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Katherine Baicker

THE 2019 MARTIN FELDSTEIN LECTURE

Economic Analysis for Evidence-Based Health Policy: Progress and Pitfalls

Katherine Baicker*

It is an enormous honor to deliver this lecture, particularly this year. You have just heard from a number of our profession's luminaries about the monumental effect that Marty Feldstein had on both the world and on their careers. This is personal for me as well, as another of the many students to whom Marty provided such exceptional guidance, support, and investment. Marty has served as a mentor for me throughout my career, from my first week of graduate school through every professional opportunity and decision that I have had, and I am profoundly grateful.

I am privileged to be able to talk with you about one of the many policy arenas that Marty Feldstein helped to shape, from one of his earliest publications, to which this lecture's title alludes. Health system reform is one of the pressing policy issues of the day, and economics has a great deal to contribute to the debate. The economics tool kit is particularly well suited to generating the analytical framework and evidence base needed to inform decisions around the difficult trade-offs inherent to so many aspects of health policy. But, of course, there are a number of challenges to overcome in translating

**This is an edited version of the Martin Feldstein Lecture delivered on July 25, 2019, at the NBER Summer Institute. Katherine Baicker is dean and Emmett Dedmon Professor at the University of Chicago's Harris School of Public Policy, and an NBER research associate affiliated with the programs on aging, education, health care, and public economics. She serves on the Congressional Budget Office's Panel of Health Advisers, on the boards of directors of Eli Lilly and Company pharmaceuticals and HMS Holdings, and on the advisory board of the National Institute for Health Care Management Foundation.*

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a vast and impressive body of research into policy impact. I will start by trying to define what I mean by “evidence-based health policy” before turning to the current reform debate. I will conclude with thoughts about where, as a profession, we have been more or less successful in achieving that impact and how we might continue to promote the use of the evidence we generate in informing effective policy.

What do I mean by evidence-based health policy? Proponents on both sides of debates often claim to have views grounded in evidence. Having a clear framework for characterizing what we mean by evidence-based health policy is a prerequisite for a rational approach to making policy choices, and may even help focus the debate on the most promising approaches. First, policies need to be well-specified; a slogan is not sufficient. For example, “Medicare for All” isn’t really a policy. That slogan masks areas of fundamental disagreement about the role of government and markets, coverage expectations, and cost structure. It may be an effective way to signal a political orientation, but the lack of specificity sidesteps the hard work of assessing the relative effectiveness of the different policies that might fall under that umbrella.

Second, grounding policy decisions in evidence requires a careful distinction between policies and goals. This is important on two fronts: Many different policies may aim to achieve the same goal with very different degrees of effectiveness; and there may be many different goals for a given policy, with different likelihoods of success. For example, consider the financial incentives for physicians to coordinate care. The evidence that this would reduce health care spending—one potential goal—is quite weak, while the evidence that it might improve health outcomes—a different goal—is stronger. Similarly, there may be alternative policies that are more effective in improving health outcomes through coordinating care across sites.

Third, generating the evidence to support policy is an inherently empirical endeavor. Introspection—particularly by economists!—and theory are terrible ways to evaluate policy. For some policies, we have clear conceptual models that suggest

the direction of the effect the policy is likely to have, but these models never tell us how big the effect is likely to be. For example, economic theory says that, all else equal, when copayments or deductibles are higher, patients use less care — we're pretty sure that demand slopes down, even for health care — but the theory doesn't tell us by how much. And for other policies, even the direction of the effect is unclear without empirical research, with competing effects potentially going in different directions.

Interpreting the often vast bodies of evidence that speak to a policy question requires judgment and nuance, but it is crucial that interpretation not be flavored by the policy preferences of the researcher or analyst. A given body of evidence can be used to support very different policy positions depending on one's goals—for example, how one weighs costs to taxpayers versus redistribution of health care resources—but different goals shouldn't drive different interpretations of the evidence base.

Translating evidence into policy requires a distinct toolkit. As a profession, economists bring a lot of strengths to the table, and Marty was exceptionally talented and successful in this endeavor. Perhaps one of the discipline's greatest strengths is the very careful and sophisticated approach to causality, eschewing policy prescriptions built on correlations. We also bring a depth of understanding of incentives and markets that helps to highlight potential intended and unintended consequences of policy changes, as well as the static and

dynamic effects that those policies have on decision-making. This is also conducive to understanding the ultimate incidence and distributional consequences of different policies. And our analytical framework helps us to interpret evidence in a nuanced way that reflects the complexity of multiple mechanisms at play. Putting this toolkit together is a major asset in generating evidence that remains distinct from advocacy.

There are also substantial weaknesses to contend with. Academics in general are often loath to speak

Mechanically, this is probably the easier of the two goals, as we have well-developed mechanisms for expanding insurance coverage, albeit with lots of open questions about which are most efficient and what that insurance ought to look like. But it is important to understand the underlying rationale for redistribution through the health care system. It is tempting to think that there are externalities that warrant redistributing resources in this way, for example, that insuring Jim will keep him from spreading disease to me, or that Jim will be so much

healthier because of his insurance that his health care use will decline and his earnings and taxes paid will increase enough that I will actually be better off. I don't believe that the evidence supports this. Rather, the primary rationale for publicly funded redistributive insurance plans is altruism. Policy then needs to be based on social preferences for the degree of redistribution. It isn't enough to debate whether "health care is a right." Rather, we

need to answer the question: "How much health care for low-income populations do we want to fund with public resources?"

Insurance coverage has substantially expanded since passage of the Affordable Care Act (ACA, or Obamacare), but there remain substantial disparities in coverage by, for example, race and ethnicity. It is also worth noting that coverage through new health insurance marketplaces seems to have received attention disproportionate to the share of the population enrolled, with the vast majority of privately insured Americans still obtaining coverage through employer-

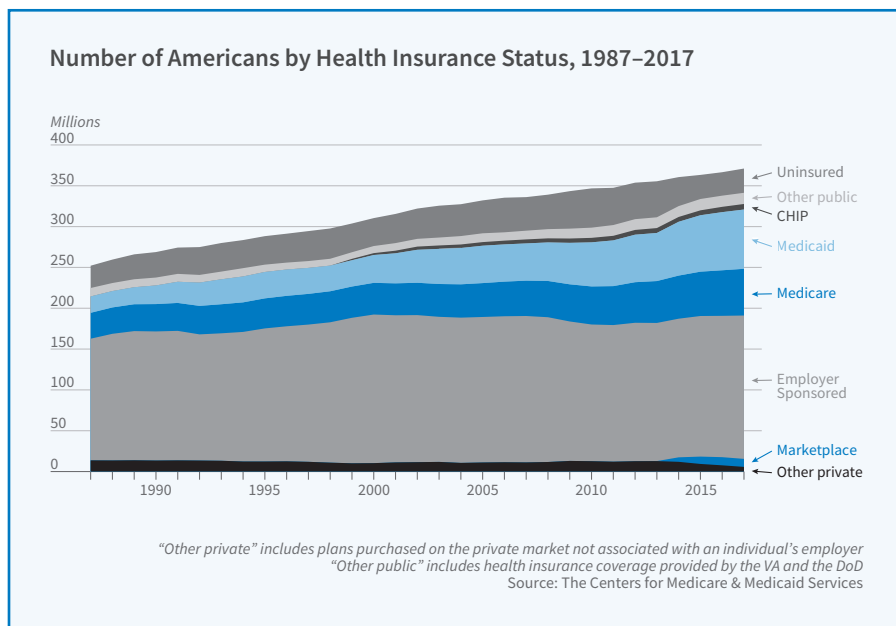


Figure 1

definitively—further study is always needed! We are also not known for the timeliness of our evidence, given lags in data availability, speed of analysis, and publication processes. We struggle both to incorporate real political constraints and to put aside second-order concerns. Lastly, we often do not reward the effort that real translation requires.

This is now playing out in the current health policy debate. Reform efforts have multiple goals, some allocative and some productive. Allocative goals focus on health care availability and affordability across the income distribution—social insurance.

based plans.

The second goal of improving productive efficiency is even more complex, given the multiple potential policy levers on patient and provider sides as well as the intrinsic imperfections in health care markets. There is little disagreement that we spend a lot of money on health care and that we could be getting more out of our health care system for every dollar that we spend, but that is often where agreement ends. Understanding how we finance health care spending is foundational to understanding the effects of different policy levers, and economic analysis can help focus attention.

Most care in the United States is purchased through insurance—public or private. Despite mounting concern about cost-sharing, the share of spending that is purchased with out-of-pocket dollars has remained relatively flat, although that masks a change in the composition of those insured by Medicaid with very low cost-sharing and those insured through private plans where higher deductibles are increasingly prevalent. Though public discourse is often not focused on these categories, the majority of health care dollars are spent on physicians and hospitals.

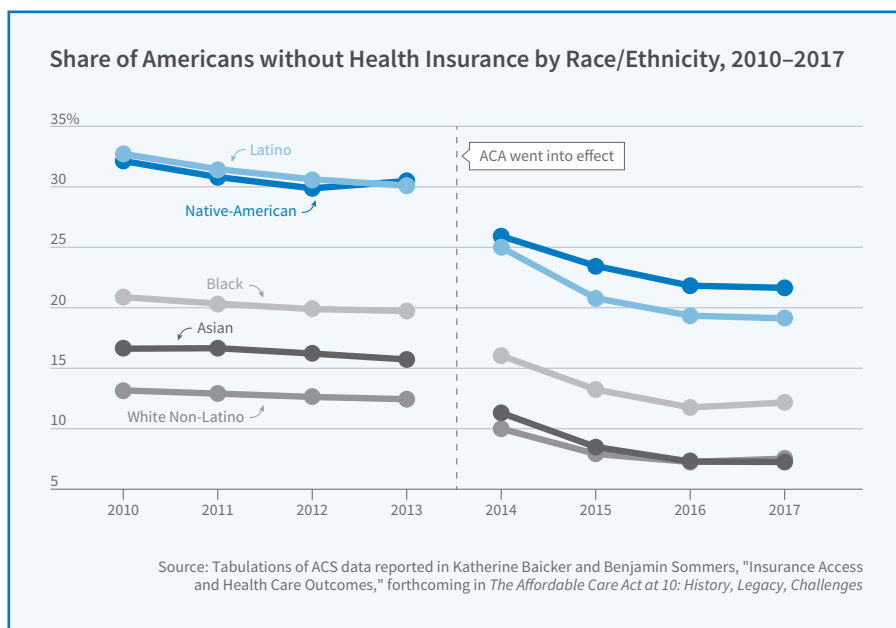


Figure 2

tally, even if we had such decomposition, we would need to understand the underlying supply and demand conditions that generated the observed price and quantity outcomes. Without that understanding, simply observing higher prices wouldn't indicate the optimal policy response.

Health care value is of course about health outcomes as well as dollars spent. There is ample evidence of inefficiency within our health care system. Here, too, a robust analytical framework is crucial for drawing out policy implications. For example, the Dartmouth Atlas of Health Care has produced an important body of evidence on the geographic variation in health care quality and spending even within the Medicare program. This variation is certainly suggestive of underlying inefficiency, and has generated a fruitful line of research into the underlying causes of that variation. But the variation alone does not tell us how policy ought to be different, and the goal of policy ought to be improving system efficiency, rather than dampening variation per se.

With multiple factors beyond the health care system determining health outcomes, it is challenging to generate evidence about the health effects of additional spending, but this is where our toolkit can add the greatest value to the debate. I will start on the patient side with the effects of expanding health insurance coverage and of the features of those health insurance plans.

The primary increase in coverage generated by the ACA/Obamacare was through Medicaid. This raises the first-order question of what Medicaid coverage actually does. This is a prime example of theory highlighting competing effects on both the cost and benefit sides. The primary cost of expanding insurance is increased health care use. To non-economists this may

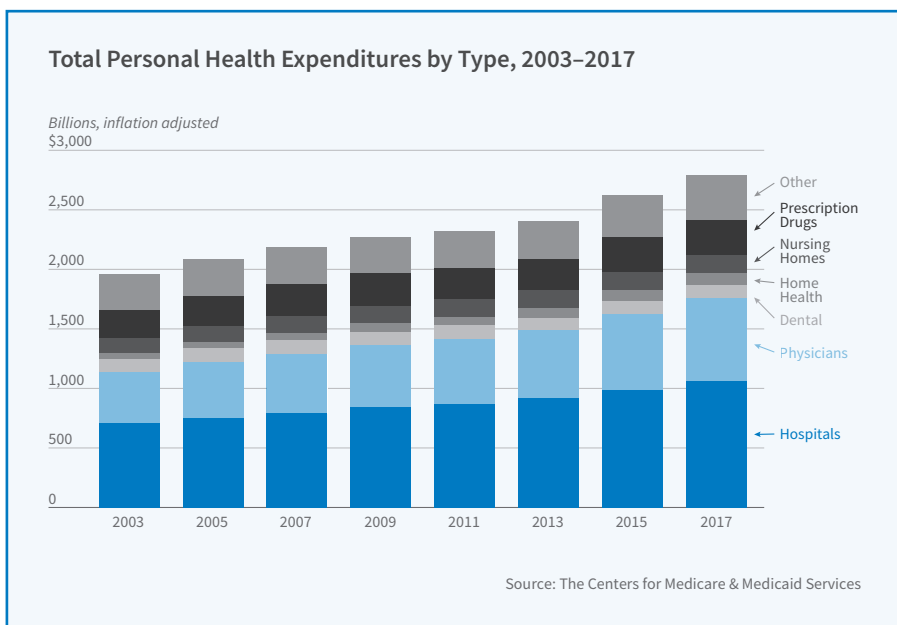
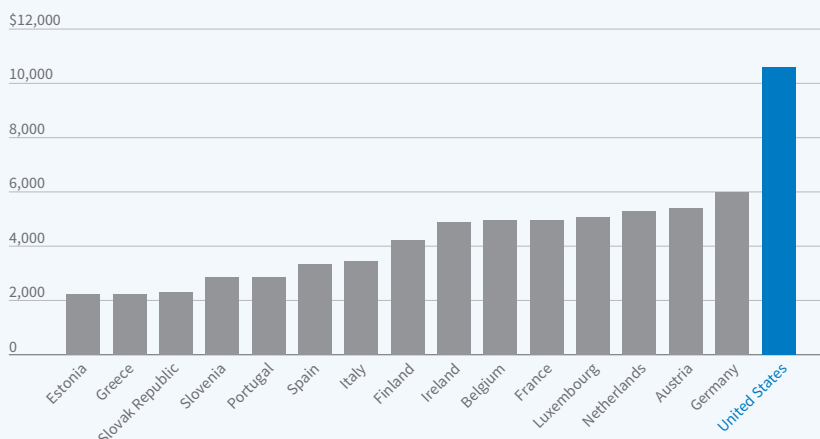


Figure 3

Total Health Care Spending per Capita, 2018



Source: The Organisation for Economic Co-operation and Development

Figure 4

sound more like the point rather than a cost, but achieving the same health while expending fewer health care resources would be a good thing. Insurance lowers the price of health care, which should increase health care use, but many proponents of expansion hoped that having insurance would reduce patients' spending by moving them out of expensive emergency departments and into more cost-effective primary care. On the benefits side, there are multiple potential benefits of insurance expansion. Insurance ought to provide greater financial security, often underappreciated in the debate. But it's possible that the uninsured had fewer opportunities to spend money on health care. Of course, the main potential benefit is improved health—although in theory, insurance could undermine enrollees' incentives to maintain their health (though this seems unlikely). Empirical evidence is thus needed on all fronts.

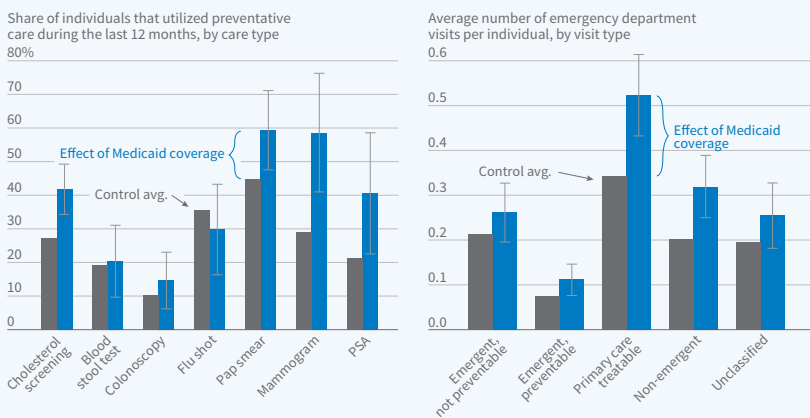
These effects are notoriously difficult to estimate, because people who are covered by Medicaid are different from the uninsured in many ways—such as income and underlying health—that may confound estimates. Along with colleagues, Amy Finkelstein and I had the chance to estimate these effects using the rigor of a randomized controlled trial. In 2008, Oregon had a waiting list for its Medicaid program for non-disabled low-income adults, a population that was optional for states to cover, and which only a minority of states did at the time. The state drew names from the list by lottery, giving us a remarkable opportunity to gauge Medicaid's effects. We found that Medicaid increased health care use across settings, including primary care, prescription drugs, hospitals, and—surprisingly to many—emergency departments. This result is actually not surprising based on econom-

ics principles. As noted, demand slopes down, even for health care, and insurance dramatically lowers the price for emergency department care. Of course, insurance also lowers the price of primary care, and if the doctor and the emergency department are strong substitutes, this cross-price elasticity could dominate the own-price elasticity and drive emergency department use down on net. But it is not surprising—at least to economists and, it turns out, many physicians—that the own-price elasticity dominates. We also found that financial security was substantially improved by having Medicaid. The effects on health were much more nuanced. People reported that their health was much better, and rates of depression were dramatically lower, but we didn't detect any improvements in blood pressure, cholesterol, blood sugar, or obesity. These results require careful, measured interpretation. I'll return to how that worked out for us in the popular press.

The next question is how patient cost-sharing and the other features of insurance plans affect health care use and efficiency. Classical theory suggests that optimal cost-sharing ought to balance insurance protection against moral hazard. The insurance plans that we observe in both the public and private sectors look far from optimal. On the public side, Medicare alone provides surprisingly limited coverage, leaving beneficiaries exposed to unlimited catastrophic out-of-pocket spending, motivating almost all Medicare beneficiaries to have wrap-around Medigap coverage that virtually eliminates cost-sharing as a tool to modulate utilization.

On the private side, the dominance of the employer-sponsored insurance market is driven in large part by the tax preference for health insurance benefits relative to wage compensation,

Effects of Medicaid Exposure: The Oregon Health Insurance Experiment



Source: K. Baicker, S. Taubman, H. Allen, M. Bernstein, J. Gruber, J. P. Newhouse, E. Schneider, B. Wright, A. Zaslavsky, A. Finkelstein, and the Oregon Health Study Group, "The Oregon Experiment – Effects of Medicaid on Clinical Outcomes", *New England Journal of Medicine*, 368(18), May 2013, pp. 1713–22; and S. Taubman, H. Allen, B. Wright, K. Baicker, A. Finkelstein, and the Oregon Health Study Group, "Medicaid Increases Emergency Department Use: Evidence from Oregon's Health Insurance Experiment", *Science*, 343(6168), January 2014, pp. 263–8

Figure 5

which also drives down cost-sharing, since care covered through insurance plan premiums is often tax-preferred to out-of-pocket spending. This aspect of the tax code is thus both inefficient (driving inefficient utilization through moral hazard) and regressive (favoring people with higher incomes and more generous benefits) — a rare opportunity to improve both efficiency and distribution through reform.

This is a prime example of the challenge of translating economic insights into policy: Even though economists on both sides of the aisle agreed, proposing the taxation of employer-sponsored insurance to policy-makers and the public was not popular. The “Cadillac tax” on expensive plans came into existence largely because it was nominally levied on insurers rather than taxpayers. This made it more politically palatable, even though it does not mean that the ultimate incidence falls on insurers, and it constrains the degree to which it can undo the regressivity of the tax treatment of employer-sponsored insurance. Earlier this year, the House voted to repeal the Cadillac tax; whether it will ever take effect remains an open question.

This points to opportunities to improve efficiency using patient-side levers. A large body of research points to potential innovations in insurance design through greater use of cost-sharing, often misperceived as just shifting costs to patients rather than as a tool to reduce low-value care; taxing of Medigap benefits; and shared-savings models. But a growing body of evidence also highlights the limitations of the traditional rational agent model. Patients often react to copays in ways that are inconsistent with the model. We see not only overutilization, but underutilization of high-value care — such as limited adherence

to high-value drugs. And even small copays seem to dissuade use of care with substantial health benefits. Thus, insurance design that takes this “behavioral hazard” as well as traditional moral hazard into account has the potential to improve efficiency while maintaining insurance protection.

There are also multiple opportunities to improve payments on the provider side. Providers are human beings who are sensitive to both prices and behavioral forces, and much of our health care is delivered through payment models that promote higher-volume, rather than higher-value, use of

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care. Medicare payments have an outsized effect on the system, driving investment in expensive technologies and setting norms for coverage and standards of care. Most Medicare beneficiaries remain in the standard fee-for-service Medicare model, but there is experimentation with alternative models. The “sustainable growth rate” formula provides a cautionary tale—for another day—of unintended consequences of global price setting. Accountable Care Organizations have been set up to share savings from more efficient delivery with providers, but with limited incentives that seem to have led to limited effects. Bundled payments hold the promise of constraining spending per procedure, but without addressing the number of procedures.

There are also a host of questions about policy mechanisms for addressing market imperfections, such as far-from-perfect competition and limited information on quality for patients. There is some inherent tension between policies

that rely on competition to drive down prices and premiums and drive up quality with those that rely on coordination across providers and sites to improve efficiency of delivery and quality of care. And each of these can have crucial dynamic effects, driving the return to entry, innovation, and investment in improved delivery.

I would like to conclude by returning to the question of how successful we have been—and how we can be more successful—in promoting the use of our scholarship and evidence in informing health policy. The Oregon results

highlight some of the challenges. In the days after our nuanced findings on the effects of Medicaid on physical health were published, newspaper headlines were all over the map, some suggesting that we had proven that

Medicaid was a terrible program and others suggesting that we had proven its high value. One even acknowledged that the results were being used to further entrenched ideological views. One might find this discouraging, but in fact many policymakers were open to learning more about the findings, and it became much harder to support either the unduly optimistic view of the program, that it would improve health and the efficiency of delivery so much that it would save money, and the unduly pessimistic view that people on the program were no better off than if they were uninsured. And, of course, there are many, many other studies that speak to these important points.

There are some notable successes in the dissemination of evidence into policy, from congressional testimony to judicial citations and even to law. But success depends on devoting substantial time and energy to timely translation of our results into outlets and formats that are accessible to those in a position to act on them.

Research Summaries

Beliefs, Tail Risk, and Secular Stagnation

Laura Veldkamp

Beliefs govern every choice we make. Much of the time, they lie in the background of our economic models. We often assume that everyone knows everything that has happened in the past, as well as the true probabilities of all future events. The concept of rational expectations means that the true distribution of future outcomes and the believed distribution of future outcomes are the same.

If the rational expectations assumption were true, there would be no need for economists. If everyone knew all covariances, we would not need any empirical work. If everyone knew the true model of the economy and could reason through it, we would not need theorists. Luckily for us, the rational expectations assumption is not correct.

Yet most of the time it is a useful simplification. We have seen enough economic booms and recessions, firm and bank failures to have a reasonable estimate of their true probability. However, when studying rare events, often referred to as “tail events,” assuming rational expectations can lead economists astray. Because these events are rare, data on them are scarce, and our estimates of their true probability are unlikely to be accurate. In these circumstances, understanding belief formation becomes particularly important.

My research focuses on how individuals, investors, and firms get their information, how that information affects the decisions they make, and how those decisions affect the macroeconomy and asset prices. It also examines how people form beliefs about tail risk and how learning about tails, or disas-

ters, can explain persistent low interest rates, volatile equity prices, and secular stagnation.

Belief Formation

There are two broad approaches to explaining belief formation. The first is a behavioral approach, which departs from rational expectations by directly stating some belief formation rule that explains the phenomenon at hand. Such assumptions are often supported with survey or experimental data. These assumptions may be right, but they rarely provide a reason for the agents’ beliefs. If we don’t understand why the rule holds, we don’t know in what circumstances the rule will continue to hold. While such approaches provide insights, there is more to be discovered.

The second approach to belief formation is an imperfect-information approach. Agents have finite data to estimate states and distributions. Despite the limited information, they estimate efficiently, given the data they have, or the information they have optimally chosen to acquire, attend to, or process. Agents in these models do what economists would do if we were in their place: They collect data and use standard econometrics to estimate features of their environment. When a new outcome is observed, they re-estimate their model in real time.

The imperfect-information approach overcomes one of the main challenges of working on beliefs—the fact that beliefs are hard to observe or measure. Survey data are informative in many circumstances, but report-



Laura Veldkamp is a research associate in the NBER's Economic Fluctuations and Growth Program and is the Cooperman Professor of Economics and Finance at Columbia University. She is a co-editor of the *Journal of Economic Theory*, the first woman to hold that role. She also serves on the Economic Advisory Panel of the Federal Reserve Bank of New York and is the author of the Ph.D. textbook, *Information Choice in Macroeconomics and Finance*.

Veldkamp's research explores the role of information in the aggregate economy. Her topics range from business cycles and mutual fund performance to home bias and female labor force participation. A unifying theme of her work is that treating information, or the ability to process information, as a scarce and valuable resource helps to remedy many failures of full-information, rational expectations frameworks. Her recent work uses these information tools to understand the aggregate consequences of the digital economy.

Veldkamp received a B.A. in applied mathematics and economics from Northwestern University and her Ph.D. in economic analysis and policy from Stanford University. She joined the Columbia faculty in 2018 after teaching at New York University for 15 years.

A native of Lexington, Massachusetts, Veldkamp met her husband, Stijn Van Nieuwerburgh, while at Stanford. She enjoys playing the viola, playing squash with her two boys, and sculling.

ing accurate probabilities of rare events is particularly difficult, and surveys are rarely designed to elicit these beliefs. Also, when beliefs change on short notice, capturing this change with surveys is usually infeasible because of the costly and time-consuming nature of survey administration. In contrast, when we model agents as econometricians, we can estimate their beliefs in real time with publicly observable data and standard econometrics.

Tail Risks, Secular Stagnation, and the Scarring Effect

Tail risk beliefs have three properties that are helpful in explaining puzzling macroeconomic phenomena. They help explain persistent reactions to rare events, biased expectations, and, in environments where uncertainty matters, strong reactions to seemingly innocuous events.

One macroeconomic puzzle that tail risk can help explain is the persistent aftermath of the 2008 financial crisis, often referred to as secular stagnation, in which the real effects of that financial crisis persisted long after the financial conditions that triggered it had been remedied. Some of this persistence seems to come from a scarring effect on beliefs.

Consider this: In 2006, before the financial crisis, were economists concerned with financial stability, bank runs, and systemic risk? Mostly not. Yet afterward, though banks are safer and risk is more tightly regulated, the knowledge that such possibilities are real has influenced research for more than a decade. Similarly, the knowledge that firms can suffer severe negative capital returns influences the actions and risks that firms are willing to take. Seeing the United States at the brink of financial collapse taught us that a financial crisis is more likely than we thought. The fact that firms have not seen another financial crisis in the last 10 years does not undermine that lesson. It is perfectly consistent with financial crisis being a once-in-50-years event. Even if no more crises are observed for the next 50 years, our estimate of this rare-event probability will still be informed by the 2008 event. In my research with Julian

Kozlowski and Venky Venkateswaran, we explore this scarring effect as an explanation for the slow rebound of investment, labor, and output, as well as tail risk-sensitive options prices.¹

While logical, this effect could be tiny. To assess whether this is a plausible explanation for the persistence of the post-crisis output loss, we embed learning in a dynamic stochastic general equilibrium model. For our purposes, this model needs two features. First, it needs to have shocks that had extreme (tail) outcomes in the financial crisis. Second, the model needs enough non-linearity so that unlikely tail events can have some aggregate effect. For this purpose, we use an augmented version of a model developed by François Gourio.² In this model, shocks have large initial effects, but there is no guarantee of any persistent effects from transitory shocks.

The predictions of this model teach us some new lessons. First, the change in beliefs is large enough to make the drop in output a highly persistent level effect. This doesn't mean that the positive shocks in recent years cannot return the economy to trend. It does mean that, without the Great Recession, incomes today would have been higher. Second, the equilibrium effects are surprising. Some economists asserted that persistent economic responses to the Great Recession could not be due to tail risk because high tail risk would imply wide credit spreads and low equity prices. This logic would be correct if firms did not respond to higher risk by reducing their debt. But when risk and the price of credit both rise, firms demand less credit. They deleverage. Less indebted firms are less risky. As a result, their credit spread narrows and their equity price rebounds. Because of these competing forces, equity prices and interest rates are not reliable indicators of tail risk. However, the option prices offer a reliable measure of tail risk. Just as the Chicago Board Options Exchange's volatility index (VIX) measures option-implied volatility, the skewness index (SKEW) measures option-implied tail risk. After the Great Recession, the SKEW rose to record highs and never returned to its pre-crisis level.

Tail Risks, Low Interest Rates, and Inflation

In follow-up work, we use a much simpler economic environment to speak to the persistently low interest rates on safe assets.³ To create a link between heightened tail risk and the interest rate, or yield, on safe assets, we focus on two standard mechanisms.

First, faced with more risk, agents want to save more. But not every agent can save more. The bond market has to clear. Therefore, the return on bonds declines in order to clear that market. This force explains about a third of the decline in the interest rate. The second force at work is that safe assets offer liquidity that is particularly valuable in very bad conditions. When the probability of these tail events rises, liquid assets are more valuable and their yield declines, clearing the market. That liquidity effect explains the other two-thirds of the persistent interest rate gap from the pre-crisis period.

If re-estimating distributions with real-time data can make actions persistently different following a crisis, does it matter how we estimate those distributions? For some purposes, no. For others, yes. In the secular stagnation paper, the magnitude of stagnation depended on the size of the increase in tail risk. That measurement is robust to many estimation methods. They all produce about the same effect, because they all fit the data by putting the same probability mass on extreme outcomes. Our agents used classical, non-parametric econometrics to estimate the shock distribution. We adopted this approach for its simplicity. Simplicity was essential because of the non-linearity and computational complexity of our economic framework. What doesn't work is a normal or thin-tailed distribution. It rules out any tail risk by construction.

The choice of whether to use a Bayesian or classical estimator is not innocuous for all purposes. For example, in the presence of tail risk, finite-sample Bayesian estimators are biased.⁴ This bias arises because agents are confident that

high inflation is more likely than extreme deflation. But they have few high-inflation data points with which to estimate that probability. The probability of high inflation could be much higher than they think. But it can't be much lower and a probability can't be below zero.

Hassan Afrouzi, Michael Johannes, and I use this mechanism to understand why households, firms, and forecasters consistently report inflation forecasts with large positive bias.⁵ People seem to think inflation will be much higher than it turns out to be, month after month, year after year. These biases are shared by financial market participants who pay too much for inflation insurance relative to insurance on other risks.

If a perfectly rational, Bayesian forecaster observes the time series of US inflation monthly from 1948 through 2018 and uses it to estimate a three-state mixture of normals, the estimated distribution has positive skewness of 0.38, and the average 2010–18 forecast is 1.45 percent higher than the average 2010–18 inflation realization. This is on par with the average size of the forecast bias from the University of Michigan Consumer Sentiment Index. If firms and forecasters observe additional data that are informative about inflation, the lower uncertainty reduces their inflation biases.

Estimating Changes in Tail Risk

A final reason that the procedure for estimating beliefs matters is that estimating parameters that govern tail risk can make tail risk assessments and uncertainty quite volatile. With a non-parametric estimator, changes to a distribution are local: Each new data point

affects the probability distribution by adding probability mass locally around the observed outcome and subtracting a small probability everywhere else. But with parametric systems, an observation in one part of the distribution can change a parameter estimate that significantly alters the probability mass elsewhere. In other words, observing ordinary, non-outlier events can affect our assessment of tail risk.

Why are tail risk probabilities likely to be affected by observing nonlocal events? Because data on tail events are scarce, tail probability estimates are

I explore tail risk as a source of uncertainty shocks.^{6,7} Uncertainty shocks have been a popular way of generating aggregate fluctuations in macroeconomic models, but it is not clear where they come from. Somehow, we pretend that everyone wakes up one day knowing for certain that the variance of some aggregate shock just rose. We do that because it helps explain aggregate phenomena, not because it makes sense. But one reason we might all suddenly feel uncertain is if we all observe an aggregate data point that makes disaster seem more likely than it was before.

Using the post-war series of quarterly GDP growth, we apply Bayes' law to estimate parameters of a skewed distribution. Asking GDP to generate large swings in uncertainty is tough, because GDP is not a particularly volatile series. Yet when we allow agents to estimate a distribution that admits skewness, on average they estimate that GDP growth has a skewness coefficient of -0.3, which indicates that production melt-

downs are more likely than "melt-ups." More importantly, the skewness estimate changes over time and it "wags the tail" of the distribution. Since tail events are far from the mean and uncertainty measures probability-weighted distance from the mean squared, these outliers move levels of uncertainty. We find that the standard deviation of the resulting uncertainty series is one-third of its average level. Those are large uncertainty fluctuations from a mundane macro time series.

Macroeconomists have neglected tail risk, in part, because it is so difficult to measure. But the lack of data and difficulty of measurement are the things that make it interesting. Tail probability

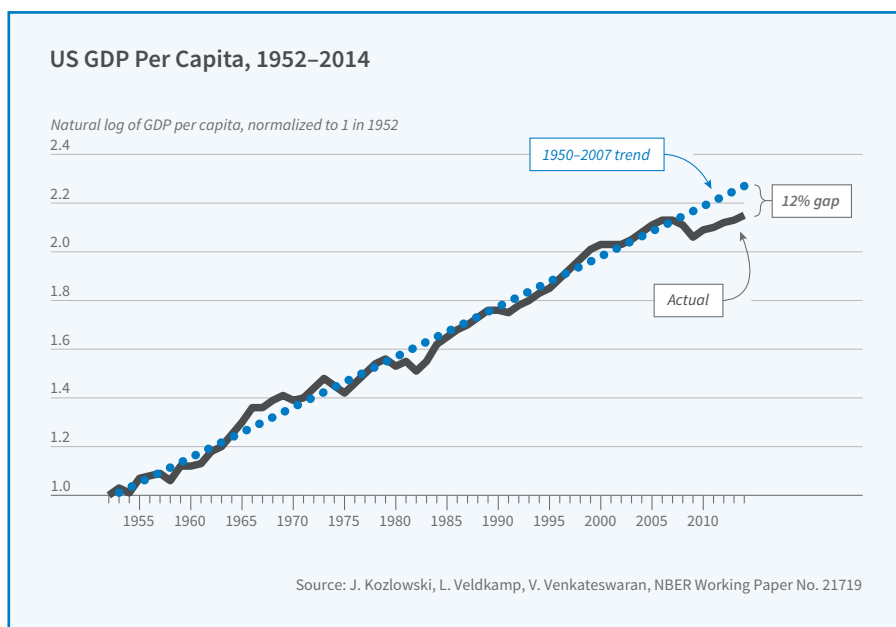


Figure 1

uncertain. Uncertain estimates are more likely to experience large revisions. In a parametric system, if there is a parameter that largely governs tail risk, that parameter will be tough to estimate with a high degree of confidence. For example, skewness is notoriously difficult to estimate. Observations not too far from the mean can nudge the estimate of a skewness parameter up or down. But a small change in skewness can double or triple the probability estimate of an outcome far out in the tail of a distribution.

Such small adjustments in tail risk could be the origin of excess volatility or many apparent overreactions. Nicholas Kozenias, Anna Orlik and

estimates are likely to diverge from true probabilities in ways that are persistent, volatile, and biased. All these econometric problems, and human faults, offer possible explanations for some of the most puzzling findings in aggregate economics.

¹ “[The Tail that Wags the Economy: Beliefs and Persistent Stagnation](#),” Kozlowski J, Veldkamp L, Venkateswaran V. NBER Working Paper 21719, November 2015, and *Journal of Political Economy*, forthcoming, 2019.

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² “[Disaster Risk and Business Cycles](#),”

Gourio F. NBER Working Paper 15399, October 2009, and *American Economic Review*, 102(6), October 2012, pp. 2734–2766.

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³ “[The Tail That Keeps the Riskless Rate Low](#),” Kozlowski J, Veldkamp L, Venkateswaran V. NBER Working Paper 24362, February 2018, and *NBER Macroeconomics Annual* 2018, 33, June 2019, pp. 253–283.

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⁴ “[Bias in Nonlinear Estimation](#),” Box M. *Journal of the Royal Statistical Society*, 33(2), 1971, pp. 171–201.

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⁵ “[Biased Inflation Forecasts](#),” Afrouzi

H, Veldkamp L. Paper presented at the Society for Economic Dynamics Annual Meeting, St. Louis, MO, June 2019.

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⁶ “[The Common Origin of Uncertainty Shocks](#),” Kozeniasukas N, Orlik A, Veldkamp L. NBER Working Paper 22384, July 2016, and published as “[What Are Uncertainty Shocks?](#)” *Journal of Monetary Economics*, 100, December 2018, pp. 1–15.

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⁷ “[Understanding Uncertainty Shocks and the Role of Black Swans](#),” Orlik A, Veldkamp L. NBER Working Paper 20445, August 2014.

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Quantitative Approaches to Violence, Small Wars, and Insurgencies

Francesco Trebbi

The surge in quantitative analysis of insurgency, civil wars, and terrorism can be traced primarily to two main drivers. The first is the availability of detailed data that provide fine-grained, micro-level information on violent incidents and on attacks in several theaters of war. The second is the emergence of a set of econometric and statistical approaches appropriate to the analysis of such data.

Concerning the data, new databases differ in structure and origin. Some are created from primary data (live records) from military troops on the ground in Afghanistan, Iraq, Syria, and other areas of active engagement of US military personnel or allied forces with access to geo-positioning technology. These include the Significant Activities (SIGACTS) databases for Iraq and Afghanistan declassified by the United States Central Command in recent years (in 2014 for the Afghan data, for example). The SIGACTS Afghan data cover more than 600,000 reports of violent incidents, such as direct attacks, indirect

attacks, and improvised explosive device (IED) attacks, each with location, time, and a brief description of the incident, and military activities, such as arms caches discovered. The data, over the period from January 2008 through December 2014, are readily available online. The data for Iraq cover more than 250,000 significant activities from January 2004 through July 2007.

Some of these data prove instructive in tracing surprising dynamics in these costly conflicts. Eric Weese, Austin L. Wright, Andrew Shaver, and I use the Afghan SIGACTS to document that the effectiveness of IED attacks, the most deadly and incisive insurgent tactic employed by the Taliban, remained constant from 2006 through 2014.¹ The likelihood of IEDs generating property or human damage is stable at around 23 percent, even as IED use is stable, and its cost goes down over the nine-year period we study. Figures 1a, 1b, and 1c demonstrate this finding by showing relatively constant counts of wounded and killed coalition forces personnel and

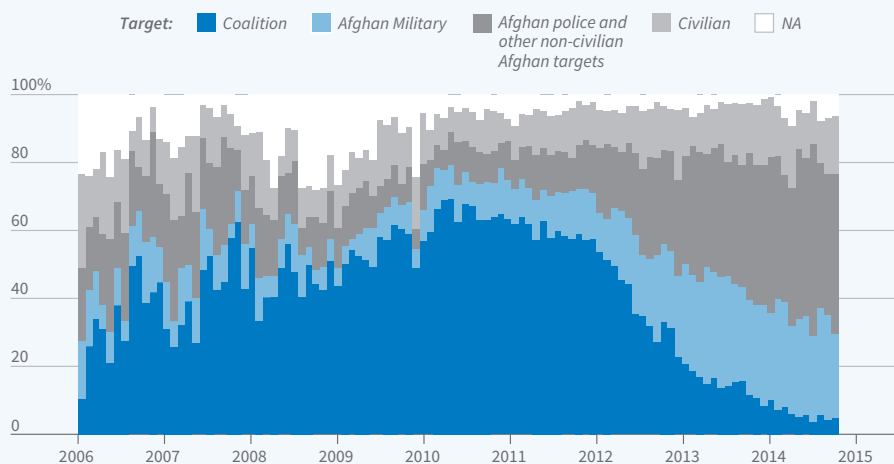


Francesco Trebbi's academic research focuses on political economy and applied economics more generally. He has worked on political institutions and their design. He also has worked on the political economy of development, conflict, corruption, political behavior, electoral campaigns and campaign finance, lobbying, and financial regulation. His primary teaching interests are in applied and political economics.

Trebbi is Canada Research Chair in Economics and professor of economics at the Vancouver School of Economics, University of British Columbia. Before joining UBC, he was an assistant professor of economics at the University of Chicago Booth School of Business. He received his Ph.D. in economics from Harvard University in 2006.

Trebbi is a research associate affiliated with the NBER's Political Economy Program and a Fellow of the Bank of Canada. He describes himself as a direct beneficiary of the late NBER President Martin Feldstein's support for the quantitative and data-driven study of violence and insurgency, as reflected in his creation of the NBER's Economics of National Security Working Group. These issues were actively discussed at the meetings of that group, and continue to attract interest in the NBER's Political Economy Program.

Share of IED Explosions in Afghanistan by Target, 2006–2014



Source: F. Trebbi, E. Weese, A. L. Wright, A. Shaver, NBER Working Paper No. 23475

Figure 1

the stable deployment of IED attacks on the part of the insurgents.

The evidence suggests that in this asymmetric conflict, a US military counterinsurgency investment ranging in the billions of dollars yearly, directed at anti-IED activities alone, according to an official Joint IED Defeat Organization (JIEDDO) 2010 report, was effectively countered by insurgent technological adaptation and investments of tens of millions of dollars.² The data further allow conflict researchers focused on insurgency to recover parameters approximating the relative effectiveness of offensive versus defensive activities, to express the defense/offense asymmetry in clear quantitative terms, and to assess the speed of learning of Afghan insurgents during the fighting season by looking at the systematically changing nature of the targets of attacks and their effectiveness. In synthesis, from SIGACTS a researcher is able to recover a much clearer picture of the technology of insurgency and its capacity for adaptation.

Other new datasets have a more indirect origin and are sourced from news media and other forms of intelligence reports. Some of these data have a clear link to the area spanning conflict studies and counterterrorism analysis. An example is the Worldwide Incidents Tracking System (WITS). According to John Wigle, WITS is

“the US Government’s authoritative database on acts of terrorism, and is used to enumerate statistical data for the annual “Country Reports on Terrorism” from the

SIGACTS, the WITS and BFRS data are extremely useful for capturing highly visible insurgent activities designed to hijack the media cycle, to maximize public exposure of insurgent groups, and to signal strength to the noncombatant population for recruiting or co-opting purposes. A specific instance of this is the overrepresentation within BFRS and WITS of simultaneous attacks carried out within the same day by insurgent groups across different geographic areas.⁵ Weese and I show how to exploit the covariance structure of attacks over time and across different geographic areas to recover the internal organizational structure of insurgent groups in Afghanistan and Pakistan.⁶ This “structure” refers to the internal divisions of insurgents across independent groups operating within an umbrella coalition. An open question about the Afghan Taliban was whether it was a unitary organization or a heterogeneous coalition.

To illustrate how the WITS data can be useful, consider observing violent incidents over time and at daily frequency in two geographic districts, A and B. Having a violent incident in both on the same day may well be the result of random occurrence in an environment plagued by unorganized violence, not necessarily a simultaneous attack signaling the presence of the same group in the two areas. However, if systematically when an

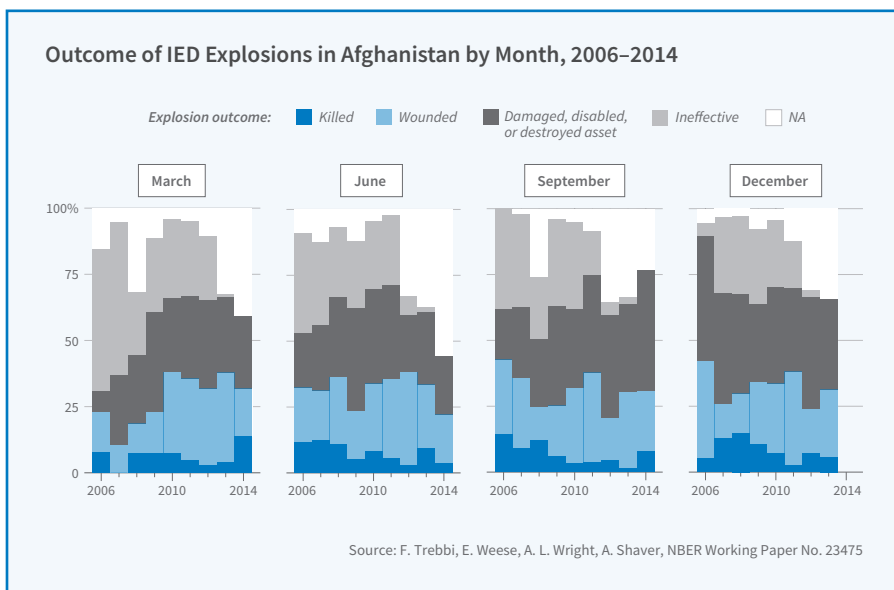


Figure 2

US Department of State and the National Counterterrorism Center’s Report on Terrorism.³ Other examples of such databases originate from within academia, as, for example, the BFRS database (the acronym is made from initials of some of its developers) covering violence and insurgency within Pakistan.⁴

Less fine-grained and direct than

different geographic areas to recover the internal organizational structure of insurgent groups in Afghanistan and Pakistan.⁶ This “structure” refers to the internal divisions of insurgents across independent groups operating within an umbrella coalition. An open question about the Afghan Taliban was whether it was a unitary organization or a heterogeneous coalition.

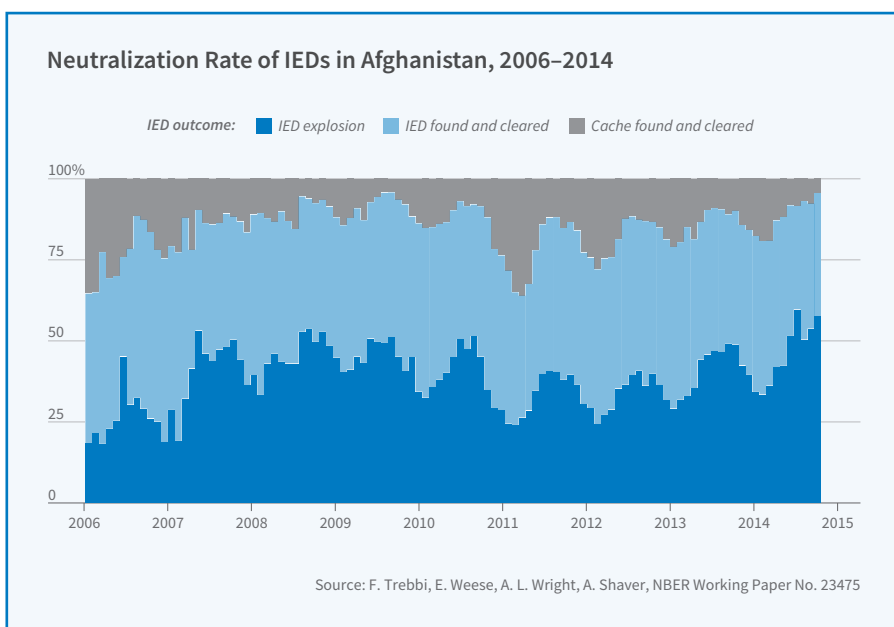


Figure 3

attack occurs in A, another occurs in B on the same day, then it is more likely that one organization is coordinating attacks in both locations.

Next, consider violent incidents over time and at daily frequency in two other districts, C and D. If a positive and statistically significant correlation between C and D is also observed, but no correlation between C and A or C and B is observed, then two clusters of attack correlations start to emerge: A–B and C–D as opposed to A–B–C–D. Our research applies classification and unsupervised clustering algorithms to the estimated variance covariance matrix of attacks across districts within Afghanistan or Pakistan, and thereby obtains new information about the insurgency.⁷ The clustering methods formally reject the hypothesis of a fragmented organization of the Afghan Taliban in favor of a highly organized and unitary entity during the period of analysis. In contrast, in Pakistan, violence appears to be the outcome of actions by multiple groups. We use incident-level data to estimate the ethnic-based structure of the various insurgencies in Pakistan and even to detect when new insurgent groups enter the conflict.

Approaches to conflict analysis that utilize microdata can apply methods from unsupervised machine learning to study questions of violence and insurgency. Problems of estimating the number of combatant groups, the unknown number and strength of latent alliances, and other classification problems central to conflict studies require different tools from standard regression analysis. We show how econometric tests typically used in the context of time series econometrics can be used to test for the number of latent insurgent groups/clusters in conflict.⁸ We conclude that the structure of the Taliban is one group because a large fraction of the latent variation of the covariation in attacks is explained by a single cluster.

Advances in the design of surveys and survey experiments have also been deliver-

ing important insights on human behavior in conflict environments. For example, Leonardo Bursztyn, Michael Callen, Bruno Ferman, Saad Gulzar, Ali Hasanain, and Noam Yuchtman isolate anti-US intrinsic motivation of men in Pakistan after controlling for a number of potentially confounding factors.⁹ Advances in the economics and econometrics of networks are also finding application in conflict studies. For example, Michael König, Dominic Rohner, Mathias Thoenig, and Fabrizio Zilibotti show how the detailed conflict level information from the Armed Conflict Location & Event Data Project (ACLED) could be used to reconstruct the complex matrixes of enmities and alliances among insurgent groups in the Democratic Republic of the Congo between 1998 and 2010.¹⁰

To conclude, one can easily see how methodological and data advancements in the areas considered in this short review may be extended to other fields of research or conflict zones.¹¹ As conflict studies evolve, issues of pacification, de-escalation, or post-conflict humanitarian and development intervention will become deeply intertwined with issues of political economy and national security.

¹ “Insurgent Learning,” Trebbi F, Weese E, Wright A, Shaver A. NBER Working Paper 23475, June 2017.

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² Joint Improvised Explosive Device Defeat Organization (JIEDDO), 2010 Annual Report. <https://www.hsdl.org/?view&did=682214>

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³ “Introducing the Worldwide Incidents Tracking System (WITS),” Wigle J. *Perspectives on Terrorism* 4(1), 2010, pp. 3–23.

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⁴ Many of the datasets described in this article can be downloaded at esoc.princeton.edu under the Empirical Studies of Conflict initia-

tive. “Measuring Political Violence in Pakistan: Insights from the BFRS Dataset,” Bueno de Mesquita E, Fair C, Jordan J, Rais R, Shapiro J. *Conflict Management and Peace Science* 32(5), November 2015, pp. 536–558.

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⁵ Other examples of similarly designed databases of geocoded and time-stamped violent incidents include the [Global Terrorism Database](#) at the University of Maryland.

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⁶ “Insurgency and Small Wars: Estimation of Unobserved Coalition Structures,” Trebbi F, Weese E. NBER Working Paper 21202, May 2015, and *Econometrica* 87(2), March 2019, pp. 463–496.

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⁷ “Eigenvalue Ratio Test for the Number of Factors,” Ahn S, Horenstein A. *Econometrica* 81(3), May 2013, pp. 1203–1227.

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⁸ Ibid, NBER Working Paper 21202.

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⁹ “Identifying Ideology: Experimental Evidence on Anti-Americanism in Pakistan,” Bursztyn L, Callen M, Ferman B, Gulzar S, Hasanain A, Yuchtman N. NBER Working Paper 20153, May 2014. About 25 percent of the men surveyed were willing to forgo up to 20 percent of their average daily wage rather than express gratitude to the US government by checking a box in a questionnaire.

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¹⁰ “Networks in Conflict: Theory and Evidence from the Great War of Africa,” König M, Rohner D, Thoenig M, Zilibotti F. *Econometrica* 85(4), July 2017, pp. 1093–1132.

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¹¹ For instance, ACLED covers violent episodes in Africa, South Asia, Southeast Asia, the Middle East, Europe, and Latin America.

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John Haltiwanger is the Dudley and Louisa Dillard Professor of Economics and a Distinguished University Professor at the University of Maryland. He received his Ph.D. from Johns Hopkins University in 1981. After serving on the faculties of UCLA and Johns Hopkins, he joined the faculty at Maryland in 1987. In the late 1990s, he served as chief economist of the US Census Bureau. He is a research associate in the NBER programs on Economic Fluctuations and Growth and Productivity, Innovation, and Entrepreneurship, and is a Fellow of the Econometric Society and the Society of Labor Economists.

Haltiwanger has played a major role in developing and studying US longitudinal firm-level data and matched employer-employee data at the US statistical agencies. Using these data, he has developed new statistical measures on business dynamism, labor market fluidity, and productivity dispersion. In his research, he has explored the implications of these micro-based measures of firm and worker dynamics for aggregate US productivity growth and for the contribution of entrepreneurs to US economic performance. He won the Julius Shiskin Award for Economic Statistics in 2013 and the Roger Herriot Award for Innovation in Statistics in 2014.

Synthesizing Micro and Macro Evidence on the US Economy

John Haltiwanger

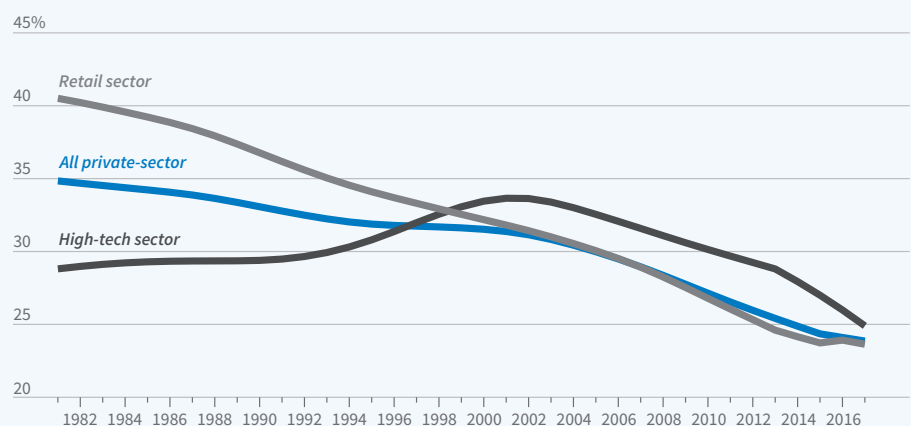
The US economy has experienced a long expansion from the trough in June 2009 through the first half of 2019. The unemployment rate has dipped below 4 percent since April 2018, something that has happened only a few times in the last 50 years. At the same time, inflationary pressures have remained low, with relatively modest wage and price inflation rates. Two periods in the last half century also had these favorable macroeconomic conditions—the mid-1960s and the second half of the 1990s—but those were periods of robust productivity growth. In contrast, productivity growth has been relatively anemic since the Great Recession.¹

Moreover, the evidence points to the productivity slowdown pre-dating the Great Recession. Given perceptions of rapid technological change from artificial

intelligence, automation, and robotics, this has led some to argue that mismeasurement of productivity has increased over this period. While debate on this issue remains open, careful studies suggest that the slowdown shown in the measured productivity data from the early years of the 21st century is not primarily due to increased mismeasurement.²

Changes in the dynamics of productivity and growth at the micro level offer a deeper understanding of the macroeconomic patterns. In this summary, I review some of my research that explores these issues. This research reflects collaborative work with Kim Bayard, Cindy Cunningham, Steven Davis, Ryan Decker, Emin Dinlersoz, Tim Dunne, Jason Faberman, Lucia Foster, Cheryl Grim, Shawn Klimek, C.J. Krizan, Ron Jarmin, Javier Miranda, Scott Ohlmacher,

Job Reallocation as a Share of Total U.S. Employment, 1981–2017



Job reallocation is the sum of gross jobs created by expanding and entering establishments and gross jobs destroyed by downsizing and exiting establishments
Source: R. A. Decker, J. C. Haltiwanger, R. S. Jarmin, and J. Miranda, NBER Working Paper No. 24236, updated with data from the Bureau of Labor Statistics

Figure 1

Sabrina Pabilonia, John Stevens, Jay Stewart, and Zoltan Wolf. Many other researchers have been engaged in closely related research.

Declining Business Dynamism and Startups

One of the most striking changes in the dynamics of US businesses is the decline in indicators of business dynamism and business startups, especially in the post-2000 period.³ These patterns emerge from analysis of longitudinal business databases developed at US statistical agencies from administrative data tracking establishments and their parent firms in the private, nonfarm sector. Figure 1 shows the trends in job reallocation at the economy-wide, private, nonfarm sector level and for two selected broad sectors, retail trade and high tech. The latter is a combination of the science-, technology-, engineering-, and mathematics-intensive sectors. These are series primarily computed from the Longitudinal Business Database at the Census Bureau, spliced with the closely related series from the Bureau of Labor Statistics' Business Employment Dynamics series.⁴

It is apparent from Figure 1 that the pace of job reallocation has declined over the last few decades, with an accelerated decline in the post-2000 period. Since 2000, there has been a ubiquitous decline in the pace of job reallocation across all sectors. Prior to 2000, the high-tech and retail trade sectors exhibit distinct differences in trends. The pace of job reallocation in the retail trade sector exhibits a pronounced decline since 1980, while job reallocation increased in the high-tech

sector until 2000 but declined substantially after that.

A closely related phenomenon is the change in firm startup rates. The share of activity at young firms has declined over the last few decades, as shown in Figure 2. The pattern of changes in young firm activity closely mimics that of job reallocation. Young firms are more volatile; about 30 per-

Alternatively, changes in the structure of businesses induced by changing technology and globalization may account for the declines in both young firm activity and job reallocation without having adverse implications for productivity and growth. For example, the retail trade sector has undergone productivity-enhancing structural change that has been accompanied by a decline

in the pace of entry and reallocation.⁶ In this sector, there has been a pronounced shift away from single-establishment firms toward large national and multinational chains. Information and Communications Technology and globalization have enabled large, multinational chains to develop global supply chains and efficient distribution networks. Establishments of large, national chains are both more productive and stable than single-establishment

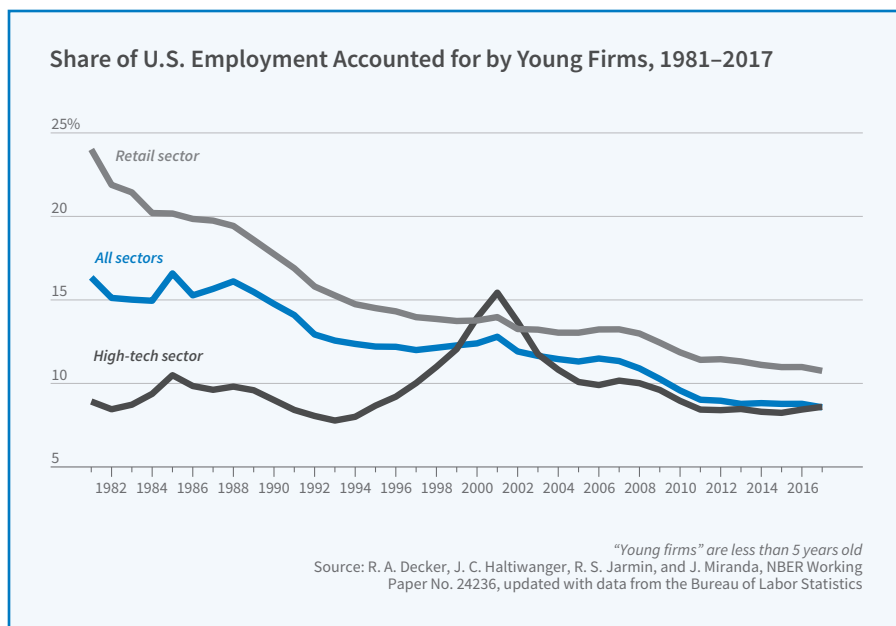


Figure 2

cent of the overall decline in job reallocation is accounted for by a shift in the age distribution toward older rather than younger firms.

Implications for Productivity?

The declines in both startups and reallocation potentially are related to the aggregate decline in productivity. Young firms disproportionately contribute to job creation, innovation, and productivity growth.⁵ More generally, empirical evidence supports the view that medium-term reallocation flows are an important source of medium-term productivity growth. This also resonates with Schumpeterian theories of creative destruction that see reallocation as critical for innovation and growth. Increasing barriers to entry and reallocation stifle growth, according to these theories.

firms. This structural change accounts for a large fraction of the productivity growth in retail trade over recent decades.

Both of these alternative perspectives could be at work accounting for some fraction of the decline in reallocation and startups, but with different implications for economic growth. Sorting out these alternative perspectives is an active area of research. The evidence suggests that the relative importance of these alternatives varies over time and sectors. Multiple mechanisms and directions of causality are likely at work. Industries in the high-tech sector with extraordinary bursts of productivity growth in the late 1990s and early 2000s exhibited a systematic pattern of entry, followed by productivity dispersion and a shakeout period.⁷ A burst of entry in a narrowly defined industry in high tech

first led to a period of rising productivity dispersion and, if anything, a decline in productivity growth. Following this period of experimentation, a shakeout occurred, with more productive young firms growing and exhibiting rapid within-firm productivity growth and less productive firms contracting and exiting. Only several years after the surge of entry in a narrowly defined industry did productivity growth increase. These patterns in the high-tech sector are consistent with the view that entry plays a critical role in innovation and productivity growth in some sectors.

Differences between retail trade and high tech show up in other dimensions of firm dynamics, arguing against a one-size-fits-all explanation of the declining pace of startups and reallocation. Before 2000, young firms in the high-tech sector exhibit a pronounced right skewness in the growth rate distribution—indicating the presence of some extreme outlier firms with very high growth rates.⁸ These patterns are consistent with high-growth young firms playing a critical role in economic growth. However, during the post-2000 decline in entry and reallocation, the right skewness in high tech declines substantially. This decline is associated with a decline in the number of high-growth young firms in high tech and is consistent with the observed declines in IPOs in this sector over this period. In contrast, young firms in the retail trade sector exhibit no right skewness either before or after 2000.

The post-2000 period also exhibits a decline in the responsiveness of firms to productivity shocks and an accompanying rise in the dispersion of productivity across firms within industries.⁹ These patterns are more robustly measured in the manufacturing sector, where total factor productivity can be measured, but also hold in nonmanufacturing sectors when calculated using firm-level revenue productivity measures. The declining responsiveness is consistent with an increase in adjustment frictions, broadly interpreted to include any impediment to resources being allocated to their highest valued use. This decline in responsiveness acts as a drag on aggregate (sectoral level)

productivity growth. An active area of research seeks to uncover the source of these changes in responsiveness accompanied by rising productivity dispersion.¹⁰

Interactions with the Cycle: Was the Great Recession Different?

The post-2000 acceleration of the decline in job reallocation and startups begins before the Great Recession, but the latter yields interactions with the cycle that are distinct from prior downturns. Young firms are especially sensitive to financial conditions, which makes them exhibit more cyclical behavior than their mature counterparts. The financial crisis yielded an especially sharp decline in the share of young firm activity, as is evident in Figure 2. The collapse in housing prices and the decline in bank lending to young firms during the Great Recession account for almost all of the sharp decline in young firm activity.¹¹

The Great Recession was also distinctive in that the relationship between firm growth and productivity shocks weakened substantially during this period. The decline in responsiveness of firms to differences in productivity predates the recession but the financial collapse dampened responsiveness further. During this period, heterogeneity in firm outcomes became less associated with economic fundamentals.¹²

Looking Forward

The pace of job reallocation, the business startup rate, and the associated share of young firm activity have exhibited pronounced changes in the last few decades. Patterns differ by sector and time period, but since 2000 the decline in these indicators of business dynamism and entrepreneurship has accelerated. The long-run decline in these indicators in retail trade is a stark reminder that a high pace of reallocation, business startups, and share of young firm activity are not inherently associated with more robust economic performance. However, theory and evidence suggest that frictions or distortions that inhibit entry and reallocation can be a drag on innova-

tion and productivity. Moreover, a surge of entry, a high pace of reallocation, and productivity dispersion often accompany the development of new products and processes. Distinguishing between episodes when changes in reallocation and entry reflect benign versus detrimental channels is an area of active research.

Great progress has been made at the US statistical agencies in developing public domain statistics tracking business dynamism and entry. The underlying administrative datasets, some containing longitudinal firm-level data and others similar data at the establishment level within firms, have become active sources of ongoing research, including much of the research discussed in this summary. These databases, which cover the universe of US businesses, have also been integrated with a host of external data as well as survey data at the statistical agencies. The resulting combined datasets have yielded a number of new insights.¹³ I have been actively engaged in collaborating on the development of these databases, and it is heartening to see their active use both as micro databases for research and as public domain databases for use by both researchers and policy analysts.

One challenge is that the underlying micro administrative data on businesses are typically not sufficiently timely to generate economic indicators on the current health of the economy. The Business Formation Statistics (BFS) are an important exception; I helped develop them with collaborators from the research community, the Federal Reserve Board, and the Census Bureau.¹⁴ BFS are based on the real-time flow of applications for new employer identification numbers that the Census Bureau receives on an ongoing basis. The potential of the BFS, illustrating new applications that have a high propensity for becoming employer businesses, is shown in Figure 3. This data series, along with other new statistical measures, is now released within a couple of weeks of the end of the most recent quarter at national and state levels. More disaggregated series

at sub-state and sector levels can also be constructed. Figure 3 shows that the patterns highlighted in Figure 2 persisted through the second quarter of 2019. High-propensity applications for new businesses in 2019:2 were still 6 percent below the pre-Great Recession levels. The research summarized here suggests that real-time measures of the pace of reallocation and entry can provide useful indicators for assessing the state of the US economy.

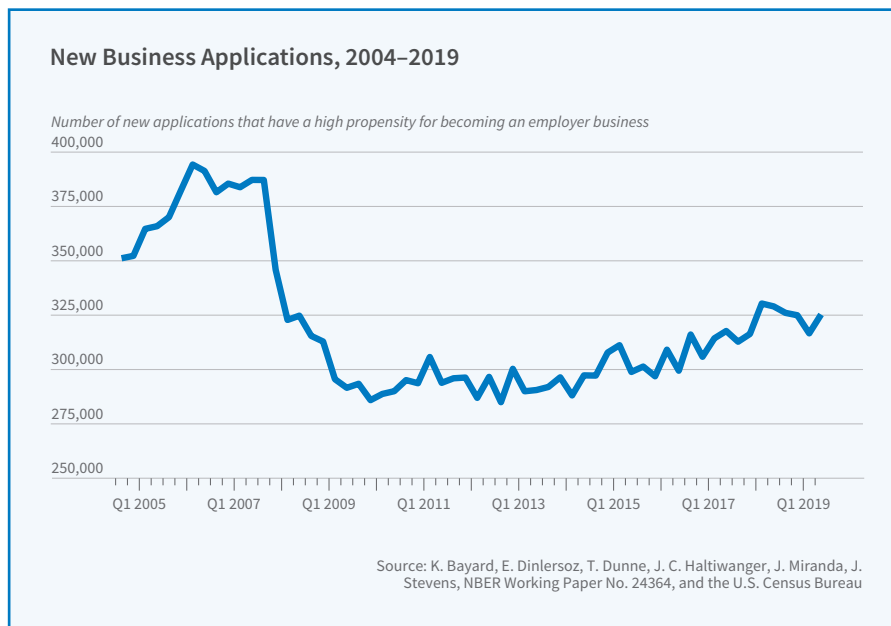


Figure 3

¹ “Productivity and Potential Output Before, During, and After the Great Recession,” Fernald J. *NBER Macroeconomics Annual* 29, pp. 1–51, and Federal Reserve Bank of San Francisco total factor productivity data. [Return to Text](#)

² “Challenges to Mismeasurement Explanations for the U.S. Productivity Slowdown,” Syverson C. NBER Working Paper 21974, February 2016. [Return to Text](#)

³ “Labor Market Fluidity and Economic Performance,” Davis S, Haltiwanger J. NBER Working Paper 20479, revised December 2014, and presented as “Re-Evaluating Labor Market Dynamics,” at annual economic policy symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, WY, August 21–23, 2014. [Return to Text](#)

⁴ “Changing Business Dynamism and Productivity: Shocks vs. Responsiveness,” Decker R, Haltiwanger J, Jarmin R, Miranda J. NBER Working Paper 24236, February 2018. [Return to Text](#)

⁵ “Who Creates Jobs? Small vs. Large vs. Young,” Haltiwanger J, Jarmin R, Miranda J. NBER Working Paper 16300, revised November 2012, and *Review of Economics*

and Statistics 95(2), March 2013, pp. 347–361. “The Role of Entrepreneurship in U.S. Job Creation and Economic Dynamism,” Decker R, Haltiwanger J, Jarmin R, Miranda J. *Journal of Economic Perspectives* 28(3), Summer 2014, pp. 3–24. [Return to Text](#)

⁶ “Market Selection, Reallocation, and Restructuring in the US Retail Trade Sector in the 1990s,” Foster L, Haltiwanger J, Krizan CJ. *Review of Economics and Statistics* 88(4), November 2006, pp. 748–758. See also “The Evolution of National Chains: How We Got Here,” Foster L, Haltiwanger J, Klimek S, Krizan CJ, Ohlmacher S, in *Handbook of the Economics of Retailing and Distribution*, Basker E, editor, pp. 7–37. Cheltenham, UK: Edward Elgar Publishing, 2016. [Return to Text](#)

⁷ “Innovation, Productivity Dispersion, and Productivity Growth,” Foster L, Grim C, Haltiwanger J, Wolf Z. NBER Working Paper 24420, revised September 2018, and forthcoming in *Measuring and Accounting for Innovation in the 21st Century*, Corrado C, Miranda J, Haskel J, Sichel D, editors. Chicago: University of Chicago Press. [Return to Text](#)

⁸ “Where Has All the Skewness Gone? The Decline in High-Growth (Young) Firms in the US,” Decker R, Haltiwanger J, Jarmin R, Miranda J. NBER Working Paper

21776, revised January 2016, and *European Economic Review* 86, July 2016, pp. 4–23. [Return to Text](#)

⁹ Ibid, NBER Working Paper 24236. See endnote 4. [Return to Text](#)

¹⁰ An experimental new data product with statistics on productivity dispersion by 4-digit NAICS is being released jointly later this year by the Bureau of Labor Statistics and the Census Bureau. The methodology for this measure, along with a beta release

(<https://www2.census.gov/ces/displ/>), was presented at the NBER Summer Institute in the NBER/CRIW group in July 2019. The team developing this product included Cindy Cunningham, Lucia Foster, Cheryl Grim, Sabrina Pabilonia, Jay Stewart, Zoltan Wolf, and me. [Return to Text](#)

¹¹ “Dynamism Diminished: The Role of Housing Prices and Credit Conditions,” Davis S, Haltiwanger J. NBER Working Paper 25466, January 2019. [Return to Text](#)

¹² “Reallocation in the Great Recession: Cleansing or Not?” Foster L, Grim C, Haltiwanger J. NBER Working Paper 20427, August 2014, and *Journal of Labor Economics* 34(1), January 2016, pp. S293–S331. [Return to Text](#)

¹³ See, e.g., “The Establishment-Level Behavior of Vacancies and Hiring,” Davis S, Faberman RJ, Haltiwanger J. NBER Working Paper 16265, revised August 2012, and *Quarterly Journal of Economics* 128(2), 2013, pp. 581–622. [Return to Text](#)

¹⁴ “Early Stage Business Formation: An Analysis of Applications for Employer Identification Numbers,” Bayard K, Dinlersoz E, Dunne T, Haltiwanger J, Miranda J, Stevens J. NBER Working Paper 24364, March 2018. [Return to Text](#)

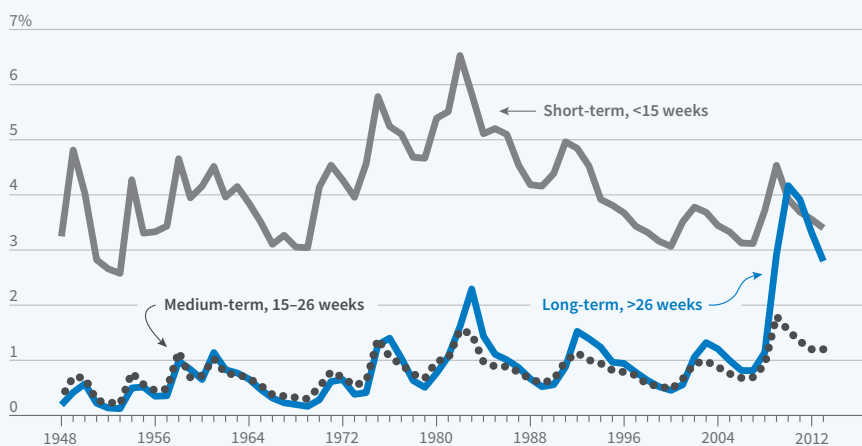
Long-Term Unemployment and the Great Recession

Kory Kroft, Fabian Lange, and Matthew J. Notowidigdo

The share of unemployed individuals who are “long-term unemployed”—that is, unemployed for 26 weeks or longer—surged to record highs in the United States during the Great Recession. Figure 1 decomposes the overall unemployment rate into three groups—short-, medium-, and long-term unemployed—and shows the unusual trend in long-term unemployment during the Great Recession and its aftermath. For more than 50 years, unemployed individuals were mostly short-term unemployed, even during recessions. But starting in 2007, the long-term unemployment share increased from roughly 20 percent to 45 percent and remained at that elevated level for several years, even as the overall unemployment rate started to return to normal.

In our recent research on long-term unemployment, we have sought to understand the relative importance of the changing composition of the pool of unemployed individuals over time, the impact of “duration dependence”—the possibility that the chance of finding a job depends in part on how long an individual has been unemployed—and labor market nonparticipation in long-term unemployment trends in both the United States and

Short-, Medium-, and Long-Term Unemployment in the U.S., 1948–2013



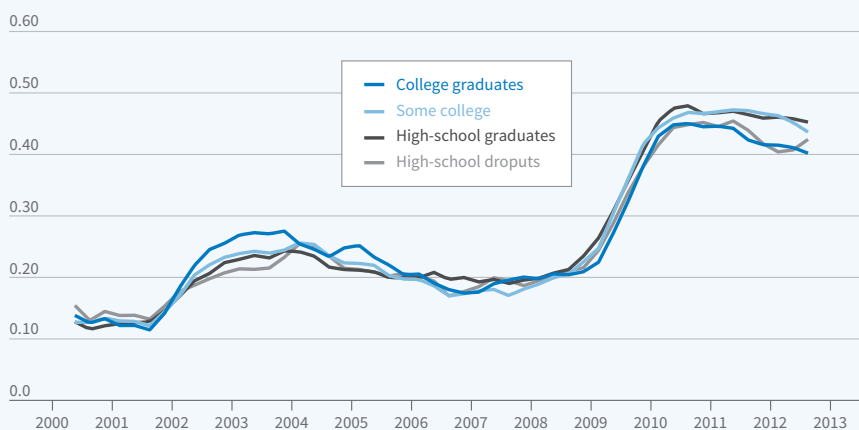
Source: K. Kroft, F. Lange, M. J. Notowidigdo, L. F. Katz, NBER Working Paper No. 20273

Figure 1

Canada. In addition, we have also studied the role of long-term unemployment in recent changes in macroeconomic relationships, most notably the outward shift

in the Beveridge curve—the relationship between the unemployment rate and the job vacancy rate—that occurred during the Great Recession.

Share of Unemployed Who Are Long-Term Unemployed, by Education



The data are smoothed by taking a three-month average around each observation.
Source: K. Kroft, F. Lange, M. J. Notowidigdo, L. F. Katz, NBER Working Paper No. 20273

Figure 2

This summary of our research on long-term unemployment is dedicated to Alan Krueger, who was working on long-term unemployment alongside us in recent years. He discussed much of the research highlighted in this summary during his [2015 Martin Feldstein Lecture](#) at the NBER Summer Institute. We are grateful for his encouragement and feedback. His example continues to inspire us to study labor economics.

The Negligible Role of Composition

In work with Lawrence Katz, we study the role of shifts in the composition of the unemployed in accounting for the rise in long-term unemployment.¹ Intuitively, if unemployment during the Great Recession was concentrated among individuals who historically had been those most likely to end up in long-term unemployment, then some of the increase in the long-

term unemployment share could be accounted for by compositional shifts.

Using data from the Current Population Survey (CPS), we find no evidence that observable changes in the demography of unemployed people played a meaningful role in the rise of long-term unemployment. Instead, we find that long-term unemployment increased for virtually all demographic groups. For example, Figure 2 shows that the increase in the long-term unemployment share is fairly simi-

lar across all education groups. We find similar trends for many other groups defined by other characteristics such as age, occupation, industry, and geographic region. Change in the composition of the unemployed along observable criteria account for very little of the increase in long-term unemployment during the Great Recession, suggesting that changes in composition along unobservables are also unlikely to explain the increase in long-term unemployment.



Kory Kroft is an associate professor in the Department of Economics and the Munk School of Global Affairs and Public Policy at the University of Toronto. He is a research associate affiliated with the NBER's Public Economics Program, serves on the editorial board of the *American Economic Journal: Economic Policy*, and is an associate editor of the *Journal of the European Economic Association*, the *Canadian Journal of Economics*, and *International Tax and Public Finance*.

His current research interests include the optimal design of taxation and social insurance policies, the causes and consequences of unemployment, imperfect competition in labor markets, and behavioral welfare economics.

Kroft received his B.A. from the University of Western Ontario, his M.A. from Queens University and Ph.D. degree from the University of California, Berkeley. He grew up in Toronto and currently lives there with his wife and daughters.

Fabian Lange is the Canada Research Chair in Labour and Personnel Economics at McGill University, a research associate in the NBER's Labor Studies Program, and co-editor of the *Canadian Journal of Economics*.

His research interests concern how careers are shaped by processes of information revelation. In particular, he focuses on the role of performance management systems in modern corporations and on employer learning. He received the 2008 H. Gregg Lewis Prize and the IZA Young Labor Economist Award for his work in this area. Lange also studies mobility in the labor force, in particular between labor force states. He studies how changing mobility in the labor force interacts with the business cycle and the process by which individuals get shut out of the labor market.

Lange completed his Ph.D. in economics at the University of Chicago in 2004 and subsequently joined the Department of Economics at Yale University. In 2012, he moved to Montreal with his wife and newborn daughter to join the McGill University Department of Economics, where he is director of the industrial relations program and the founder of the Montreal Partnership for Human Resource



Management, which fosters cooperation across the academic-corporate divide.



Matthew J. Notowidigdo is a professor of economics in the Department of Economics and a professor of strategy in the Kellogg School of Management at Northwestern University. He is an associate editor of the *Quarterly Journal of Economics*, a co-editor of the *American Economic Journal: Economic Policy*, and an NBER research associate affiliated with the Labor Studies Program, Health Care Program, and Public Economics Program.

He studies a broad set of topics in labor and health economics. In labor economics, he has studied the causes and consequences of unemployment duration dependence and long-term unemployment. His current research in health economics explores the economic consequences of hospitalizations and the relationship between health insurance and financial well-being.

Notowidigdo received his B.S., M.Eng., and Ph.D. from MIT. He grew up in Columbus, Ohio, and currently lives in Chicago with his wife and daughters.

Duration Dependence

In our research with Katz, we also study the role of negative duration dependence in understanding long-term unemployment. Negative duration dependence refers to the tendency of the job-finding rate of unemployed individuals to decline with the duration of unemployment. This is a plausible explanation for some of the rise in long-term unemployment, since duration dependence can “produce a self-perpetuating cycle wherein protracted spells of unemployment heighten employers’ reluctance to hire those individuals, which in turn leads to even longer spells of joblessness.”²

In CPS data, we find negative duration dependence in the average job-finding rate.³ That rate falls sharply with the length of the unemployment spell, particularly during the first few months, as shown in Figure 3. A key issue with interpreting this pattern, however, is that it may conflate unobserved heterogeneity with “true” duration dependence. In particular, the average job-finding rate may decline with duration because unemployed individuals have heterogeneous, latent job-finding probabilities; in this setting, the surviving unemployment pool becomes negatively selected over time. If negative selection occurs, then those who are unemployed longer will, on average, have

lower job-finding rates than those who experience shorter unemployment spells. Alternatively, the job-finding rate may be lower for those with longer unemployment spells due to true duration dependence, which captures the idea that a given individual’s job-finding rate declines with duration. This can be due to human capital depreciation, which makes workers less attractive to potential employers, or it can be due to statistical discrimination, as employers infer that those with long-

term unemployment are likely to be lower-skilled than those who have been unemployed for less time.

Several recent studies provide compelling evidence of true duration dependence using quasi-experimental approaches, such as longer durations of non-employment arising from delays in processing applications for Social Security Disability Insurance, and longer unemployment durations arising from a sharp age discontinuity in unemployment insurance eligibility in Germany.^{4,5} Our own research

on duration dependence comes from a résumé audit study that randomizes unemployment durations on fictitious job applications. We find clear evidence of duration dependence in callback rates, as shown in Figure 4. Gregor Jarosch and Laura Pilossoph use a structural model to show that duration dependence in callback rates does not necessarily imply duration dependence in job-finding rates.⁶ As

a result, the magnitude of true duration dependence remains somewhat uncertain, even though employers may engage in a substantial amount of statistical discrimination against the long-term unemployed. On balance, this body of research suggests that at least some of the drop in job-finding rates as unemployment spells lengthen is due to the causal effect of unemployment duration on the probability of finding a job.

Given this evi-



Figure 3

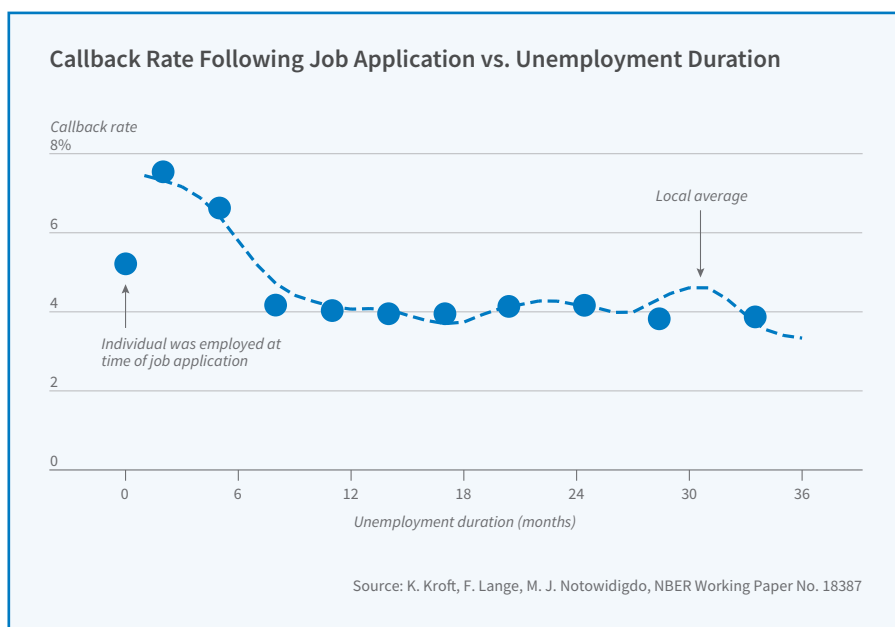


Figure 4

dence, we calibrate a matching model of the labor market that allows for true duration dependence in the job-finding probability for the unemployed as well as transitions between employment, unemployment, and nonparticipation. For different but plausible degrees of duration dependence, this model can account for a meaningful share of the post-2007 rise in long-term unemployment.

The Role of Individuals Not in the Labor Force

The final explanation that we consider for rising long-term unemployment is transitions in and out of the labor force. Our rationale for exploring the role of nonparticipation (i.e., some individuals' decisions to leave or stay out of the labor force) builds on a prior large literature that emphasizes the fluid boundary between unemployment and nonparticipation.^{7 8 9} Another motivation for this analysis is that the long-term unemployed are more likely to leave the labor force than to find a job.

When we add nonparticipants to the pool of job seekers, our calibrated model is much more successful in predicting long-term unemployment trends. In particular, ignoring the nonparticipation margin leads our model to under-predict both unemployment overall and the rise in long-term unemployment during and after the Great Recession. The combination of duration dependence and transitions in and out of the labor force can also account for a meaningful share of the outward shift in the Beveridge curve after 2008. Alan B. Krueger, Judd Cramer, and David Cho build on our matching model and reach similar conclusions.¹⁰

Comparing the United States and Canada

In work with Matthew Tudball we extend our matching model, calibrated to the US economy, to study the slightly less pronounced increase in long-term unemployment in Canada.¹¹ We use restricted-use data from the Canadian Labour Force Survey (LFS). Unlike the CPS, the LFS

measures "time since last job" for both unemployed workers and those out of the labor force. This allows us to study a broader measure of long-term joblessness that includes both the unemployed and nonparticipants. Using this dataset, we are able to enrich our model to allow for duration dependence in job-finding rates among both unemployed individuals and nonparticipants, and for flows between unemployment and nonparticipation. We find, as in our US analysis, that the increase in long-term unemployment occurred across demographic groups, and that there was a very limited role for composition in accounting for its rise in Canada.

In addition to Canada's less pronounced increase in long-term unemployment during the Great Recession, we also document another interesting US-Canada difference: There is no "outward shift" of the Beveridge curve in Canada. To document this, we construct a new vacancy series building on recent work by Camille Landaï, Pascal Michaillat, and Emmanuel Saez that proxies for vacancies using a "recruiter-producer ratio" computed using the number of workers in "recruiting industries."¹² We must use this approach because Canada does not have a monthly vacancy series that spans the last two decades.

Allowing for duration dependence, we calibrate our extended matching model using an approach similar to that in our work with Katz. Allowing for duration dependence in joblessness for all flows involving nonparticipants helps account for the rise in long-term unemployment in Canada.

Next Steps

Duration dependence continues to be an active area of research. Fernando E. Alvarez, Katarína Borovičková, and Robert Shimer develop new econometric tools for identifying true duration dependence, while Katharine Abraham, John Haltiwanger, Kristin Sandusky, and James Spletzer provide new evidence of "true" duration dependence by merging CPS data with several years of adminis-

trative wage records.¹³ Additionally, several recent papers have complemented our own résumé audit study with additional audit studies of "employer-driven" duration dependence.^{14 15 16}

While most of the recent audit studies find some discrimination against the long-term unemployed, the magnitudes vary. One finding in our résumé study that seems surprising is that employers were more likely to call back newly unemployed workers, compared to workers who were currently employed. This finding is replicated in the recent résumé audit study by Henry S. Farber, Dan Silverman, and Till von Wachter.¹⁷ One explanation for this finding, based on our informal discussions with human resources professionals, is that "some employers express the concern that workers who are currently employed are not serious job seekers and, as a result, some employers are less likely to invite them for an interview."¹⁸

Our research has emphasized the role of duration dependence and transitions in and out of the labor force in accounting for long-term unemployment trends and the outward shift in the Beveridge curve. In our research in the United States, we have mostly used data from the CPS, which is well suited to studying labor market transitions between employment, unemployment, and nonparticipation. However, in order to use the CPS data in our model calibration, we had to deal with a number of irregularities and inconsistencies. For example, there are some disparities between estimates of flows between labor market states and estimates of changes in stocks over time. Recent research by Hie Joo Ahn and James D. Hamilton makes substantial progress toward trying to reconcile these and other irregularities in a unified framework, which should be useful for future matching model calibrations like ours.¹⁹

Lastly, our work in Canada gave us an appreciation for some of the key advantages of the Canadian LFS data relative to the CPS. Our paper and the work by Marianna Kudlyak and Lange suggest that durations of joblessness and unemployment are distinct economic phenomena.²⁰ Researchers interpreting the duration of

unemployment as the time since an unemployed individual was last employed will often be mistaken. The CPS could consider following the LFS in collecting time-since-last-employment data for both the unemployed and nonparticipants, particularly given the increasing interest in studying trends in labor force participation.²¹

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⁴ “Does Delay Cause Decay? The Effect of Administrative Decision Time on the Labor Force Participation and Earnings of Disability Applicants,” Autor D, Maestas N, Mullen K, Strand A. NBER Working Paper 20840, January 2015.
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⁶ “Statistical Discrimination and Duration Dependence in the Job Finding Rate,” Jarosch G, Pilossoph L. NBER Working Paper 24200, January 2018.
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⁷ “Labor Market Dynamics and Unemployment: A Reconsideration,” Clark K, Summers L, Holt C, Hall R, Baily N, Clark K. *Brookings Papers on Economic Activity*, 1979(1), pp. 13–72.
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⁸ “A Comparative Analysis of Unemployment in Canada and the United States,” Card D, Riddell W. In *Small Differences That Matter: Labor Markets and Income Maintenance in Canada and the United States*, Card D, Freeman R, editors, pp. 149–190. Chicago: University of Chicago Press, 1993.
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¹³ “Decomposing Duration Dependence in a Stopping Time Model,” Alvarez F, Borovičková K, Shimer R. NBER Working Paper 22188, April 2016.
“The Consequences of Long-Term Unemployment: Evidence from Linked Survey and Administrative Data,” Abraham K, Haltiwanger J, Sandusky K, Spletzer J, NBER Working Paper 22665.
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¹⁴ “Factors Determining Callbacks to Job Applications by the Unemployed: An Audit Study,” Farber H, Silverman D, Von Wachter T. NBER Working Paper 21689, October 2015.
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¹⁵ “Whom Do Employers Want? The Role of Recent Employment and Unemployment Status and Age,” Farber H, Herbst C, Silverman D, Von Wachter T. NBER Working Paper 24605, May 2018.
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¹⁶ “Do Employers Use Unemployment as a Sorting Criterion When Hiring? Evidence from a Field Experiment,” Eriksson S, Rooth D. *American Economic Review*, 104(3), March 2014, pp. 1014–1039.
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¹⁷ Ibid, NBER Working Paper 21689. See endnote 14.
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¹⁸ Ibid, NBER Working Paper 18387. See endnote 3.
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¹⁹ “Measuring Labor-Force Participation and the Incidence and Duration of Unemployment,” Ahn H, Hamilton J. Finance and Economics Discussion Series 2019-035, May 2019. Washington: Board of Governors of the Federal Reserve System.
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²⁰ “Measuring Heterogeneity in Job Finding Rates among the Non-Employed Using Labor Force Status Histories,” Kudlyak M, Lange F. Working Paper 2017-20, Federal Reserve Bank of San Francisco.
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Six New Directors Elected to NBER Governing Board

The NBER Board of Directors elected six new members — two representing universities, one a professional society, and three at large — at its September 2019 meeting.



Timothy Beatty

Timothy Beatty is the new representative of the Agricultural and Applied Economics Association (AAEA). A professor of agricultural and resource economics at the University of California, Davis, his research focuses on the empirical analysis of consumption behavior, particularly the demand for nutrition and health, and on the links between consumption and health outcomes. He has served as co-editor of the *American Journal of Agricultural Economics* and is currently a member of the executive board of the AAEA. Beatty received his B.A. from Université Laval, an M.Sc. from the University of Montreal, and his Ph.D. from the University of California, Berkeley. He taught at the University of Minnesota and the University of British Columbia before joining the faculty at Davis.

Susan M. Collins is a new at-large director. She is the Edward M. Gramlich Collegiate Professor of Public Policy, professor of economics, and former dean of the Gerald R. Ford School of Public Policy at the University of Michigan. Collins is an international economist whose research interests center on understanding and fostering economic growth in both developed and developing nations. She received her B.A. in economics from Harvard College and her Ph.D. in economics from MIT. She has been an NBER affiliate in the International Finance and Macroeconomics Program since 1984. She served on the faculties at Harvard University and Georgetown University before joining the Michigan faculty. She is a member of the boards of directors of the Federal Reserve Bank of Chicago and the Peterson Institute for International Economics and is a member of the Council on Foreign Relations.



Susan M. Collins



Maureen Cropper

Maureen Cropper is the new representative of the University of Maryland, which is one of two universities that this year were invited to join the list of universities that nominate NBER directors. She is a Distinguished University Professor and is an environmental economist who has studied many topics in this field, including the links between air and water pollution, the risk of chronic illness, and life expectancy, of the impact of climate change on migration, and the role of collective action in pandemic flu control. Cropper is the past president of the Association of Environmental and Resource Economists, a past chair of the Environmental Economics Advisory Committee of the Science Advisory Board at the US Environmental Protection Agency, and a Senior Fellow at Resources for the Future. She received her B.A. in economics from Bryn Mawr College and her Ph.D. from Cornell University. A research associate in the NBER Program on Environment and Energy Economics since 2007, she is also an elected member of the National Academy of Sciences.

Graham Elliott is the new representative of the University of California, San Diego, the second university that was asked this year, for the first time, to nominate an NBER director. He is a professor of economics and the current department chair. His research focuses on econometrics and statistical theory, particularly the design of tools for hypothesis testing in time series econometric applications and on economic forecasting. More recently he has begun work on issues revolving around the application of energy storage in grid applications. Elliott received his undergraduate degree from the University of New South Wales and his Ph.D. from Harvard University. He served as co-editor of the *International Journal of Forecasting* for eight years and as associate editor of a number of other journals in the fields of economics and statistics. He is a co-author of *Economic Forecasting*.



Graham Elliott



Douglas Peterson

Douglas Peterson is a new at-large director. He is president and chief executive officer of S&P Global, a global financial services and data analytics firm that he joined in 2011 after a long career at Citigroup. He previously served as the chief operating officer of Citibank, N.A., Citigroup's principal banking entity, with operations in more than 100 countries. Peterson leads S&P Global's drive to support global capital and commodity markets with transparent, innovative, and independent credit ratings, benchmarks, analytics, and data. He serves on the boards of directors of the Business Roundtable and the Japan Society, is a member of the Council on Foreign Relations and the US-India Forum, and co-chairs the World Economic Forum's "Shaping the Future of Long-Term Investing" initiative. He received his B.A. in history and mathematics from Claremont McKenna College, where he is a member of the Board of Trustees, and his M.B.A from the Wharton School at the University of Pennsylvania.

Mark Weinberger is a new at-large director. He is the former global chairman and chief executive officer of EY, a global professional services firm that is best known as one of the "Big Four" accounting firms. Under his leadership, the company successfully executed over 120 acquisitions to expand its digital and operational capabilities in cybersecurity, artificial intelligence, and data. Within the organization, Weinberger championed increasing diversity and creating an inclusive culture at all levels, and helped reshape the company's highest governing body to reflect the diversity of EY's employees, clients, and the communities in which EY operates. Weinberger served as assistant secretary of the US Department of the Treasury in the administration of President George W. Bush, and was appointed by President William J. Clinton to serve on the US Social Security Administration Advisory Board. He plays an active role in the World Economic Forum, serves on the board of directors of the US Business Roundtable, and is also vice chair of the Corporate Fund Board at The Kennedy Center for the Performing Arts. Weinberger received his B.A. from Emory University, an M.B.A. and J.D. from Case Western Reserve University, and an L.L.M. in Taxation from Georgetown University.



Mark Weinberger

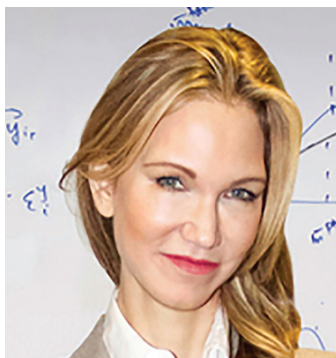
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of the NBER Board of Directors**

<https://www.nber.org/board.html>

Koijen and Ludvigson New Co-Directors of Asset Pricing Program



Ralph S.J. Koijen



Sydney Ludvigson

Ralph S.J. Koijen of the University of Chicago and Sydney Ludvigson of New York University are the new co-directors of the NBER's Asset Pricing Program, succeeding Monika Piazzesi of Stanford University.

Koijen is the AQR Capital Management Professor of Finance and the Fama Family Fellow at Chicago's Booth School of Business. His research spans the fields of financial economics, insurance economics, and macroeconomics. He was awarded the Fischer Black Prize by the American Finance Association this year. The award is given biennially to the top financial economics scholar under the age of 40.

Koijen received his undergraduate degree in econometrics and his Ph.D. in finance from Tilburg University in the Netherlands. In addition to Chicago, he has taught at London Business School and New York University's Stern School of Business. Koijen has been an NBER affiliate since 2010; he is a co-editor of the *Review of Financial Studies*.

Sydney Ludvigson is the Julius Silver, Roslyn S. Silver, and Enid Silver Winslow Professor of Economics at New York University. She is also the chair of the Economics Department. Her research centers on the interplay between asset markets and macroeconomic activity, particularly the factors that determine the risk premia on stocks, bonds, and real estate investments, and the links between uncertainty and business cycle fluctuations.

Ludvigson received her undergraduate degree in economics from the University of California, Los Angeles and her Ph.D. from Princeton University. She began her career at the Federal Reserve Bank of New York and joined the NYU faculty in 2001. An NBER affiliate since 2003, Ludvigson has been an Alfred P. Sloan Fellow, directed the C.V. Starr Center for Applied Economics at NYU for nearly a decade, and was a board member of the Academic Female Finance Committee of the American Finance Association.

42nd Annual NBER Summer Institute

Researchers from 40 countries and 474 institutions participated in the 42nd annual NBER Summer Institute, which was held in Cambridge over a three-week period in July. Nearly 2,900 participants took part in 52 distinct meetings arranged by 104 organizers.

There were 575 first-time participants, and 224 graduate students, at the 2019 Summer Institute. About two-thirds of the participants were not NBER affiliates. Researchers submitted 2,990 distinct papers, of which 547 were included on the program.

Katherine Baicker, dean and Emmett Dedmon Professor at the University of Chicago Harris School of Public Policy, delivered the 2019 Martin Feldstein Lecture on "Economic Analysis for Evidence-Based Health Policy: Progress and Pitfalls." Her presentation described both the importance of integrating empirical evidence on the behavior of prospective patients and health care providers into the design of health care policies and the challenges of doing so. An edited text of her lec-

ture appears earlier in this issue of the *NBER Reporter*.

Edward Miguel, the Oxfam Professor of Environmental and Resource Economics at the University of California, Berkeley presented the 2019 Methods Lecture, speaking on "Research Transparency and Reproducibility." His talk offered a number of strategies for improving the documentation associated with empirical projects in economics, and thereby enhancing the capacity for replication.

Conferences

International Seminar on Macroeconomics

A meeting of the NBER International Seminar on Macroeconomics took place on June 27–28 in London. Research Associates Kristin Forbes of MIT and Pierre-Olivier Gourinchas of the University of California, Berkeley organized the meeting. These researchers' papers were presented and discussed:

- **François Fontaine**, Paris School of Economics; **Julien Martin**, UQAM; and **Isabelle Mejean**, École Polytechnique, “Price Discrimination within and across EMU Markets: Evidence from French Exporters”
- **Shang-Jin Wei**, Columbia University and NBER, and **Yinxi Xie**, Columbia University, “Monetary Policy in a World of Global Supply Chains”
- **Olivier Coibion**, University of Texas at Austin and NBER; **Yuriy Gorodnichenko**, University of California, Berkeley and NBER; **Saten Kumar**, Auckland University of Technology; and **Mathieu Pedemonte**, University of California, Berkeley, “Inflation Expectations as a Policy Tool?” (NBER Working Paper [24788](#))
- **Sergio de Ferra**, Stockholm University; **Kurt Mitman**, Institute for International Economic Studies; and **Federica Romei**, Stockholm School of Economics, “Household Heterogeneity and the Transmission of Foreign Shocks”
- **Chris Redl**, Bank of England, “Uncertainty Matters: Evidence from Close Elections”
- **Ulrike Malmendier**, University of California, Berkeley and NBER; **Demian Pouzo**, University of California, Berkeley; and **Victoria Vanasco**, Center for Research in International Economics, “Investor Experiences, Capital Flows and Debt Pricing” (NBER Working Paper [24697](#))
- **Nuno T. Coimbra**, Paris School of Economics, “Sovereigns at Risk: A Dynamic Model of Sovereign Debt and Banking Leverage”
- **Julia Bevilacqua**, **Galina Hale**, and **Eric Tallman**, Federal Reserve Bank of San Francisco, “Corporate Spreads, Sovereign Spreads, and Crises”

Summaries of these papers are at www.nber.org/conferences/2019/ISOM19/summary.html

The 28th NBER-TCER-CEPR Conference

The 28th NBER-TCER-CEPR Conference took place in Tokyo July 27. This meeting was sponsored jointly by the Centre for Economic Policy Research in London, the NBER, the Tokyo Center for Economic Research, the Center for Advanced Research in Finance, and the Center for International Research on the Japanese Economy, and co-sponsored by the Center for Advanced Research in Finance (CARF), Center for International Research on the Japanese Economy (CIRJE), and the Research Institute of Capital Formation (RICF), of the Development Bank of Japan. Shin-ichi Fukuda and Kenichi Ueda, both of the University of Tokyo, Research Associate Takeo Hoshi of Stanford University, and Franklin Allen of Imperial College London organized the meeting. These researchers' papers were presented and discussed:

- **Yukihiro Yasuda** and **Ryosuke Fujitani**, Hitotsubashi University, and **Joseph French**, University of Northern Colorado, "Stock Market Listing, Investment, and Business Groups: How Firm Structure Impacts Investment"
- **Arantxa Jarque**, Federal Reserve Bank of Richmond, and **Edward S. Prescott**, Federal Reserve Bank of Cleveland, "Banker Compensation, Relative Performance, and Bank Risk"
- **Jennifer Corbett**, Australian National University, and **Ying Xu**, Australian Treasury, "Using Network Method to Measure Financial Interconnection"
- **Renée Adams**, University of Oxford; **Brad Barber**, University of California, Davis; and **Terrance Odean**, University of California, Berkeley, "Values in Finance"
- **Kenichi Ueda** and **Somnath Sharma**, University of Tokyo and Reserve Bank of India, "Listing Advantages around the World"
- **Rodney Ramcharan**, University of Southern California; **Stefan Gissler**, Federal Reserve Board; and **Edison Yu**, Federal Reserve Bank of Philadelphia, "The Effects of Competition in Consumer Credit Markets"
- **Andreas Lehnert**, Federal Reserve Board; **Michael Barr** and **Phillip Swagel**, University of Maryland; and **Neel Kashkari**, Federal Reserve Bank of Minneapolis, "Inside the US Strategy for Fighting the 2007–2009 Global Financial Crisis"
- **Eugenio M. Cerutti**, International Monetary Fund, "US vs. Euro Area: Who Drives Cross-Border Bank Lending to EMs?"
- **Yoshiaki Ogura**, Waseda University, "Search for Yield under Prolonged Monetary Easing and Aging"

Summaries of these papers are at www.nber.org/conferences/2019/TRIO19/summary.html

Japan Project

The NBER Japan Project held a conference in Tokyo July 29. Shiro P. Armstrong of Australian National University, Tsutomu Watanabe, of the University of Tokyo, and Research Associates Charles Yuji Horioka of Kobe University, Takeo Hoshi of Stanford University, and David Weinstein of Columbia University organized the meeting. These researchers' papers were presented and discussed:

- **Melissa Dell**, Harvard University and NBER, and **Sahar Parsa**, Tufts University, "Managerial Talent and Economic Performance: Evidence from Discontinuities in Douglas MacArthur's Economic Purge"
- **Yoon J. Jo** and **Misaki Matsumura**, Columbia University, and **David Weinstein**, "The Impact of E-Commerce on Relative Prices and Consumer Welfare"
- **Takeo Hoshi** and **Anil K. Kashyap**, University of Chicago and NBER, "The Great Disconnect: The Decoupling of Wage and Price Inflation in Japan"
- **Mari Tanaka** and **Chiaki Moriguchi**, Hitotsubashi University, and **Yusuke Narita**, Yale University, "Meritocracy and Its Discontents: Evidence from Centralizing and Decentralizing School Admissions"
- **Ichiro Uesugi** and **Daisuke Miyakawa**, Hitotsubashi University; **Kaoru Hosono**, Gakushuin University; **Arito Ono**, Chuo University; and **Hirofumi Uchida**, Kobe University, "The Collateral Channel versus the Bank Lending Channel: Evidence from a Massive Earthquake"
- **Elif C. Arbatli** and **Naoko Miake**, International Monetary Fund; **Steven J. Davis**, University of Chicago and NBER; and **Arata Ito**, Research Institute of Economy, Trade and Industry, "Policy Uncertainty in Japan" (NBER Working Paper 23411)

Summaries of these papers are at www.nber.org/conferences/2019/JPMs19/summary.html

Incentives and Limitations of Employment Policies on Retirement Transitions: Comparisons of Public and Private Sectors

An NBER conference on Incentives and Limitations of Employment Policies on Retirement Transitions: Comparisons of Public and Private Sectors took place in Jackson Hole, Wyoming, August 9–10. Research Associates Robert L. Clark of North Carolina State University and Joseph P. Newhouse of Harvard University organized the meeting, which was sponsored by the Alfred P. Sloan Foundation. These researchers' papers were presented and discussed:

- **Katharine G. Abraham**, University of Maryland and NBER, and **Brad Hershbein** and **Susan Houseman**, W.E. Upjohn Institute for Employment Research, "Contract Work at Older Ages"
- **Richard V. Burkhauser**, Cornell University, "How the CEA and the Trump Administration Addressed Work and Retirement Policies"
- **Péter Hudomiet**, **Andrew Parker**, and **Susann Rohwedder**, RAND Corporation, and **Michael D. Hurd**, RAND Corporation and NBER, "Current and Desired Job Characteristics of Older Workers and Their Effects on Retirement"

- **Dhiren Patki**, University of Michigan, “Breaking the Implicit Contract: Using Pension Freezes to Estimate the Labor Supply Elasticity”
- **Courtney Coile**, Wellesley College and NBER, and **Susan Stewart**, NBER, “Retirement Incentives and Behavior of Private and Public Sector Workers”
- **Raimond Maurer**, Goethe University Frankfurt, and **Olivia S. Mitchell**, University of Pennsylvania and NBER, “Older Peoples’ Willingness to Delay Social Security Claiming” (NBER Working Paper [22942](#))
- **Robert L. Clark** and **Robert G. Hammond** and **Siyan Liu**, North Carolina State University, “Work after Retirement: Worklife Transitions of Career Public Employees”
- **Alicia Munnell**, Boston College, and **Geoffrey Sanzenbacher** and **Abigail Walters**, Center for Retirement Research at Boston College, “How Do Older Workers Use Nontraditional Jobs?”
- **John Chalmers**, University of Oregon; **Olivia S. Mitchell**, University of Pennsylvania and NBER; **Jonathan Reuter**, Boston College and NBER; **Geoffrey Sanzenbacher**, Boston College; and **Mingli Zhong**, University of Pennsylvania, “Auto-Enrollment Retirement Plans for the People: Choices and Outcomes in OregonSaves”

Summaries of these papers are at www.nber.org/conferences/2019/ELMRs19/summary.html

Economics of Mega-Firms and Changes in Market Power

An NBER conference on the Economics of Mega-Firms and Changes in Market Power took place in Cambridge September 12–13. Research Associates Chad Syverson of the University of Chicago and John Van Reenen of MIT organized the meeting, which was sponsored by the Smith Richardson Foundation. These researchers’ papers were presented and discussed:

- **Luis Aguiar**, University of Zurich, and **Joel Waldfogel**, University of Minnesota and NBER, “Platforms, Power, and Promotion: Evidence from Spotify Playlists”
- **José A. Azar**, IESE Business School; **Steven T. Berry**, Yale University and NBER; and **Ioana Marinescu**, University of Pennsylvania and NBER, “Estimating Labor Market Power”
- **Ufuk Akcigit**, University of Chicago and NBER, and **Sina T. Ates**, Federal Reserve Board, “What Happened to US Business Dynamism?” (NBER Working Paper [25756](#))
- **Matthew Backus**, Columbia University and NBER; **Christopher Conlon**, New York University; and **Michael Sinkinson**, Yale University and NBER, “Common Ownership in America: 1980–2017” (NBER Working Paper [25454](#))
- **Chang-Tai Hsieh**, University of Chicago and NBER, and **Esteban Rossi-Hansberg**, Princeton University and NBER, “The Industrial Revolution in Services” (NBER Working Paper [25968](#))
- **Gregor Jarosch**, Princeton University and NBER; **Jan Sebastian Nimczik**, ESMT Berlin; and **Isaac Sorkin**, Stanford University and NBER, “Granular Search, Market Structure, and Wages”
- **Brent Neiman** and **Joseph S. Vavra**, University of Chicago and NBER, “The Rise of Niche Consumption” (NBER Working Paper [26134](#))

- **Xiang Ding**, Harvard University; **Teresa C. Fort**, Dartmouth College and NBER; **Stephen J. Redding**, Princeton University and NBER; and **Peter K. Schott**, Yale University and NBER, “Structural Change within versus across Firms: Evidence from the United States”

Summaries of these papers are at www.nber.org/conferences/2019/MFf19/summary.html

Program Meeting

Economic Fluctuations and Growth

Members of the NBER’s Economic Fluctuations and Growth Program met July 13 in Cambridge. Research Associate Amir Sufi of the University of Chicago and Silvana Tenreyro of the London School of Economics organized the meeting. These researchers’ papers were presented and discussed:

- **Masao Fukui**, MIT, and **Emi Nakamura** and **Jón Steinsson**, University of California, Berkeley and NBER, “Women, Wealth Effects, and Slow Recoveries” (NBER Working Paper [25311](#))
- **Julian Kozlowski**, Federal Reserve Bank of St. Louis; **Laura Veldkamp**, Columbia University and NBER; and **Venky Venkateswaran**, New York University and NBER, “The Tail that Wags the Economy: Beliefs and Persistent Stagnation” (NBER Working Paper [21719](#))
- **Pascal Michaillat**, Brown University and NBER, and **Emmanuel Saez**, University of California, Berkeley and NBER, “Resolving New Keynesian Anomalies with Wealth in the Utility Function”
- **Francesco Lippi**, LUISS University & EIEF, and **Fabrizio Perri**, Federal Reserve Bank of Minneapolis, “Unequal Growth”
- **Andreas Fagereng**, Statistics Norway; **Martin Blomhoff Holm**, University of Oslo; **Benjamin Moll**, Princeton University and NBER; and **Gisle Natvik**, BI Norwegian Business School, “Saving Behavior across the Wealth Distribution: The Importance of Capital Gains”
- **Pablo Fajgelbaum**, University of California, Los Angeles and NBER; **Pinelopi K. Goldberg**, World Bank, on leave from Yale University and NBER; **Amit Khandelwal**, Columbia University and NBER; and **Patrick Kennedy**, University of California, Berkeley, “The Return to Protectionism” (NBER Working Paper [25638](#))

Summaries of these papers are at www.nber.org/conferences/2019/SI2019/EFGs19/summary.html

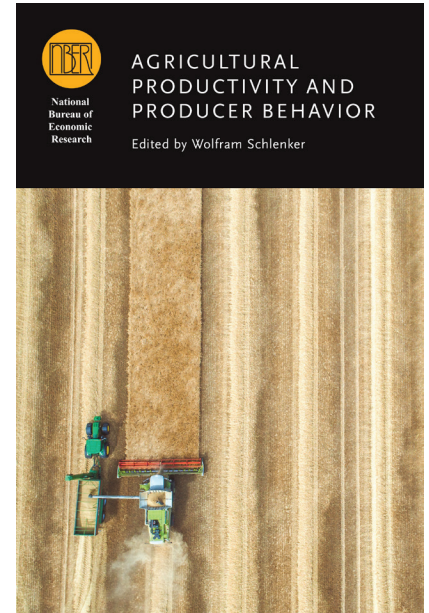
Agricultural Productivity and Producer Behavior

Edited by Wolfram Schlenker

<https://press.uchicago.edu/ucp/books/book/chicago/A/bo42710291.html>

Agricultural yields have increased steadily in the last half century, particularly since the Green Revolution. At the same time, inflation-adjusted agricultural commodity prices have been trending downward as increases in supply outpace the growth of demand. Yet recent severe weather events, biofuel mandates, and a switch toward a more meat-heavy diet in emerging economies have boosted commodity prices. Whether this is a temporary jump or the beginning of a longer-term trend is an open question. *Agricultural Productivity and Producer Behavior* examines the factors contributing to the remarkably steady increase in

global yields and assesses whether yield growth can continue. This research also considers whether such growth will have significant environmental consequences. Among the topics studied are genetically modified crops; changing climatic factors; farm production responses to government regulations including crop insurance, transport subsidies, and electricity subsidies for groundwater extraction; and the role of specific farm practices such as crop diversification, disease management, and water-saving methods. This research provides new evidence that technological as well as policy choices influence agricultural productivity.



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

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