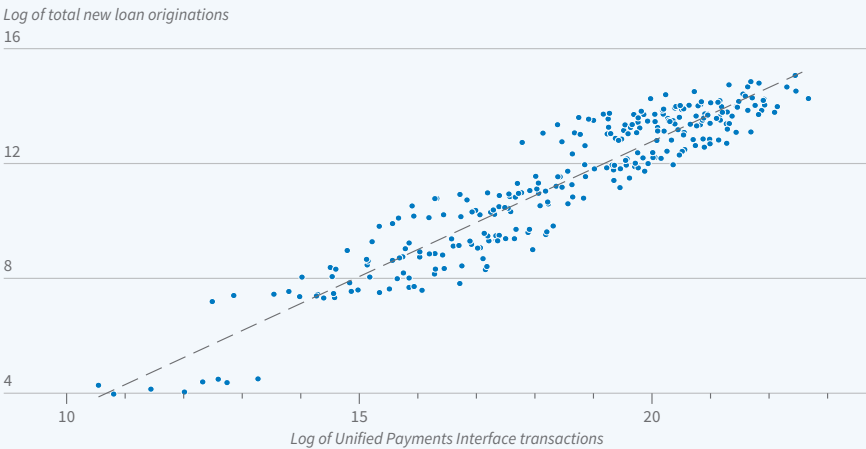
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### Tim McQuade

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India’s Unified Payments Interface and Credit



Dots represent state-quarter observations.  
Source: “Breaking Barriers to Financial Access: Cross-Platform Digital Payments and Credit Markets,” Alok S, Ghosh P, Kulkarni N, Puri M. NBER Working Paper 33259, August 2025.



and 50 million merchants using UPI. As of October 2023, nearly 75 percent of all retail digital payment transactions were through UPI.

Using proprietary regulatory data-sets that cover the universe of consumer loans alongside payments, internet rollout, and bank account penetration data, we examine how UPI adoption influenced credit supply by banks (incumbents) and fintechs (new entrants). We document four main findings. (i) UPI adoption substantially increased financial deepening, measured by the number of loans per capita, particularly for subprime and new-to-credit borrowers. (ii) Banks and fintechs responded differently: banks mainly increased lending to prime borrowers, whereas fintechs expanded across all segments—and only fintechs extended credit to new-to-credit customers. (iii) Complementarities matter: UPI’s impact was strongest in regions with affordable internet access (following Reliance Jio’s low-cost 4G rollout) and where households had been recently onboarded into the banking system through new bank accounts. (iv) Importantly, increased credit access did not come at the cost of more defaults, suggesting that UPI-enabled digital footprints helped lenders identify underserved but creditworthy borrowers.

Private Innovation: Buy Now, Pay Later

BNPL products are an archetypal example of private innovation in fintech lending. BNPL products have seen stunning growth across the globe. Global BNPL volumes were \$50 billion in 2019; they have risen tenfold to \$500 billion in 2024. BNPL bundles the sale of a product with a consumer loan. It combines three features that have been made possible by technological advancements.

User experience

BNPL offers an improvement in user experience and a faster loan granting process compared to traditional consumer lending products. The data required for a lending decision is already collected during the checkout process (e.g., the name and address

of the borrower), so taking out a BNPL loan takes little additional effort on the part of the consumer.

Screening

BNPL providers use digital footprint data to score customers, thereby improving screening without requiring applicants to fill out burdensome application forms. Fintech lenders typically process applications faster and require less manual input from the applicant. An increase in convenience and speed appear to have been central to fintech lending’s growth and we discuss the evidence surrounding this in a joint paper with Berg and Andreas Fuster.

Bundling

BNPL is frequently offered at below-market rates. BNPL therefore bundles the sale of a product with a subsidized loan, effectively offering lower prices to customers with bad credit. BNPL thereby allows merchants to price discriminate among customers with a different willingness to pay. Such bundling has been more common in larger-scale purchases, such as a car purchase with an auto loan, but technology has enabled targeted bundling for smaller purchases at scale.

In work with Berg, Valentin Burg, and Jan Keil, we document that—from an economic point of view—BNPL can best be understood as a bundle between a product and a subsidized

loan. Many BNPL products have a 0 percent interest rate, implying that the higher a consumer’s cost of borrowing with traditional products such as credit cards, the higher the implicit subsidy from a 0 percent BNPL loan. The effect is the opposite of the reverse Robin Hood effect observed for credit card payments. This economic mechanism helps explain why BNPL significantly increases sales. In a randomized experiment, we show that offering BNPL increases conversion rates (i.e., the likelihood of buying a product conditional on having added it to a shopping basket) from 70 percent to 80 percent and leads to the purchase of higher-value items, thereby increasing sales by 20 percent.

Banks and Fintech

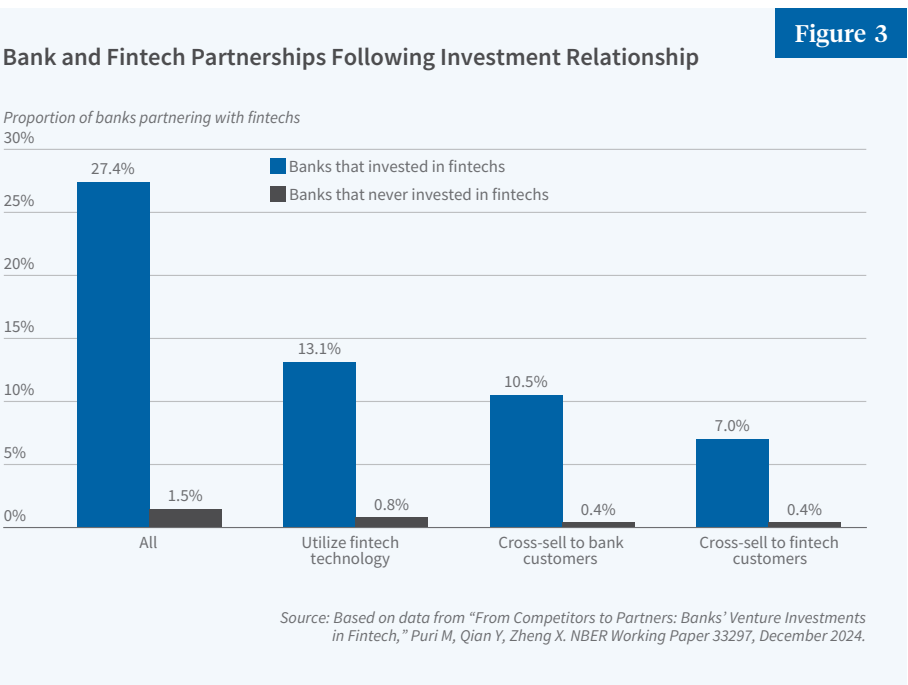
Over the past two decades, banks have increasingly made equity investments in fintech startups. By 2022, more than 70 percent of publicly listed US banks that had ever made venture investments in startups had invested in fintech startups, up from roughly 20 percent in 2001. The number of such deals climbed from less than 10 before 2011 to 66 in 2022, and the annual dollar amount committed jumped from only \$21 million in 2001 to \$485 million in 2022 (and peaked in 2021 with \$1.4 billion in investments). The surge is not just riding a bigger fintech wave;

banks’ fintech deals have grown faster than the fintech sector itself, and the share of all bank VC rounds targeting fintech has jumped from 4 percent to about 35 percent, far outpacing the shift toward the sector by other venture capital investors.

Why invest in would-be competitors? Yiming Qian, Xiang Zheng, and I investigate this question. Three patterns stand out. First, banks facing steep local competition from fintech mortgage lenders are the ones most likely to invest in fintech startups. Second, they pick fintech startups that exhibit high business and technological relatedness to their own operations. Third, equity investments pave the way for collaboration. Nearly one-third (29.6 percent) of bank-fintech pairs formed operational partnerships after establishing an investment relationship, compared to less than 2 percent of matched pairs without such investment relationships. Figure 3 illustrates that gap. The characteristics of these alliances range from banks embedding the startup’s code in their own apps to cross-selling each other’s products, and they coincide with banks’ increased patent citations to their fintech partners.

Geopolitics and the Payment Sector

Central banks have become active players in the consumer payment market in the last decade. Under the guidance of the Reserve Bank of India, the UPI payment system was developed in 2016. The Central Bank of Brazil launched its Pix payment system in 2020, and the European Central Bank (ECB) is widely expected to launch the digital euro—a retail payment system—in the 2020s. In work with Berg, Jan Keil, and Felix Martini, we show that these developments often have a geopolitical angle. Payment infrastructure forms part of a country’s critical infrastructure. Central banks are reluctant to leave digital payment reins in the hands of foreign players. With the increasing use of payment systems to foster geopolitical goals, the autonomy over payment systems has played a central role in the development of

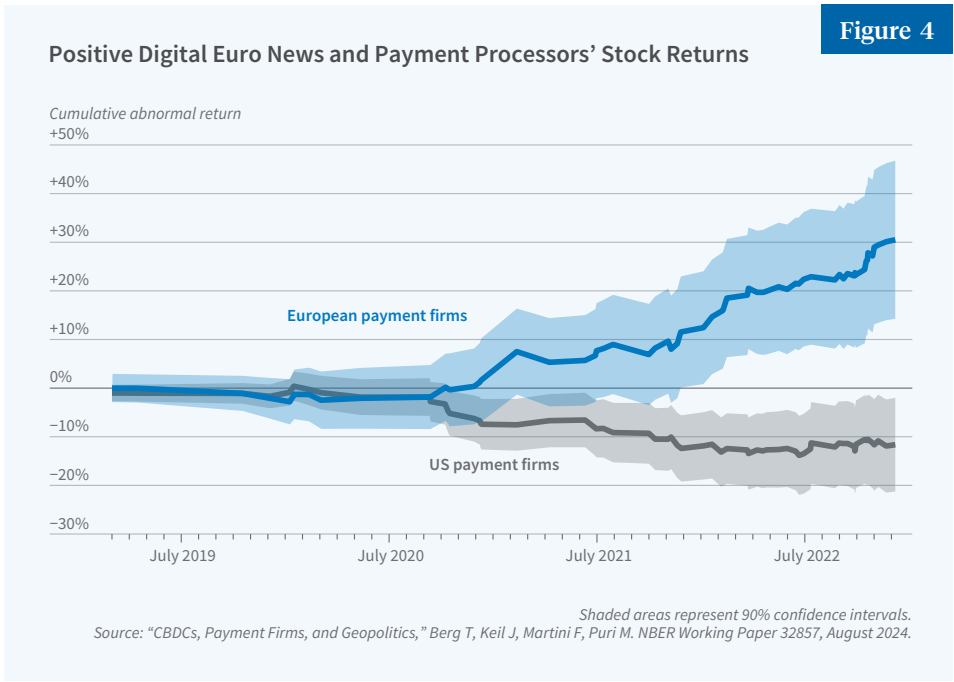
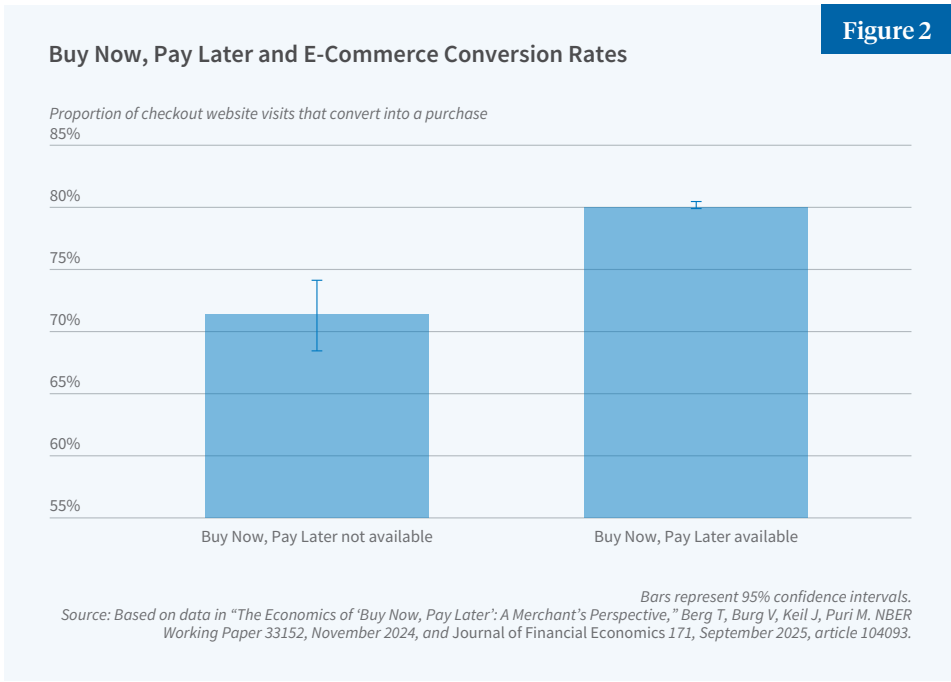


payment systems and central bank digital currencies around the globe.

In the context of the digital euro project, most major announcements were made in speeches by members of the executive board of the ECB or of one of the national central banks in the eurozone. We show that positive news about the digital euro—implying that it will come sooner or more forcefully than expected previously—results in a negative stock market reaction for US payment firms (such as Visa, Mastercard, or PayPal) and a positive stock market reaction for European payment

firms. This event study evidence is backed up by textual analysis of central bank speeches, annual reports, conference calls, and comments from industry associations. We also highlight how the institutional arrangements of the digital euro are designed to benefit European payment firms at the expense of US payment firms. We provide some of the first evidence of the importance of geopolitical motives in financial innovation in the current global environment.

Across these studies, a unifying theme emerges: Digital transformation



is not just reshaping products and services but reconfiguring the relationships between consumers, financial institutions, and policymakers. Whether through expanded access to credit enabled by public infrastructure, new lending models pioneered by fintechs, strategic collaborations between incumbents and disruptors, or geopolitical motives driving future financial architecture, the financial landscape is undergoing a profound reordering. As digital systems continue to mature, their design—public or private—will increasingly shape who gets credit, how financial activity is intermediated, and how countries exert influence in a more fragmented and strategically contested global economy.

Manju Puri

Manju Puri is the JB Fuqua Professor of Finance at the Fuqua School of Business, Duke University, and recently served as Editor of the *Review of Financial Studies*. She is a research associate with the NBER’s [Corporate Finance](#) program and has served in leadership roles including President of the Western Finance Association and the Financial Intermediation Research Society. Her research expertise spans empirical corporate finance and financial intermediation, with particular focus on commercial banks, investment banks, venture capital, entrepreneurship, behavioral finance, and FinTech, examining both traditional banking and new developments such as digital footprints in credit and implications for financial inclusion. Her work has appeared in leading publications including the *American Economic Review*, *Journal of Finance*, *Journal of Financial Economics*, and *Review of Financial Studies*, earning numerous awards including four Financial Management Association best paper awards, two Western Finance Association best paper awards, *Review of Financial Studies* Brennan best paper runner-up award, and three *Journal of Financial Economics* Fama-DFA/Jensen best paper awards. She earned her MBA from the Indian Institute of Management, Ahmedabad, her PhD in Finance from NYU, and has served as a consultant to governments and regulatory authorities including testimony before Congress and service on Federal Reserve advisory panels.



<sup>1</sup> “[On the Rise of FinTechs – Credit Scoring Using Digital Footprints](#),” Berg T, Burg V, Gombović A, Puri M. NBER Working Paper 24551, July 2018, and *The Review of Financial Studies* 33(7), July 2020, pp. 2845–2897. [Return to text](#)

<sup>2</sup> “[Breaking Barriers to Financial Access: Cross-Platform Digital Payments and Credit Markets](#),” Alok S, Ghosh P, Kulkarni N, Puri M. NBER Working Paper 33259, August 2025. [Return to text](#)

<sup>3</sup> “[FinTech Lending](#),” Berg T, Fuster A, Puri M. NBER Working Paper 29421, October 2021, and *Annual Review of Financial Economics* 14, November 2022, pp. 187–207. [Return to text](#)

<sup>4</sup> “[The Economics of ‘Buy Now, Pay](#)

[Later’](#): A Merchant’s Perspective,” Berg T, Burg V, Keil J, Puri M. NBER Working Paper 33152, November 2024, and *Journal of Financial Economics* 171, September 2025, Article 104093. [Return to text](#)

<sup>5</sup> “[From Competitors to Partners: Banks’ Venture Investments in Fin-tech](#),” Puri M, Qian Y, Zheng X. NBER Working Paper 33297, December 2024. [Return to text](#)

<sup>6</sup> “[CBDCs, Payment Firms, and Geopolitics](#),” Berg T, Keil J, Martini F, Puri M. NBER Working Paper 32857, August 2024. [Return to text](#)

NBER News

Summer Institute 2025

More than 2,800 researchers, hailing from 31 countries, traveled to Cambridge for the [48th annual NBER Summer Institute](#), which was held over three weeks in mid-July. The Summer Institute included 50 distinct workshops that were arranged by more than 150 organizers. Most of the meetings were streamed on the [NBER’s YouTube channel](#).

The participants represented 432 universities, central banks, think tanks, businesses, and government agencies. About one-third of the participants were NBER affiliates; over 500 were first-time Summer Institute participants.

The 602 research papers presented during the course of the Summer Institute were selected from 3,448 submissions, implying an acceptance rate of 17.4 percent.

NBER Research Associate and former Council of Economic Advisers chair [N. Gregory Mankiw](#) of Harvard University presented the Martin Feldstein Lecture on “[The Fiscal Future](#).” He described the prospective growth of US government debt, which some projections suggest will lead

to a debt-to-GDP ratio of 1.5 by mid-century. He analyzed five possible strategies for achieving a more sustainable fiscal path—extraordinary economic growth, government default, large-scale money creation, substantial spending cuts, and large tax increases—and concluded that significant tax increases, potentially including a value-added tax, is the most likely outcome.

Kosuke Imai and Research Associate [Raj Chetty](#), both of Harvard University, delivered the Methods Lectures on “[Uncovering Causal Mechanisms: Mediation Analysis and Surrogate Indices](#).” They described both the theory behind and the application of new tools for drawing inferences about the long-term consequences of policy interventions when only short-term outcomes can be measured. They showed how in such settings, well-identified causal effects of short-run consequences could be combined with other data sources to bound potential long-term effects.

Gianluca Violante Joins Macro Annual Organizer Team

Research Associate [Gianluca Violante](#), the Theodore A. Wells ‘29 Professor of Economics at Princeton University and an affiliate of the NBER Economic Fluctuations and Growth and Monetary Economics programs, has joined John Leahy and Valerie Ramey as an organizer of the Macroeconomics Annual conference and an editor of the subsequent volume. Violante’s research ranges widely across macroeconomics, labor economics, and public finance. He is also a past co-editor of *Econometrica* and a past editor of the *Review of Economic Dynamics*.



Damon Jones to Edit Tax Policy and the Economy

Research Associate [Damon Jones](#), an affiliate of the Economics of Aging and Public Economics programs whose research focuses on the economic effects of tax policies and transfer programs, will co-organize the [2025 Tax Policy and the Economy \(TPE\) meeting](#) and co-edit the resulting publication. Jones, a faculty member of the Harris School of Public Policy at the University of Chicago, will succeed Research Associate [Robert Moffitt](#) of Johns Hopkins University, who has served in these roles since 2016. Jones and Moffitt will collaborate on the 2025 TPE meeting, and Jones will be the sole organizer and editor beginning in 2026.



Cohort Studies Working Group Winds Down

After 25 years of promoting research on economic events over the course of the lifecycle, intergenerational household linkages, and how individuals in different birth cohorts have been affected by variation over time in economic, institutional, and demographic factors, the NBER Working Group on Cohort Studies has closed. Research Associate [Dora Costa](#), the Kenneth L. Sokoloff Professor

of Economic History at UCLA, founded the group and served as its sole director. For many years, the Working Group was supported by grants from the National Institute on Aging. Active research on the core issues that animated the group’s meetings continues in several NBER programs, particularly [Economics of Aging, Children and Families](#), and [Development of the American Economy](#).



# Conferences and Meetings

Detailed programs for NBER conferences are available at [nber.org/conferences](https://nber.org/conferences)

Title of Conference/Meeting	Organizers	Dates
<a href="#">Heterogeneous-Agent Macroeconomics Workshop</a>	Adrien Auclert, Adrien Bilal, Matthew Rognlie, and Ludwig Straub	June 4–6, 2025
<a href="#">NBER Coordinating Center on the Economics of AD/ARD Prevention, Treatment, and Care</a>	Rhoda Au, Julie Bynum, and Kathleen M. McGarry	June 12, 2025
<a href="#">Aging and Health</a>	Fabrizio Mazzonna, Kathleen M. McGarry, and Jonathan S. Skinner	June 14–16, 2025
<a href="#">International Seminar on Macroeconomics</a>	Kristin Forbes and Ricardo Reis	June 21–22, 2025
<a href="#">International Finance and Macroeconomics Data Session</a>	Jesse Schreger and Chenzi Xu	July 7, 2025
<a href="#">Corporate Finance</a>	Antoinette Schoar and Amir Sufi	July 7–8, 2025
<a href="#">International Trade and Investment</a>	Treb Allen and Cécile Gaubert	July 7–9, 2025
<a href="#">Capital Markets and the Economy</a>	Janice C. Eberly and Deborah J. Lucas	July 7–9, 2025
<a href="#">Development of the American Economy</a>	Leah Platt Boustan, William J. Collins, Shari Eli, Eric Hilt, and Taylor Jaworski	July 7–10, 2025
<a href="#">Monetary Economics</a>	Emi Nakamura and Jón Steinsson	July 7–11, 2025
<a href="#">Impulse and Propagation Mechanisms</a>	Lawrence Christiano and Martin S. Eichenbaum	July 7–11, 2025
<a href="#">International Trade and Macroeconomics</a>	Yan Bai and Michael E. Waugh	July 8, 2025
<a href="#">International Finance and Macroeconomics</a>	Pablo Ottonello and Vincenzo Quadrini	July 8–11, 2025
<a href="#">Forecasting &amp; Empirical Methods</a>	Allan Timmermann and Jonathan H. Wright	July 8–11, 2025
<a href="#">International Asset Pricing</a>	Karen K. Lewis and Adrien Verdelhan	July 9, 2025
<a href="#">Workshop on Methods and Applications for Dynamic Equilibrium Models</a>	S. Borağan Aruoba, Luigi Bocola, Jesús Fernández-Villaverde, and Christian K. Wolf	July 9–10, 2025
<a href="#">Macro, Money and Financial Frictions</a>	Markus K. Brunnermeier, Arvind Krishnamurthy, and Guillermo Ordoñez	July 9–10, 2025
<a href="#">Martin Feldstein Lecture</a>	James M. Poterba	July 10, 2025
<a href="#">International Economics and Geopolitics</a>	Matteo Maggiori and Jesse Schreger	July 10, 2025
<a href="#">Economic Growth</a>	Ufuk Akcigit, Francisco J. Buera, and David Lagakos	July 10–11, 2025
<a href="#">Asset Pricing</a>	Ralph S. J. Koijen and Sydney C. Ludvigson	July 10–11, 2025
<a href="#">Behavioral Macro</a>	Andrew Caplin and Ulrike Malmendier	July 11, 2025
<a href="#">Innovation Research Boot Camp</a>	Benjamin Jones and Heidi L. Williams	July 11–17, 2025
<a href="#">Big Data and High-Performance Computing for Financial Economics</a>	Toni Whited and Mao Ye	July 12, 2025
<a href="#">Economic Fluctuations and Growth</a>	Yueran Ma and Michael Peters	July 12, 2025
<a href="#">Entrepreneurship</a>	Yael Hochberg, Josh Lerner, and David T. Robinson	July 14, 2025

# Conferences and Meetings (continued)

Detailed programs for NBER conferences are available at [nber.org/conferences](https://nber.org/conferences)

Title of Conference/Meeting	Organizers	Dates
<a href="#">Macroeconomics Within and Across Borders</a>	Mark A. Aguiar, Cristina Arellano, Patrick J. Kehoe, and Mark L. J. Wright	July 14, 2025
<a href="#">Conference on Research in Income and Wealth</a>	Susanto Basu, David M. Byrne, and Karen Dynan	July 14–15, 2025
<a href="#">The Micro and Macro Perspectives of the Aggregate Labor Market</a>	Philipp Kircher, Guido Menzio, and Giuseppe Moscarini	July 14–17, 2025
<a href="#">Micro Data and Macro Models</a>	Erik Hurst, Greg Kaplan, and Gianluca L. Violante	July 14–17, 2025
<a href="#">Entrepreneurship Research Boot Camp</a>	David T. Robinson and Jorge Guzman	July 14–18, 2025
<a href="#">Macroeconomics and Productivity</a>	Susanto Basu, Nicholas Bloom, Raffaella Sadun, and Chad Syverson	July 15, 2025
<a href="#">Political Economy</a>	Filipe R. Campante, Karam Kang, Nancy Qian, and Romain Wacziarg	July 15–16, 2025
<a href="#">Innovation</a>	Adam B. Jaffe, Benjamin Jones, and Heidi L. Williams	July 15–16, 2025
<a href="#">Inequality and Macroeconomics</a>	Roland Bénabou, Raquel Fernández, and Jonathan Heathcote	July 15–16, 2025
<a href="#">Digital Economics and Artificial Intelligence</a>	Erik Brynjolfsson, Avi Goldfarb, and Catherine Tucker	July 16–18, 2025
<a href="#">Macro Public Finance</a>	Dirk Krueger, Florian Scheuer, Stefanie Stantcheva, and Aleh Tsyvinski	July 17, 2025
<a href="#">Science of Science Funding</a>	Megan MacGarvie, Paula Stephan, and Reinhilde Veugelers	July 17–18, 2025
<a href="#">Industrial Organization</a>	Milena Almagro, Mert Demirer, Liran Einav, Charles Hodgson, and Stephen P. Ryan	July 17–18, 2025
<a href="#">Household Finance</a>	Janet Gao, Adair Morse, and Stephen P. Zeldes	July 17–18, 2025
<a href="#">Workshop on Aging</a>	David M. Cutler, Kosali I. Simon, and Jonathan S. Skinner	July 21–22, 2025
<a href="#">Environmental &amp; Energy Economics</a>	Hannah Druckenmiller, Meredith Fowlie, Will Rafey, and Nicholas Ryan	July 21–22, 2025
<a href="#">Development Economics</a>	Arya Gaduh, Rema Hanna, Seema Jayachandran, Joseph P. Kaboski, Cynthia Kinnan, Ahmed Mushfiq Mobarak, Gautam Rao, and Dean Yang	July 21–22, 2025
<a href="#">Labor Studies</a>	David Arnold, David Autor, Zoë B. Cullen, Alessandra Fenizia, Matthew S. Johnson, Kurt J. Lavetti, Alexandre Mas, Pascual Restrepo, and Nina Roussille	July 21–23, 2025
<a href="#">Public Economics</a>	Raj Chetty, Itzik Fadlon, Tatiana Homonoff, Benjamin B. Lockwood, Mathilde Muñoz, and Maria Polyakova	July 22–23, 2025
<a href="#">Gender in the Economy</a>	Marcella Alsan, Jessica Goldberg, Claudia Goldin, Claudia Olivetti, and Melanie Wasserman	July 22–23, 2025
<a href="#">Economics of Social Security</a>	Manasi Deshpande and James M. Poterba	July 23, 2025

# Conferences and Meetings (continued)

Detailed programs for NBER conferences are available at [nber.org/conferences](https://nber.org/conferences)

Title of Conference/Meeting	Organizers	Dates
Economics of Education	Caroline M. Hoxby	July 23, 2025
Personnel Economics	Mitchell Hoffman and Fabian Lange	July 23–24, 2025
Law and Economics	Christine Jolls	July 23–24, 2025
Economics of Health	Colleen Carey, Christopher S. Carpenter, Paul J. Eliason, Amy Finkelstein, Sarah Miller, Erik T. Nesson, Adam Sacarny, and Meghan Skira	July 23–24, 2025
Real Estate	Christopher Palmer, Tomasz Piskorski, Winnie van Dijk, and Maisy Wong	July 23–24, 2025
Methods Lecture: Uncovering Causal Mechanisms: Mediation Analysis and Surrogate Indices	James M. Poterba	July 24, 2025
Frontier Econometric Methods	Isaiah Andrews, Susan Athey, and Christopher R. Walters	July 24, 2025
Children and Families	Anna Aizer and Janet Currie	July 24–25, 2025
Urban Economics	Rebecca Diamond, Jonathan I. Dingel, and Edward L. Glaeser	July 24–25, 2025
Economics of Crime	Jens Ludwig and Crystal Yang	July 24–25, 2025
Japan Project Meeting	Kosuke Aoki, Shiro P. Armstrong, Charles Yuji Horioka, and David Weinstein	July 29–30, 2025

# Books

## NBER Macroeconomics Annual 2024, volume 39

**Martin S. Eichenbaum, John V. Leahy, and Valerie A. Ramey, editors.**

The **NBER Macroeconomics Annual** presents research on central issues in contemporary macroeconomics.

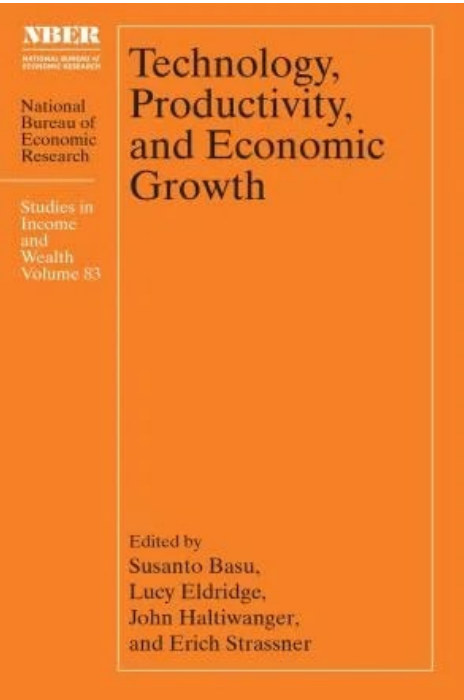
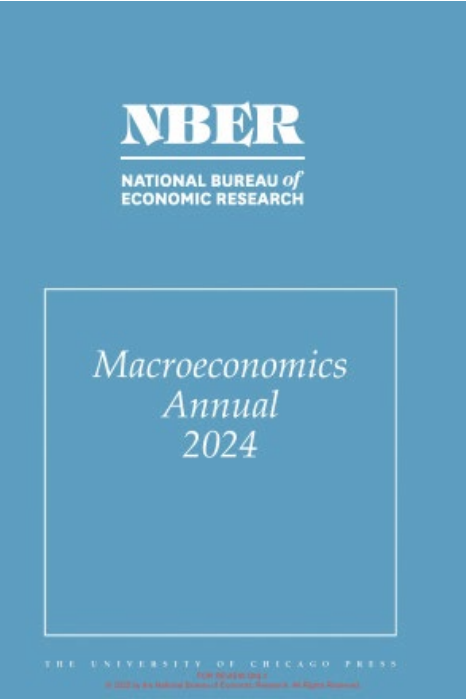
**Martin Kornejew, Chen Lian, Yueran Ma, Pablo Ottonello, and Diego J. Perez** investigate the role of bankruptcy institutions in mitigating the economic fallout of credit crunches following booms and find that efficient institutions reduce the adverse effect of credit tightening on GDP.

**Santiago Camara, Lawrence Christiano, and Hüsnu Dalgic** analyze the global effects of US monetary policy shocks, with particular attention to trade channels and financial frictions, and find that tighter US monetary policy leads to more pronounced contractions in emerging markets than in advanced economies.

**David Altig, Alan J. Auerbach, Erin F. Eidschun, Laurence J. Kotlikoff, and Victor Yifan Ye** assess the welfare costs of inflation through interactions with tax and benefit programs and show that imperfect indexation leads to welfare losses for some households and gains for others.

**Paul Beaudry, Chenyu Hou, and Franck Portier** examine inflation dynamics and find that supply shocks and inflation expectations are pivotal for explaining them.

Finally, **Davide Debortoli** and **Jordi Galí** develop a simplified two-agent New Keynesian (TANK) model to emulate more complex heterogeneous agent New Keynesian (HANK) models and use it to examine the many channels through which heterogeneity influences aggregate fluctuations.



## Technology, Productivity, and Economic Growth

**Susanto Basu, Lucy Eldridge, John Haltiwanger, and Erich Strassner, editors.**

Current technological developments in a number of industries, such as the rise of artificial intelligence and innovations associated with the green energy transition, are likely to have significant and wide-ranging effects.

This **volume** explores the implications of rapid changes in advanced technology and considers how to conceptualize and model these advances and improve measures of productivity and economic growth.

The study of these issues is facilitated both by new methods for using and integrating disparate data sources and by the availability of new data sources.

The chapters in this volume leverage these developments to offer fresh insights on long-standing issues in productivity analysis and technological change.