NBER
Reporter

Mario Draghi

ALSO IN THIS ISSUE

15th Annual Martin Feldstein Lecture

The Next Flight of the Bumblebee: The Path to Common Fiscal Policy in the Eurozone

Presented by Mario Draghi, former President, European Central Bank, and former Prime Minister, Italy

The NBER is a cornerstone of economic thinking worldwide. Since its foundation over a century ago, its members have pushed the boundary of academic research to an extent that was simply unimaginable at that time. You have also guided the work of policymakers and contributed to making the world a better place. I am personally very grateful for the research you have produced during my time in government and central banks. It has prevented mistakes, strengthened our convictions, and made our policies much more effective.

I would also like to pay tribute to the late Marty Feldstein. He was a towering figure throughout my career — in fact, it was thanks to an invitation from him that I attended the first Summer Institute back in 1978. Since then, he went on to influence academia and policymaking to an extent that few other economists can equal. His work on tax policy, public economics, and savings behavior has transformed the way we think about entire areas of research. This is because Marty's research always combined insightful ideas with robust empirical evidence and policy relevance. As the chairman of the Council of Economic Advisers to President Ronald Reagan, he spearheaded a paradigm shift in the relationship between governments and markets, not just in the US but worldwide. At the NBER, his stewardship has contributed to transforming this institution into the intellectual powerhouse it is today. And he did all of this while continuing to care deeply for undergraduate and graduate students, mentoring many generations of economists. In the economics profession, it is hard to think of someone who — in one way or another — does not owe a debt of gratitude to Marty.

My lecture today will focus on a topic that was very close to Marty's heart, which is the creation of the European Monetary Union and

its future — of which Marty was extremely skeptical.

The fundamental macroeconomic challenge of forming a monetary union was laid out by Robert Mundell in 1961 and centered on the management of asymmetric shocks. Countries joining a common currency would relinquish the ability to set their own monetary policy and use the exchange rate as an instrument of stabilization. As monetary policy and exchange rate policy would be allocated to the management of common shocks, other adjustment mechanisms would be needed to address asymmetric shocks and prevent them from triggering prolonged regional slumps. Mundell identified those adjustment mechanisms as fiscal transfers and labor and capital mobility, which could stabilize demand ex post in depressed regions. In the later literature, the crucial role of risk sharing via capital market integration was also recognized, which would limit the size of local shocks ex ante.[1]

The euro however went ahead with few of these conditions in place. Fiscal transfers among member states in the form of assuming each other's debts were outlawed in the Maastricht treaty — reflecting a philosophy where countries should "keep their own house in order" and not rely on the largesse of others. Regional adjustment through labor mobility was underdeveloped, with studies at the time finding that the majority of employment shocks were absorbed through changes in the participation rate rather than migration.[2] And there was no serious attempt to integrate European financial markets beyond soft regulatory alignment.

So why did they do it? Viewed from this side of the Atlantic, the reasons were often incomprehensible. Many economists warned that the European monetary union was doomed to fail, that the elites had cheated their people, and that the consequences would be stark — condemning the EU both as an economic and a political project. As Marty Feldstein warned in a famous 1997 article for *Foreign Affairs*, "[i]f EMU does come into existence, as now seems increasingly likely, it will change the political character of Europe in ways that could lead to conflicts in Europe...".

But there was always another perspective, which was that the euro was the consequence of decades of past integration — notably the evolution of Europe's single market — and that it was only one more step along a much longer road

towards political union. And through the so-called "functionalist" logic of integration, where one step forward leads inexorably to the next as its shortcomings are revealed, the end goal of political union would drive the necessary macroeconomic changes. From this viewpoint, the key question was not whether the euro area was an optimal currency area from the start — evidently it was not — but whether European countries were prepared to make it converge towards one over time.

The immediate aftermath of the creation of the euro, however, added to the doubts of the skeptics. And it is easy to see why many did not view this political narrative as credible, especially once the euro was launched and the next steps in political union began to unfold. When given the chance to demonstrate their commitment to political union in the form of a European constitution, Europeans rejected it. And the EU then elected to enlarge to Eastern Europe in the mid-2000s without reforming its decision-making rules — arguably weakening rather than strengthening its political nature.

But having taken part in the negotiations for monetary union in the early 1990s as head of the Italian treasury, I can attest that this political motivation was real. The goal of building an ever-closer European Union ran very deep, born out of the ashes of World War II and conceived above all to avoid conflict in Europe. And the single currency was seen as a fundamental step towards that goal. From a political standpoint, the priority was therefore to seize the historical moment and not to wait until every necessary condition was in place. And there was a genuine belief that the core commitment to European unity would create the political will to address any design flaws that were uncovered along the way.

So we moved forward, sidestepping our contradictions and knowing that there were serious economic concerns — especially the lack of fiscal transfers and the very different starting conditions across member states in terms of public debt levels.

Success would depend on three conditions being met.

First, national fiscal stabilizers would have to be able to operate freely, which — given the size of national budgets in Europe — could provide substantial stabilization of local shocks. Estimates at the time suggested that national budgets could provide as much stabilization of asymmetric shocks as the US federal budget.[3,4]

Second, the political commitment to the euro would have to create implicit transfers in place of explicit ones — via fiscally weaker countries "borrowing" the credibility of fiscally stronger ones and enjoying lower financing costs. That would allow governments to implement stabilization policies without threatening their market access.

Third, fiscal rules would have to be designed and applied in such a way as to anchor confidence in the medium-term soundness of public finances so that countercyclical expansions would not engender fundamental questions of solvency. In that way, the promises that underlay those implicit transfers would never have to be tested.

For the first decade of the euro, the first two of these conditions broadly held. Markets viewed euro area sovereign issuers as essentially interchangeable, with spreads on Italian bonds converging to within a few basis points of German ones. And national fiscal stabilizers were able to operate relatively freely when faced with moderate shocks, such as 9/11 and the dot-com bust. But the third condition failed. Europe's fiscal rules were built around deficit limits — with a ceiling of 3 percent of GDP — which created built-in procyclicality.

Whenever a country grew quickly, it would see revenue windfalls which made the deficit ceiling look slack, leading in turn to rising spending commitments and higher structural deficits. But if the cycle turned sharply, those revenues would evaporate while the structural commitments remained, rapidly reducing fiscal space. As a result, with the very large shock after the Lehman bust, deficits ballooned and public debts were pushed closer to levels that could not be

sustained by implicit transfers alone. The constructive ambiguity of the common commitment to the euro had to be filled out by detailed plans for what would happen in extremis.

Governments initially responded as the "functionalists" had hoped, by expanding the euro area's policy framework to allow limited transfers in the form of IMF–style financial assistance. And they did so successfully, launching the first Greek bailout and a common European financing mechanism.

But then EU leaders announced in late 2010 that future bailouts would be subject to sovereign debt restructuring: the so-called "Deauville agreement." In an instant, this cut off implicit transfers and injected credit risk into all European sovereign bonds. It left us with two stark choices.

The first was to accept widespread sovereign failures in order to "reset" the union at lower debt levels, thereby preserving the principle that fiscally stronger states should not pay for weaker ones. But precisely because initial debt levels were so high, and holdings of sovereign paper were concentrated within the euro area banking system, defaults could not remain contained events except in very limited cases.

Fearing principal losses and — at worst — redenomination into lower-value currencies, investors sold off the public debt of any country perceived to be vulnerable, triggering a vicious circle of worsening bank balance sheets, tightening credit conditions, and tumbling growth — and ultimately deep financial fragmentation. By 2012, spreads vis-à-vis German ten-year government bonds reached 500 basis points in Italy and 600 basis points in Spain, with even wider spreads in Greece, Portugal, and Ireland. As those economies represented a third of euro area GDP, it was unthinkable that the rest of the union would not be pulled under without a change of tack.

The second option was therefore to make transfers more explicit, which is what Europe ultimately did — if in a suboptimal way. It expanded its common financing mechanism, which increased

risk sharing through cross-border lending within the European Union. Recent literature finds that pre-sovereign debt crisis, only around 40 percent of country-specific shocks in the euro area were absorbed, whereas once this official assistance was in place around 60 percent were smoothed out.[5] This lending in turn facilitated a form of fiscal transfer. It allowed Greek debt to be restructured, transferring resources from private bondholders to public creditors. And those public creditors then extended their loans decades into the future at very low fixed interest rates, which will lead over time to a large intertemporal transfer to Greece and other countries that received financial assistance.

This response again inched the euro area closer to an optimal currency area. But the transfers still fell some way short of the model that Mundell had imagined. The key problem was that their stabilizing effect was undermined in the countries receiving them by the strict terms of the accompanying adjustment programs. And at the same time, Europe's procyclical fiscal rules compounded the weakness in demand by inducing an aggregate fiscal contraction into a recessionary shock. As countries strived to stay on the right side of the deficit limits, the euro area fiscal stance tightened by around 4 percentage points of potential GDP from 2011 to 2013 — even in countries that had ample fiscal space and suffered no market pressure, thereby reducing demand for exports from countries without fiscal space.

The difficult road towards building a complete monetary union was illustrated by the diverging responses in Europe to these developments. In Greece and other countries, years of austerity fueled rising populism. But in Germany, Euroskepticism also rose as new parties appeared opposing bailouts and the perceived laxity of their terms. And a few years later, once monetary policy turned strongly accommodative in part to offset the disinflationary effects of fiscal tightening, the Finance Minister of Germany claimed that he was 50 percent responsible for the rise of Euroskeptic parties in his country.

For all these problems, however, the euro survived. Governments of all colors and from all countries continued to stand behind the project, preferring to keep even the weakest member states on board. This strong political commitment was essential when the European Central Bank (ECB) announced in 2012 that it would be within its mandate to do "whatever it takes" to save the euro — a decision sanctioned by the European Court of Justice three years later. And investors stopped betting against the dissolution of the common currency since they knew that Europe's decision-makers would never allow it to happen.

There is still no agreement today in the euro area around a central budget for stabilization purposes or cross-border fiscal transfers. And this begs the question of whether the currency area can ever be truly stable without further integration in this domain. There is no doubt that it would be a desirable end goal to have a central fiscal capacity for stabilization purposes, as regions will always be exposed to asymmetric shocks. But three factors suggest that it may no longer be a sine qua non condition.

First, over time, the euro area has gradually converged closer to the other ideal conditions that Mundell laid out, somewhat mitigating the need for fiscal transfers. Twenty-five years of economic integration have led to more integrated supply chains and more synchronized business cycles, making the single monetary policy more appropriate for all countries. Multiple studies find that business cycle synchronization in the euro area has risen since 1999 and the euro can explain at least half of the overall increase.[6]

At the same time, while labor mobility in the euro area remains some way short of US levels, studies have found a gradual convergence, reflecting both a fall in interstate migration in the US and a rise in the role of migration in Europe.[7] And channels of risk sharing have improved further. For example, against the backdrop of banking sector integration — the so-called banking union — and generous official assistance, cross-border lending was notably more resilient during the pandemic than we had seen during previous large shocks.[8] The further Europe can advance along this path — especially in terms of integrating its capital markets — the lower the need for permanent fiscal transfers will be.

Second, the ability of national fiscal policies to stabilize the cycle has been bolstered by the changing reaction function of the central bank. Since 2012, the ECB has identified unwarranted increases in sovereign spreads as a fundamental impediment to the smooth transmission of monetary policy — and repeatedly acted when transmission was under threat. That reaction function has placed an effective floor under sovereign bond markets in cases where spreads are not fundamentally driven — a floor that has proven to be effective even when the stances of monetary and fiscal policy have not been aligned. For example, euro area governments were able to undertake a sizable fiscal stimulus to offset the effects of the energy crisis last winter, even as policy rates were rising steeply and the economy was stalling — with the euro area transferring more than 200 billion euro to the rest of the world in the form of a terms of trade tax. This would likely have been impossible a decade prior when even small rate increases proved destabilizing. It suggests that something has fundamentally changed in how investors view the euro area and the leeway that they are prepared to provide.

Third, the nature of the shocks we are facing is changing. With the pandemic, the energy crisis, and the war in Ukraine, we are increasingly confronting common, imported shocks rather than asymmetric, self-inflicted ones. This shifts the problem from supporting struggling states towards addressing shared challenges — and so creates a different alignment of political preferences. As the episode I described earlier illustrated, cyclical risk sharing is hard to implement in Europe because political preferences are severely misaligned. But for shared goals such as health, defense, and the climate transition, policy preferences are overlapping and the need for higher spending com-

mitments is incontrovertible.

The European response to the pandemic acknowledged this new reality. It forced Europe to centralize important areas of health policy, as the European Commission proved a more effective buyer of vaccines than individual states could be. The restrictions which were necessary to slow the spread of the virus also led to the creation of a joint fund to support labor markets across the euro area (SURE). Ultimately, Europe agreed on the creation of a 750 billion euro fund (NextGenerationEU) to support countries in addressing the green and digital transitions, which demand much greater investment than individual countries alone can afford. And so, if the degree of convergence within the euro area is higher, the frequency of asymmetric shocks is lower, and common funding of shared goals increases, the rarer will become the instances when a fiscal capacity is really needed.

The key question now is whether Europe can continue this transition from cyclical to structural fiscal policy — and thereby open up a different, perhaps more historically founded, road towards fiscal union. History tells us that common budgets have rarely been created as an adjunct to monetary integration, but rather to deliver specific goals in the public interest. In the US, it was the War of Independence that delivered the "Hamiltonian moment" of debt assumption by the federal government. In Canada and Germany, the first direct federal taxes — aside from customs duties — were created to generate new revenues to fund outlays associated with the First World War. It was the need to overcome the Great Depression that led to the expansion of the US federal budget in the 1930s.

Similarly, in Europe today we have never faced so many shared supranational goals, by which I mean goals that cannot be managed by countries acting alone. We are undergoing a series of major transitions that will require vast common investments. The European Commission puts the investment needs for the green transition at more than 600 billion euro

annually until 2030[9] — and between a quarter and a fifth of this will have to be funded by the public sector.[10]

We are also facing a geopolitical transition, driven by US-China decoupling, in which we can no longer rely on unfriendly countries for critical supplies. That will require a substantial reorientation of investment towards building capacity at home. And never in the history of the EU have its founding values of peace, democracy, and freedom been challenged as much as they are by the war in Ukraine. One immediate consequence is that we must make a transition towards much stronger common European defense if we are, at a minimum, to meet the NATO military expenditure target of 2 percent of GDP.

But as it stands, Europe's institutional construct is not well suited to carry out these transitions — as a comparison with the US reveals. Here, we are seeing a new focus on so-called "statecraft," where federal spending, regulatory changes, and tax incentives align to pursue US strategic goals. The Inflation Reduction Act, for example, will simultaneously accelerate green spending, attract foreign investment, and restructure supply chains in America's favor. But Europe lacks an equivalent strategy to integrate EU-level spending, state aid rules, and national fiscal plans — as the example of climate change shows.

Once NextGenerationEU expires, there is no proposal for a federal instrument to replace it to carry out the necessary climate-related spending. EU state aid rules limit the ability of national authorities to actively pursue green industrial policy. And we have no carve-outs in our fiscal rules to enable sufficient long-term investment. Without action, there is a serious risk that we underdeliver on our climate goals, and likely lose our industrial base to regions that impose fewer constraints on themselves. This leaves us with two options.

First, we can ease state aid rules and relax fiscal rules, allowing member states to take on the burden of investment spending in full. But in the process, we will create fragmentation as — even with

the greater leeway that markets are allowing the euro area today — countries with more fiscal space will have much more room to spend than others. As we learned from the Deauville agreement, fragmentation makes no sense when there is a supranational objective that countries cannot achieve on their own. Just as the euro cannot be stable if large parts of the monetary union are failing, climate change cannot be solved by Germany reducing its carbon emissions faster than Italy.

So, this means that the only option that allows us to achieve our goals is the second one: to take this opportunity to redefine the EU, its fiscal framework, and its decision-making process, and make them commensurate with the challenges we face. And it so happens that the fiscal rules are currently up for discussion, while — with further enlargement on the table — the time to reflect on decision-making rules is apt.

The core challenge for the euro area is that we are relying on fiscal rules at the national level to deliver multiple different goals. Given the crucial stabilizing role of national budgets, we need rules that allow a countercyclical policy to respond to local shocks. We also need rules that facilitate massive public investment programs. And we need to ensure the medium-term credibility of national fiscal policies in the context of very high post-pandemic debt levels. But there is an inherent trade-off between these goals.

Ensuring fiscal credibility requires rules to be more automatic and less discretionary. But since no rule can be tailored to all future contingencies, more automaticity will always constrain the ability of governments to react to unforeseen shocks. Likewise, credible rules require adjustments over not-too-long time horizons. But the kind of investments we need today imply long-term spending commitments — many of which will extend beyond the lifetimes of the governments making them.

The European Commission has attempted to resolve these trade-offs by proposing to focus on an expenditure rule that is linked to a country's medium-term debt trajectory. This would certainly

be an improvement on the previous deficit caps, as expenditure rules accommodate revenue windfalls during upswings, thereby enabling the countercyclical, stabilizing role of fiscal policy when the cycle turns.[11] The expenditure path can also be adjusted for countries undertaking investments by lengthening the period until the debt trajectory needs to start declining. But all this will inevitably come at the price of automaticity and, perhaps, enforceability.

So, if we look further ahead, we need to acknowledge that truly credible fiscal rules cannot work without an equivalent rethinking of where fiscal powers should reside. As automatic rules represent devolution of power *to* the center, they can only work if they are matched by a greater degree of spending *from* the center. This is broadly what we see in the US, where the devolution of power to the federal government makes possible broadly inflexible fiscal rules for the states. Balanced budgets at the state level are credible *precisely because* of fiscal transfers and federal spending on common projects, which can address unforeseen shocks and fund shared goals. The euro area will probably never replicate this structure in full, given the greater role of national budgets in macroeconomic stabilization. But there are good reasons why importing some elements would make sense.

First, if we were to carve out and federalize some of the investment spending that is needed for shared goals, it would make more efficient use of our fiscal space. Europe's asymmetric fiscal space — with some countries able to spend much more than others — is fundamentally wasteful when it comes to shared goals like climate and defense. If some countries can spend freely on these goals but others cannot, then the multiplier of all spending is lower, since none are able to achieve climate or military security.

Second, issuing more common debt to finance this investment would potentially enlarge the collective fiscal space we have available. The borrowing costs of the EU are lower than the weighted average borrowing costs of its member states, and they are almost identical to those of the

financing mechanism set up during the crisis, the European Stability Mechanism (ESM), despite the latter sitting on so much paid-in capital that it could repurchase 70 percent of its bonds at nominal value. This suggests that investors put significant faith in the capacity of the EU to extract from each participating country the future stream of revenue necessary to service the underlying debt. And that in turn implies an untapped potential for the EU to intermediate debt and lower aggregate borrowing costs in the Union.

But elevating more tasks to the federal level would require trust among member states in the ability and integrity of national authorities to spend joint funds as much of the implementation would still take place at the national level. And it would require a commensurate change in our fiscal rules in the direction of less flexibility. Issuing more EU debt would, everything else equal, reduce the fiscal capacity to service national debt. And that means, at a minimum, we would need to ensure that high-debt member states use the fiscal space created by common spending to improve their fiscal outlook — a part of which should come through positive growth effects.

For now, there are limits to how far we can go in this direction, not least because the borrowing cost of the Union is still above that of its strongest members, meaning more common borrowing may be seen as a form of unsanctioned fiscal transfer. And so, one possibility is to proceed — as we have up to now — with technocratic, "functionalist" integration, making apparently technical changes and hoping that political ones will follow. This approach succeeded eventually with the euro, and it has ultimately made the EU stronger. But the costs have been high and progress has been slow.

The other possibility is to proceed with a genuine political process, where the ultimate goal is explicit from the outset and endorsed by voters in the form of an EU Treaty change. This route failed in the mid-2000s and policymakers have shied from it since, but I believe that now there is more hope of movement. As the EU enlarges further to include

the Balkans and Ukraine, it will be essential to reopen the Treaties to ensure that we do not repeat the mistakes of the past by expanding our periphery without strengthening the center. And this should produce a natural alignment between our shared goals, collective decision-making, and fiscal rules.

The starting point of any future Treaty change must be the acknowledgment of the increasing number of shared goals and the need to finance them together, which in turn necessitates a different form of representation and centralized decision-making. Then, a move towards more automatic rules would become more realistic. I believe that Europeans are more ready today than 20 years ago to take this route because today they only really have three options: paralysis, exit, or integration. The polls are clear that citizens feel an increasing sense of external threat, not least since the Russian invasion, which makes paralysis increasingly unattractive. The case for exit has moved from theory to reality with Brexit and whether there are net benefits remains highly uncertain. And so, the relative costs of further integration are now lower.

Whichever route we take, we cannot stand still or — like a bicycle — we will fall over. The strategies that had ensured our prosperity and security in the past — reliance on the USA for security, on China for exports, and on Russia for energy — are insufficient, uncertain, or unacceptable. The challenges of climate change and migration only add to the sense of urgency to enhance Europe's capacity to act.

We will not be able to build that capacity without reviewing Europe's fiscal framework, and I have tried to outline the directions this change might take. But ultimately the war in Ukraine has redefined our Union more profoundly — not only in its membership, and not only in its shared goals, but also in the awareness it has created that our future is entirely in our hands, and in our unity.

[1] "A Theory of Optimum Currency Areas" Mundell RA. *The American*

Economic Review 51(4), September 1961, pp. 657–665; "Optimum Currency Areas" McKinnon RI. *The American Economic Review* 53(4), September 1963, pp. 717–724; "The Theory of Optimum Currency Areas: An Eclectic View | Semantic Scholar" Kenen P. in Mundell RA, Swodoba AK (eds), *Monetary Problems of the International Economy* University of Chicago Press, 1969.
Return to Text

2   "Regional Labor Market Dynamics in Europe" Decressin J, Fatás A. *European Economic Review* 39(9), December 1995, pp. 1627–1655.
"Regional Non-Adjustment and Fiscal Policy" Obstfeld M, Peri G, Blanchard OJ, Fatás A. *Economic Policy* 13(26), April 1998, pp 205–259.
Return to Text

3   "Fiscal flows in the United States and Canada: Lessons for monetary union in Europe" Bayoumi T, Masson PR. *European Economic Review* 39(2), February 1995, pp. 253–274.
Return to Text

4   Later estimates find that 49% of an unemployment shock is absorbed by the automatic stabilisers in the euro area, whereas the figure for the US is 32%. "Automatic Stabilizers in the Eurozone: Analysis of their Effectiveness at the Member State and Euro Area Level and in International Comparison" Dolls M, Fuest C, Kock J, Peichl A, Wehrhöfer N, Wittneben C. *Center for European Economic Research*, November 2014.
Return to Text

5   "Private and Public Risk Sharing in the Euro Area" Cimadomo J, Ciminelli G, Furtuna O, Giuliodori M. *European Economic Review* 121, January 2020, 103347.
Return to Text

6   Meta-analysis by Campos et al. (2017) that encompasses the estimates, design and estimation characteristics of more than 60 studies on business cycle correlations between EU countries.
"Business Cycle Synchronisation in a Currency Union: Taking Stock of the Evidence" Campos N, Fidrmuc J, Korhonen I. *Bank of Finland Research Discussion Paper* 28, September 2017.
Return to Text

7   "Labour Market Adjustments and Migration in Europe and the United States: How Different?" Beyer RCM, Smets F. *Economic Policy* 30(84), October 2015, pp. 643–682.
Return to Text

8   "Risk Sharing in the Euro Area: a Focus on the Public Channel and the COVID-19 Pandemic" Cimadomo J. *ECB Economic Bulletin* (7), 2022.
Return to Text

9   "2023 Strategic Foresight Report", *European Commission*, July 2023.
Return to Text

10 "A Green Fiscal Pact: Climate Investment in Times of Budget Consolidation" Darvas Z, Wolff GB. *Policy Contribution* (18), Bruegel, September 2021.
Return to Text

11 "Taking Stock of the Functioning of the EU Fiscal Rules and Options for Reform" Kamps C, Leiner-Killinger N. *ECB Occasional Paper Series* No. 231, August 2019.
Return to Text

Research Summaries

How Do Corporate Taxes Affect Economic Activity?

Juan Carlos Suárez Serrato and Owen Zidar

This article surveys our recent work on the economic effects of corporate taxes, first discussing research on the effects of state corporate tax cuts and then considering how federal tax policies that encourage investment impact workers. It concludes by outlining new avenues for research on related issues.

State Corporate Taxes and Local Economic Activity

Local and state policymakers compete to attract companies to their jurisdictions. Proponents of using business tax cuts as incentives for firm location argue that increases in job creation justify losses in revenue, while detractors argue that incentives have little economic impact and mostly benefit firm owners. Our research provides new empirical evidence of the effects of corporate taxes on local economic outcomes and develops a new framework to quantify the incidence of business tax cuts and the distribution of the benefit of such cuts among firm owners, land owners, and workers.[1]

Corporate taxes in an open economy are conventionally thought to reduce both efficiency and equity: they distort the location and scale of economic activity and ultimately fall on workers via lower wages. Previous models of corporate taxation and spatial equilibrium have limitations for addressing this issue. Models of corporate taxation usually assume that firms earn zero profits, which implies that firm owners cannot benefit from business tax cuts. On the other hand, models of spatial equilibrium assume a single firm in each location, which obviates a meaningful role for firm location incentives. We develop a spatial equilibrium model with imperfectly mobile firms and workers. Firm owners may earn profits and may be inframarginal in their location choices due to differences in location-specific productivities. This modeling innovation allows the analysis of the effects of tax incentives to attract firms to be informed by data.

We find that tax cuts are associated with an increase in the number of local firms. Moreover, as firms locate in areas with lower taxes, there is an increase in employment, wages, and rents. We use the evidence on these responses to tax changes to estimate who benefits from tax cuts. We find that firm owners bear a substantial portion of incidence. This implies that while business tax cuts may grow the local economy, most of the benefits of the tax cut accrue to relatively wealthy firm owners.[2] In contrast, the burden of higher sales taxes, which are often used to counterbalance the reduction in revenue from business tax cuts, falls disproportionately on lower-income workers.

Our most recent work presents new theoretical and empirical results.[3] First, we enhance the empirical analysis of the effects of state business taxes using new data from the US Census Bureau's Longitudinal Business Database and Annual Survey of Manufactures. We provide new evidence that business tax cuts increase the local labor demand of incumbent firms and lead to the entry of relatively less productive firms. Second, we show that these new reduced-form effects identify the benefits to firm owners from state corporate tax cuts. We update our modeling approach to estimate profit effects and to account for the effects of taxes on the composition of firms and the cost of capital, thereby allowing for more flexible responses of the local cost of capital to changes in business taxes.[4] Finally, we show how to derive income shares for each of the agents of the model and compute income-share-weighted incidence estimates. Our central finding is that firm owners receive roughly half of the benefit of a corporate tax cut, while workers and landowners receive 35–40 percent and 10–15 percent, respectively.

While states compete for businesses by lowering tax rates, they also attract them by providing tax credits and generous deductions. We reassess the state corporate tax structure — tax rates and tax base rules — and document how it has changed over time.[5] The average state-level corporate tax rate has remained relatively stable over the last three decades, while the ratio of corporate tax revenue to state GDP has generally decreased. Changes in tax base rules, such as loss carry forward provisions and investment tax credits, explain more of the variation in the ratio of state corporate tax revenue to GDP than do changes in state corporate tax rates. These rules account for 60 to 90 percent of the explained variation in corporate tax revenues, and the trend toward narrower state corporate tax bases helps explain the reduction in corporate tax revenues as a share of GDP. This shows that relatively obscure changes in tax policy may be more important for state finances than well-debated changes in state tax rates. Overall, we find that changes in the structure of the corporate tax system have been favorable for corporations and have reduced the extent to which tax rate increases raise corporate tax revenue.

In addition to tax rates and tax base rules, business tax incentives are also relied upon by states to attract and retain companies. Cailin Slattery and Zidar characterize these firm incentive policies, describe the selection process that determines which places and firms give and receive incentives, and evaluate their economic consequences.[6] In 2014, states spent between $5 and $216 per capita on incentives for firms in the form of firm-specific subsidies and general tax credits. These mostly targeted investment, job creation, and research and development (R&D). Collectively, these incentives amounted to nearly 40 percent of state corporate tax revenues on average, but in some states incentive spending exceeded corporate tax revenues. States with higher per capita incentives tended to have higher state corporate tax rates. Recipients of firm-specific incentives were usually large establishments in manufacturing, technology, and high-skilled service industries. The average discretionary subsidy cost $160 million in return for 1,500 promised jobs. Firms tend to accept subsidy deals from places that are richer, larger, and more urban than the average county, while poor places provide larger incentives and spend more per job. While the study yields some evidence of direct employment gains from attracting a firm, it does not find strong evidence that firm-specific tax incentives increased broader economic growth at the state and local levels. Although incentives are often intended to attract and retain high-spillover firms, the evidence on spillovers and productivity effects of incentives is mixed.

Ethan Rouen, Suresh Nallareddy, and Suárez Serrato use regression and matching techniques to study the effects of corporate tax cuts on income inequality.[7] They find that state corporate tax cuts lead to increases in the share of income accruing to the top 1 percent of tax filers. Specifically, a 1 percentage point (pp) state corporate tax cut increases the share of income to the top 1 percent of the income distribution by 1.5 pp. Since the share of income accruing to the top 1 percent increased by 6.1 pp between 1990 and 2010, this implies that the average tax rate cut of 0.5 pp was responsible for 12.4 percent of this overall increase in the top income share. This result corroborates the findings that landowners and business owners gain the most from business tax cuts.

Analyzing the regional effects of changes in spending and taxes allows us to use policy changes as plausibly exogenous natural experiments to measure the effects of fiscal policy on economic activity. A drawback of this approach is that reduced-form regional analyses are not able to measure the aggregate consequences of policy changes. In work with Pablo Fajgelbaum and Eduardo Morales, we quantify the nationwide effects of fundamental tax reform across states by combining the insights from our work on corporate taxation in spatial equilibrium models with a

Juan Carlos Suárez Serrato is a professor of economics at Stanford University's Graduate School of Business and an NBER research associate affiliated with the Public Economics Program.

Suárez Serrato's research focuses on how taxes and government spending affect economic growth and welfare. His studies of the US economy examine how federal spending affects local economic growth, welfare, and inequality; who benefits from state corporate tax cuts; the aggregate consequences of disparate state tax systems; how subsidies for municipal bonds affect the borrowing cost of local governments; and how tax incentives for investment affect employment and worker earnings. His research on the Chinese economy studies the efficacy of meritocracy in the selection of political leaders, whether firms respond to tax incentives for R&D by manipulating expenses, and how corporate tax incentives affect investment and firm growth. His research on international taxation studies which measures are effective at curbing profit shifting to tax havens, and how these policies affect domestic economic activity.

Suárez Serrato has served as a co-editor of the *Journal of Public Economics* and is on the board of editors of the *American Economic Review* and the *Journal of Economic Perspectives*.

He received his BA in economics and mathematics from Trinity University and his PhD in economics from the University of California, Berkeley. Prior to joining the Stanford faculty, he was a professor of economics at Duke University.

Owen Zidar is a professor of economics and public affairs in the Princeton University Department of Economics and School of Public and International Affairs. He is also an NBER research associate in the Public Economics Program and a former co-editor of the *Journal of Public Economics.*

Zidar studies inequality and tax policy. Before joining the Princeton faculty, Zidar was an assistant professor of economics at the University of Chicago Booth School of Business, a staff economist at the Council of Economic Advisers, and as an analyst at Bain Capital Ventures. Zidar holds a PhD in economics from the University of California, Berkeley. His predoctoral studies were at Dartmouth College where he earned a BA, summa cum laude, in economics. He is a 2018 recipient of a National Science Foundation CAREER Award and a 2020 recipient of a Sloan Research Fellowship.

quantitative model of trade between states.[8]

One insight is that when firms choose a location, they trade off higher productivity, which is partly location specific, with lower taxes and production costs. Thus, a location that lowers its taxes attracts more firms that were, on the margin, more productive elsewhere. While the local increase in jobs may benefit the local population, the aggregate consequences may be negative on net, as overall productivity and employment may decrease. We explore this issue by studying whether the wide variation in taxes across states generates spatial misallocation in the United States. We build a spatial general-equilibrium framework that incorporates salient features of the US state tax system. It allows us to compute national-level effects of reforms that limit cross-state competition in business taxation, as well as to simulate the effects of specific aspects of the Tax Cuts and Jobs Act of 2017 (TCJA).

Our model includes the amenity value of public services. This allows us to compute the effects of tax reform on worker welfare, accounting for the fact that some states may be underproviding public goods due to cross-state tax competition. We use changes in state tax rates between 1980 and 2010 to estimate the model parameters that determine how worker and firm-location decisions respond to changes in state taxes and govern-

Change in State GDP from Tax Haromization

Change in State GDP, %

- <-3.0
- -3.0 – 0.0
- 0.0 – 3.0
- 3.0 – 5.0
- >5.0

Source: Pablo Fajgelbaum, Eduardo Morales, Juan Carlos Suárez Serrato, and Owen Zidar. NBER Working Paper 21760 and as "State Taxes and Spatial Misallocation", Review of Economic Studies 86(1), January 2019, pp. 333–76.

Figure 1, Panel A

ment spending.

We find that state differences in tax rates generate spatial misallocation, which leads to aggregate losses in GDP and welfare. Specifically, worker welfare increases by 0.6 percent when we simulate the effects of harmonizing taxes across states while holding spending constant. The gains to workers are twice as large when government spending responds endogenously to the changes in taxes. Panel
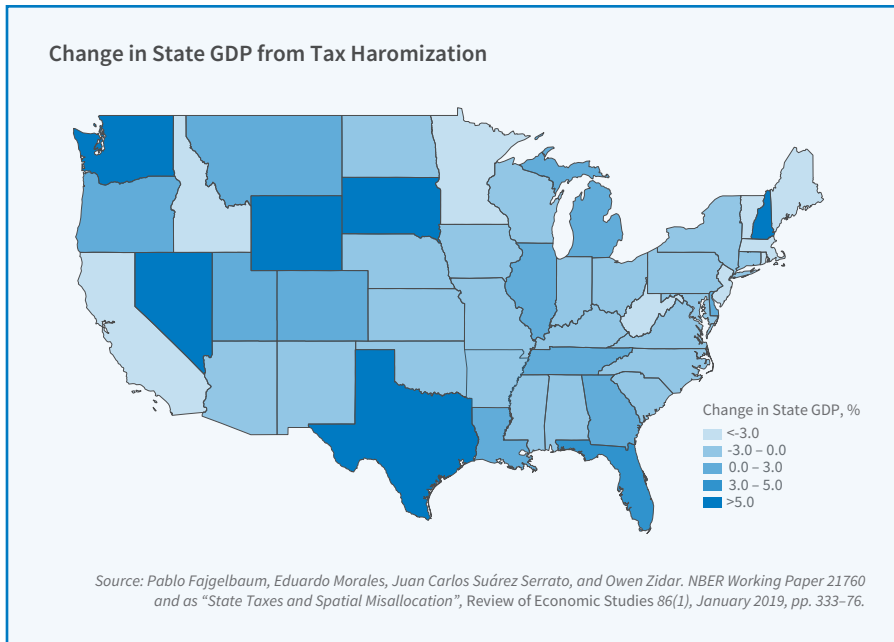
A in Figure 1 shows how the gains in GDP are distributed across states. While there is considerable variation in effects, states that experience large increases in government spending, such as Texas, Florida, Nevada, and New Hampshire, experience the largest gains from harmonization. Panel B shows that most of the gains from tax harmonization can be achieved by harmonizing state taxes within census regions.

In addition to studying the effects of tax harmonization, we simulate the effects of the limit on the state and local tax (SALT) deduction that was enacted as part of the TCJA. Prior to the TCJA, taxes paid to state and local governments were deductible from federal income taxes. This policy effectively subsidized taxes in states with higher tax rates, but it also reduced the dispersion in net tax rates across states. We find that removing the SALT deduction nearly doubles the standard deviation in average effective personal income tax rates across states. This increase in tax dispersion lowers welfare by 0.75 percent.
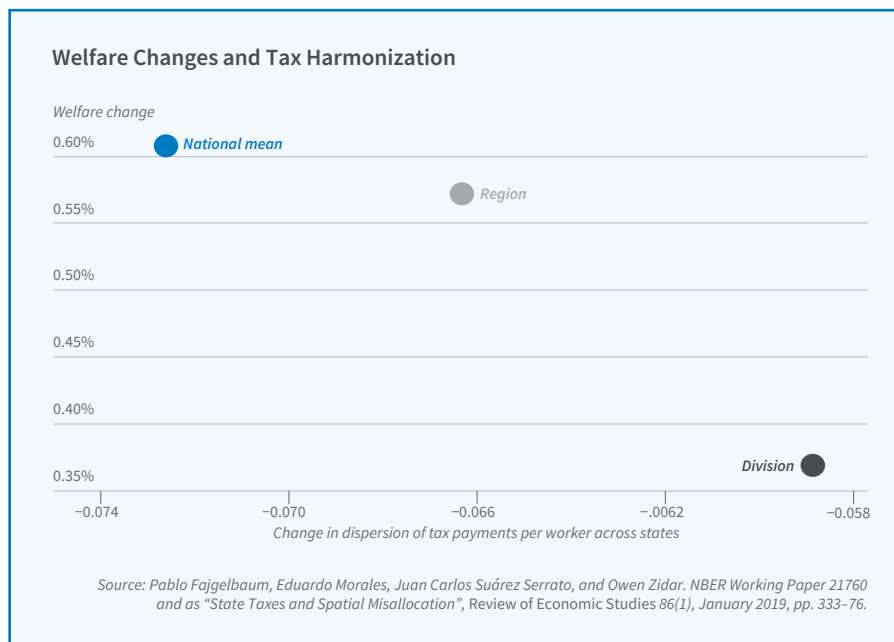
Corporate Investment Incentives and the Labor Market

Policymakers in the US and elsewhere often use tax incentives to stimulate the economy. While many of these incentives target corporate investment, policymakers often advocate for them by

Welfare Changes and Tax Harmonization

Welfare change

- 0.60% ● **National mean**
- 0.55% ● *Region*
- 0.50%
- 0.45%
- 0.40%
- 0.35% ● ***Division***

−0.074   −0.070   −0.066   −0.062   −0.058

Change in dispersion of tax payments per worker across states

Source: Pablo Fajgelbaum, Eduardo Morales, Juan Carlos Suárez Serrato, and Owen Zidar. NBER Working Paper 21760 and as "State Taxes and Spatial Misallocation", Review of Economic Studies 86(1), January 2019, pp. 333–76.

Figure 1, Panel B

arguing that the additional investment will create jobs and raise wages for workers. In contrast, detractors of these policies argue that by lowering the cost of labor-saving machines, tax incentives for investment may accelerate the pace of automation. We have studied whether incentives for capital investment stimulate the labor force, lead to productivity growth, or lead to the substitution of workers with machines. To identify the effects of changes in capital investment, we analyze the effects of a policy called bonus depreciation, which lowers the tax cost of investment by allowing companies to claim an additional tax deduction in the year that equipment investments are made. Bonus depreciation policies, which have been in place in the US for most years since 2001, were significantly expanded as part of the TCJA, and have been adopted by other countries, including China, Germany, and the United Kingdom.

In work with Dan Garrett and Eric Ohrn, Suárez Serrato studies the local labor market effects of bonus depreciation.[9] While bonus depreciation applies to all corporations in the US, firms in industries that rely on assets with longer depreciation schedules benefit most from the policy. The effects of the policy can be identified by studying local labor markets with greater exposure to the industries that benefit the most from it. Figure 2 plots the results of an event-study analysis showing that the introduction of the policy in 2001 led to significant employment growth in locations with greater exposure to bonus depreciation. Increasing a location's exposure to bonus depreciation from the 25th to the 75th percentile of the distribution increased employment by 2.1 percent on average over the sample

period. The estimates suggest that every job created by this policy cost taxpayers between $20,000 and $50,000. On the other hand, Figure 2 also shows that these employment increases were not accompanied by increases in the average earnings of workers.

A benefit of studying the local labor market effects of tax policies is that these estimates capture spillover effects of capital investment on the local economy.

Effect of Bonus Depreciation on Local Labor Markets

Thin vertical bars represent 95% confidence intervals
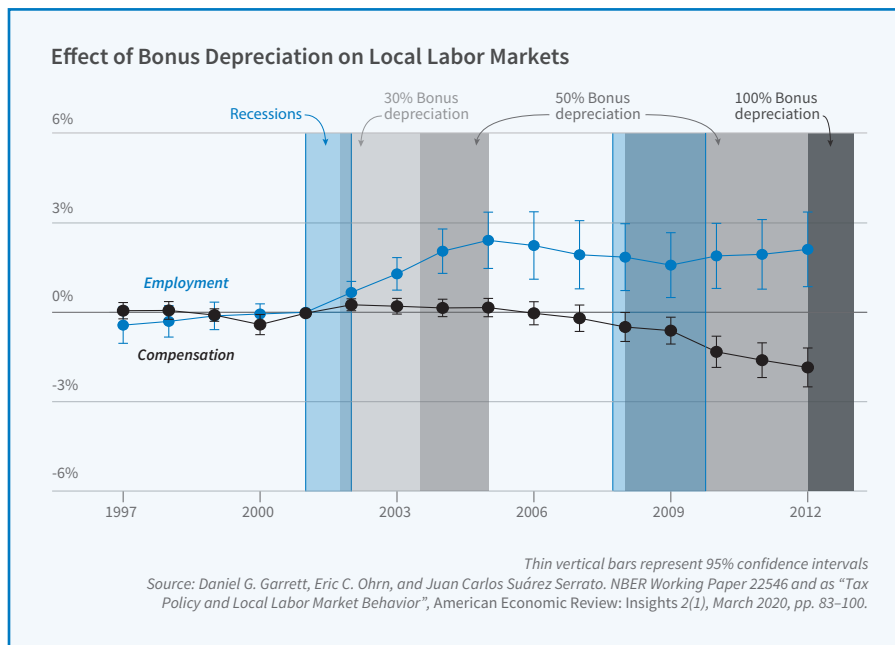*Source: Daniel G. Garrett, Eric C. Ohrn, and Juan Carlos Suárez Serrato. NBER Working Paper 22546 and as "Tax Policy and Local Labor Market Behavior",* American Economic Review: Insights *2(1), March 2020, pp. 83–100.*

Figure 2

However, this benefit comes at the cost of not being able to directly estimate how individual plants substitute between capital and labor or whether the policy leads to additional productivity growth.

A related study by Mark Curtis, Kevin Roberts, Garrett, Ohrn, and Suárez Serrato examines how US manufacturing plants responded to this tax policy.[10] It analyzes confidential plant-level data from the Census Bureau. To measure the effects of the policy, the study compares plants that had more to gain from the policy to those that would benefit less, relying on industry-level tabulations from Eric Zwick and James Mahon.[11] The data show that plants that could benefit the most from bonus depreciation saw sustained relative increases in capital investment and in capital stocks.

Relative to other firm-level datasets

such as financial statements data or tax data, the data from the Census Bureau provide insight into manufacturing plants' response to tax policy. Plants that increase their capital use also have large increases in employment. Interestingly, the employment increases are concentrated among production workers, who are more likely to operate new machines.

Using more aggregate data, the research also shows that bonus depreciation led to larger employment increases for workers in demographic groups that have been historically excluded from the manufacturing sector: Black, Hispanic, female, and less-educated workers see larger employment increases because of the policy.

These employment gains raise the question of whether policies that incentivize capital investment can also increase worker pay. In the case of bonus depreciation, capital accumulation was not accompanied by gains in total factor productivity at the plant level, or by increases in the average earnings of workers at the plants that could benefit the most from the policy.

These findings bear on the question of whether tax incentives for capital investment benefit workers or lead to automation. The finding of employment increases suggests that the worst fears about policy-driven automation did not materialize. At the same time, increased capital accumulation did not translate into productivity or wage growth. While wages did not increase on average, the results show that the policy helped workers from traditionally underrepresented groups gain a foothold in the manufacturing industry, historically a pathway to the middle class.

New Directions in Corporate Tax Research

While the research described above focuses on the US economy, research by business tax scholars on other leading economies has also made inroads. A particularly interesting case study is that of China, which has long spent more in capital investment than the US and which is also increasing its emphasis on innovation and R&D. In a series of coauthored papers, Suárez Serrato has studied the structure of business taxation in China,[12] how Chinese firms respond to tax incentives for R&D investment,[13] and how tax policies interact with other investment frictions.[14] Research on business taxation in China can improve our understanding of policies used to stimulate the economy and to transition from a production-based to a knowledge-based economy.

International taxation is also a fertile area for business taxation research. A key concern in this literature is that multinational corporations shift profits to low-tax countries at the expense of domestic taxpayers. Some of our recent work uses tax data to document the prevalence of advanced tax planning structures among US multinationals[15] and to examine whether policies meant to limit profit shifting can be circumvented by multinational corporations.[16] Ongoing research also studies the domestic employment effects of policies that either facilitate profit shifting[17] or that aim to limit the use of tax havens by US multinationals.[18] This research focus is particularly timely given that international corporate taxation is in a period of flux, with the introduction of global minimum taxes and increased interest in new approaches for cooperation. We are currently exploring the effects of recent reforms on the investment behavior of US multinationals.[19]

---

[1] "Who Benefits from State Corporate Tax Cuts? A Local Labor Markets Approach with Heterogeneous Firms," Suárez Serrato JC, Zidar O. NBER Working Paper 20289, July 2014, and *American Economic Review* 106(9), September 2016, pp. 2582–2624.
Return to Text

[2] "Top Wealth in America: New Estimates and Implications for Taxing the Rich," Smith M, Zidar O, Zwick E. NBER Working Paper 29374, October 2021, and *The Quarterly Journal of Economics* 138(11), August 2022, pp. 515–573.
Return to Text

[3] "Who Benefits from State Corporate Tax Cuts? A Local Labor Market Approach with Heterogeneous Firms: Further Results," Suárez Serrato JC, Zidar O. NBER Working Paper 31206, May 2023.
Return to Text

[4] Malgouyres, Mayer, and Mazet-Sonilhac (2022) observe that Suárez Serrato and Zidar (2016) did not account for the compositional margin, which is the effect of tax changes on average idiosyncratic firm productivity, and was inconsistent in addressing whether or not the cost of capital varied across locations. In Suárez Serrato and Zidar (2023), we show that accounting for the composition margin and the cost of capital in the baseline structural model has modest effects on estimates of corporate tax incidence.
Return to Text

[5] "The Structure of State Corporate Taxation and Its Impact on State Tax Revenues and Economic Activity," Suárez Serrato JC, Zidar O. NBER Working Paper 23653, August 2017, and *Journal of Public Economics* 167, November 2018, pp. 158–176.
Return to Text

[6] "Evaluating State and Local Business Tax Incentives," Slattery C, Zidar O. NBER Working Paper 26603, January 2020, and *Journal of Economic Perspectives* 34(2), Spring 2020, pp. 90–118. This study relies on data from "Bidding for Firms: Subsidy Competition in the US," Slattery, C. Working Paper, University of California, Berkeley, 2022. https://cailinslattery.com/s/Slattery-2022-Bidding-for-Firms.pdf
Return to Text

[7] "Do Corporate Tax Cuts Increase Income Inequality?" Nallareddy S, Rouen E, Suárez Serrato JC. NBER Working Paper 24598, August 2019.
Return to Text

[8] "State Taxes and Spatial Misallocation," Fajgelbaum P, Morales E, Suárez Serrato JC, Zidar O. NBER Working Paper 21760, November 2015, and *Review of Economic Studies* 86(1), January 2019, pp. 333–376.
Return to Text

[9] "Tax Policy and Local Labor Market Behavior," Garrett DG, Ohrn EC, Suárez Serrato JC. NBER Working Paper 25546, February 2019, and *American Economic Review: Insights* 2(1), March 2020, pp. 83–100.
Return to Text

[10] "Capital Investment and Labor Demand," Curtis EM, Garret DG, Ohrn EC, Roberts KA, Suárez Serrato JC. NBER Working Paper 29485, June 2022.
Return to Text

[11] "Tax Policy and Heterogeneous Investment Behavior," Zwick E, Mahon J. NBER Working Paper 21876, January 2016, and *American Economic Review* 107(1), January 2017, pp. 217–248.
Return to Text

[12] "The Structure of Business Taxation in China," Chen Z, He Y, Liu Z, Suárez Serrato JC, Xu DY. NBER Working Paper 28051, November 2020, and *Tax Policy and the Economy* 35, 2021, pp. 131–177.
Return to Text

[13] "Notching R&D Investment with Corporate Income Tax Cuts in China," Chen Z, Liu Z, Suárez Serrato JC, Xu DY. NBER Working Paper 24749, October 2020, and *American Economic Review* 111(7), July 2021, pp. 2065–2100.
Return to Text

[14] "Tax Policy and Lumpy Investment Behavior: Evidence from China's VAT Reform," Chen Z, Jiang Z, Liu Z, Suárez Serrato JC, Xu DY. NBER Working Paper 26336, June 2020, and *The Review of Economic Studies* 90(2), March 2023, pp. 634–674.
Return to Text

[15] "Tax Planning Multinational Behavior," Altshuler R, Boller L, Suárez

Serrato JC. Working Paper, August 2023.
Return to Text

[16] "The Race Between Tax Enforcement and Tax Planning: Evidence From a Natural Experiment in Chile," Bustos S, Pomeranz D, Suárez Serrato JC, Vila-Belda J, Zucman G. NBER Working Paper 30114, June 2022.
Return to Text

[17] "Effects of International Tax Provisions on Domestic Labor Markets," Garrett DG, Ohrn E, Suárez Serrato JC. *Proceedings, Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association* 113, 2020, pp. 1–2.
Return to Text

[18] "Unintended Consequences of Eliminating Tax Havens," Suárez Serrato JC. NBER Working Paper 24850, December 2019.
Return to Text

[19] "Tax Policy and Global Investment Behavior: Evidence from the TCJA," Chodorow-Reich G, Smith M, Zidar O, Zwick E. Working Paper, August 2023.
Return to Text

The Role of Women's Employment in Recent Recessions

Matthias Doepke

Matthias Doepke is the Gerald F. and Marjorie G. Fitzgerald Professor of Economic History at Northwestern University and a professor of economics at the London School of Economics. His research explores how decisions taken within families shape macroeconomic outcomes and how, in turn, economic conditions feed back into what families do.

Doepke's research has been published in leading international journals including the *American Economic Review*, *Econometrica*, the *Journal of Political Economy*, *The Quarterly Journal of Economics,* and *The Review of Economic Studies.* He is coauthor with Fabrizio Zilibotti of the bestselling book *Love, Money, and Parenting: How Economics Explains the Way We Raise Our Kids*.

Doepke is a former coordinating editor of the *Review of Economic Dynamics*, a recipient of a Sloan Research Fellowship, and a fellow of the Econometric Society. He received his PhD in 2000 from the University of Chicago and was an assistant and an associate professor of economics at UCLA before moving to Northwestern in 2008.

The pandemic recession of 2020 was unusual not only for its cause and severity, but also for the disproportional impact that it had on women's employment.

Figure 1 displays the difference between the increases in women's and men's unemployment for all US recessions since 1949. In most recessions, this difference is either close to zero or negative, indicating that men experienced a sharper rise in unemployment than women. In the Great Recession of 2007–09, for example, men's unemployment increased by about 2 percentage points more than women's. In contrast, in the pandemic recession of 2020 women experienced a sharper rise in unemployment. The gap between the increase in women's and men's unemployment is almost 3 percentage points, which is larger in absolute value than the gap in all other recessions. At the height of the recession, hundreds of thousands more women than men were unemployed, even though 10 million fewer women than men were in the labor force.

The pattern displayed in Figure 1 gives rise to a number of questions that my coauthors and I address in recent work. The first challenge is to understand exactly why recessions affect women and men differently, and which factors account for the extraordinarily large impact of the pandemic recession on women's employment. A related question is whether the gendered impact of recessions is specific to the US economy or a generic feature of many countries. Lastly, there is the question of the wider impact of the gendered dimension of recessions. Specifically, is a "female" recession just a "male" recession with the signs reversed, or are there qualitative differences in the transmission, amplification, and persistence of macroeconomic shocks depending on which gender is more affected?

Looking for Causes: Industry Composition and Childcare

Regarding the causes of the differential impact of recessions on women and men, one key factor is the industry compo-

Gender Difference in the Change in the Unemployment Rate, US Recessions

Women minus men, percentage points

X-axis indicates start and end dates of US recessions as identified by the NBER. Each bar is the rise in the women's unemployment rate minus the rise in the men's unemployment rate from the first to the last month of each recession according to the NBER business cycle dates.
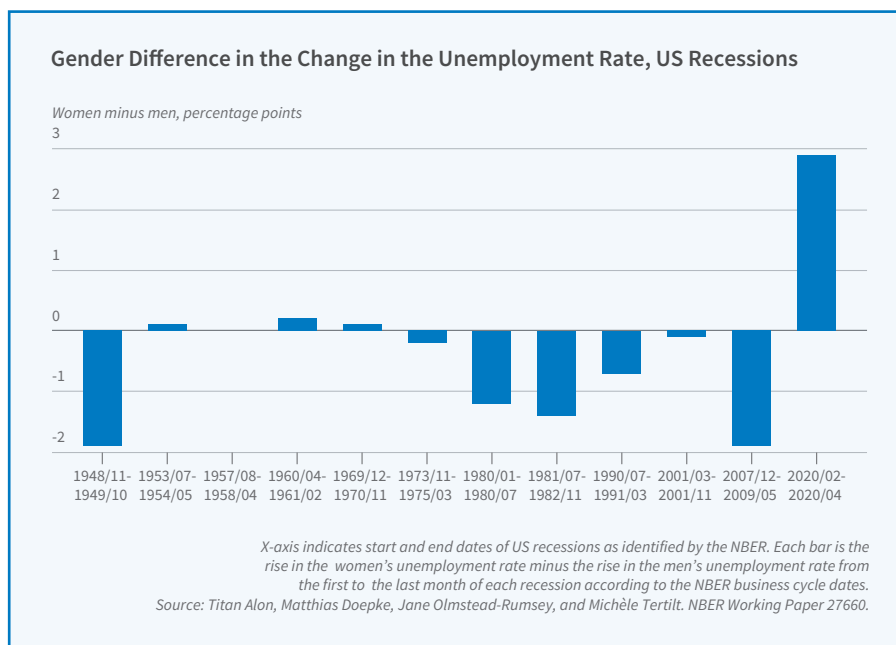Source: Titan Alon, Matthias Doepke, Jane Olmstead-Rumsey, and Michèle Tertilt. NBER Working Paper 27660.

Figure 1

sition of employment. The share of male and female workers varies widely across sectors, and likewise there are large differences in how much employment in each sector is affected by recessions. In recent recessions before 2020, the sectors with the largest employment losses included manufacturing and construction; sectors such as education and healthcare saw little or no employment losses. As it happens, the sectors that decline the most in typical recessions also have high male employment shares, whereas many women work in sectors that exhibit stable employment over the cycle. Hence, the industry composition of employment contributes to the larger impact of recent pre-pandemic recessions on men's employment.

The industry composition of employment also plays a central role in the large impact of the pandemic recession on women's employment. Employment losses were in large part driven by shutdown orders and social distancing. Consequently, the largest employment reductions in the pandemic recession were in contact-intensive services such as restaurants, and in the hospitality sector. These are sectors with high female employment shares.

Figure 2, Panel A illustrates the role of the sectoral composition of employment by comparing employ-
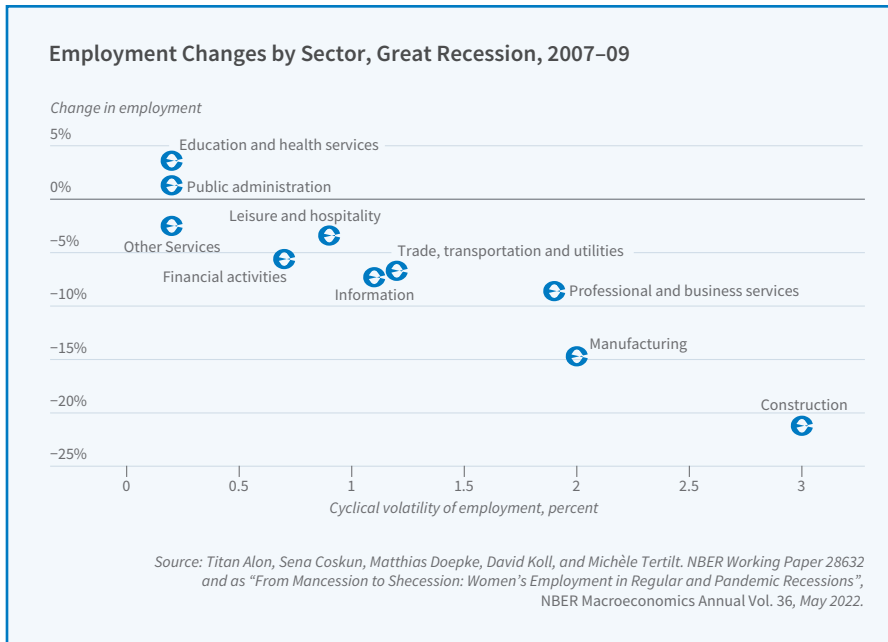
ment declines across sectors between the Great Recession of 2007–09 and the pandemic recession of 2020. The figure plots the cyclical volatility of each sector — the extent to which employment varies with overall output over the cycle, averaged over the pre-pandemic period — versus the actual change in employment in the last two recessions. In the Great Recession we observe the typical pattern, with large employ-

ment losses of up to 20 log points in the cyclical sectors of construction and manufacturing, which have high male employment shares. In contrast, the sectors with the highest female employment shares saw little change in employment. In the pandemic recession of 2020 the pattern is completely different. Two sectors stand out — Leisure and Hospitality with an employment loss of 50 log points and other services with a loss of 20 log points. Both of these sectors have high female employment shares. Employment losses are substantially smaller in the other sectors, and display no correlation with cyclical volatility in earlier economic cycles.

Figure 2, Panel B suggests that the industry composition of employment plays a central role in the gendered impact of recessions, but it turns out that there is more to the story. A second factor specific to the pandemic recession is changing childcare needs. At the height of the pandemic, daycare centers and schools were closed in most US states and in other countries, implying that parents had to care for their children and organize their learning at home. And while in some places schools reopened after a few months, in large parts of the United States school closures lasted for more than a year and extended throughout the 2020–21 school year. The

Employment Changes by Sector, Great Recession, 2007–09

Source: Titan Alon, Sena Coskun, Matthias Doepke, David Koll, and Michèle Tertilt. NBER Working Paper 28632 and as "From Mancession to Shecession: Women's Employment in Regular and Pandemic Recessions", NBER Macroeconomics Annual Vol. 36, May 2022.

Figure 2, Panel A

Employment Changes by Sector, COVID-19 Recession

Source: Titan Alon, Sena Coskun, Matthias Doepke, David Koll, and Michèle Tertilt. NBER Working Paper 28632 and as "From Mancession to Shecession: Women's Employment in Regular and Pandemic Recessions", NBER Macroeconomics Annual Vol. 36, May 2022.
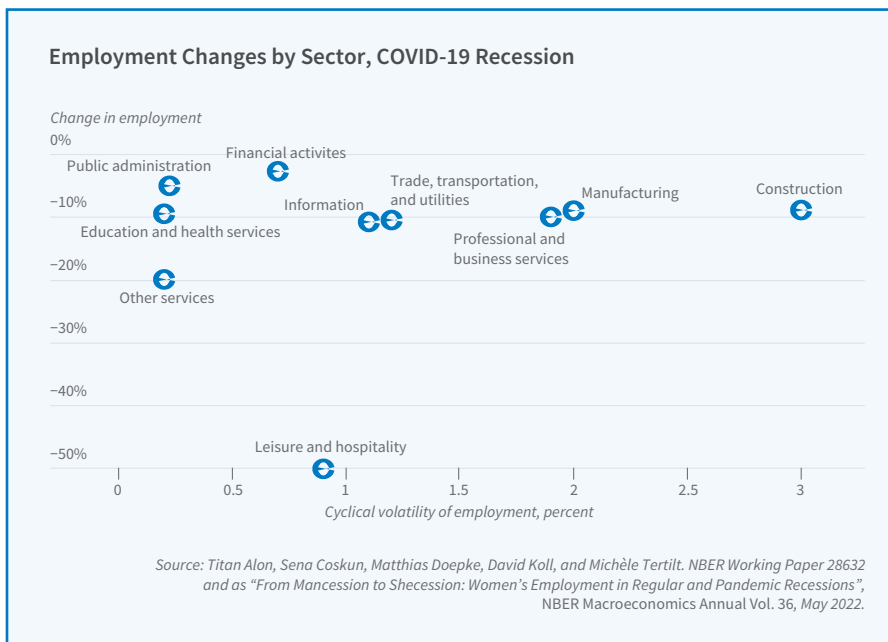
Figure 2, Panel B

resulting rise in childcare needs may have impacted parents' ability to work. If mothers bear the majority of the extra burden of childcare, the rise in childcare needs could have reduced their labor supply.

Figure 3 illustrates the potential role of the childcare channel by showing how women's and men's employment evolved in the Great Recession versus the pandemic recession depending on whether they had minor children in the household. Each line displays the change in the gap between women's and men's employment from the beginning of each recession; hence, a flat line would indicate that women's and men's employment moved in parallel. The blue lines display the data for the Great Recession of 2007–09. Here we see that women gradually gained employment relative to men, in line with a larger impact of the recession on men. Having children made little difference to this finding: the employment gap evolves roughly in parallel among parents and nonparents.

The results for the pandemic recession are starkly different. There is little change over time in the employment gap among women and men without children; overall, in this group the relative impact is similar to that in the Great Recession. In sharp contrast, among parents, women with minor children experienced a rapid decline in employment of more than 5 percentage points relative to men in the first two months of the recession. This employment gap specifically for mothers of minor children remained large through the following one and a half years, which covers the period of widespread school closures in the United States. These results strongly suggest that women's disproportionate share in meeting childcare responsibili-
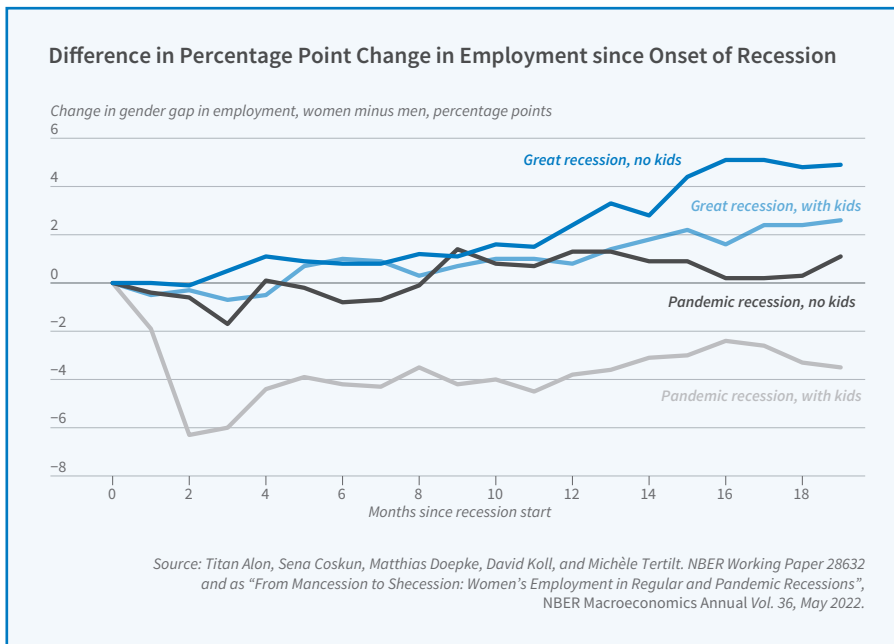

Difference in Percentage Point Change in Employment since Onset of Recession

Change in gender gap in employment, women minus men, percentage points

Great recession, no kids

Great recession, with kids

Pandemic recession, no kids

Pandemic recession, with kids

Months since recession start

Source: Titan Alon, Sena Coskun, Matthias Doepke, David Koll, and Michèle Tertilt. NBER Working Paper 28632 and as "From Mancession to Shecession: Women's Employment in Regular and Pandemic Recessions", NBER Macroeconomics Annual Vol. 36, May 2022.

Figure 3

ties was a key factor in the large impact of the pandemic recession on women's employment.

Disentangling the Channels

The empirical patterns documented above do not provide final answers on the causes of the gendered impact of the pandemic recession. For example, the sectoral composition of employment differs between parents and nonparents, suggesting possible interactions between the channels. Titan Alon, Sena Coskun, David Koll, Michèle Tertilt, and I use microdata on individual changes in employment and hourly labor supply to get a more detailed picture.[1] Specifically, we regress changes in labor supply during the COVID recession on gender and the presence of children, along with a large set of occupation and industry fixed effects. These fixed effects filter out the change in employment common to all workers in a specific industry-occupation combination during the recession. The effects of gender and childcare that we measure therefore do not arise because, say, mothers are more likely to be employed in contact-intensive service sectors.

In the case of the United States, this analysis confirms that both sec-

toral effects and childcare contributed to women's employment decline during the pandemic recession. However, the effects of childcare were substantially smaller than what is suggested by the raw data, which indicate that mothers are more likely to work in sectors and occupations that were more affected by the crisis. Among parents of young children up to preschool age, once we control for industry and occupation effects there are no significant differences in the employment impact on women and men. Among parents of school-age children, in contrast, mothers' employment declines by close to 2 percentage points more than fathers' even after controlling for other factors. When we look at hours worked instead of employment, the effects are substantially larger: the labor supply of mothers of school-age children declines by close to 9 percentage points more than that of fathers after controlling for industry and occupation effects. These patterns suggest that many women reduced hours or switched to part-time work to make more time to take care of their children at home.

Another compelling finding from this analysis is that the disproportionate impact of the pandemic on women's employment is entirely concentrated on women who cannot work from home. Workers who were able to telecommute and continue working from home experienced fewer layoffs to begin with, and the added flexibility of being at home evidently facilitated meeting childcare needs while continuing to work. Among telecommuting workers, there were no significant gender differences or childcare effects in the employment impact of the pandemic.

Lastly, we also find that sector and childcare effects do not account for all of the large impact of the pandemic recession on women's employment. Specifically, we find that even after controlling for industry and occupation effects and focusing only on workers with no minor children at home, women's employment still declined by a percentage point more than men's, and their hours worked declined by an additional 4 log points. An analogous regression for the Great Recession shows the opposite pattern of smaller employment declines for women after controlling for industry, occupation, and childcare effects. A decomposition exercise shows that depending on whether we consider employment or hours, industry and occupation effects account for between 12 and 20 percent of the gender gap in the impact of the recession, and childcare effects make up 14 to 18 percent of the total. In either case, the residual accounts for more than 50 percent of the gap.

Little is known so far about what accounts for this additional impact on women's employment. One possibility is that the decline reflects care work not related to minor children. For example, some women may have left employment or reduced hours to care for older relatives. Another possibility is that the decline reflects precautionary behavior. Some workers may have voluntarily reduced employment to avoid the possibility of getting infected at work. If women in general adjust their behavior more strongly in response to possible infection, this would generate an additional decline beyond that attributed to sector and childcare effects.

Macro Repercussions

The gendered impact of recessions has usually been ignored in formal economic models of the business cycle. Classic real business cycle models rely on a representative household that splits time between leisure and labor supply, without any gender dimension or indeed any heterogeneity within or across households. More recently, models often allow for a range of household types distinguished by their preferences and their income processes, but gender is still largely left aside. Does this omission matter for the onset, propagation, and persistence of macroeconomic shocks?

Jane Olmstead-Rumsey, Alon, Tertilt, and I address this question by including multimember households and gender distinctions in an otherwise standard representation of the household sector in a business cycle model.[2] The model accounts for childcare needs, productivity differences in market production, home production, and childcare, and also for a potential role of social norms in generating the division of labor within households that is observed in the data. We calibrate the model to reproduce the structure of labor supply and time allocation for US households, including a higher share of part-time work among women and a disproportionate female contribution to home production and childcare.

Using this model, we compare the overall economic impact of economic shocks of a similar overall magnitude that either affect women or men more, such as industry-specific shocks that take place in industries with high female versus male employment shares. We think of this comparison as a stylized comparison of a Great Recession shock that takes place primarily in manufacturing and construction with a pandemic recession shock that takes place primarily in services, while holding constant the magnitude and persistence of the initial shock. We find that these shocks differ not just in terms of who is most affected, but also in the overall response of the economy.

Both in the model and in the data, the overall labor market behavior of women is sharply different from that of men. Most prime-age male workers are strongly attached to the labor force; the vast majority of them either work full time or are unemployed and looking for full-time work. Hence, when a shock hits and men are laid off, they usually do not leave the labor force, but enter unemployment until they find a new job. In recent decades there has been a mod-erate decline in prime-age men's labor force participation, but overall these patterns persist.

Among women, there is much greater variation in labor market behavior. Some women, such as young single women without children, behave similarly to men of the same age. In contrast, among married women and women with children we observe much greater variation, with some working full time, a substantial fraction part time, and others out of the labor force. Greater variation in labor supply can also be observed for individual women over time. For example, many women leave the labor force temporarily when they have children and later return to part- or full-time work. Women's labor supply also reacts more flexibly to new economic circumstances, such as changes in their own wages or career opportunities and changes to their partners' income and employment.

We find that this added flexibility of women's labor supply matters for macroeconomic outcomes in two ways. First, spouses can provide implicit insurance for each other by each adjusting their labor supply in response to shocks that affect the other. One example is the "added worker effect" whereby nonworking spouses enter the labor force in response to their partners' job losses. We find that this insurance channel is stronger when business cycle shocks affect primarily men. Many men have female partners who work part-time or are out of the labor force, and thus can potentially offset some of the income reduction for the household by increasing their labor supply. In contrast, given that most men already work full time, there is less scope for reacting to shocks that affect their female partners.

A second channel concerns the persistence of a shock's impact. When women lose employment in a recession, they are more likely to transition temporarily out of the labor force or to part-time work, whereas men are more likely to continue seeking full-time work. As a result, when women lose

employment they experience a more persistent decline in labor supply and in earnings, amplified by the loss of work experience when out of the labor force and by forgone career opportunities. As a result, all else equal, economic shocks that put more women out of work result in a more persistent decline in overall labor supply and also put upward pressure on the gender wage gap.

The results of our modeling exercise, along with the experience of the pandemic recession of 2020, highlight the once-neglected role of gender in aggregate economic fluctuations.

Macro shocks differ in their impact on women and men in the labor market, and who is most affected matters for the propagation and persistence of economic downturns. The underlying features that give rise to these effects, in particular women's and men's labor force participation, childcare needs, and the intrahousehold division of labor, have changed rapidly in recent decades. Accounting for the role of gender in economic fluctuations, and understanding how it has shifted in response to the changing roles of women and men in families and in society more generally, represents an important research challenge.

[1] "From Mancession to Shecession: Women's Employment in Regular and Pandemic Recessions," Alon T, Coskun S, Doepke M, Koll D, Tertilt M. In *NBER Macroeconomics Annual* 36, 2022, pp. 83–151.
Return to Text
[2] "This Time It's Different: The Role of Women's Employment in a Pandemic Recession," Alon T, Doepke M, Olmstead-Rumsey J, Tertilt M. NBER Working Paper 27660, August 2020.
Return to Text

From Cash to Central Bank Digital Currency

Fernando Alvarez

Central banks of many countries are seriously considering replacing cash with some form of central bank digital currency — often referred to as CBDC. This will be a large change, perhaps second only in importance to the widespread adoption of fiat currency during the twentieth century. As with any new, untried system, evaluation of it has to rely both on theoretical ideas and on empirical studies that quantify the effects of past reforms that most resemble the proposed change. In this piece I summarize some of the empirical work that various colleagues and I have done to shed light on the potential effects of adopting a CBDC. Most of the work uses either natural or field experiments we thought could help evaluate the cost and benefit of replacing cash with a nationwide, centralized digital payment system.

My research has focused on the loss of private benefits if cash is abolished as means of payment. The welfare loss of not being able to use cash depends both on the intensity of cash use and on the benefit per unit of cash used. While there are clearly private losses from not being able to use cash, many economists point out that there are also social costs of using cash, such as facilitating tax evasion via an informal sector and also in leading to other crimes. A notable countrywide experiment was the 2016 India demonetization plan, enacted in part to remove from circulation certain large-denomination bills that were used for such purposes. It entailed nonnegligible costs.[1] Macroeconomists add to the cost of cash the inability to set negative nominal interest rates, which can be a useful monetary policy tool under special circumstances.[2]

Estimating the Value of Transacting in Cash

David Argente and I estimate the private welfare costs of banning the use of cash.[3] We concentrate on the use of cash to pay for Uber rides in Mexico. While in developed nations Uber rides generally are paid for electronically, in developing countries, including Mexico, it is quite common for a large share of Uber trips to be paid for in cash. On the one hand, Uber rides are only one good or service, so extrapolating our conclusions to other goods and services should be done with caution. On the other hand, we argue that our studies offer a very nice combination of both natural and field experiments to estimate the welfare losses from a ban on cash.

We employ two approaches: quasi-natural experiments, where we examine data from the effects of either cash bans or cash introductions into a particular market, and randomized controlled trials where, for example, riders face different prices depending on their payment method. While our papers contain detailed analysis and review of each experiment, here I only summarize the key findings.

In 15 cities in Mexico, cash was introduced as a form of payment for Uber after the entry of Uber into those cities. For those cities, at first only digital payments were accepted. We use a standard event study to estimate the magnitude of many outcomes of interest after cash became an acceptable means of payment (Figure 1, next page). After the introduction of cash, there was a large increase in the number of trips and total expenditure on Uber rides. The number of drivers increased, but less than the number of

Fernando Alvarez is the Charles F. Grey Distinguished Service Professor in the Kenneth C. Griffin Department of Economics of The University of Chicago. He is an NBER research associate affiliated with the Economic Fluctuations and Growth and Monetary Economics Programs, a fellow of the Econometric Society, an Economic Theory Fellow, and a member of the American Academy of Arts & Sciences.

Alvarez has been a Wim Duisenberg Fellow at the European Central Bank, the Alexandre Lamfalussy Senior Research Fellow at the Bank for International Settlements and a consultant at the Federal Reserve Banks of Chicago and Minneapolis. His research is in macroeconomics, broadly conceived. His current interests are in dynamic heterogeneous agent models, price setting with nominal rigidities, and money demand and means of payments. His work has been published in the *American Economic Review*, *The Quarterly Journal of Economics*, *Econometrica*, *The Review of Economic Studies*, *Journal of Political Economy*, *Journal of Economic Theory*, and *Journal of Monetary Economics*, among others.

Alvarez graduated from the University of Minnesota in 1994, was an assistant professor at the Wharton School of the University of Pennsylvania, and joined The University of Chicago in 1996. He lives in Chicago with his wife, Gaby Silva Bavio.

Introduction of Uber in the 15 Largest Mexican Cities

City	Launch date	Introduction of cash	City size
Estado de Mexico	June 22, 2013	November 23, 2016	12,636,506
Ciudad de Mexico	June 22, 2013	October 31, 2018	8,802,665
Monterrey	October 24, 2014	June 6, 2016	4,941,616
Guadalajara	May 23, 2014	June 6, 2016	4,708,592
Puebla-Tlaxcala	September 2, 2015	March 3, 2017	3,136,141
Toluca	December 11, 2015	November 23, 2016	2,374,273
Tijuana	June 14, 2014	June 6, 2016	1,958,475
León	October 27, 2015	July 15, 2016	1,860,165
Juárez	June 24, 2016	June 24, 2016	1,473,464
Torreón	July 15, 2016	July 15, 2016	1,416,259
Querétaro	June 15, 2015	September 5, 2016	1,322,093
San Luis Potosí	March 8, 2016	June 6, 2016	1,219,717
Mérida	March 8, 2016	June 6, 2016	1,150,889
Mexicali	March 8, 2016	June 6, 2016	1,117,433
Aguascalientes	March 8, 2016	June 6, 2016	1,034,608

Source: Fernando E Alvarez and David O Argente. NBER Working Paper 28145 and as "On the Effects of the Availability of Means of Payments: The Case of Uber", The Quarterly Journal of Economics 137(3), February 2000, pp. 1737–89.

Figure 1

Effect of Uber Introducing Cash Payment Option

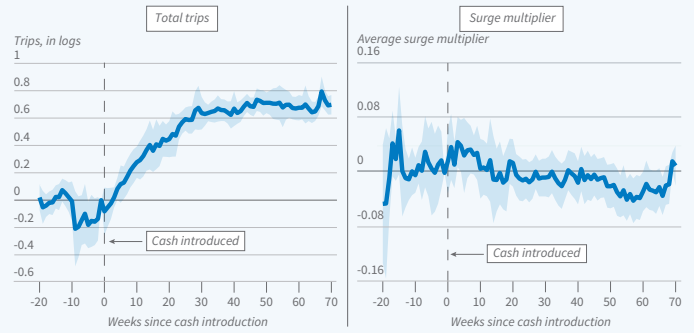Shaded area represent 95% confidence intervals
Source: Fernando E Alvarez and David O Argente. NBER Working Paper 28145 and as "On the Effects of the Availability of Means of Payments: The case of Uber", The Quarterly Journal of Economics 137(3), February 2020, pp. 1737–89.

Figure 2

riders, with total weekly hours increasing by the same approximate percentage as total fares. While there was a very large increase in rides, about doubling in less than a year, there was no increase in prices or customer wait times for pickup, or in prices of alternative means of transportation such as taxis (Figure 2). These findings suggest that the availability of cash as a means of payment made the ride-hailing service much more valuable to consumers.

Mexico City, with more than 20 million metro area residents and one of the top 10 Uber-use volumes, offers a rich natural experiment. The metropolitan area is divided into two parts: the Federal District, with national regulation, and a surrounding area that is part of the subnational State of Mexico, where state-level regulation applies. Cash payment for Uber was introduced at the end of 2016 in Mexico City, but only riders whose trip originated in the greater metro area — in the State of Mexico — were allowed to use cash. For rides that began in the city proper (the DF), cash was not an option until

November 2018, after the Mexican Supreme Court ruling on cash payments.

In our research, we geolocalize all the Uber rides to the city block in which they started for one month in the year before the introduction of cash (August 2016), one month in the year after the introduction of cash (August 2017), and also for one month a year later (August 2018). Analyzing rides originating in each census block, we find that neighborhoods with higher permanent income — denoted by characteristics such as higher education and greater internet connectivity — took a smaller share of trips with cash (Figure 3, Panels A and B). Comparing the growth rate of trips before and after the introduction of cash for comparable blocks in the State of Mexico and in the DF, we find that trips originating in the State of Mexico grew at much higher rate, showing a large effect of the availability of cash payments on the use of Uber. Our preferred estimates come from using a regression discontinuity design with the distance to the border, which shows a large increase — on the

Change in Ridership when Cash Payment Option Expanded
August 2017 (cash) vs August 2016 (no cash): effect of cash introduction

A negative value in the x-axis indicates a city block is located in the State of Mexico as opposed to city blocks in the DF.
Source: Fernando E Alvarez and David O Argente. NBER Working Paper 28145 and as "On the Effects of the Availability of Means of Payments: The case of Uber", The Quarterly Journal of Economics 137(3), February 2020, pp. 1737–89.
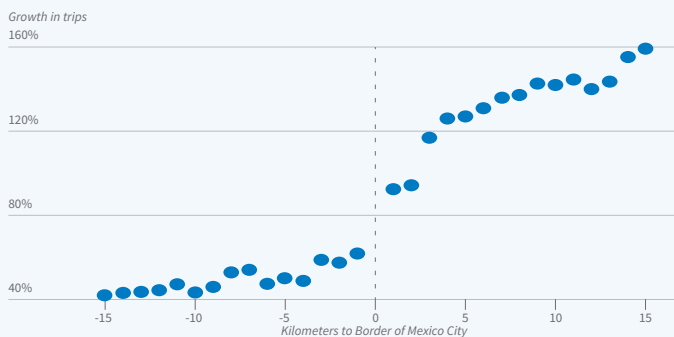
Figure 3, Panel A

Change in Ridership when Cash Payment Option Expanded
August 2018 (cash) vs August 2017 (cash), placebo
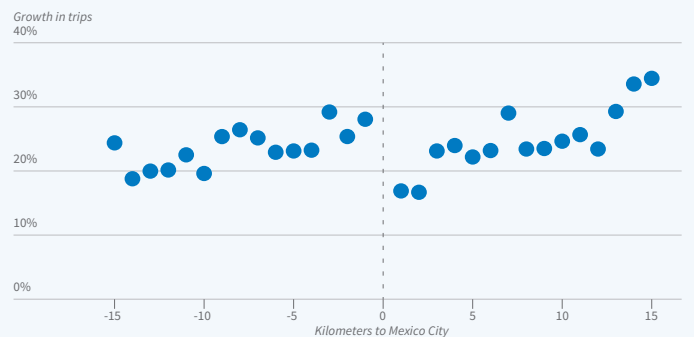
A negative value in the x-axis indicates a city block is located in the State of Mexico as opposed to city blocks in the DF.
Source: Fernando E Alvarez and David O Argente. NBER Working Paper 28145 and as "On the Effects of the Availability of Means of Payments: The case of Uber", The Quarterly Journal of Economics 137(3), February 2020, pp. 1737–89.

Figure 3, Panel B

order of 40 percent — in trips originated from city blocks in the State of Mexico compared to trips originated from city blocks near them in the DF (Figure 3, Panel A). As a check of our hypothesis, we use the same comparisons between August 2017 and August 2018, when cash was already available in both years, and find no effect around the boundary (Figure 3, Panel B).

We also analyze data on Uber traffic in other cities to provide additional evidence on the effect of allowing cash payments. Following a crime in the city of Puebla that was allegedly committed by a driver for an Uber competitor, in December 2017 that city banned cash payments for all app-based ride services. Using data on ride-sharing traffic in other cities as our controls, we estimate a 50 percent reduction in trips by riders who used cash and had not registered a credit card. Over time, about one-third of these cash users registered a credit card with Uber and ridership rose, but the drop-off was still 40 percent (Figure 4). To understand the effect of means of payment on the use of Uber, we sort the riders by the fraction of rides paid in cash before the ban among the riders who had paid using both cash and credit cards before the ban. The fraction of trips paid for in cash before the ban predicts the drop-off in trips when cash was banned (Figure 5).

It is noteworthy that Mexico City and Puebla are the Mexican cities with the lowest shares of trips paid for in cash, about 40 percent. Other Mexican cities have cash payment rates twice as high, reflecting the cash dependence of many Mexicans.

Evidence from Field Experiments

To complement our analysis of quasi-natural experiments, we also ran three large field experiments, each involving over 100,000 Uber riders within the State of Mexico. Using price discounts and credits, we measured riders' responsiveness to incentives and found that riders change payment methods to some degree in response to incentives. We interpret that to mean consumers attach a high value to the use of their preferred means of payment, which for many riders is cash. This implies a large private welfare cost to a ban on the use of cash.

Two of our experiments involved providing incentives to cash riders, those who had not registered a credit card with Uber. In one, discounts of 10, 15, 20, and 25 percent were offered to four groups of 23,000 riders, with a control group of 56,000 for whom prices remained stable. This experiment established the price elasticity of demand for Uber rides among cash users. It provides information on the cost of not having the cash payment option for those who have no other means of payment.

Our second experiment with cash riders involved six control groups of about 20,000 cash users, each of whom received rewards equal to three, six, or nine times their average weekly expenditures if they registered a credit card within a week, and for other groups the same rewards if they registered a card in six weeks. This experiment provides information on the cost to cash users of registering a credit card as a means of payment. This experiment was motivated by the experience in Puebla, where about a third of cash users registered a card when cash payments were abolished. Cash riders were responsive to the incentives to register, but their responses were moderate, indicating a relatively large cost of obtaining an alternative to cash.

Surprisingly, about half of State of Mexico riders alternate the use of cash and credit cards, in different proportions. We refer to these riders as mixed users. We conducted an experiment where four groups of 20,000 such riders each were offered discounts of different magnitudes that applied only if they paid with cash or with a credit card, and a control group of 90,000 riders were offered the regular price regardless of the means of payment. One group received a 10 per-

Effect of Banning Cash Payments for Ride-Shares in Puebla, Mexico

Difference in number of trips relative to control group

October 2017, law banning use of cash passed

December 2017, ban of cash goes into effect

September 2017, crime commited by driver

Source: Fernando E Alvarez and David O Argente. NBER Working Paper 28145 and as "On the Effects of the Availability of Means of Payments: The case of Uber", The Quarterly Journal of Economics 137(3), February 2020, pp. 1737–89.

Figure 4

Effect of Banning Cash Payments for Uber on Ride Demand
Graph shows the effects of banning the use of cash to pay for ride-shares in Puebla, Mexico

Probability change in probability of using Uber at all after cash payment ban

Percent change in the number of Uber trips

Share of trips paid in cash before ban, percentage points

Share of trips paid in cash before ban, percentage points

Shaded area represent 95% confidence intervals.
Source: Fernando E Alvarez and David O Argente. NBER Working Paper 28145 and as "On the Effects of the Availability of Means of Payments: The case of Uber", The Quarterly Journal of Economics 137(3), February 2020, pp. 1737–89.

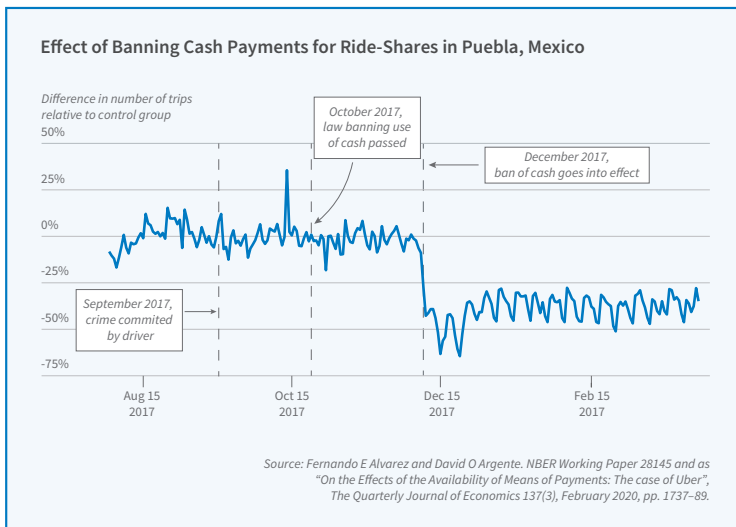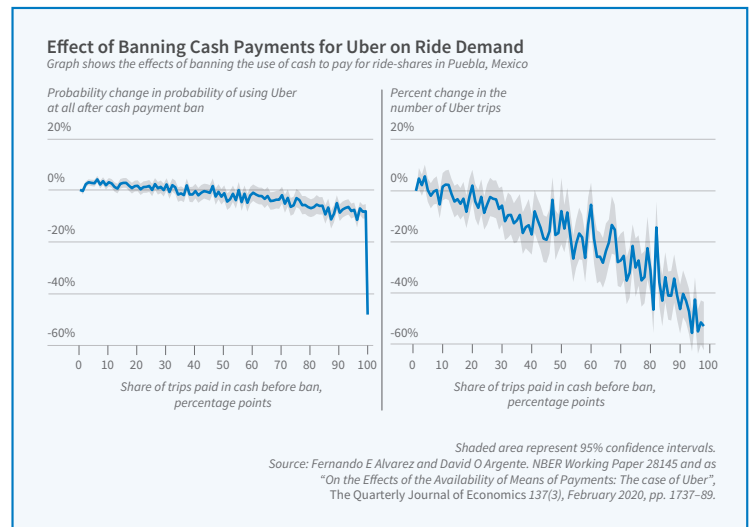**Figure 5**

cent discount if they paid in cash, a second group a 20 percent discount if they paid in cash, a third group a 10 percent discount if they paid with a credit card, and a fourth group a 20 percent discount if they paid with a card. In this experiment riders also substitute consistently toward the cheaper means of payment, but the effect was small; many riders still chose to ride using the means of payment without the discount. We estimate an elasticity of substitution of 3: the ratio of trips paid with credit relative to cash changes by three times the change in the relative price (Figure 6). Again, we interpret this as showing riders' strong attachment to their preferred means of payment, and hence a large cost of abolishing cash.

These experiments allow us to estimate the consumer surplus for Uber riders from the use of cash. Not all cash riders are wholly dependent on cash, as some will move to credit cards under certain conditions. However, in the State of Mexico, about 25 percent of riders are dependent on cash, and about 50 percent of riders with a registered credit card use both cash and credit. We estimate that a cash ban imposes a cost on consumers equal to about 50 percent of the value of trips paid for with cash.

The Cost of Abolishing Cash

In other work we compare the private social cost of abolishing cash with its social benefits.[4] We use a natural experiment on the change of means of payment for a large welfare program in Mexico to estimate the social cost of cash payments inducing higher rates of crime and or the growth of the informal sector. We also use the estimated elasticities for cash use among Uber passengers, together with the

cash intensity across all goods, to estimate a lower bound on the private cost of abolishing cash for all goods and services. For the range of estimated parameters, eliminating the use of cash reduces welfare.

We caution that our analysis neglects many issues, including the classic insight from monetary economics that the value of a means of payment can have large increasing returns to scale. For a given user, the value of the means of payment increases with the fraction of the population that uses that means of payment. This natural monopoly argument is one of the rea-

Elasticity of Substitution between Rides Paid for with Cash and Credit

Dots show the average share of rideshare trips paid for by credit card for each relative price. The three lines show predicted shares for various elasticities of substitution (ETA).
Source: Fernando E Alvarez and David O Argente. NBER Working Paper 28145 and as "On the Effects of the Availability of Means of Payments: The case of Uber", The Quarterly Journal of Economics 137(3), February 2020, pp. 1737–89.
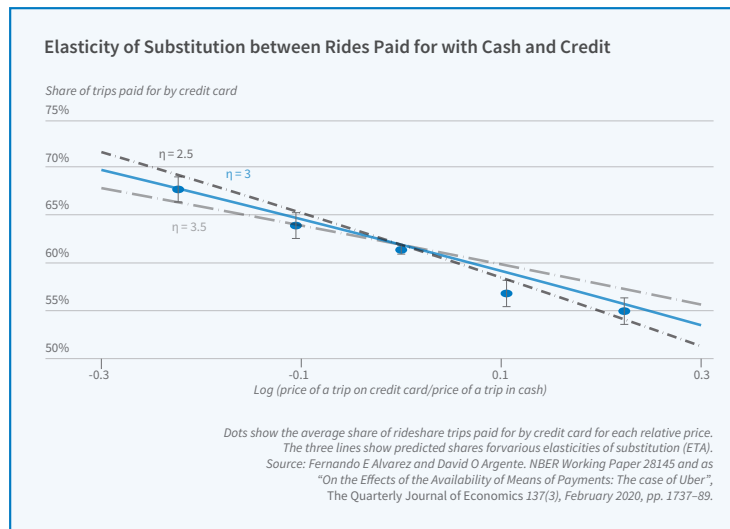
Figure 6

sons given for a digital currency to be issued by a central bank.

We assess the importance of this argument, which can motive a big push toward adopting a nationwide means of payment, using the natural experiment of the adoption of Bitcoin as legal tender in El Salvador.[5] We find scant evidence of the effectiveness of a big push. We also use several rich datasets from Costa Rica to assess this effect in a peer-to-peer digital transfer system operated by the Central Bank of Costa Rica.[6] We find evidence of increasing returns in the use of this digital transfer app. Our analysis of the experi-

ences in these two countries thus yields mixed evidence on the returns to scale of the introduction of digital payment.

[1] "Cash and the Economy: Evidence from India's Demonetization," Chodorow-Reich G, Gopinath G, Mishra P, Narayanan A. *The Quarterly Journal of Economics 135(1),* February 2020, pp. 57–103.
Return to Text

[2] *The Curse of Cash,* Rogoff KS. Princeton, NJ: Princeton University Press, 2017.
Return to Text

[3] "Consumer Surplus of Alternative Payment Methods: Paying Uber with Cash," Alvarez FE, Argente DO. NBER Working Paper 28133, November 2020. Published as "On the Effects of the Availability of Means of Payments: The Case of Uber" in *The Quarterly Journal of Economics* 137(3), August 2022, pp. 1737–1789.
Return to Text

[4] "Cash: A Blessing or a curse?" Alvarez F, Argente D, Jimenez R, Lippi F. *Journal of Monetary Economics* 125, January 2022, pp. 85–128.
Return to Text

[5] "Are Cryptocurrencies Currencies? Bitcoin as Legal Tender in El Salvador," Alvarez FE, Argente D, Van Patten D. NBER Working Paper 29968, February 2023.
Return to Text

[6] "Strategic Complementarities in a Dynamic Model of Technology Adoption: P2P Digital Payments," Alvarez FE, Argente D, Lippi F, Méndez E, Van Patten D. NBER Working Paper 31280, May 2023.
Return to Text

ESG and Sustainable Investing

Caroline Flammer

Sustainable investing has been growing very rapidly, as investors increasingly express concerns about climate change, biodiversity loss, social inequality, and other societal issues. According to Bloomberg, sustainable investing will reach about $50 trillion in assets under management (AUM) in 2025, accounting for about one-third of global AUM.[1]

While the growth of this market is nothing short of breathtaking, there are concerns and challenges. Indeed, concerns have been raised that such investments and companies' environmental, social, and governance (ESG) practices may not have any real impact; rather, they might be a form of "greenwashing" — with businesses portraying themselves as environmentally conscious without any intent to deliver — or "window dressing" of existing activities. These concerns are compounded by the inherent difficulty of measuring companies' social and environmental impact. This sum-mary describes recent research I have conducted to better understand the effectiveness, limitations, and challenges of various tools of sustainable investing and ESG practices.

Climate Finance: Green Bonds

One branch of my research examines green bonds, whose proceeds are earmarked to be invested in green projects.[2] While the first green bonds were issued primarily by governments and supranational entities such as the European Investment Bank, which in 2007 issued the first green bond, corporations are increasingly issuing green bonds as well.

Figure 1 plots the evolution of the market for corporate green bonds from 2013 to 2018. The total issuance amount rose from $5 billion in 2013 to $96 billion in 2018. This trend echoes the rapid growth in sustainable investing observed in recent years.

Caroline Flammer is a professor of international and public affairs and of climate at Columbia University, with joint appointments at the School of International and Public Affairs (SIPA) and the Climate School, and a secondary appointment at Columbia Business School. She serves as the director of SIPA's Sustainable Investing Research Initiative. She is an NBER research associate affiliated with the Environment and Energy Economics Program and a research member at the European Corporate Governance Institute.

Flammer's area of expertise is sustainable investing. Her award-winning research has examined whether and how sustainable finance and impact investing can help finance a more sustainable world and under what conditions firms can incorporate environmental, social, and governance considerations to enhance competitiveness while also playing a critical role in addressing climate change, inequality, global health, and other challenges to society and the natural environment.

Flammer is ranked by the Web of Science as one of the top 100 Highly Cited Researchers in the economics and business profession for impact over the past 10 years. She is president of the Alliance for Research on Corporate Sustainability, a global multi-disciplinary network of scholars fostering rigorous academic research on corporate sustainability, and chairs the Academic Network Advisory Committee of the United Nations-supported Principles for Responsible Investment (PRI), the largest network of responsible investors to date. She is an associate editor of *Management Science* and the *Strategic Management Journal.*
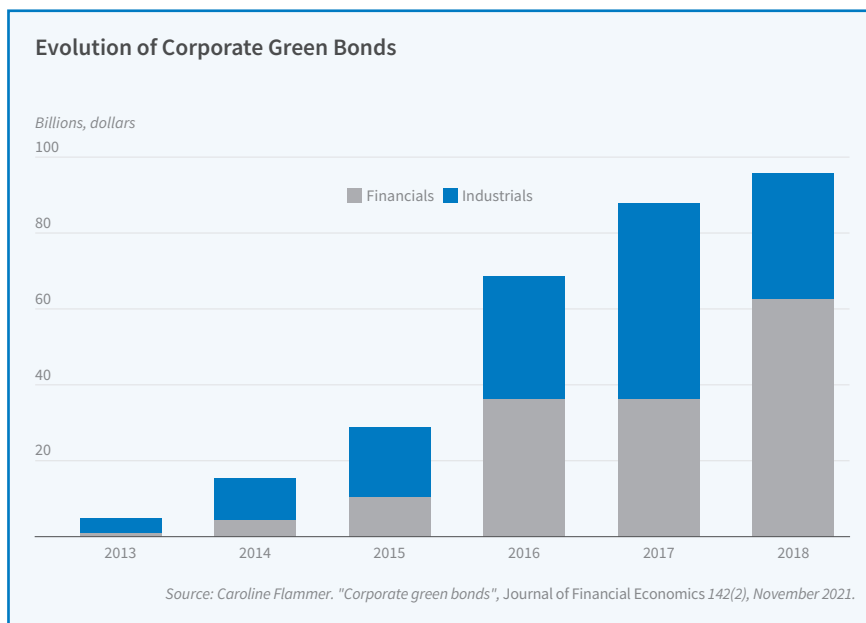

Evolution of Corporate Green Bonds

Billions, dollars

Source: Caroline Flammer. "Corporate green bonds", Journal of Financial Economics *142(2), November 2021.*

Figure 1

My analysis of corporate green bonds yields four main insights. First, I find that the stock market responds positively to the issuance of green bonds. That is, when companies announce that they are going to issue green bonds, their stock price increases. This suggests that shareholders perceive green bonds to be value enhancing. Second, I find that issuers significantly reduce their emissions in the years following the green bond issuance. This indicates that green bonds serve as a signal of the companies' commitment toward the environment, as opposed to being mere tools of "greenwashing." Third, I find that green bond issuers experience an increase in ownership by long-term and green investors, suggesting that green bonds help attract an investor clientele that is mindful of the long term and the natural environment. Fourth, and importantly, I find that these results concentrate among firms that issue green bonds that are certified by independent third parties. This indicates that, in the absence of public governance in the green bond market, private governance in the form of certification helps mitigate greenwashing concerns. Conversely, this also suggests that green bonds that are not certified are more likely to be subject to greenwashing.[3]

Biodiversity Finance

Climate change is closely intertwined with the loss of biodiversity. Several organizations such as the World Wide Fund for Nature (WWF) and the United Nations (UN) stress the urgency and importance of mitigating the biodiversity crisis; arguing that doing so is crucial for the planet, our health and well-being, and the global economy, as more than half of the world's GDP is dependent on nature and the services it provides.[4]

Protection and restoration of biodiversity requires considerable funding. The Nature Conservancy estimates a financing gap of $722 billion to $967 billion per year relative to its projection of the funding needed to effectively address the biodiversity crisis.[5] How can this gap be closed? One potential avenue is private capital investments in biodiversity projects that aim to provide both financial returns and biodiversity impact. While this practice is gaining momentum among investors, it is not well understood.

In recent work, Thomas Giroux, Geoffrey M. Heal, and I shed light on this new phenomenon in two ways.[6] First, we provide a conceptual framework that lays out how biodiversity — a public good — could be financed by private capital. A key component is the bundling of the public good with a private good whose value increases with the protection of biodiversity. For example, the protection of pollinators such as bees, beetles, and butterflies can enhance farmland's productivity, so investments that bundle farmland investments and pollinator preservation can protect biodiversity while providing a financial return to investors.

While such bundling serves as a monetization mechanism, the risk-return tradeoff of biodiversity investments may nevertheless not be appealing enough to attract private capital. To subsidize and de-risk biodiversity investments, a potential remedy is blended finance — combining funding from the public sector or philanthropic organizations with private capital to reduce the risk borne by, and improve the risk-return tradeoff for, private investors. In this vein, the blending improves the attractiveness of biodiversity investments and hence serves as a catalyst to private capital.

Second, we provide the first empirical evidence on biodiversity finance using deal-level data from a leading biodiversity finance institution. We find that projects with higher expected financial returns tend to be financed by pure private capital. Their scale is smaller, however, and so is their expected biodiversity impact. For larger-scale projects with a more ambitious biodiversity impact, blended finance is the more prevalent form of financing. While these projects have lower expected returns, their risk is also lower. This suggests that the blending — and the corresponding de-risking of private capital — is an important tool for improving the risk-return tradeoff of these projects, thereby increasing their appeal to private investors.

We also examine a set of projects that did not make it to the portfolio stage, and find that in order to be financed by private capital, biodiversity projects need to meet a certain threshold in terms of both their financial return and biodiversity impact. Accordingly, while private capital investments in biodiversity might be a useful addition to the toolbox, they are likely to only partially close the financing gap. As such, they are unlikely to substitute for effective public policies.

Social Impact Investing

Impact investing aims to finance business ventures that are both economically viable and have a positive social impact. Romain Boulongne, Rodolphe Durand, and I examine whether impact investing is more effective in achieving this dual objective when investments are directed toward ventures located in disadvantaged urban areas such as banlieues in France, favelas in Brazil, and slums in the US compared to similar investments directed toward ventures located outside these areas.[7]

We explore this question in the context of impact loans made to business ventures in and outside French banlieues using data from a French impact investor that we merge with establishment-level data from INSEE (Institut national de la statistique et des études économiques). We find that, following the issuance of the loans, banlieue ventures achieve greater improvements in financial performance and greater social impact in terms of the creation of local employment opportunities, quality jobs, and gender-equitable jobs compared to observationally similar non-banlieue ventures. Figure 2, on the next page, summarizes these results, plotting the evolution of the firm's return on assets and employment among banlieue and non-banlieue ventures several years before and after the issuance of the impact loan.

These results indicate that impact investors are able to contract with ventures of greater unrealized potential in banlieues. Why are traditional inves-

tors missing out on these opportunities? Our results point toward discrimination against banlieue ventures in the traditional loan market. This is corroborated in a controlled lab experiment in which participants — working professionals who are asked to act as loan officers — are randomly assigned to business ventures that are identical except for their geographic location. Participants are less likely to grant loans to banlieue ventures than to non-banlieue ventures, despite the ventures being identical.

Sustainable Equity Investing

Equity investors have various tools available to influence their portfolio companies' ESG practices. They can pursue passive sustainable investing strategies, including divestment and thematic screening, as well as more active forms of sustainable investing, including shareholder engagement and activism. Previous studies suggest that active sustainable investing strategies are more effective than passive forms of sustainable investing in shaping the ESG practices of portfolio companies.[8] The intuition is straightforward: when they choose to divest, investors lose their seat at the table and the potential to shape their portfolio companies' business practices. In contrast, investors' active engagement may serve as a more effective governance mechanism.

In a series of papers, my collaborators and I study the growing importance of shareholder activism pertaining to ESG practices, corporate short-termism, and shareholders' demand for greater disclosure of their portfolio firms' climate risks exposure.[9] Our findings suggest that shareholder

Profitability and Employment at Firms Receiving Venture Loans, Banlieues vs. Non-Banlieues

Evolution of return on assets

Evolution of employment

Banlieues are neighborhoods that have been identified by the French government as "zones urbaines sensibles," deprived urban areas with clearly identified social and economic challenges.
Source: Romain Boulongne, Rodolphe Durand, Caroline Flammer. NBER Working Paper 30551, and Strategic Management Journal (forthcoming).

Figure 2

activism can serve as an important private governance tool that improves ESG practices and their disclosure, and ultimately contributes to shareholder value.

Companies' ESG Practices

Diversity, Equity, and Inclusion

Companies' ESG practices, which are often referred to as corporate social responsibility (CSR), come in different flavors. One dimension that has received considerable attention but is not well understood is Diversity, Equity, and Inclusion (DEI). Perhaps due to the challenges in measuring DEI, metrics often focus narrowly on demographic diversity — e.g., the number of women and minorities on the board — but do not capture cognitive diversity, nor equity or inclusion.

Alex Edmans, Simon Glossner, and I take a first step toward measuring the DEI of companies more holistically, using employee survey data.[10] Our DEI measure has low correlation with gender and ethnic diversity in the boardroom, in senior management, and within the workforce, suggesting that DEI captures additional dimensions missing from traditional measures of demographic diversity. This indicates

that companies can hit the target but miss the point, improving diversity statistics without actually improving DEI.

We find that a firm's DEI score is positively associated with seven out of eight measures of future profitability, such as return on assets, return on sales, profits divided by employees, and sales divided by employees (labor productivity). These results are obtained after controlling for the share of female and minority employees at the firm; these variables are insignificantly related to almost all performance measures. In other words, DEI is correlated with higher profits, but diversity alone is not. We also find that DEI is positively associated with valuation measures, such as Tobin's q, suggesting that the market at least partially incorporates the value of DEI.

Other ESG Practices

Companies also implement various other CSR policies besides DEI. My research suggests that CSR can benefit companies in several ways, including by increasing their ability to innovate, to retain employees, to increase employee motivation, to improve their resilience in times of crisis, and to compete in the product market and the market for government contracts. All of these benefits help contribute to financial performance.[11]

Given these potential benefits of CSR, a natural question is: why are companies often hesitant to engage in ambitious CSR programs? In two related studies, I argue that this is partly due to managerial myopia, as the benefits of CSR programs tend to accrue in the long run while they might be costly in the short run.[12] I find that, consis-
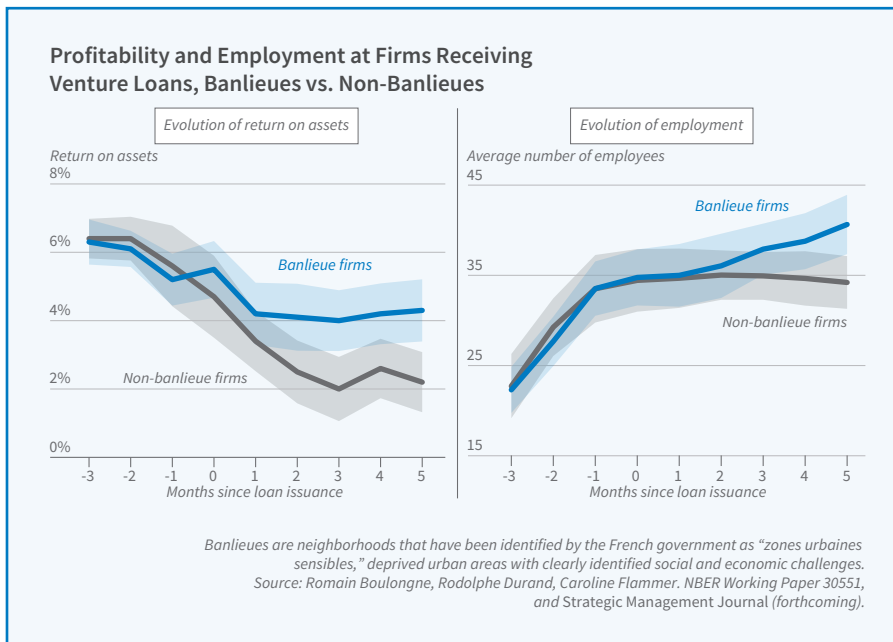
tent with this argument, the adoption of ESG-linked compensation — so-called "pay for social and environmental performance" — and executive compensation linked to the firm's long-term performance helps improve both firm value and the firm's engagement in long-term strategies such as CSR.

---

[1] "ESG assets may hit $53 trillion by 2025, a third of global AUM," Bloomberg Intelligence, February 23, 2021.
Return to Text
[2] "Green Bonds: Effectiveness and Implications for Public Policy," Flammer C. NBER Working Paper 25920, June 2019. Published in *Environmental and Energy Policy and the Economy* 1, 2020, pp. 95–128.
Return to Text
[3] "Green Bonds: Effectiveness and Implications for Public Policy," Flammer C. NBER Working Paper 25920, June 2019. Published in *Environmental and Energy Policy and the Economy* 1, 2020, pp. 95–128.
Return to Text
[4] "Living Planet Report 2022," WWF, 2022. "State of Finance for Nature 2022," United Nations Environment Programme, 2022.
Return to Text
[5] "Closing the Nature Funding Gap: A Finance Plan for the Planet," The Nature Conservancy, September 14, 2020.
Return to Text
[6] "Biodiversity Finance," Flammer C, Giroux T, Heal GM. NBER Working Paper 31022, March 2023.
Return to Text
[7] "Impact Investing in Disadvantaged

Urban Areas," Boulongne R, Durand R, Flammer C. NBER Working Paper 30551, October 2022, and forthcoming in *Strategic Management Journal*.
Return to Text
[8] For a curated list of academic publications in sustainable investing, see https://www.unpri.org/research/top–academic–resources–on–responsible–investment/4417.article.
Return to Text
[9] "Does Corporate Social Responsibility Lead to Superior Financial Performance? A Regression Discontinuity Approach," Flammer C. *Management Science* 61(11), November 2015, pp. 2549–2568. "Does a Long–Term Orientation Create Value? Evidence from a Regression Discontinuity," Flammer C, Bansal P. *Strategic Management Journal* 38(9), September 2017, pp. 1827–1847. "Shareholder Activism and Firms' Voluntary Disclosure of Climate Change Risks," Flammer C, Toffel MW, Viswanathan KV. *Strategic Management Journal*, 42(10), October 2021, pp. 1850–1879.
Return to Text
[10] "Diversity, Equity, and Inclusion," Edmans A, Flammer C, Glossner S. NBER Working Paper 31215, May 2023.
Return to Text
[11] "The Impact of Stakeholder Orientation on Innovation: Evidence from a Natural Experiment," Flammer C, Kacperczyk AJ. *Management Science* 62(7), July 2016, pp. 1982–2001. "Corporate Social Responsibility As a Defense against Knowledge Spillovers: Evidence from the Inevitable Disclosure Doctrine," Flammer C, Kacperczyk AJ. *Strategic Management Journal* 40(8), August 2019, pp. 1243–1267.

"Corporate Social Responsibility As an Employee Governance Tool: Evidence from a Quasi–Experiment," Flammer C, Luo J. *Strategic Management Journal* 38(2), February 2017, pp. 163–183. "Strategic Management during the Financial Crisis: How Firms Adjust Their Strategic Investments in Response to Credit Market Disruptions," Flammer C, Ioannou I. *Strategic Management Journal* 42(7), July 2021, pp. 1275–1298. "Competing for Government Procurement Contracts: The Role of Corporate Social Responsibility," Flammer C. *Strategic Management Journal* 39(5), May 2018, pp. 1299–1324. "Does Corporate Social Responsibility Lead to Superior Financial Performance? A Regression Discontinuity Approach," Flammer C. *Management Science* 61(11), November 2015, pp. 2549–2568. "Does Product Market Competition Foster Corporate Social Responsibility? Evidence from Trade Liberalization," Flammer C. *Strategic Management Journal* 36(10), October 2015, pp. 1469–1485.
Return to Text
[12] "Does a Long–Term Orientation Create Value? Evidence from a Regression Discontinuity," Flammer C, Bansal P. *Strategic Management Journal* 38(9), September 2017, pp. 1827–1847. "Corporate Governance and the Rise of Integrating Corporate Social Responsibility Criteria in Executive Compensation: Effectiveness and Implications for Firm Outcomes," Flammer C, Hong B, Minor DB. *Strategic Management Journal* 40(7), July 2019, pp. 1097–1122.
Return to Text

NBER News

NBER Appoints 54 Research Associates, 3 Faculty Research Fellows

The NBER Board of Directors appointed 54 research associates, all of whom were promoted from faculty research fellow status, at the board's September 11, 2023 meeting. Research associates must be tenured faculty members at North American colleges or universities; their appointments are recommended to the board by the directors of the NBER's 20 research programs, typically after consultation with a steering committee of leading scholars. The new research associates are affiliated with 28 different colleges and universities; they received graduate training at 25 different institutions.

In addition, NBER President James Poterba appointed three new faculty research fellows, typically junior scholars, also on the advice of program directors and their steering committees. The names and university affiliations of the new research associates and faculty research fellows and their primary NBER program affiliations are listed below.

Research Associates

Name	University Affiliation	Program
Achyuta Adhvaryu	University of California, San Diego	Children
Amanda Agan	Rutgers University	Labor Studies
Leila Agha	Harvard University	Economics of Health
Brian Beach	Vanderbilt University	Development of the American Economy
Shai Bernstein	Harvard University	Corporate Finance
John Beshears	Harvard University	Aging
Vivek Bhattacharya	Northwestern University	Industrial Organization
Peter Christensen	University of Illinois	Environment and Energy Economics
Eric Chyn	University of Texas at Austin	Public Economics
Christopher Conlon	New York University	Industrial Organization
Manasi Deshpande	University of Chicago	Aging
Monica Deza	Syracuse University	Economics of Health
Alessandro Dovis	University of Pennsylvania	International Finance and Macroeconomics
Alex Eble	Columbia University	Economics of Education
Florian Ederer	Boston University	Productivity, Innovation, and Entrepreneurship
Ying Fan	University of Michigan	Industrial Organization
Michela Giorcelli	University of California, Los Angeles	Development of the American Economy
Osea Giuntella	University of Pittsburgh	Economics of Health
Jacob Goldin	University of Chicago	Public Economics
Matthew Grennan	University of California, Berkeley	Economics of Health
Tal Gross	Boston University	Economics of Health

Walker Hanlon	Northwestern University	**Development of the American Economy**
John Horton	Massachusetts Institute of Technology	**Labor Studies**
Alex Imas	University of Chicago	**Asset Pricing**
Anupam Jena	Harvard University	**Economics of Health**
Damon Jones	University of Chicago	**Public Economics**
Namrata Kala	Massachusetts Institute of Technology	**Development Economics**
Supreet Kaur	University of California, Berkeley	**Development Economics**
Elira Kuka	George Washington University	**Children**
Timothy Layton	Harvard University	**Economics of Health**
Katherine Meckel	University of California, San Diego	**Children**
Sarah Miller	University of Michigan	**Economics of Health**
Tyler Muir	University of California, Los Angeles	**Asset Pricing**
Kathleen Mullen	University of Oregon	**Aging**
Ziad Obermeyer	University of California, Berkeley	**Aging**
Nicholas Papageorge	Johns Hopkins University	**Aging**
Santiago Pérez	University of California, Davis	**Development of the American Economy**
Claudia Persico	American University	**Children**
Carolin Pflueger	University of Chicago	**Asset Pricing**
Alessandro Rebucci	Johns Hopkins University	**International Finance and Macroeconomics**
Nicholas Ryan	Yale University	**Development Economics**
Frank Schilbach	Massachusetts Institute of Technology	**Development Economics**
Jesse Schreger	Columbia University	**International Finance and Macroeconomics**
Hannes Schwandt	Northwestern University	**Children**
David Simon	University of Connecticut	**Children**
Paulo Somaini	Stanford University	**Industrial Organization**
Amanda Starc	Northwestern University	**Economics of Health**
Stephen Terry	University of Michigan	**Productivity, Innovation, and Entrepreneurship**
Owen Thompson	Williams College	**Children**
Angela Vossmeyer	Claremont McKenna College	**Development of the American Economy**
Jialan Wang	University of Illinois	**Public Economics**
Guo Xu	University of California, Berkeley	**Political Economy**
David Yang	Harvard University	**Development Economics**
Seth Zimmerman	Yale University	**Economics of Education**

Peter Blair Henry Elected Chair of NBER Board of Directors; Karen Mills Elected Vice Chair

Peter Blair Henry was elected chair of the NBER's Board of Directors and Karen Mills was elected vice chair at the board's September 11, 2023 meeting.

Henry's research in international macroeconomics overturned conventional wisdom on debt relief, international capital flows, and the role of institutions in economic growth. He is the Class of 1984 Senior Fellow at Stanford University's Hoover Institution, a senior fellow at Stanford's Freeman Spogli Institute for International Studies, and dean emeritus of New York University's Leonard N. Stern School of Business.

Mills is a leading authority on US competitiveness, entrepreneurship, and innovation. She is a senior fellow at Harvard Business School in the entrepreneurial management unit, and served in President Obama's cabinet as administrator of the Small Business Administration (SBA).

Henry succeeds John Lipsky, the Peter G. Peterson Distinguished Scholar at Johns Hopkins University's Paul H. Nitze School of Advanced International Studies and a former first deputy managing director of the International Monetary Fund, who had served as

Henry   **Mills**

chair of the board since 2020.

Henry served as head of the external economics advisory group for then-Senator Obama's 2008 presidential campaign and was appointed to the Presidential Commission on White House Fellows in May 2009. He is a member of the boards of Citigroup and Nike, and is the principal investigator of the PhD Excellence Initiative, a fellowship program funded by the Alfred P. Sloan Foundation and the Hoover Institution that supports minority scholars seeking admission to economics doctoral programs. He received the 2022 Impactful Mentoring Award from the American Economic Association.

Henry received a BA in mathematics from Oxford University, where he was a Rhodes Scholar; a BA in eco-

nomics from the University of North Carolina at Chapel Hill, where he was a Morehead Scholar; and a PhD in economics from MIT.

Mills has a long record of contributions in the business, government, and academic sectors. As Administrator of the SBA 2009–13, she managed a loan guarantee portfolio of over $100 billion, and was a member of the President's National Economic Council. She is the author of the book *Fintech, Small Business & the American Dream: How Technology Is Transforming Lending and Shaping a New Era of Small Business Opportunity* and numerous other publications on fintech, innovation, and the supply chain economy. A venture capitalist, Mills serves on the board of Skillsoft, an educational technology company, and as a director of several Churchill Capital entities. She is a former director of the data analytics company Clarivate.

Mills is a member of the Harvard Corporation and a past vice chair of the Harvard Overseers. She earned an AB in economics from Harvard University and an MBA from Harvard Business School, where she was a Baker Scholar.

New Working Group on Gender in the Economy Launched

The NBER has launched a Working Group on Gender in the Economy to provide a venue for research on the role of women in the economies of both developed and developing nations. The Working Group will take a broad approach to analyzing gender-related disparities in economic outcomes, and in studying how limited access to education, labor market opportunities, and formal financial services, along with disempowering social norms and

Goldberg **Goldin** **Olivetti**

gender-biased laws and institutions, can create them. Research Associates Jessica Goldberg of the University of Maryland, Claudia Goldin of Harvard University, and Claudia Olivetti of

Dartmouth College will serve as the inaugural codirectors.

The Working Group will draw together researchers from many subfields of economics who share a common focus on economic issues that are gender related. It will build on a recent NBER initiative, supported by the Bill and Melinda Gates Foundation, that highlighted new research on topics such as women's role in caregiving and the economic and other determinants of domestic violence.

Summer Institute 2023

More than 3,600 researchers, hailing from 43 countries, participated in the 46th annual NBER Summer Institute, which was held in Cambridge, MA, July 10-28. They attended 51 distinct meetings and workshops arranged by 143 organizers. Most of the meetings also were streamed on the NBER's YouTube channel.

Participants represented 516 universities, central banks, think tanks, businesses, and government agencies. About two-thirds of in-person attendees were not affiliates of the NBER. There were 502 first-time Summer Institute participants.

A total of 3,221 papers were submitted,

of which 594 were included on the program.

Mario Draghi, a former president of the European Central Bank and former prime minister of Italy, delivered the 2023 Martin Feldstein Lecture on "The Next Flight of the Bumblebee: The Path to Common Fiscal Policy in the Eurozone." After outlining the considerations that motivated the creation of the European Monetary Union, he summarized key aspects of its performance over the last three decades and described several key challenges, as well as potential future directions for increasing economic integration. An edited text of his lecture begins on the first page of this issue of

the *NBER Reporter*, and a recording of his talk is available on the NBER website.

NBER Research Associate Jesse M. Shapiro of Harvard University and Liyang Sun of the Center for Monetary and Financial Studies presented the 2023 Methods Lectures on "Linear Panel Event Studies," which are increasingly used to estimate and plot causal effects of changes in policies and other important economic variables. The lecturers reviewed the basics of identification, estimation, and plotting in these settings, and discussed both some common pitfalls and remedies developed in the recent literature. A recording is available on the NBER website.

Three NBER Affiliates to Council of Economic Advisers

C. Kirabo Jackson, an affiliate of the NBER's Economics of Education and Labor Studies Programs, is taking leave from the NBER to serve as a member of the Council of Economic Advisers (CEA). Jackson is the Abraham Harris Professor of Education and Social Policy at

Northwestern University's School of Education and Social Policy.

Michael Geruso and Kyle Meng are both joining the CEA as senior economists. Geruso, an affiliate of the Economics of Health and Public Economics Programs, is an associate professor in the Economics Department

at the University of Texas, Austin. Meng, an affiliate of the Environment and Energy Economics Program, is an associate professor at the Bren School of Environmental Science & Management and in the Department of Economics at the University of California, Santa Barbara.

Three New Directors Elected to NBER Board

Esther George, William M. Lewis, Jr., and Laurence C. Morse were elected members at large of the NBER Board of Directors at the board's September 11, 2023 meeting.

George is the past president and CEO of the Federal Reserve Bank of Kansas City. For nearly 12 years she led the bank's staff of more than 2,000, overseeing supervision of financial institutions and provision of payment and financial services to depository institutions. She played a key role in setting national monetary policy as a voting member of the Federal Open Market Committee of the Federal Reserve, and hosted the Kansas City Fed's annual Jackson Hole Economic Symposium. George received her undergraduate degree in business administration from Missouri Western State University and an MBA from the University of Missouri-Kansas City.
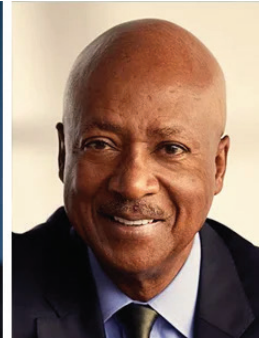
Lewis is a partner and member of the Firm Leadership Team at Apollo Global Management, a leading investment manager specializing in alternative asset classes. Prior to joining Apollo, he was a managing director and chair of investment banking at Lazard. He spent more than two decades in a variety of leadership roles at Morgan Stanley including global mergers and acquisitions, corporate finance, and chair of the firm's diversity task force. Lewis serves on the board of directors of Ariel Alternatives, the Harvard Management Company, which oversees the Harvard University endowment, and several other nonprofit institutions. He received his undergraduate degree in economics from Harvard University and an MBA from Harvard Business School.

Morse is a cofounder and managing partner of Fairview Capital Partners, a Connecticut-based venture capital and private equity investment management firm. Prior to launching the firm, he held senior positions or served on the advisory boards of several other venture capital firms. He is a board member of Webster Financial Corporation, an NYSE-listed commercial bank; a trustee of Harris Associates Investment Trust (Oakmark Mutual Funds); and chair of the board of trustees of Howard University. Morse received his undergraduate degree in economics from Howard and his PhD in economics from Princeton University.

In addition to these new appointments, the board elected Robert Hamada and Robert Parry, both long-serving board members, to emeritus status.

George **Lewis** **Morse**

Conferences and Meetings, Summer 2023

Detailed programs for NBER conferences are available at nber.org/conferences

NBER Corporate Associates Research Symposium
Organizer: James Poterba
June 8, 2023

Heterogeneous-Agent Macro Workshop
Organizers: Adrien Auclert, Bence Bardóczy, Matthew Rognlie, and Ludwig Straub
June 12–14, 2023

Distributional Consequences of New Energy Policies
Organizers: Catherine Hausman and Shanjun Li
June 15–16, 2023

CEPRA/NBER Workshop on Aging and Health
Organizers: Fabrizio Mazzonna, Kathleen M. McGarry, Kosali I. Simon, and Jonathan S. Skinner
June 19–20, 2023

International Seminar on Macroeconomics
Organizers: Jeffrey A. Frankel and Hélène Rey
June 22–23, 2023

International Asset Pricing
Organizers: Karen K. Lewis and Adrien Verdelhan
July 10, 2023

Corporate Finance
Organizers: Antoinette Schoar and Amir Sufi
July 10–11, 2023

Capital Markets and the Economy
Organizers: Janice C. Eberly and Deborah J. Lucas
July 10–12, 2023

Development of the American Economy
Organizers: Katherine Eriksson, Martin Fiszbein, Joshua K. Hausman, Leah Platt Boustan, and William J. Collins
July 10–13, 2023

International Trade & Investment
Organizers: Oleg Itskhoki and Ina Simonovska
July 10–13, 2023

Monetary Economics
Organizers: Emi Nakamura and Jón Steinsson
July 10–14, 2023

Impulse and Propagation Mechanisms
Organizers: Lawrence Christiano and Martin S. Eichenbaum
July 10–14, 2023

International Trade & Macroeconomics
Organizers: Javier Cravino and Katheryn Russ
July 11, 2023

Martin Feldstein Lecture
Organizer: James Poterba
July 11, 2023

Risks of Financial Institutions
Organizers: Mark Carey and René M. Stulz
July 11–12, 2023

Forecasting & Empirical Methods
Organizers: Allan Timmermann and Jonathan H. Wright
July 11–14, 2023

International Finance & Macroeconomics
Organizers: Fabrizio Perri and Stephanie Schmitt-Grohé
July 11–14, 2023

International Finance and Macroeconomic Data Sources
Organizers: Jesse Schreger and Chenzi Xu
July 12, 2023

Macro, Money, and Financial Frictions
Organizers: Markus K. Brunnermeier, Arvind Krishnamurthy, and Guillermo Ordoñez
July 12–13, 2023

Asset Pricing
Organizers: Ralph S. J. Koijen and Sydney C. Ludvigson
July 13–14, 2023

Workshop on Methods and Applications for Dynamic Equilibrium Models
Organizers: S. Borağan Aruoba, Jesús Fernández-Villaverde, and Frank Schorfheide
July 13–14, 2023

Economic Growth
Organizers: Ufuk Akcigit, Francisco J. Buera, and David Lagakos
July 13–14, 2023

Behavioral Macro
Organizers: Andrew Caplin and Michael Woodford
July 14, 2023

Innovation Research Boot Camp
Organizers: Kevin A. Bryan, Ina Ganguli, Benjamin Jones, Kyle R. Myers, and Heidi L. Williams
July 14–20, 2023

Big Data and High-Performance Computing for Financial Economics
Organizers: Toni Whited and Mao Ye
July 15, 2023

Economic Fluctuations and Growth Program Meeting
Organizers: Christopher Tonetti and Annette Vissing-Jorgensen
July 15, 2023

Entrepreneurship
Organizers: Yael Hochberg, Josh Lerner, and David T. Robinson
July 17, 2023

Macroeconomics within and across Borders
Organizers: Mark A. Aguiar, Cristina Arellano, Patrick J. Kehoe, and Mark L. J. Wright
July 17, 2023

Conference on Research in Income and Wealth
Organizers: Katharine G. Abraham, Susanto Basu, and David M. Byrne
July 17–18, 2023

The Micro and Macro Perspectives of the Aggregate Labor Market
Organizers: Philipp Kircher, Guido Menzio, and Giuseppe Moscarini
July 17–20, 2023

Micro Data and Macro Models
Organizers: Erik Hurst, Greg Kaplan, and Giovanni L. Violante
July 17–20, 2023

Entrepreneurship Research Boot Camp
Organizer: David T. Robinson
July 17–21, 2023

Macroeconomics and Productivity
Organizers: Susanto Basu, Nicholas Bloom, Raffaella Sadun, and Chad Syverson
July 18, 2023

Inequality and Macroeconomics
Organizers: Roland Bénabou, Raquel Fernández, and Jonathan Heathcote
July 18–19, 2023

Innovation
Organizers: Adam B. Jaffe, Benjamin Jones, and Heidi L. Williams
July 18–19, 2023

Political Economy

Organizers: Matilde Bombardini, Ernesto Dal Bó, Suresh Naidu, and Thomas R. Palfrey
July 18–19, 2023

Digital Economics and Artificial Intelligence

Organizers: Erik Brynjolfsson, Avi Goldfarb, and Catherine Tucker
July 19–21, 2023

Macro Public Finance

Organizers: Dirk Krueger, Florian Scheuer, Stefanie Stantcheva, and Aleh Tsyvinski
July 20, 2023

Science of Science Funding

Organizers: Paula Stephan and Reinhilde Veugelers
July 20–21, 2023

Industrial Organization

Organizers: Zach Y. Brown, Liran Einav, Adam Kapor, Amanda Starc, and Kevin R. Williams
July 20–21, 2023

Household Finance

Organizers: Adair Morse, Constantine Yannelis, and Stephen P. Zeldes
July 20–21, 2023

Gender in the Economy

Organizers: Jessica Goldberg, Claudia Goldin, Claudia Olivetti, Jessica Pan, and Alessandra Voena
July 24–25, 2023

Environmental & Energy Economics

Organizers: Tamma Carleton and Matthew Kotchen
July 24–25, 2023

Development Economics

Organizers: Orazio Attanasio, Emily Breza, Claudio Ferraz, Rachel Glennerster, Seema Jayachandran, Jeremy Magruder, Anant Nyshadham, and Leonard Wantchekon
July 24–25, 2023

Aging

Organizers: David M. Cutler, Kosali I. Simon, and Jonathan S. Skinner
July 24–25, 2023

Labor Studies

Organizers: David Autor, Rebecca Diamond, Patrick M. Kline, Brian K. Kovak, Alexandre Mas, Melvin Stephens, Lowell Taylor, and Winnie van Dijk
July 24–27, 2023

Public Economics

Organizers: Michael C. Best, Raj Chetty, Eric Chyn, Tatiana Homonoff, Maria Polyakova, and Danny Yagan
July 25–26, 2023

Economics of National Security
Organizers: Samuel Bazzi and Eli Berman
July 26, 2023

Economics of Social Security
Organizers: Manasi Deshpande and James Poterba
July 26, 2023

Economics of Education
Organizer: Caroline M. Hoxby
July 26, 2023

Personnel Economics
Organizers: Mitchell Hoffman and Christopher T. Stanton
July 26–27, 2023

Economics of Health
Organizers: Leila Agha, Christopher S. Carpenter, Laura Dague, Amy Finkelstein, Benjamin R. Handel, and Alex Hollingsworth
July 26–27, 2023

Law and Economics
Organizer: Christine Jolls
July 26–27, 2023

Real Estate
Organizers: Tomasz Piskorski and Maisy Wong
July 26–27, 2023

Urban Economics
Organizer: Edward L. Glaeser
July 27–28, 2023

Crime
Organizers: Jens Ludwig and Crystal Yang
July 27–28, 2023

Children
Organizers: Janet Currie and Anna Aizer
July 27–28, 2023

Methods Lectures: Linear Panel Event Studies
Organizer: James Poterba
July 28, 2023

Japan Project
Organizers: Shiro P. Armstrong, Charles Yuji Horioka, Tsutomu Watanabe, and David Weinstein
August 1–2, 2023

Digital Economics and AI Tutorial
      Organizers: Avi Goldfarb and Catherine Tucker
      September 21, 2023

Tax Policy and the Economy
      Organizer: Robert A. Moffitt
      September 21, 2023

Economics of Artificial Intelligence
      Organizers: Ajay K. Agrawal, Joshua S. Gans, Avi Goldfarb, and Catherine Tucker
      September 22, 2023

Macroeconomics across Time and Space
      Organizers: Ufuk Akcigit, Satyajit Chatterjee, Jeremy Greenwood, David Lagakos, and Lee E. Ohanian
      September 22, 2023

NBER Books

Risks in Agricultural Supply Chains

Pol Antràs and David Zilberman, editors
https://www.nber.org/books-and-chapters/risks-agricultural-supply-chains

Climate change and the recent COVID-19 pandemic have exposed the vulnerability of global agricultural supply and value chains. There is a growing awareness of the importance of interactions within and between these supply chains for understanding the performance of agricultural markets.

Risks in Agricultural Supply Chains presents a collection of research studies that develop conceptual models and empirical analyses of risk resilience and vulnerability in supply chains.

The chapters emphasize the roles played by microeconomic incentives, macroeconomic policies, and technological change in contributing to supply chain performance. The studies range widely, considering for example how agent-based modeling and remote sensing data can be used to assess the impact of shocks, and how recent shocks such as the COVID-19 pandemic and the African Swine fever in China affected agricultural labor markets, the supply chain for meat products, and the food retailing sector.

A recurring theme is the transformation of agricultural supply chains and the volatility of food systems in response to microeconomic shocks. The chapters not only present new findings, but also point to important directions for future research.
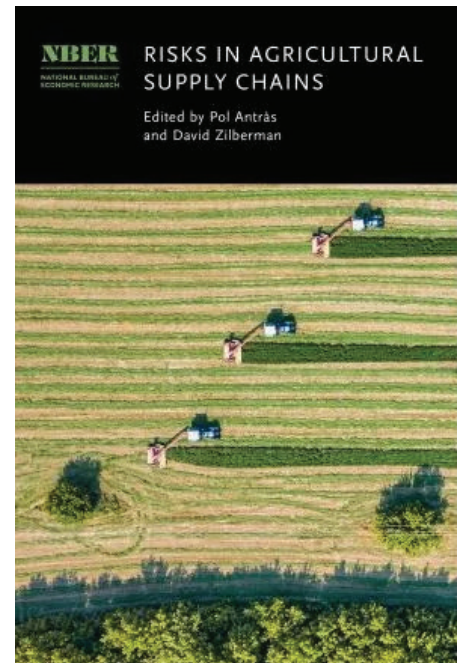
Tax Policy and the Economy, Volume 37

Robert A. Moffitt, editor

This volume of *Tax Policy and the Economy* presents new research on important issues concerning US taxation and transfers.

First, Edward L. Glaeser, Caitlin S. Gorback, and James M. Poterba examine the distribution of burdens associated with taxes on transportation. Replacing the gasoline tax with a vehicle-miles-traveled (VMT) tax would increase the burden on higher-income households, who drive more fuel-efficient cars and are more likely to own electric vehicles. User charges for airports, subways, and commuter rail are progressive, while the burden of bus fees is larger for lower-income households than for their higher-income counterparts.

Next, Katarzyna Bilicka, Michael Devereux, and Irem Güçeri investigate tax shifting by multinational companies (MNCs) and the implications of a potential Global Minimum Tax (GMT). They find that MNCs shift intellectual property to tax havens, and that a large share of patenting activity takes place in tax havens where little or no R&D occurs. Tax havens are particularly important for MNCs with large subsidiary networks; such firms would likely be subject to a GMT.

Mark Duggan, Audrey Guo, and Andrew C. Johnston study the role of experience rating in the Unemployment Insurance (UI) system and find that the current structure stabilizes the labor market because it penalizes firms with high rates of UI-eligible layoffs.

In the fourth paper, David Altig, Laurence J. Kotlikoff, and Victor Yifan Ye calculate how retiring at different ages will affect Social Security benefit amounts, taking into account taxation and other benefits. They find that virtually all individuals aged 45 to 62 should wait until age 65 or later to maximize their Social Security benefits. Indeed, 90 percent would benefit from waiting until age 70, but only 10 percent do so.

Finally, Jonathan Meer and Joshua Witter examine the potential impact of the Earned Income Tax Credit (EITC) on the labor force decisions of childless adults who are eligible for a small credit after they reach age 25. Comparing labor force attachment changes just before and after this age suggests that the EITC has little impact on the labor force participation of this group.

NBER *Reporter*

NATIONAL BUREAU OF ECONOMIC RESEARCH

1050 Massachusetts Avenue
Cambridge, Massachusetts 02138-5398
(617) 868-3900

Change Service Requested