Program Report

Productivity, Innovation, and Entrepreneurship

Nicholas Bloom, Josh Lerner, and Heidi Williams*

The Productivity, Innovation, and Entrepreneurship (PIE) Program was founded as the Productivity Program, with Zvi Griliches as the inaugural program director, in 1978. The program benefited tremendously from Griliches’ inspirational leadership, which was continued by Ernst Berndt. In recent years, the program has expanded to incorporate the vibrant and growing body of research in the affiliated fields of innovation and entrepreneurship.

With the generous support of the Ewing Marion Kauffman and Alfred P. Sloan Foundations, the program has generated a large and diverse volume of research activity. Currently, 128 researchers are affiliated with the PIE Program. Since the last program report, in September 2013, affiliates have distributed more than 1,050 working papers and edited or contributed to several research volumes, including the annual Innovation Policy and the Economy series.

The activities of the program are organized into four large project areas: economic research on the measurement and drivers of productivity growth; innovation, which examines R&D, patenting, and creative activities; entrepreneurship, which focuses on the measurement, causes, and effects of new business creation; and digitization, which focuses on the creation, use, and impact of digital information. This review summarizes the research in the first three of these areas. In the interest of space, we will not detail the PIE group’s many activities, including boot camps for

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Recent years have seen growing concerns that US gross domestic product (GDP) growth is slowing. A factor that accounts for about half of this slowdown is the decline of labor productivity growth [Figure 1], which fell by roughly half, from 3 percent to 1.5 percent, between 1950 and 2019. The other half of slowing growth is due to declining labor force hours, due roughly equally to declining population growth and declining labor force participation. National productivity is defined as the amount of GDP that can be obtained with a given set of inputs. In this sense, productivity growth is “growth by inspiration” in that it yields more from less, in contrast to growth from increasing the use of inputs, which has been labeled “growth by perspiration.” As such, productivity growth is critical to driving long-run increases in the standard of living.

One immediate question is whether the productivity growth slowdown is real. An alternative view is that the observed slowdown in productivity growth could be an artifact of some measurement issue such as the increasing importance of online activity, much of which may not be recorded in conventional GDP statistics. Several recent studies argue against this view: they conclude that the decline in productivity growth is real, rather than due to measurement issues in inputs and outputs, transfer pricing, or cyclical issues related to the end of the 1990s information technology boom.3

This then leads to another question: what is driving the fall in productivity? Robert Gordon argues that a combination of headwinds accounts for this slowdown.4 One is the slowing growth of educational attainment, which began around 1980 with the annual growth rate of the percentage of the population completing high school falling from 3.3 percent per year until 1980 to only 0.2 percent after 1980, with similar slowdowns in college enrollment growth.

The second headwind Gordon highlights is the slowdown of productivity growth after the end of the Great Inventions Era. He argues that inventions such as sanitation, antibiotics, steam and electric power, radio, telephone, and air conditioning drove rapid national growth...
during the first part of the 20th century, and that comparably high-impact inventions have not been produced as frequently in recent years. Nicholas Bloom, Charles Jones, John Van Reenen, and Michael Webb build on this idea, arguing empirically that new ideas like these great inventions are becoming increasingly hard to find.\footnote{\textsuperscript{5}} They document that innovation output per R&D dollar or per scientist is falling, perhaps because the lower-hanging fruits on the knowledge tree are getting plucked over time.

A final, more positive headwind may be that the huge productivity benefits derived from modern information communication technologies (ICT) like computers, the internet, and smartphones take time to show up in national productivity. Erik Brynjolfsson, Daniel Rock, and Chad Syverson argue that since it took almost 50 years in the first half of the 20th century to incorporate electricity fully into modern factories and offices, we should be more patient in looking for the productivity impact of ICT.\footnote{\textsuperscript{6}} This is the ICT productivity J-curve — an initially slow productivity impact as society has to reorganize to use these new technologies efficiently, but a longer-run acceleration once they are effectively exploited.

Following this narrative, a reasonable outlook is that these modern great inventions will eventually raise productivity growth, overcoming some of the first two headwinds. But it may take another 10 or 20 years for society to reorganize itself to exploit them. Of course, one step toward that has potentially been the massive shift to working from home during the pandemic, for which ICT has been invaluable.\footnote{\textsuperscript{7}} Indeed, one could argue this almost certainly improved productivity versus any pre-computer version of working from home, so in that sense the enormous productivity impact of modern ICT has already begun.

**Innovation**

A second focus of academics and policymakers in recent years has been trying to understand the causes and consequences of rising inequality in the United States and other developed countries.\footnote{\textsuperscript{8}} From an innovation policy perspective, several questions are of interest. Have innovation policies — such as government-awarded market power through patents and antitrust policy decisions — contributed to the observed rise in inequality? How does inequality at a societal level impact who becomes an inventor and what they invent? Tremendous progress is being made in developing new conceptual frameworks, datasets, and empirical approaches to tackle these questions at both the macro and micro levels.

At the macro level, two recent studies consider how innovation affects inequality in Schumpeterian growth models.\footnote{\textsuperscript{9}} One of these studies also leverages variation in the composition of the US Senate Committee on Appropriations to empirically test for a causal link between innovation and inequality, and argues that a 1 percent increase in patents increases the top 1 percent’s income share by 0.2 percent.\footnote{\textsuperscript{10}}

At the micro level, research in fields such as health economics and labor economics has provided evidence on how innovation affects inequality. David Cutler, Ellen Meara, and Seth Richards-Shubik point out that when the most common causes of death vary across demographic groups, a policy of equalizing the expected marginal benefit of research across diseases can increase cross-group disparities in mortality outcomes.\footnote{\textsuperscript{11}} Taking this idea to the data, they suggest that National Institutes of Health-funded research increased the Black-White infant mortality gap between 1950 and 2007.

Two recent studies have explored the link between innovation and earnings inequality. Patrick Kline, Neviana Petkova, Heidi Williams, and Owen Zidar develop a novel firm-level linkage between patent applications and US Treasury firm/worker tax filings, and document that patent allowances raise average earnings at the firm level but also exacerbate within-firm inequality on a number of margins — with earnings of top-earning employees, firm officers, and male employees responding more strongly to patent grants.\footnote{\textsuperscript{12}} Related research using a novel firm-level linkage between patents and US Social Security Administration earnings records suggests that rising inequality in innovation activity across firms in the 1990s, as measured by patenting, can account for a significant share of the recent rise in income inequality.\footnote{\textsuperscript{13}}

Of course, inequality at the societal level might also affect who becomes an inventor, and what they invent. Several recent studies have constructed linked

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**Figure 1**

<table>
<thead>
<tr>
<th>US Productivity Growth, 1950–2020</th>
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<tbody>
<tr>
<td>Change in real output per hour, year-over-year</td>
</tr>
<tr>
<td>8%</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>-2</td>
</tr>
<tr>
<td>Long-run trend</td>
</tr>
</tbody>
</table>

Source: Researchers’ calculations using data from the Bureau of Economic Analysis
data enabling new analyses of how demographic factors are associated with the probability of inventing, as measured by patenting.\textsuperscript{14} Figure 2 documents that children from high-income (top 1 percent) families are 10 times as likely to become inventors as those from below-median-income families. While the results from these papers suggest that public policies could influence who becomes an inventor, it is difficult to derive quantitative conclusions from these descriptive analyses. An important step in closing this gap is provided by the work of Chang-Tai Hsieh, Erik Hurst, Chad Jones, and Peter Klenow, who estimate that between 20 and 40 percent of the increase in US output per person between 1960 and 2010 can be explained by an improved allocation of talent, notably the convergence in occupations across gender and race.\textsuperscript{15}

**Entrepreneurship**

Given the concerns about stagnant productivity and rising inequality, it is natural to wonder whether either or both concerns are being—or have the potential to be—addressed by the burgeoning number of new high-potential ventures. Much attention in recent years has focused on the role of venture capital (VC) in fostering innovation. The level of VC financing has rapidly increased over the last decade, in contrast with federal R&D which has been stagnant in the US. A number of economic models suggest that VC funds should be uniquely positioned to promote innovative growth in risky and uncertain environments, given their combination of careful screening, intense monitoring, and staged financing.\textsuperscript{16}

![Parents’ Income and Child’s Probability of Being Awarded a Patent](image)

The empirical literature, however, suggests a more nuanced picture. VC funding is increasingly concentrated in a relatively small number of startup firms that raise far more capital than in the past and stay private much longer.\textsuperscript{17} Much of the funding comes not from the venture investors themselves, but from investors who traditionally focused on public firms, such as mutual and hedge funds, as well as pension funds and other large institutional investors.

This concentration of capital may or may not be socially desirable; after all, the list of long-gestation firms that garnered extensive financing while private would include Alibaba, Facebook, and Uber, each of which undoubtedly has had profound economic impacts. But Josh Lerner and Ramana Nanda argue that while venture funding is very efficacious in stimulating a certain kind of innovative business, the scope is increasingly limited. For instance, using data on the patents filed at the US Patent and Trademark Office, they found that the top 10 patent classes using the US Cooperative Patent Classification (CPC) system represented 48 percent of all US VC patents filed over the 2008–17 period, compared to 24 percent for the top 10 patent classes for patents not filed by comparable VC-backed firms.\textsuperscript{18} This concentration has increased substantially over time.

This suggestion is underscored by computations by Sand Hill Econometrics. Susan Woodward and Robert Hall describe this firm’s indices, which suggest that an investment in all software deals between December 1991 and September 2019 would have yielded an annualized gross return of 24 percent, far greater than investments in hardware (17 percent), healthcare (13 percent), or clean tech (2 percent).\textsuperscript{19} These data further illustrate that the divergence in the performance of these categories has been particularly stark in the last decade. Thus, the shift of venture investment to software is not surprising.

A related concern is the increasing concentration of venture funds in the hands of a number of small groups. Not only are these funds concentrated geographically in a few urban areas, but the makeup of the most influential US firms is very different from that of the country as a whole. At VC firms and among the founders of VC-backed startups, women represent less than 10 percent of the entrepreneurial and VC labor pool, Hispanics about 2 percent, and African Americans less than 1 percent.\textsuperscript{20} This concentration appears despite the fact that women, Hispanics, and African Americans have much higher corresponding levels of representation in education programs that traditionally lead to careers in these sectors, as well as higher rates of representation in other highly compensated professions.

The disparities are also manifested in financing raised. For instance, using data from the Kauffman Firm Survey, Robert Fairlie, Alicia Robb, and David Robinson show that the typical White-
owned firm had 35 times the amount of outside equity financing as the analogous Black-owned firm at the time of the initial survey, a difference that persists over time.\footnote{For an overview of the digitization effort, see “The Economics of Digitization,” Greenstein S. The Reporter, 2020-2. Return to Text}

These findings suggest that while VC is a powerful tool for boosting innovation, it is far from a panacea for addressing rising inequality or stagnant productivity across the economy.

1 For an overview of the digitization effort, see “The Economics of Digitization,” Greenstein S. The Reporter, 2020-2. Return to Text


4 Gordon, ibid note 2. Return to Text


10 Aghion et al., Ibid. Return to Text


Research Summaries

Long-Run Trends and the Natural Rate of Unemployment

Ayşegül Şahin

Starting with Milton Friedman and Edmund Phelps, academics and policymakers have endeavored to measure a sustainable level of unemployment and the implications that deviations from this level have for inflation of prices and wages. This natural rate of unemployment, $u^*$, is broadly defined as the unemployment rate at which, controlling for supply shocks, inflation remains stable.

Long-run trends in the labor market and changes in inflation expectations make it hard to pin down this natural rate of unemployment. Specifically, the dramatic trend decline in unemployment and the concurrent anchoring of inflation expectations since the 1980s have triggered extensive discussions in policy and academic circles. My recent work focuses on using detailed data on labor market flows and inflation expectations to estimate the natural rate of unemployment.

In this report, I first focus on the drivers of the trend decline in unemployment and review my work that connected this decline to two prominent long-run trends in the economy: the grand gender convergence and the dual aging of workers and firms. Then I summarize my work and discuss a unified framework that I have developed with Richard Crump, Stefano Eusepi, and Marc Giannoni for estimating the natural rate of unemployment. While I mostly focus on the period before the COVID-19 pandemic, I end with a discussion of the effect of the pandemic on the natural rate of unemployment.

Inflows to and Outflows from Unemployment, 1960–2018

The inflow rate is the percentage of employed workers leaving employment and becoming unemployed each month. The outflow rate is the percentage of unemployed workers becoming employed each month. Source: Crump R, Eusepi S, Giannoni M, and Şahin A, NBER Working Paper 25930 and published as "A Unified Approach to Measuring $u^*$", Brookings Papers on Economic Activity, 50(1), Spring 2019, pp 43–214

Inflows to and Outflows from Unemployment, 1960–2018

Figure 1

Ayşegül Şahin is the Richard J. Gonzalez Regents Chair in Economics at the University of Texas at Austin and an NBER research associate in the Economic Fluctuations and Growth and Monetary Economics programs. She has been serving as a coeditor of the American Economic Journal: Macroeconomics since January 2020.

Şahin is a member of the panel of economic advisers of the Congressional Budget Office, the Bureau of Labor Statistics’ technical advisory committee, the American Economic Association Committee on Economic Statistics and the advisory boards of the Federal Reserve Bank of San Francisco and the Carnegie-Rochester-NYU Conference on Public Policy. She also is a consultant to the Federal Reserve Banks of Cleveland, Dallas, and Minneapolis.

Prior to joining UT Austin’s economics department, Şahin was a research economist at the Federal Reserve Bank of New York for 14 years, concentrating primarily on analysis of the US labor market. Her research focuses on analysis of macro-labor issues such as unemployment and labor force participation dynamics, labor market mismatch, the natural rate of unemployment, gender disparities in labor market outcomes, and entrepreneurship.

Şahin grew up in Turkey, where she studied electrical engineering at Bilkent University in Ankara before earning her PhD in economics from the University of Rochester. She lives in Austin and enjoys hiking and doing jigsaw puzzles with her daughter.
Trend Decline in the Unemployment Rate

A useful insight from my research with Michael Elsby and Bart Hobijn is that the flow origins of unemployment rate movements provide useful information about the underlying drivers of unemployment fluctuations and trends. The idea is simple: the unemployment rate increases either because more workers become unemployed (inflows increase) or it becomes harder for the unemployed to leave unemployment (outflows decrease).

Visual examination of inflow and outflow rates in Figure 1 shows that the inflow rate is characterized by sharp, short-lived spikes during recessions, while the outflow rate from unemployment is strongly procyclical with persistent downswings during recessions. The figure also shows the secular trends in these flow rates, estimated using flow data by detailed demographics with a state-space method that I developed with Crump, Eusepi, and Giannoni. Two flows that shape the evolution of the unemployment rate over time exhibit differential long-run trends. The inflow rate has a striking downward trend declining gradually to 0.02, with half of its level preceding the twin recessions of the early 1980s. In contrast, there is no evident trending behavior in the outflow rate.

This stark decline in the rate at which workers become unemployed caused about a 1 percentage point decline from the 1980s to the 1990s and another 1.5 percentage point decline from the 1990s to 2020 in the long-term trend rate of unemployment. Interestingly, this downward trend continued even after the dramatic job losses of the Great Recession, underscoring the importance of secular trends in the labor market. My research has focused on explaining this declining incidence of unemployment.

Grand Gender Convergence

The United States experienced grand gender convergence in the 20th century, with female labor force participation, the fraction of all women who are in the labor force, increasing from around 47 percent in 1976 to approximately 60 percent in 2000. The main driver of the rise in the female labor force participation rate was the increase in participation of married women with children. Women started to work longer into their pregnancies and to work sooner after childbirth than their counterparts in the 1960s, likely due to changes in social norms, more widespread availability of maternity leave, which facilitated return to women’s previous jobs, and advances in maternal health and child care. As labor market interruptions declined, women’s labor force attachment gradually increased. Having stretches of uninterrupted employment allowed women to build more stable employment relationships. Stefania Albanesi and I found that this reduced frictional unemployment through a decline in the incidence of job loss and the incidence of unemployment during reentry into the labor force.

Figure 2 shows the unemployment inflow rate by gender. During the 1980s and 1990s, the unemployment inflow rate for women, which had been higher than that for men, converged to men’s rate, driving down the secular trend of unemployment. The importance of gender convergence was relatively minor after 2000. This is when another prominent trend—dual aging—took over.

Dual Aging

The US economy has been experiencing a striking shift toward older workers and older firms since the mid-1990s. While the change in worker demographics is directly attributable to the drastic increase in births following World War II, the emphasis on aging of firms is relatively new, as data have only recently become available. Benjamin Pugsley and I show that declining births of firms almost fully account for the shift of employment toward older firms. Moreover, in joint work with Fatih Karahan, Pugsley and I find that the origin of the decline in the unemployment rate is due to labor supply growth arising from the aging of the baby boom cohort and the flattening out of the female labor force participation rate.

We establish a clear link from worker to firm demographics. The aging pattern is stark. Around 18 percent of the labor force consisted of workers between 16 and 24 years old (young workers in Figure 3) in 1987. By

Figure 2

Unemployment Inflows by Gender, 1976–2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>1986</td>
<td>4.0</td>
<td>5.0</td>
</tr>
<tr>
<td>1996</td>
<td>5.0</td>
<td>6.0</td>
</tr>
<tr>
<td>2006</td>
<td>6.0</td>
<td>7.0</td>
</tr>
<tr>
<td>2016</td>
<td>7.0</td>
<td>8.0</td>
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</tbody>
</table>

2017, the number had declined to 10 percent. The employment share of firms less than five years old also followed a similar pattern, with their share declining from around 20 percent to 10 percent. On the flip side, in 1987, firms 11 or more years old—mature firms—employed about two-thirds of the workers in the economy. By 2017, the number of workers in mature firms had increased to 80 percent. [Figure 3]

Younger workers are four times more likely to become unemployed than prime-age workers. Similarly, firms aged between one and five years old are twice as likely to eliminate jobs as their older counterparts. These patterns suggest that declines in unemployment and job destruction are direct consequences of dual aging. While the shift in worker and firm age composition falls short of accounting for the decline in the inflow rate, aging also affects the economy by affecting age-specific outcomes. Put differently, in economies with older workers and firms, unemployment and job destruction are lower for all workers. Using state-level variation and an instrumental variables approach, Crump, Eusepi, Giannoni and I showed that a 1 percentage point increase in mature firms’ share lowers the job destruction rate by 0.60 percentage points for younger firms.7

While grand gender convergence was important in accounting for the secular decline in the unemployment rate until 2000, dual aging stands out as an important driver of the decline since then.

Natural Rate of Unemployment

Grand gender convergence and dual aging together have reduced the overall incidence of unemployment, and consequently the secular trend of unemployment. Concurrently, inflation expectations became better anchored following survey-based expectations of inflation at different horizons to provide noisy signals of true inflation expectations and impose that the secular trend of unemployment we derive from the flow dynamics acts as an anchor for the natural rate, while accommodating the possibility of persistent deviations.

Figure 4 shows the evolution of u* since 1960. In the first decade of the sample, the natural rate hovers slightly below 6 percent and starts rising in the early 1970s, easily exceeding 7 percent by the late 1970s before falling to about 7 percent in 1983. The natural rate then declines throughout the 1980s falling consistently below the median of the secular trend of the unemployment rate (black solid line). The period from the 1990s to the Great Recession is characterized by a fairly stable natural rate of unemployment.
which remains range-bound between 4.5 and 5.5 percent. Finally, during the prerecession years 2005–06, the natural rate of unemployment begins increasing toward its long-run trend. In the aftermath of the Great Recession, the natural rate of unemployment gradually declines roughly in line with its secular trend. The natural rate toward the end of 2018 was 3.8 percent, with a confidence interval between 3.4 and 4.5 percent, consistent with the unemployment gap being around zero before the pandemic.

While some recent work argues for a change in the unemployment-inflation trade-off, our work emphasizes the role of inflation expectations. This is illustrated in Table 1, which compares the early 1980s with the late 2000s. In the early 1980s, we estimate an unemployment gap (the difference between the actual and the natural rate of unemployment) of 3.5 percentage points. During this time period, average core CPI inflation fell from 9.1 percent in 1978–79 to 4.6 percent in 1982–83. Following the Great Recession, which displays the largest unemployment gap in the sample, at around 4 percentage points, price inflation declined only modestly, from 2.5 percent in 2006–07 to 1.2 percent in 2009–10. The key determinant is the behavior of inflation expectations, which dropped much more sharply in the early 1980s than in the aftermath of the Great Recession. The comparison of the early 1980s with the Great Recession period demonstrates the importance of accounting for inflation expectations in explaining the behavior of inflation and the unemployment gap.

The longest labor market expansion in postwar US history came to an abrupt end with the emergence of the COVID-19 pandemic in March 2020. The unemployment rate jumped from its historically low level of 3.5 percent in February to 14.8 percent in April. This sharp increase was followed by a steep decline; the unemployment rate retreated to 6.9 percent by October. Murat Tasci, Jin Yan, and I show that this was due to the unprecedented rise in unemployment inflows, which was mostly driven by workers on temporary layoffs. Applying the methodology I developed with Crump, Eusepi, and Giannoni, we find that during the pandemic recession, increased from 3.8 percent to a range of 4.0 to 4.5 percent, suggesting that the unemployment gap as of May 2021 stood between 1.3 and 1.8 percentage points.

Table 1

<table>
<thead>
<tr>
<th>Evolution of Unemployment Gap, Core CPI, and Inflation expectations</th>
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<tbody>
<tr>
<td><strong>Early 1980s</strong></td>
</tr>
<tr>
<td>Unemployment gap</td>
</tr>
<tr>
<td>Core CPI</td>
</tr>
<tr>
<td>Core CPI</td>
</tr>
<tr>
<td>Decline in Core CPI</td>
</tr>
<tr>
<td>Inflation expectations</td>
</tr>
</tbody>
</table>


3 “The Quiet Revolution That Transformed Women’s Employment, Education, and Family,” Goldin C.


7 Ibid note 2.


9 Ibid note 2.

Dynamic Corporate Finance under Costly Equity Issuance

Patrick Bolton and Neng Wang

Two fundamental concepts in corporate finance are the net present value (NPV) rule and the Modigliani-Miller (MM) irrelevance proposition. When financial markets operate without frictions, when investors can trade securities that correspond to all relevant risks, when investors and managers share the same information, when incentives are aligned, and when there are no tax distortions, then corporate finance boils down to a valuation exercise and a simple investment decision rule: undertake all investments with a positive NPV. How companies and investments are financed is irrelevant.

This characterization of financial markets is frequently taken as approximately valid; a plausible and convenient simplification even if it poorly reflects reality. Corporate income taxation, the interest tax shield for debt, and bankruptcy costs are often the only deviations from this view that are considered when explaining corporate financing choices.

Although tax distortions and bankruptcy costs are obviously relevant, they cannot alone account for most observed corporate financial decisions. They cannot explain why companies hold so much cash, their leverage dynamics, nor their payout, equity issuance, and investment policies. We show in our research that the cost of issuing equity is a key and practically relevant distortion. Because of asymmetric information or incentive misalignment, firms must incur costs when raising external funds and these costs are higher for equity than for debt financing.

When firms face external financing costs, they seek to avoid such financing. This is a key reason that firms retain earnings and accumulate cash (corporate savings). With Hui Chen, we analyze a dynamic model with three main building blocks: (1) an investment rule based on the marginal value of incremental capital investment relative to its cost, (2) cash, equity, and a credit line as funding sources (together with hedging), and (3) equity issuance costs and cash carry costs. A first, key result of our analysis is that investment is no longer determined by equating the marginal cost of investing with the marginal addition to the firm’s valuation from such capital, as in the neoclassical theory of investment. Instead, investment is determined by the ratio of the marginal increase in the firm’s value to the marginal value of cash. The marginal cost of investing equals the marginal product of capital, also known as marginal $q$, divided by the marginal value of cash.

When firms are flush with cash, the marginal value of cash is about one, so that this equation is approximately the same as the equation under MM irrelevance. But when firms are close to running out of internal funds, or close to the limit of their credit line, the marginal value of cash is much larger than one, so that marginal product may need to yield a much higher return, and optimal investment may be far lower, than the level
dicted under MM neutrality.

Figure 1 illustrates the sizable value destruction that a financial crisis can cause, as firms are shut out of capital markets and can only rely on internal funds to continue their operations. Panels A and B show that firm value is increasing and concave in cash holdings, that the marginal value of cash always exceeds one, and that it is very large when the firm runs out of cash. Panel C shows that firms substantially cut investment and engage in very costly fire sales when liquidity is low. The firm values a dollar in hand at about $30 and sells about 60 percent of its productive capital at a significant value discount when it is close to being inefficiently liquidated, in sharp contrast to the predictions of the neoclassical theory of investment. Finally, Panel D reveals how nonlinear and nonmonotonic investment-cash sensitivity can be, indicating that investment-cash sensitivity is a poor measure of how financially constrained a firm is.

A second key result concerns the firm’s optimal cash-inventory policy. That involves continuous management of cash reserves through adjustments in investment, asset sales, and corporate hedging between two barriers: a lower bound at which the firm must tap external financing after exhausting all its cash reserves, and an upper bound at which the firm has accumulated enough cash that it is safe to pay out any additional earnings. Our model provides insights into how these bounds depend on factors such as the growth rate and volatility of earnings, external financing costs, and capital adjustment costs. It can thus provide part of an explanation for why the average cash-to-assets ratio for US public corporations more than doubled from 1980 to 2006, and remained elevated after the 2008 financial crisis.5

### Market Timing and Financial Crises

Our model predicts that cash holdings increase when earnings volatility rises, but this is not an adequate explanation for the rise in corporate savings. A more plausible explanation is the risk of a financial crisis, which causes a jump in the cost of external financing and possibly even a financial market shutdown.

With Chen, we further explore how firms’ financial policies are affected by anticipation of random financial crises.7 We show that during such a crisis, firms delay payout, cut investment, and engage in fire sales of assets even when their productivity remains unaffected, all to avoid incurring prohibitive equity issuance costs. This is especially true when a firm enters the crisis with low cash reserves. We also find that in normal or boom times, when external financing costs are affordable (cheap), firms optimally time their equity offerings and issue equity even when there is no immediate need for external funds. Along with the timing of equity issuance by firms with low cash holdings in good market conditions, there is also optimal timing of stock repurchases by firms with large cash holdings. Just as firms with low cash holdings seek to take advantage of low costs of external financing to raise more funds, firms with high holdings will be inclined to disburse their cash through stock repurchases when financing conditions improve. This result is consistent with the finding that aggregate equity issuances and stock repurchases are positively correlated.8 When the perceived probability of a crisis rises, firms invest more conservatively, issue equity sooner, and delay payouts to shareholders, all to increase cash hoards that will help them through the impending crisis. Finally, we demonstrate that firms’ risk premia have two components: productivity and financing. Both risk premia change substantially with firms’ cash holdings, especially in a crisis when external financing conditions are poor.

### Real Options and Financial Flexibility

Real-options theory, which applies when investments are lumpy and irreversible, is an important subfield of corporate finance that generally assumes that firms operate in an MM environment. With Jinqiang Yang, we show that the presence of external financing costs fundamentally alters the value and exercising decisions
Managing Keyman Risk

In addition to the cost of raising external funds, moral hazard is an important source of financial constraints. With Yang, we explore a dynamic model where the source of moral hazard is inalienability of human capital—what is commonly referred to as “keyman risk” in the tech industry to describe the risk that a profitable firm pays out more, while in a mature phase, payout policy is different depending on whether the firm is in a growth or a mature phase. In a mature phase a more profitable firm pays out more, while in a growth phase it pays out less.

Leverage Dynamics under Costly Equity Issuance

An important lesson from dynamic models of corporate finance is that “capital structure is not static, but rather evolves over time as an aggregation of sequential decisions.” With Yang, we build on the work of Christopher Hennessy and Toni Whited and show how leverage dynamics can be naturally explained by companies’ efforts to avoid incurring equity issuance costs. We consider a company that can issue equity and short-term debt, facing both cash-flow diffusion and jump shocks. As in the MM trade-off theory widely taught in MBA classes, when the company faces no equity issuance costs it always stays at its target leverage, defined as the point at which the benefits from debt financing are equal to expected bankruptcy costs. In our model, debt has a net funding advantage over equity because shareholders are impatient. When making a profit, the company uses it to pay down debt to the extent that it stays at its target leverage, and when making a loss it raises just enough new equity to return to its target leverage. These predictions are clearly counterfactual.

However, when we incorporate equity issuance costs, the model yields plausible average leverage outcomes and leverage dynamics. First, and somewhat paradoxically, it is optimal for companies to target lower leverage when they face higher equity issuance costs. Indeed, when it is costly to issue equity, it is best to avoid incurring such costs too often, which is achieved by keeping leverage low to be able to cover a future loss by borrowing, which is cheaper. Second, the company’s leverage increases following a loss and decreases following a profit realization. Leverage can then only increase in response to earnings losses. When the company attains its low leverage target any additional profit is paid out, and when leverage reaches the company’s debt capacity any additional loss either triggers a costly recapitalization via equity issuance or—when the jump loss is very large—a default. When leverage is close to the recapitalization target, the expected change in leverage is negative, so that leverage tends to revert to the recapitalization target. But when leverage passes a certain threshold, the expected change in leverage is positive, so that the company enters a leverage death spiral.

These leverage dynamics are consistent with the empirical evidence pointing to the heterogeneity of corporate leverage of firms with similar characteristics. Companies, in effect, behave like households with credit card debt, except that they also have an option to issue external equity to deleverage. As credit card revolvers, firms pay down their debt when they receive a positive earnings shock, and they increase their debt when they have no option to do otherwise, consistent with empirically observed leverage dynamics.

Dynamic Trade-off Theory under Costly Equity Issuance

With Chen, we add equity issuance costs to the standard dynamic trade-off theory model of capital structure. An important additional cost of debt financ-
ing in this expanded model is debt service: debt payments drain the firm’s cash holdings, which increases the risk of incurring equity issuance costs. Also, realized earnings are separated in time from payouts to shareholders, so that savings have both a corporate tax, when savings are inside the firm, and a personal tax component, when savings are outside the firm. In this setting, standard measures of the net tax benefits of debt are no longer valid.

This framework can be extended beyond the traditional corporate setting. With Ye Li and Yang, we show that costly equity issuance also plays a critical role in understanding the dynamics of a bank’s balance sheet, bank valuation, and the effects of equity capital and leverage regulation. We develop a dynamic theory of banking in which the role of deposits is akin to that of productive capital in the neoclassical theory of investment for nonfinancial firms. We show that deposits create value for well-capitalized banks. However, the marginal value of deposits can turn negative for undercapitalized banks, as further inflows of deposits may require the bank to raise more costly equity capital to comply with leverage regulations. Our predictions on bank valuation and dynamic asset-liability management are broadly consistent with the evidence, and our model offers new insights into the dynamics of banking in a low interest rate environment.

In sum, our research shows that avoiding future costly equity issuance is a key motive driving various aspects of dynamic corporate financial behavior.

4 Ibid. Figure 2. Return to Text
Wealth Inequality in the United States

Edward N. Wolff

Much attention has focused in the last few years on the issue of inequality. With recent proposals for a direct wealth tax, particular attention has been given to wealth inequality. My work also focuses on this issue. Here, I summarize studies of four different aspects.

First, what are the general trends in wealth and wealth inequality over the last 60 years or so in the United States? I pay particular attention to the role of leverage and asset price movements in explaining these trends. Second, how has the racial wealth gap evolved over time, and what are the factors that account for its movement? Third, how does one account for the valuation of these assets and how does this impact measured inequality and wealth movements over time? Fourth, how might a direct tax on household wealth impact wealth inequality?

The Role of Leverage

In the first study, I examine wealth trends from 1962 to 2019. My empirical work in this and the next three papers is based mainly on data from the Federal Reserve Board’s Survey of Consumer Finances. In terms of median wealth, the year 2007 stands out as a true high-water mark. Median net worth in constant dollars showed robust growth over 1962–2001, gaining 1.55 percent per year, and rose even faster over 2001–07, at 2.90 percent per year. Then the Great Recession hit like a tsunami and wiped out 40 years of gains. Over 2007–10, house prices fell 24.5 percent in real terms, overall stock ownership rate — either directly or indirectly through mutual funds, trust funds, or pension plans — either directly or indirectly through mutual funds, trust funds, or pension plans — either directly or indirectly through mutual funds, trust funds, or pension plans —

Edward N. Wolff received his PhD from Yale University in 1974 and is currently professor of economics at New York University, where he has taught since 1974. He is a research associate at the NBER, where he is affiliated with the Productivity, Innovation, and Entrepreneurship Program, and is a member of the editorial boards of the Journal of Economic Inequality and the Review of Income and Wealth.


However, between 2010 and 2019 asset prices recovered, and median wealth advanced by a robust 41.9 percent. Still, it was 20.4 percent below its 2007 peak. Mean wealth more than fully recovered by 2016 and by 2019 it was up 9.2 percent from its 2007 level.

Wealth grew more vigorously at the top of the wealth distribution than in the middle. Indeed, according to the Gini coefficient and top wealth shares, wealth inequality rose sharply from 1983 to 1989 (the Gini coefficient was up 0.029), remained relatively stable from 1989 to 2007, then showed a steep increase over 2007–10 (the Gini was up 0.032), and a more modest rise from 2010 to 2016. By 2016, the Gini coefficient and the share of the top percentile were at their highest levels of the 57 years of the study period, at 0.877 and 39.6 percent, respectively. However, from 2016 to 2019 there was actually a small decline in inequality, with the top percentile share down by 1.4 percentage points, the Gini coefficient down by 0.008, and the mean wealth of the top 1 percent down by 1.9 percent.

Another notable trend is the sharp increase in relative debt after 1983, with the debt-income and the debt-net worth ratios peaking in 2010 and then receding. The overall homeownership rate fell from 63.4 percent in 1983 to 69.1 percent in 2004, then fell off to 64.9 percent in 2019. The overall stock ownership rate — either directly or indirectly through mutual funds, trust funds, or pension plans — after rising briskly from 31.7 percent to a peak of 51.9 percent over 1989–2001, fell off to 46.1 percent in 2013. It rebounded to 49.6 percent in 2019, though it was still down from its peak.

The key to understanding the plight of middle-class Americans in the years following the Great Recession is...
their high degree of leverage, the high concentration of assets in their homes, and the precipitous fall in home prices. This translated into a very high negative rate of return on their wealth (−10.4 percent per year), which largely explains the steep decline in median wealth over 2007–10. High leverage, moreover, helps explain why median wealth fell more than house prices over these years. The high negative rate of return accounted for 61 percent of the collapse in median net worth, with the other 39 percent due to dissaving.

What about the recovery in median wealth after 2010? In 2010–16, the rate of return should have led to a $42,600 increase in median wealth, while the actual increase was $12,200. Dissaving reduced the gain by $30,400. For 2016–19, both the rate of return and saving made positive contributions, explaining 85.6 and 14.4 percent of the gain, respectively.

The large spread in returns between the middle three wealth quintiles and the top percentile — over 4 percentage points — also helps explain why wealth inequality climbed steeply from 2007 to 2010. It is first of note that, as shown in Figure 1, the return on net worth for the middle group exceeded that for the top percentile over the whole 1983–2019 period and for all subperiods except 1983–89 and 2007–10. A lot of theoretical work on wealth inequality assumes just the opposite relationship. In a decomposition analysis of the change in the ratio of the wealth of the top percentile to median wealth, the differential in returns between the two groups accounted for 28.7 percent of the increase in the inequality ratio over the Great Recession, with differences in saving accounting for the rest. The middle class took a bigger relative hit to its wealth from the home price plunge than the top 1 percent did from the stock market decline. There was a modest rise in the inequality ratio from 2010 to 2016. The same decomposition shows that the differential in returns between the two groups — now in favor of the middle group — should have led to a decline in the inequality ratio, while there actually was an increase. The inequality ratio fell a bit from 2016 to 2019. In this case, the rate of return difference — again in favor of the middle group — accounted for 18.2 percent of the decline and the residual accounted for 81.8 percent.

The Decline in Black and Hispanic Wealth

The year 2007 was also a watershed year for both the racial and ethnic wealth gaps. The ratios of mean net worth between Blacks and Whites and between Hispanics and non-Hispanic Whites reached their maximum values, 0.19 and 0.26, respectively. The Great Recession hit Black households much harder than White because Blacks were more highly leveraged and had a greater share of their assets in their homes; the racial ratio plunged to 0.14 in 2010, reflecting a 33 percent decline of Black wealth in real terms. The wealth gap remained unchanged from 2010 to 2019.

Hispanic households made sizable gains on White households from 1983 to 2007, with the mean net worth ratio growing from 0.16 to 0.26. However, like Blacks, Hispanics got hammered by the Great Recession, with their mean net worth plunging in half over 2007–10 and the wealth ratio falling from 0.26 to 0.15. The relative and absolute losses suffered by Hispanic households over these three years were also mainly due to their much higher leverage and greater concentration of assets in homes. Over 2010–16, the mean wealth ratio rebounded to 0.19, where it remained in 2019.

Differential leverage and resulting differences in rates of return on net worth play critical roles in accounting for movements in the wealth of minorities relative to Whites. Blacks and Hispanics had much higher indebtedness and a higher concentration of housing wealth than Whites. In 2007, the debt-net worth ratio among Black households was an astounding 0.553 and that for Hispanics was 0.511, compared to 0.154 among Whites. Housing as a share of gross assets was 54 percent for Blacks and 52.5 percent for Hispanics, compared to 30.8 percent for Whites. The rate of return on net worth for the Black and Hispanic middle groups surpassed that for Whites for the whole period 1983–2019 and for all subperiods except 1983–89 and 2007–10, as shown in Figure 2, on the next page.

Using a decomposition analy-
sis, I find that capital revaluation explains about three-quarters of the advance of mean wealth among Black households over 2001–07 and 78 percent of the ensuing collapse over 2007–10. Among Hispanics, the corresponding figures are 59 and 57 percent. Differentials in returns account for 43 percent of the gain in the Black-White wealth ratio over 2001–07 and 39 percent of the decline over 2007–10. Over 2010–19, the higher rate of return for Black households should have helped close the racial wealth gap, but this was offset by greater dissaving.

Likewise, disparities in returns account for 33 percent of the gain in the Hispanic-White wealth ratio in 2001–07 and 28 percent of the ensuing drop over 2007–10. Over 2010–16, the higher returns for Hispanic households explain 41.4 percent of their relative gains, but over 2016–19 this effect is neutralized by greater dissaving.

The racial gap in augmented wealth, defined as the sum of net worth, defined-benefit pension wealth, and Social Security wealth, is considerably smaller than that in net worth. The former is defined as the present value of expected future pension benefits and the latter as the present value of expected Social Security benefits. In 2016, while the Black-White ratio in mean net worth was 0.14 and that in median net worth a mere 0.02, the ratio in mean augmented wealth was 0.27 and that in median augmented wealth also 0.27. The ratios in mean defined-benefit pension and Social Security wealth were notably higher, at 0.50 and 0.60, respectively. Whereas the racial gap in net worth widened from 1983 to 2016, the gap in augmented wealth remained largely unchanged.

Figure 2
Taxes and the Revaluation of Household Wealth

The face value of 401(k)s, IRAs, and other tax-deferred assets cannot be directly valued with other components of wealth like houses, stocks, and securities because tax-deferred assets carry a substantial tax liability on withdrawal. For example, an IRA valued at $1,000 can yield considerably less than $1,000 when the asset is “cashed out.” Whether the net rate of return is higher with tax-deferred assets or directly investing in stocks depends on the income level of the investor, the time horizon, and the tax treatment of dividends.

I compare trends in wealth levels and wealth inequality with and without netting out this implicit tax liability. I also consider how netting out income taxes due on accrued capital gains impacts wealth trends for both conventional net worth and augmented wealth over the period 1983–2016.

Netting out implicit taxes on tax-deferred assets and accrued capital gains reduces the growth in net worth and augmented wealth by between 17 and 20 percent [see Figure 3] but has little impact on their inequality. However, it does lower pension wealth and Social...
Security wealth inequality. The implication is that the use of pre-tax values has led to a considerable overstatement of household wealth growth.

The impact of implicit taxes varies by demographic group. Netting out taxes is generally an equalizing factor with regard to intergroup differences in pension and Social Security wealth, though less so for net worth or augmented wealth. It has a minimal effect on the Black-White ratio in net worth or augmented wealth.

### Distributional Effects of Wealth Taxation

I also analyze the fiscal effects of a Swiss-type direct tax on household wealth, with a $120,000 exemption and marginal tax rates running from 0.05 to 0.3 percent on $2,400,000 or more of wealth. I also analyze the wealth tax proposed by Senator Elizabeth Warren with a $50 million exemption, a 2 percent tax on wealth above that, and a 1 percent surcharge on wealth above $1 billion. Based on the 2016 Survey of Consumer Finances augmented with wealth data from the Forbes 400, the Swiss tax would yield $189.3 billion and the Warren tax $303.4 billion per year by my estimates. Only 0.07 percent of households would pay the Warren tax, compared to 44.3 percent for the Swiss tax. However, the effect on wealth inequality of implementing either the Swiss tax or the Warren tax is small. If the policies were in place for a single year, they would reduce the Gini coefficient by at most 0.0005. The effect of both policies on wealth inequality would grow if they remained in place for a long period of time.

The incidence of the Swiss tax differs by demographic group, falling proportionately more on older than younger families, more on married couples than on singles, and more on Whites than on others.

A potential problem stemming from a wealth tax is capital flight. However, by my estimates, the Swiss tax would reduce the average yield on household assets by only 6.2 percent. It would reduce the yield in the top bracket by 9.7 percent. These figures suggest that disincentive effects on personal savings would be very modest. In contrast, the Warren wealth tax could reduce the after-tax rate of return on investments for the top group by almost 100 percent.

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College major choice and its relationship to labor market outcomes has long been a topic of study for social scientists. Stretching back at least to the 1970s, researchers have recognized that the particular field, and not just the level of education, deserves attention. A number of studies have demonstrated that the choice of post-secondary field is a key correlate of future earnings, and that choice of college major may be an important factor in explaining earnings differences, in particular by gender. Beyond individual welfare, major choice affects the skill composition of the workforce, making an understanding of how these choices are affected by changes in skill demand and wages important to research on the dynamics in the overall economy.

Our recent work on college major choice is focused on identifying the importance of earnings to major choice, relative to any other nonpecuniary considerations. Across our work, we bring new approaches to this classic issue, including the collection of new survey data on college students’ expectations about the consequences of majors on their own future earnings and other outcomes, including future labor supply, marriage, and fertility. We show how information interventions, lab experiments, and hypothetical/stated choice designs can supplement subjective expectations data to provide further evidence on the factors that affect choice of major. Although this work has used a sample of high-ability college students from a selective university, we demonstrate that the richness of our data collection brings important new insights into the choice of a major and serves as a model for subsequent work.

Earnings Beliefs

The standard economic literature on decisions made under uncertainty, such as occupational and educational choices, generally assumes that individuals, after comparing the expected outcomes from various choices, choose the option that maximizes...
their expected utility. In the absence of expectations data, assumptions have to be made on expectations to infer the decision rule, including assumptions about expectations for counterfactual choices—the majors not chosen by the student. Although previous studies allow varying degrees of individual heterogeneity in beliefs about future earnings, they typically assume that expectations are either myopic or rational and use realized choices and realized earnings to identify the choice model. This approach is problematic because observed choices and realized earnings can be consistent with several combinations of expectations and preferences.

We designed a survey of major-specific earnings expectations and fielded it to undergraduates at New York University. We distinguish between two kinds of beliefs: what we term self-beliefs concern how much each respondent expects to earn in the future if they were to complete their degree in each major category, while population beliefs concern the realized distribution—for example, beliefs about average earnings for past graduates in each major. Whether correct or not, self-beliefs are the bases of choices, and collecting this information allows us to robustly estimate the importance of earnings to college major choices, free from the bias of incorrectly assuming the wrong model of expectations. Population beliefs, on the other hand, may not be directly relevant at all to self-beliefs or choices, but they provide some indications of how well-informed college students are about the labor market and whether some information intervention would be effective.

To understand how students believe their earnings would evolve through their life cycle, we asked questions about expected earnings at three future ages: just after college graduation (age 22-23), age 30, and age 45. We also included questions to elicit perceptions about uncertainty in future earnings. Figure 1 summarizes average expected earnings for our sample. Our survey respondents believe that their earnings would grow rapidly as they aged, that their earnings would be higher if they majored in science or business rather than humanities or arts, that completing a college degree even in lower-paying fields would provide higher earnings than no degree at all, and that the earnings premium associated with higher earning majors would increase as they age. We also see that students anticipate a gender gap: average earnings beliefs of male students are higher than the average beliefs of female students, with the gap largest at older ages. When we compare these self-beliefs about own future earnings with population beliefs about current average earnings for graduates aged 30, respondents report that they believe their own earnings will exceed the current population average, even adjusting for inflation, which is unsurprising given the high-ability sample.

One of the important advantages of these data is that we can use them to construct the full distribution of individual perceptions of the earnings return to major choices. These ex ante returns are the subjective treatment effects of major choice anticipated by the students while they are in college. Figure 2 presents the sample distribution of the log of the anticipated age 30 earnings return to a science or business degree relative to a humanities or arts degree. The
average expected return (the average ex ante treatment effect) is approximately 43 percent for female and 52 percent for male students. The figure makes clear that there is also a wide distribution in anticipated earnings return, with some individuals expecting a very high return (more than a 100 percent difference in earnings), others a small return, and for a small minority even a negative return.

**Using Beliefs to Estimate Preferences**

We use our collection of beliefs data in otherwise standard models of expected utility from major choice, substituting the beliefs data for a particular model of how expectations are assumed to be formed. For earnings, a standard approach would be to use realized earnings from a prior cohort and variables such as college admissions test scores and grades, in addition to demographics, to predict each student’s future earnings from completing each major. This approach essentially assumes that students make the same prediction of earnings as the researcher. Our expectations data, providing earnings beliefs for each respondent for each major, enables us to relax these assumptions, allowing for heterogeneity in earnings beliefs beyond that captured by observable variables. We can then estimate preferences for majors, and the relative utility students place on earnings and other aspects of majors, robust to mis-specifying the expectations of students.

The disadvantage of our approach is the possibility of measurement error in the beliefs data we collect. While the overall patterns we document are reasonable, some responses are nonsensical. In part this may occur because, unlike in many studies of beliefs in the context of games played in a lab setting, we cannot incentivize students for “correct” answers to belief questions about future events and for various counterfactual outcomes that will never be realized. In addition to using various estimating strategies to account for measurement errors, we also conducted follow-up surveys when our respondents were in their mid- to late 20s. The follow-up data indicate a strong positive correlation of beliefs elicited earlier and actual realized outcomes, giving us confidence that our data are representative of students’ true beliefs.

**Information Interventions**

Information provision has been used in many contexts as a low-cost way to influence decision-making. We designed an information intervention in the context of our research on major choice for two purposes: the traditional one of assessing whether our intervention can improve decision-making and welfare, and, in addition, as a method to identify preferences. Motivated by prior studies which found that individuals have biased beliefs about the population distribution of earnings, we focused on providing earnings information to college students.

In one of our studies, we find that students logically revised their beliefs in response to the information. Students who underestimated average population earnings tended to revise upward their beliefs about their own earnings after the information treatment, and vice versa.2 By comparing changes in subjective probabilities of majoring in each field with the changes in subjective expectations about earnings and other characteristics of the major, we can measure the relative importance of each of these characteristics in the choice of major, free of bias stemming from the correlation of unobserved preferences with observed beliefs about majors. We find that earnings considerations are a significant factor in major choice, but a smaller factor than would be indicated using only baseline, cross-sectional data.

**Non-Earnings Considerations**

Early seminal work on human capital investments focused on “career concerns” motivations for human capital investment, where the motivation is solely the gain in one’s own future labor income. While earnings are of course an important consideration, human capital could affect life in many ways, and there could be a number of other motivations for human capital investments. For example, several recent studies have analyzed marriage market “returns” to human capital investment in which human capital affects an individual’s marriage prospects and the “quality” of potential spouses. Do young people actually consider these kinds of issues when making key human capital decisions?

In a very recent study, we used our study of NYU students to look beyond earnings considerations and asked students their beliefs about marriage, spousal earnings, fertility, and labor supply.3 These data allow us to analyze how young people perceive the trade-offs in career and family as they contemplate different human capital choices. Female college students, in particular, believe completing a science or business major, rather than a humanities or arts degree, would tend to lower marriage rates and lead to a delay in having children. Men, in contrast, perceive major choice to have no effect on these aspects of their later personal lives. We also elicit students’ beliefs regarding the earnings of potential spouses if they themselves were to complete different degrees, and find that male and female students alike perceive a large “spousal return” to completing higher-earning degrees, indicating that they believe this choice will yield not only higher earnings for themselves but marriages to higher-earning spouses as well.

**Understanding Beliefs and Tastes**

Two of the most important conclusions that emerge from our work concern gender. First, there are systemic gender-specific differences in beliefs, and these matter for choice of a major. Second, while earnings are a motivating factor in major choice, nonpecu-
niary factors — what economists typically refer to as "tastes" — play a major role, in particular in the higher likelihood of women completing humanities and arts degrees.

So why do men and women have systematically different beliefs? To answer this question, in our 2017 paper with Ernesto Reuben, we combined a laboratory experiment to measure behavioral traits — risk preferences, overconfidence, and competitiveness — with our NYU survey of labor market expectations and education choices. We find that the competitiveness and overconfidence measures, but not the risk aversion measure, are significantly related to the student’s expectations about future major-specific earnings, with earnings expectations increasing with the level of competitiveness and overconfidence. Importantly, the experimental measures explain as much of the gender gap in earnings expectations as a rich set of control variables, including students’ SAT scores, race, and family background. In addition, the experimental measures are not significantly related to the control variables, and thus have additional explanatory power.

The second main takeaway of our work — that tastes are a dominant driver of major choice — points to a natural question: what do these tastes capture? To unpack this, we use a hypothetical job choice methodology to recover student-level preferences for workplace amenities such as future earnings growth potential, dismissal probability, and work hours flexibility. We find substantial willingness to pay for nonpecuniary aspects of jobs, and considerable heterogeneity in preferences for these attributes. We find that women have a much higher average preference for workplace hours flexibility and more secure jobs, while men have a higher average willingness to pay for jobs with higher earnings growth potential. Finally, we show that the job preferences young adults held in college relate to their major choices, and through a later follow-up survey four years after the initial survey, to the types of jobs they actually hold after graduation.

Crystal Yang, a professor of law at Harvard Law School and a research associate in the NBER Law and Economics Program, is a new codirector of the Economics of Crime Working Group. In this role she joins Philip J. Cook of Duke University and Jens Ludwig of the University of Chicago, who along with Justin McCrary of Columbia University launched the working group in 2007.

Yang, who became an NBER affiliate in 2017, has studied a range of issues related to the criminal justice system, including bail, inter-judge sentencing disparities, racial bias, and deportation. Her research has been cited in US Supreme Court and federal district court cases.

Yang received four degrees — an AB and PhD in economics, an MA in statistics, and a JD — from Harvard University. She took leave from her teaching post in 2014–15 to serve as Special Assistant US Attorney in the US Attorney’s Office for Massachusetts.
New Research Associates, Faculty Research Fellows Named

The NBER Board of Directors appointed 15 research associates (RAs) at its April 2021 meeting. Two of them were previously faculty research fellows (FRFs).

RA appointments are reserved for tenured faculty members. They are recommended to the Board by directors of the NBER’s 20 research programs after consultation with steering committees composed of leading scholars in each field. The new RAs are affiliated with 13 different colleges and universities; they received graduate training at 14 different institutions.

In addition, the NBER president appointed 57 new FRFs, typically junior scholars, also on the advice of program directors and their steering committees. The fellows, who hold PhDs from 26 different universities, are currently affiliated with 32 different institutions.

To be appointed an NBER research affiliate, a researcher must hold a primary faculty appointment at a North American college or university. New appointments are made each spring following a call for nominations. Candidates are evaluated based on their research records and their capacity to contribute to NBER activities. This year, 357 researchers were nominated for new NBER affiliations, and 70 were appointed. Including the new appointments, as of May 1, 2021, there were 1,297 RAs and 353 FRFs.

The names, current university affiliations, and primary NBER program affiliations of the newly appointed and promoted (in italics) researchers are listed below.

### Research Associates

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<thead>
<tr>
<th>Name</th>
<th>University</th>
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<tr>
<td>Marina Agranov</td>
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<td>Political Economy</td>
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<td>David Berger</td>
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<td>Economic Fluctuations and Growth</td>
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<td>Jishnu Das</td>
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<td>Hulya Eraslan</td>
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<td>Jane Cooley Fruehwirth</td>
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<tr>
<td>Darrell Gaskin</td>
<td>Johns Hopkins University</td>
<td>Health Economics</td>
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<td>Cecile Gaubert</td>
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<td>International Trade and Investment</td>
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<td>Galina Hale</td>
<td>University of California, Santa Cruz</td>
<td>International Finance and Macroeconomics</td>
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<td>Nicolas R. Ziebarth</td>
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### Faculty Research Fellows

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<td>Vellore Arthi</td>
<td>University of California, Irvine</td>
<td>Development of the American Economy</td>
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<tr>
<td>Clare Balboni</td>
<td>Massachusetts Institute of Technology</td>
<td>Environment and Energy Economics</td>
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<tr>
<td>Jason Baron</td>
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<td>Children</td>
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<tr>
<td>John Barrios</td>
<td>Washington University in St. Louis</td>
<td>Productivity, Innovation, and Entrepreneurship</td>
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<td>Adrien Bilal</td>
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<td>Economic Fluctuations and Growth</td>
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## Faculty Research Fellows

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<thead>
<tr>
<th>Name</th>
<th>University</th>
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<tbody>
<tr>
<td>Katarzyna Bilicka</td>
<td>Utah State University</td>
<td>Public Economics</td>
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<tr>
<td>Zach Brown</td>
<td>University of Michigan</td>
<td>Health Care</td>
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<tr>
<td>Tamma Carleton</td>
<td>University of California, Santa Barbara</td>
<td>Environment and Energy Economics</td>
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<td>Mariana Carrera</td>
<td>Montana State University</td>
<td>Health Economics</td>
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<td>Christopher Conlon</td>
<td>New York University</td>
<td>Industrial Organization</td>
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<td>Zoe Cullen</td>
<td>Harvard University</td>
<td>Labor Studies</td>
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<tr>
<td>Adam Dearing</td>
<td>Ohio State University</td>
<td>Industrial Organization</td>
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<td>Anthony DeFusco</td>
<td>Northwestern University</td>
<td>Corporate Finance</td>
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<td>Ellora Derenoncourt</td>
<td>University of California, Berkeley</td>
<td>Labor Studies</td>
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<td>Niklas Engbom</td>
<td>New York University</td>
<td>Economic Fluctuations and Growth</td>
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<td>Vasiliki Fouka</td>
<td>Stanford University</td>
<td>Political Economy</td>
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<tr>
<td>Sharat Ganapati</td>
<td>Georgetown University</td>
<td>International Trade and Investment</td>
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<td>Michael Gilraine</td>
<td>New York University</td>
<td>Economics of Education</td>
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<td>Daniel Haanwinckel</td>
<td>University of California, Los Angeles</td>
<td>Labor Studies</td>
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<tr>
<td>Kareem Haggag</td>
<td>Carnegie Mellon University</td>
<td>Political Economy</td>
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<td>Kyle Herkenhoff</td>
<td>University of Minnesota</td>
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<td>Bernard Herskovic</td>
<td>University of California, Los Angeles</td>
<td>Asset Pricing</td>
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<td>Alex Hollingsworth</td>
<td>Indiana University</td>
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<tr>
<td>Kilian Huber</td>
<td>University of Chicago</td>
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<tr>
<td>John Eric Humphries</td>
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<td>Reshmaan Hussam</td>
<td>Harvard University</td>
<td>Development Economics</td>
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<tr>
<td>Alex Imas</td>
<td>University of Chicago</td>
<td>Asset Pricing</td>
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<td>Rohan Kekre</td>
<td>University of Chicago</td>
<td>International Finance and Macroeconomics</td>
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<td>Elisabeth Kempf</td>
<td>University of Chicago</td>
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<td>Marlène Koffi</td>
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<td>Productivity, Innovation, and Entrepreneurship</td>
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<td>Chen Lian</td>
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<td>Song Ma</td>
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<td>Yueran Ma</td>
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<td>Michelle Marcus</td>
<td>Vanderbilt University</td>
<td>Children</td>
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<td>Victoria Marone</td>
<td>University of Texas at Austin</td>
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<td>Eduardo Montero</td>
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<td>Alan Moreira</td>
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<tr>
<td>Ameet Morjaria</td>
<td>Northwestern University</td>
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<tr>
<td>Ismael Mourifié</td>
<td>University of Toronto</td>
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<td>Pascal Noel</td>
<td>University of Chicago</td>
<td>Public Economics</td>
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<td>Ziad Obermeyer</td>
<td>University of California, Berkeley</td>
<td>Economics of Aging</td>
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<td>Claudia Persico</td>
<td>American University</td>
<td>Children</td>
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<td>Tommaso Porzio</td>
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<td>Elena Prager</td>
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<td>Maria Rosales-Rueda</td>
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<td>Elisa Rubbo</td>
<td>University of Chicago</td>
<td>Economic Fluctuations and Growth</td>
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<td>Juliana Salomao</td>
<td>University of Minnesota</td>
<td>International Finance and Macroeconomics</td>
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Ten post-doctoral scholars will be supported by NBER fellowships for the 2021–22 academic year. These fellows are selected by review panels following widely disseminated calls for applications.

Mackenzie Alston, an assistant professor at Florida State University, is the inaugural NBER post-doctoral fellow to promote diversity in the economics profession. She is using both experimental and survey methods to study perceptions of, and behavior in response to, stereotypes and discrimination in the labor market and other settings. Alston received her PhD from Texas A&M University.

Kuan-Ming Chen, who is studying how the long-term care needs of aged parents affect the retirement decisions of their children, and Max Kellogg, who is analyzing how the social value of disability insurance depends on the other ways potential beneficiaries can access health insurance, are the 2021–22 Retirement and Disability Policy Research Fellows. They are supported by the Social Security Administration through the NBER’s Retirement and Disability Research Center. Both received PhDs in 2021 from the University of Chicago.

Juliette Fournier, who received her PhD from MIT, is the post-doctoral fellow on the NBER Project on Tax Competition and Business Taxation, which is supported by Arnold Ventures. Her research examines the effect of enterprise zones in France on the location of business activity.
Caitlin Gorback, who completed her PhD at the University of Pennsylvania’s Wharton School in 2020, is a post-doctoral researcher on the NBER’s Transportation Economics in the 21st Century Initiative, a project supported by the US Department of Transportation. She is studying how transportation innovations such as ridesharing affect the distribution of economic activities in urban areas.

Jonathan Holmes, a PhD graduate of the University of California, Berkeley, is the Postdoctoral Fellow on the Economics of an Aging Workforce, a position funded by the Alfred P. Sloan Foundation. Holmes is studying the link between health insurance premiums and employment among individuals with high-cost medical conditions.

Victoria Marone, whose research focuses on the design of health insurance markets and policies, and Francis Wong, who is analyzing how medical debt affects mental and physical health and healthcare utilization, are supported by the NBER’s National Institute on Aging Fellowship Program in Aging and Health Research. Marone and Wong received their PhDs from Northwestern University and the University of California, Berkeley, respectively.

Kathleen McKiernan, who is analyzing social security reform, and Enrico DeGregorio, who studies the role of tax compliance initiatives in raising revenue, are the 2021-22 fellows on long-term fiscal policy. They will be supported by the Peter G. Peterson Foundation. McKiernan, an assistant professor of economics at Vanderbilt University, received her PhD from the University of Minnesota. DeGregorio received his PhD from Harvard University.

Calls for fellowship applications are posted each fall at https://www.nber.org/career-resources/calls-fellowship-applications

Application closing dates are usually in early December. Anyone interested in receiving fellowship announcements can register at that webpage.

19 Graduate Students Win Support for Dissertation Research

The NBER annually supports a number of graduate students who are conducting dissertation research. Nineteen students will receive support for the 2021–22 academic year.

The Alfred P. Sloan Foundation provides support for five graduate students studying energy economics and three studying behavioral macroeconomics. The energy economics fellows are Sarah Armitage of Harvard University, who is studying technology transitions and the timing of environmental policy; Lauren Beatty of the University of Maryland, who is analyzing public policies that affect methane emissions from oil and gas production; Elise Breshears of Michigan State University, who is studying how redlining in mortgage markets affects the energy efficiency of the housing stock; Nafisa Lohawala of the University of Michigan, who is studying the effects of electric vehicle subsidies on vehicle demand; and Aspen Fryberger Underwood of Clemson University, who is analyzing the factors that affect the adoption and usage of electric vehicles.

The graduate fellows in behavioral macroeconomics are Miguel Acosta of Columbia University, whose dissertation examines the aggregate demand effects of monetary policy; Luisa Cefala of the University of California, Berkeley, who is studying the role of memory in the formation of beliefs and expectations; and Spencer Yongwook Kwon of Harvard, who is studying the macroeconomic implications of learning and information processing by behavioral agents.

The National Institute on Aging supports a Pre-Doctoral Program in Aging and Health Research that mentors fellows based at the NBER’s Cambridge office. The participants for the 2021–22 academic year are Kevin Connolly, Travis Donahoe, Pragya Kakani, Chika Okafor, and Anthony Yu of Harvard, Aileen Devlin and Anna Russo of MIT, and Sarah Robinson of the University of California, Santa Barbara.

The Social Security Administration funds a graduate fellowship program in retirement and disability policy. The three fellows for the 2021–22 academic year are Jonathan Cohen and Martina Uccioli of MIT and Ari Ne’eman of Harvard.

Calls for fellowship applications are posted each fall at: https://www.nber.org/career-resources/calls-fellowship-applications

Application closing dates are usually in early December. Anyone interested in receiving fellowship announcements can register at that webpage.
Isaiah Andrews Wins John Bates Clark Medal

NBER Research Associate Isaiah Andrews of Harvard University is this year’s recipient of the John Bates Clark Medal, which is awarded by the American Economic Association to the American economist under the age of 40 who has made the most substantial contribution to economic thought and knowledge.

Andrews has made pathbreaking contributions in econometric theory and in the application of empirical methods in applied economics. He has provided new tools for assessing the sensitivity of parameter estimates to data inputs, explored the role of publication bias and potential corrections for it when evaluating published research, and advanced the analysis of weak identification in econometric models. The prize citation notes that he is “playing a key role in the recent turn of econometrics back toward the study of the most important problems faced in empirical research.” The full citation for his award may be found here.

Andrews is affiliated with the NBER Labor Studies Program. He received his BA from Yale University and his PhD from MIT.

Chatterji and Wachter Take Leave for Posts at Commerce and SEC

Two NBER research associates have been tapped for economic leadership positions in major federal agencies. Aaron “Ronnie” Chatterji, an affiliate of the Productivity, Innovation, and Entrepreneurship Program, is the new chief economist of the US Department of Commerce. Jessica Wachter, an affiliate of the Asset Pricing Program, is serving as chief economist and director of the Division of Economic and Risk Analysis at the US Securities and Exchange Commission.

Chatterji is the Mark Burgess and Lisa Benson-Burgess Distinguished Professor of Business and Public Policy at Duke University’s Fuqua School of Business. Wachter holds the Bruce I. Jacobs Chair in Quantitative Finance at the University of Pennsylvania’s Wharton School.

Both researchers will be on leave from the NBER for the duration of their government service.
Conferences

Immigrants and the US Economy

An NBER conference on Immigrants and the US Economy took place online March 11–12. Research Associates Aimee Chin of the University of Houston and Kalena Cortes of Texas A&M University organized the meeting. These researchers’ papers were presented and discussed:

- **David N. Figlio** and **Paola Sapienza**, Northwestern University and NBER; **Paola Giuliano**, University of California, Los Angeles and NBER; **Riccardo Marchingilio**, Northwestern University; and **Umut Özek**, American Institutes for Research, “Diversity in Schools: Immigrants and the Educational Performance of US Born Students”

- **Annie Laurie Hines**, University of California, Davis, and **Chloe N. East, Philip A. Luck, Hani Mansour, and Andrea P. Velásquez**, University of Colorado Denver, “The Labor Market Effects of Immigration Enforcement”

- **Joaquin A. Rubalcaba**, University of North Carolina at Chapel Hill; **José R. Bucheli**, New Mexico State University; and **Camila N. Morales**, University of Texas at Dallas, “Immigration Enforcement and Labor Supply: Hispanic Youth in Mixed-Status Families”

- **Parag Mahajan**, University of Delaware, “Immigration and Local Business Dynamics: Evidence from US Firms”


- **Toman Barsbai**, University of Bristol; **Victoria Licuanan**, Asian Institute of Management; **Andreas Steinmayr**, University of Innsbruck; **Erwin Tiongson**, Georgetown University; and **Dean Yang**, University of Michigan and NBER, “Information and the Acquisition of Social Network Connections” (NBER Working Paper 27346)

- **Catalina Amuedo-Dorantes**, University of California, Merced; **Esther Arenas Arroyo**, WU Vienna University of Economics and Business; and **Bernhard Schmidpeter**, Johannes Kepler University Linz, “Immigration Policy and Firms’ Labor Demand”

- **Blake H. Heller** and **Kirsten E. Slungaard Mumma**, Harvard University, “Immigrant Integration in the United States: The Role of Adult English Language Training”

Summaries of these papers are at: [www.nber.org/conferences/immigrants-and-us-economy-spring-2021](http://www.nber.org/conferences/immigrants-and-us-economy-spring-2021)

Investments in Early Career Scientists: Data and Research Gaps

An NBER conference on Investments in Early Career Scientists: Data and Research Gaps took place online March 19. Research Associate Donna K. Ginther of University of Kansas organized the meeting, which was supported by the Alfred P. Sloan Foundation. These researchers’ papers were presented and discussed:

- **Xuan Jiang**, The Ohio State University, and **Joseph Staudt**, US Census Bureau, “Publish and Train or Perish? Valuing the Early Career Outcomes of STEM PhD Recipients”
• **Misty L. Heggeness**, US Census Bureau, “The Impact of NIH Postdoctoral Fellowships on a Future Independent Career in Federally Funded Biomedical Research”


Summaries of these papers are at: www.nber.org/conferences/investments-early-career-scientists-data-and-research-gaps-spring-2021

### Economics of Digitization

An NBER conference on the Economics of Digitization took place online March 19. Faculty Research Fellow Chiara Farronato of Harvard University and Research Associate Catherine Tucker of the Massachusetts Institute of Technology organized the meeting, which was supported by the Alfred P. Sloan Foundation. These researchers’ papers were presented and discussed:

• **Rebecca Janssen**, the ZEW Mannheim; **Reinhold Kesler**, University of Zurich; **Michael Kummer**, University of East Anglia; and **Joel Waldfogel**, University of Minnesota and NBER, “GDPR and the Lost Generation of Innovative Apps”

• **Sarah Moshary**, University of Chicago, “Advertising Effects in Equilibrium”


• **Francis Annan**, Georgia State University, “Misconduct and Reputation under Imperfect Information”

• **Filippo Mezzanotti** and **Nicolas Crouzet**, Northwestern University, and **Apoorv Gupta**, Dartmouth College, “Shocks and Technology Adoption: Evidence from Electronic Payment Systems”

• **Gordon Burtch**, University of Minnesota; **Miguel Godinho de Matos**, Católica Lisbon School of Business & Economics; and **Francisco Lima**, Universidade de Lisboa, “Personal Social Networks, Technology Skills, and Workers’ Digital Resilience”

Summaries of these papers are at: www.nber.org/conferences/economics-digitization-spring-2021

### Inequality, Discrimination, and the Financial System

An NBER conference on Inequality, Discrimination, and the Financial System took place April 1–2 online. Research Associates Gregor Matvos of Northwestern University and Manju Puri of Duke University, and Tarun Ramadorai of Imperial College London organized the meeting. The conference was held in collaboration with *The Review of Financial Studies*. These researchers’ papers were presented and discussed:

• **Nirupama Kulkarni**, CAFRAL, and **Ulrike Malmendier**, University of California, Berkeley and NBER, “Mortgage Policies and Their Effects on Racial Segregation and Upward Mobility”
• Marco Giacoletti, University of Southern California; Rawley Z. Heimer, Boston College; and Edison G. Yu, Federal Reserve Bank of Philadelphia, “Using High-Frequency Evaluations to Estimate Discrimination: Evidence from Mortgage Loan Officers”

• Lily Fang and Alexandra Roulet, Institut Européen d’Administration des Affaires (INSEAD), and Jim Goldman, University of Toronto, “Private Equity and Pay Gaps Inside the Firm”

• Raimundo Undurraga, Universidad de Chile, “Bad Taste: Gender Discrimination in Consumer Credit Markets”


• Francis Annan, Georgia State University, “Gender and Financial Misconduct: A Field Experiment on Mobile Money”

• Marina Gertsberg, Monash University; Johanna Mollerstrom, George Mason University; and Michaela Pagel, Columbia University and NBER, “Gender Quotas and Support for Women in Board Elections” (NBER Working Paper 28463)

Summaries of these papers are at www.nber.org/conferences/inequality-discrimination-and-financial-system-spring-2021

36th Annual Conference on Macroeconomics

The 36th Annual Conference on Macroeconomics took place April 8–9 online. Research Associates Martin S. Eichenbaum of Northwestern University and Erik Hurst of the University of Chicago organized the meeting. These researchers’ papers were presented and discussed:

• Robert E. Hall, Stanford University and NBER, and Marianna Kudlyak, Federal Reserve Bank of San Francisco and CEPR, “The Consistent Recovery of the US Economy from Every Previous Recession in the Past 70 Years”

• Michael Kremer, University of Chicago and NBER; Jack Willis, Columbia University and NBER; and Yang You, Harvard University, “Converging to Convergence”

• Richard Rogerson, Princeton University and NBER, and Johanna Wallenius, Stockholm School of Economics, “Changing Employment Trends for Older Workers in the OECD”

• Michael Barnett, Arizona State University; William Brock, University of Wisconsin; and Lars P. Hansen, University of Chicago and NBER, “Climate Change Uncertainty Spillover in the Macroeconomy”

• Titan Alon, University of California, San Diego; Matthias Doepke, Northwestern University and NBER; and Sena Coskun, David Koll, and Michèle Tertilt, University of Mannheim, “From Mancession to Shecession: Women’s Employment in Regular and Pandemic Recessions” (NBER Working Paper 28632)

Summaries of these papers are at www.nber.org/conferences/36th-annual-conference-macroeconomics-2021
The Future of Globalization

An NBER conference on The Future of Globalization took place April 9–10 online. Research Associates Stephen J. Redding of Princeton University and Robert W. Staiger of Dartmouth College organized the meeting, which was supported by the Smith Richardson Foundation. These researchers’ papers were presented and discussed:


- **Adrien Bilal**, University of Chicago, and **Hugo Lhuillier**, Princeton University, “Outsourcing, Inequality and Aggregate Output”

- **Swati Dhingra** and **Silvana Tenreyro**, London School of Economics, “The Rise of Agribusinesses and Its Distributional Consequences”

- **Farid Farrokhi**, Purdue University, and **Ahmad Lashkaripour**, Indiana University, “Trade, Firm-Delocation, and Optimal Climate Policy”

- **Natalie Bau**, University of California, Los Angeles and NBER, and **Adrien Matray**, Princeton University, “Misallocation and Capital Market Integration: Evidence from India”

- **Giovanni Maggi**, Yale University and NBER, and **Robert W. Staiger**, “International Climate Agreements and the Scream of Greta”


- **Barthélemy Bonadio**, University of Michigan; **Zhen Huo**, Yale University; **Andrei A. Levchenko**, University of Michigan and NBER; and **Nitya Pandalai-Nayar**, University of Texas at Austin and NBER, “Global Supply Chains in the Pandemic”

- **Antoine Berthou** and **Sebastian Stumpner**, Banque de France, “Trade under Lockdown”

- **David Baqee**, University of California, Los Angeles and NBER, and **Emmanuel Farhi**, “The Darwinian Returns to Scale”

Summaries of these papers are at [www.nber.org/conferences/future-globalization-conference-spring-2021](http://www.nber.org/conferences/future-globalization-conference-spring-2021)
Entrepreneurship and Innovation Policy and the Economy

The inaugural NBER Entrepreneurship and Innovation Policy and the Economy conference met April 27 online. Research Associates Josh Lerner of Harvard University and Scott Stern of the Massachusetts Institute of Technology organized the meeting. The meeting was supported by the Ewing Marion Kauffman Foundation. These researchers’ papers were presented and discussed:


- **Mercedes Delgado**, Copenhagen Business School, and **Fiona Murray**, MIT and NBER, “Mapping the Regions, Organizations & Individuals that drive Inclusion in the Innovation Economy”

- **Lisa D. Cook**, Michigan State University and NBER, “Gender and Racial Disparity in the Innovation Process”

- **Michael Kremer**, University of Chicago and NBER, “Vaccines and the Pandemic”

- **Chiara Franzoni**, Politecnico di Milano; **Paula Stephan**, Georgia State University and NBER; and **Reinhilde Veugelers**, Katholieke Universiteit Leuven, “Funding Risky Research”

Summaries of some of these papers are at [www.nber.org/conferences/entrepreneurship-and-innovation-policy-and-economy-2021](http://www.nber.org/conferences/entrepreneurship-and-innovation-policy-and-economy-2021)

Economics of Culture and Institutions

An NBER conference on the Economics of Culture and Institutions took place April 30 online. Research Associates Alberto Bisin of New York University and Paola Giuliano of the University of California, Los Angeles organized the meeting. These researchers’ papers were presented and discussed:

- **Samuel Bazzi**, University of California, San Diego and NBER; **Masyhur Hilmy**, Boston University; and **Benjamin Marx**, Sciences Po, “Islam and the State: Religious Education in the Age of Mass Schooling”

- **Daron Acemoglu**, Massachusetts Institute of Technology and NBER, and **James A. Robinson**, University of Chicago and NBER, “Culture, Institutions, and Social Equilibria: A Framework”


- **Etienne Le Rossignol**, CES; **Sara Lowes**, University of California, San Diego and NBER; and **Nathan Nunn**, Harvard University and NBER, “Traditional Supernatural Beliefs and Prosocial Behavior”
• Sebastian Hohmann, Stockholm School of Economics SITE; Stelios Michalopoulos, Brown University and NBER; and Elias Papaioannou, London Business School, “Religion and Educational Mobility in Africa”

• Marciano Siniscalchi, Northwestern University, and Pietro Veronesi, University of Chicago and NBER, “Self-image Bias and Lost Talent”

Summaries of these papers are at www.nber.org/conferences/economics-culture-and-institutions-spring-2021

Environmental and Energy Policy and the Economy

The annual NBER conference on Environmental and Energy Policy and the Economy took place May 20 online. Research Associates Tatyana Deryugina of the University of Illinois at Urbana-Champaign, Matthew Kotchen of Yale University, and James H. Stock of Harvard University organized the meeting, which was supported by the Alfred P. Sloan Foundation. These researchers’ papers were presented and discussed:

• Kenneth Gillingham, Yale University and NBER, “Designing Fuel Economy Standards in Light of Greater Electric Vehicle Offerings”

• Severin Borenstein, University of California, Berkeley and NBER, and James B. Bushnell, University of California, Davis and NBER, “Implications of Residential Energy Pricing for Energy Substitution and Welfare”

• James Archsmith, University of Maryland; Erich Muehlegger, University of California, Davis and NBER; and David S. Rapson, University of California, Davis, “Future Paths of Electric Vehicle Adoption in the United States: Predictable Determinants, Obstacles and Opportunities”

• Rebecca J. Davis, Stephen F. Austin State University, and J. Scott Holladay and Charles Sims, University of Tennessee, “Coal Fired Power Plant Retirements in the US”

• Barbara Annicchiarico, University of Rome Tor Vergata; Stefano Carattini, Georgia State University; Carolyn Fischer, Resources for the Future; and Garth Heutel, Georgia State University and NBER, “Business Cycles and Environmental Policy”

• Frank A. Wolak, Stanford University and NBER, “Long-Term Resource Adequacy in High Intermittent Renewables Wholesale Electricity Markets: Lessons from California”

Summaries of these papers are at www.nber.org/conferences/environmental-and-energy-policy-and-economy-conference-spring-2021
Wage Dynamics in the 21st Century

An NBER conference on Wage Dynamics in the 21st Century took place May 20–21 online. Research Associates Erik Hurst of the University of Chicago and Lisa B. Kahn of the University of Rochester organized the meeting, which was supported by the Smith Richardson Foundation. These researchers' papers were presented and discussed:

- **John R. Grigsby**, Northwestern University, “Skill Heterogeneity and Aggregate Labor Market Dynamics”

- **Gregor Schubert** and **Anna Stansbury**, Harvard University, and **Bledi Taska**, Burning Glass Technologies, “Employer Concentration and Outside Options”

- **Sadhika Bagga**, University of Texas at Austin, “Firm Market Power, Worker Mobility, and Wages in the US Labor Market”

- **John C. Haltiwanger**, University of Maryland and NBER, and **Henry R. Hyatt** and **James Spletzer**, US Census Bureau, “Industries, Mega Firms, and Increasing Inequality”

- **Jaime Arellano-Bover**, Yale University, and **Fernando Saltiel**, McGill University, “Differences in On-the-Job Learning across Firms”

- **Andrea L. Eisfeldt**, University of California, Los Angeles and NBER; **Antonio Falato**, Federal Reserve Board; and **Mindy Z. Xiaolan**, University of Texas at Austin, “Human Capitalists” (NBER Working Paper 28815)

- **Ellora Derenoncourt**, University of California, Berkeley and NBER, and **Clemens Noelke** and **David Weil**, Brandeis University, “Spillover Effects from Voluntary Employer Minimum Wages”

Summaries of these papers are at [www.nber.org/conferences/wage-dynamics-21st-century-conference-spring-2021](http://www.nber.org/conferences/wage-dynamics-21st-century-conference-spring-2021)

Risks in Agricultural Supply Chains

An NBER conference on Risks in Agricultural Supply Chains took place May 20–21 online. Research Associate Pol Antràs of Harvard University and David Zilberman of the University of California, Berkeley organized the meeting, which was supported by the Economic Research Service of the US Department of Agriculture. These researchers’ papers were presented and discussed:

- **Meilin Ma** and **Jayson L. Lusk**, Purdue University, “Concentration and Resiliency in the US Meat Supply Chains”

- **Farid Farrokhi**, Purdue University, and **Heitor S. Pellegrina**, New York University Abu Dhabi, “Trade, Technology, and Agricultural Productivity”

- **Austin F. Ramsey**, Virginia Tech; **Barry Goodwin**, North Carolina State University; and **Mildred Haley**, US Department of Agriculture, “Labor Dynamics and Supply Chain Disruption in Food Manufacturing”


• **Joshua Deutschmann**, University of Wisconsin-Madison; **Tanguy Bernard**, University of Bordeaux (GREThA) and International Food Policy Research; and **Ouambi Yameogo**, IITA, “Contracting and Quality Upgrading: Evidence from an Experiment in Senegal”

• **Liang Lu** and **Jason Winfree**, University of Idaho, “Demand Shocks and Supply Chain Flexibility”

• **Charles A Taylor**, Columbia University, and **Geoffrey Heal**, Columbia University and NBER, “Algal Blooms and the Social Cost of Fertilizer “

• **Sunghun Lim**, Texas Tech University, and **Marc F. Bellemare**, University of Minnesota, “Global Agricultural Value Chains and Structural Transformation”

• **Sandro Steinbach**, University of Connecticut, “Exchange Rate Volatility and Global Food Supply Chains”

• **Ishan B. Nath**, University of Chicago, “The Food Problem and the Aggregate Productivity Consequences of Climate Change”

• **Lucas Zavala**, Yale University, “Unfair Trade? Market Power in Agricultural Value Chains”

• **Bruno Conte**, Universitat Autònoma de Barcelona; **Klaus Desmet**, Southern Methodist University and NBER; **Dávid Krisztián Nagy**, CREI, Universitat Pompeu Fabra; and **Esteban Rossi-Hansberg**, Princeton University and NBER, “Local Sectoral Specialization in a Warming World”

Summaries of these papers are at www.nber.org/conferences/risks-agricultural-supply-chains-spring-2021

**NBER-SAIF Research Conference on Real Estate Markets and Housing Finance in China**

The NBER and the Shanghai Advanced Institute of Finance (SAIF) at Shanghai Jiao Tong University co-hosted a research conference on Real Estate Markets and Housing Finance in China on May 20–21 online. Research Associate James M. Poterba of the Massachusetts Institute of Technology and Hong Yan of SAIF organized the meeting. These researchers’ papers were presented and discussed:

• **Mark Rosenzweig**, Yale University and NBER, and **Junsen Zhang**, Chinese University of Hong Kong, “Housing Prices, Intergenerational Co-Residence, and ‘Excess’ Savings by the Young: Evidence using Chinese Data” (NBER Working Paper 26209)


• **Yinglu Deng** and **Li Liao**, Tsinghua University; **Jiaheng Yu**, MIT Sloan School of Management; and **Yu Zhang**, Peking University, “Capital Leakage, House Prices, and Consumer Spending: Quasi-Experimental Evidence from House Purchase Restriction Spillovers”

• **Shenzhe Jiang**, Beijing University; **Jianjun Miao**, Boston University; and **Yuzhe Zhang**, Texas A&M University, “China’s Housing Bubble, Infrastructure Investment, and Economic Growth”

• **Hanming Fang**, University of Pennsylvania and NBER; **Jing Wu**, and **Vincent Yao**, Georgia State University, “Property Right Uncertainty, Prices, and Speculation: Evidence from China’s Housing Market”

• **Kaiji Chen**, Emory University; **Qing Wang** and **Tong Xu**, Southwestern University of Finance and Economics; and **Tao Zha**, Emory University and NBER, “Aggregate and Distributional Impacts of LTV Policy: Evidence from China” (NBER Working Paper 28092)

• **Sheridan Titman**, University of Texas at Austin and NBER, and **Guozhong Zhu**, University of Alberta, “City Characteristics, Land Prices and Volatility”

• **Wenlan Qian**, National University of Singapore; **Jing Wu**; and **Hong Tu** and **Weibiao Xu**, Nankai University, “Unintended Consequences of Demand-Side Housing Policies: Evidence from Household Reallocation of Capital”

Summaries of these papers are at
Program and Working Group Meetings

Monetary Economics

Members of the NBER’s Monetary Economics Program met March 5 online. Research Associate Joshua K. Hausman of the University of Michigan, Faculty Research Fellow Arlene Wong of Princeton University, and Program Directors Emi Nakamura and Jón Steinsson, both of the University of California, Berkeley, organized the meeting. These researchers’ papers were presented and discussed:

- **Carola Binder**, Haverford College, and **Gillian Brunet**, Wesleyan University, “Inflation Expectations and Consumption: Evidence from 1951”
- **Marcus Biermann**, Université Catholique de Louvain, and **Kilian Huber**, University of Chicago, “Tracing the International Transmission of a Crisis through Multinational Firms”
- **Ricardo Reis**, London School of Economics, “The People versus the Markets: A Parsimonious Model of Inflation Expectations”
- **Martin Beraja**, MIT and NBER, and **Christian Wolf**, University of Chicago, “Demand Composition and the Strength of Recoveries”

Summaries of these papers are at [www.nber.org/conferences/monetary-economics-program-meeting-spring-2021](http://www.nber.org/conferences/monetary-economics-program-meeting-spring-2021)

Aging

Members of the NBER’s Program on Aging met March 5 online. Research Associate Kathleen M. McGarry of the University of California, Los Angeles and Program Director Jonathan S. Skinner of Dartmouth College organized the meeting. These researchers’ papers were presented and discussed:

- **Jevay Grooms**, Howard University, and **Alberto Ortega**, Indiana University, “Substance Use Disorders among Older Populations: What Role Does Race and Ethnicity Play in Treatment and Completion?”
- **Ran D. Balicer**, Ben Gurion University of the Negev; **Liran Einav**, Stanford University and NBER; **Joseph Rashba**, Clalit Research Institute; and **Dan Zeltzer**, Tel Aviv University, “The Impact of Increased Access to Telemedicine”
• Mika Akesaka, Institute of Social and Economic Research, Osaka University; Peter Eibich, Max Planck Institute for Demographic Research; Chie Hanaoka, Toyo University; and Hitoshi Shigeoka, Simon Fraser University and NBER, “Temporal Instability of Risk Preference among the Poor: Evidence from Payday Cycles”

• Lucas Goodman, US Treasury Department; Anita Mukherjee, University of Wisconsin-Madison; and Shanthi Ramnath, Federal Reserve Bank of Chicago, “Abandoned Retirement Savings”

Summaries of some of these papers are at [www.nber.org/conferences/aging-program-meeting-spring-2021](http://www.nber.org/conferences/aging-program-meeting-spring-2021)

Children

Members of the NBER’s Program on Children met March 11–12 online. Program Directors Anna Aizer of Brown University and Janet Currie of Princeton University organized the meeting. These researchers’ papers were presented and discussed:

• Nishith Prakash and Nathan Fiala, University of Connecticut; Kritika Narula, Yale University; and Ana Garcia-Hernandez, University of Rosario and Innovations for Poverty Action, “Wheels of Change: Transforming Girl’s Lives with Bicycles”

• Patrick Agte, Princeton University; Arielle Bernhardt, Harvard University; Erica M. Field, Duke University and NBER; Rohini Pande, Yale University and NBER; and Natalia Rigol, Harvard University and NBER, “Investing in the Next Generation: The Long-Run Educational Impacts of a Liquidity Shock”

• Lisa Gennetian, Duke University; Katherine Magnuson, University of Wisconsin-Madison; Kimberly Noble, Columbia University; Greg Duncan, University of California, Irvine; Nathan Fox, University of Maryland; Sarah Halpern-Meekin, University of Wisconsin-Madison; and Hirokazu Yoshikawa, New York University, “Impacts on Economic Well-Being of an Unconditional Cash Transfer during a Child’s First Year: Findings from the Baby’s First Years Study”

• Roland G. Fryer Jr, Harvard University; Steven D. Levitt, University of Chicago and NBER; John A. List, University of Chicago and NBER; and Anya Samek, University of California, San Diego and NBER, “Reducing the Academic Achievement Gap through a Summer Pre-Kindergarten Program”

• Petra Persson and Maya Rossin-Slater, Stanford University and NBER, and Xinyao Qiu, Stanford University, “Family Spillover Effects of Marginal Diagnoses: The Case of ADHD” (NBER Working Paper 28334)

• Belinda Archibong, Columbia University, and Francis Annan, Georgia State University, “’We Are Not Guinea Pigs’: The Effects of Negative News on Vaccine Compliance”

• Deborah A. Cobb-Clark and Tiffany Ho, University of Sydney, and Nicolás Salamanca, University of Melbourne, “Parental Responses to Children’s Achievement Test Results”

• Claire Duquennois, University of Pittsburgh, “Fictional Money, Real Costs: Impacts of Financial Salience on Disadvantaged Students”

Summaries of these papers are at [www.nber.org/conferences/children-program-meeting-spring-2021](http://www.nber.org/conferences/children-program-meeting-spring-2021)
International Finance and Macroeconomics

Members of the NBER’s International Finance and Macroeconomics Program met March 19 online. Cristina Arellano of the Federal Reserve Bank of Minneapolis and Research Associate Oleg Itskhoki of the University of California, Los Angeles and NBER organized the meeting. These researchers’ papers were presented and discussed:

- Zhengyang Jiang, Northwestern University; Hanno Lustig, Stanford University and NBER; Stijn Van Nieuwerburgh, Columbia University and NBER; and Mindy Z. Xiaolan, University of Texas at Austin, “Manufacturing Risk-Free Government Debt” (NBER Working Paper 27786)

- Xing Guo, Bank of Canada; Pablo Ottonello, University of Michigan and NBER; and Diego Perez, New York University and NBER, “Monetary Policy and Redistribution in Open Economies” (NBER Working Paper 28213)

- Meredith Crowley and Minkyu Son, University of Cambridge, and Lu Han, University of Liverpool, “Dominant Currency Dynamics: Evidence on Dollar Invoicing from UK Exporters”

- Harold L. Cole and Guillermo Ordoñez, University of Pennsylvania and NBER, and Daniel Neuhann, University of Texas at Austin, “Asymmetric Information and Sovereign Debt: Theory Meets Mexican Data” (NBER Working Paper 28459)

- Javier Bianchi, Federal Reserve Bank of Minneapolis; Saki Bigio, University of California, Los Angeles and NBER; and Charles Engel, University of Wisconsin-Madison and NBER, “Scrambling for Dollars: International Liquidity, Banks and Exchange Rates”

- João Ayres, Inter-American Development Bank; Constantino Hevia, Universidad Torcuato di Tella; and Juan Pablo Nicolini, Federal Reserve Bank of Minneapolis, “Real Exchange Rates and Primary Commodity Prices: Mussa Meets Backus-Smith”

Summaries of these papers are at https://www.nber.org/conferences/international-finance-and-macroeconomics-program-meeting-spring-2021

Development of the American Economy

Members of the NBER’s Development of the American Economy Program met March 19–20 online. Program Directors Leah Platt Boustan of Princeton University and William J. Collins of Vanderbilt University organized the meeting. These researchers’ papers were presented and discussed:


- Lisa D. Cook, Michigan State University and NBER; Maggie E.C. Jones, University of Victoria; Trevon Logan, The Ohio State University and NBER; and David Rosé, Wilfrid Laurier University, “Competition and Discrimination in Public Accommodations: Evidence from the Green Books”

- Price V. Fishback, University of Arizona and NBER; Jessica LaVoice, Bowdoin College; and Allison Shertzer and Randall Walsh, University of Pittsburgh and NBER, “Race, Risk, and the Emergence of Federal Redlining” (NBER Working Paper 28146)
• **Leander Heldring**, Northwestern University; **James A. Robinson**, University of Chicago and NBER; and **Sebastian Vollmer**, University of Göttingen, “The Economic Effects of the English Parliamentary Enclosures”


• **Wilfried Kisling**, University of Oxford; **Christopher M. Meissner**, University of California, Davis and NBER; and **Chenzi Xu**, Stanford University, “International Banks: Re-Agents of Globalization?”

Summaries of these papers are at [www.nber.org/conferences/development-american-economy-program-meeting-spring-2021](http://www.nber.org/conferences/development-american-economy-program-meeting-spring-2021)

### Productivity, Innovation, and Entrepreneurship

Members of the NBER’s Productivity, Innovation, and Entrepreneurship Program met March 26 online. Program Directors Nicholas Bloom of Stanford University and Josh Lerner of Harvard University, Research Associate Serguey Braguinsky of the University of Maryland, and Faculty Research Fellow Sabrina T. Howell of New York University organized the meeting. These researchers’ papers were presented and discussed:


• **Maria Kurakina**, University of Utah, “The Dark Side of Patents: Effects of Strategic Patenting on Firms and Their Peers”

• **Tania Babina**, Columbia University; **Alex X. He**, University of Maryland; **Sabrina T. Howell**; and **Elisabeth Ruth Perlman** and **Joseph Staudt**, US Census Bureau, “The Color of Money: Federal vs. Industry Funding of University Research”

• **Danielle Li**, MIT and NBER; **Lindsey R. Raymond**, MIT; and **Peter Bergman**, Columbia University and NBER, “Hiring as Exploration” (NBER Working Paper 27736)

• **Katarzyna A. Bilicka**, Utah State University, and **Daniela Scur**, Cornell University, “Organizational Capacity and Firm Profitability: Evidence from Multinationals”

Summaries of these papers are at [www.nber.org/conferences/productivity-innovation-and-entrepreneurship-program-meeting-spring-2021](http://www.nber.org/conferences/productivity-innovation-and-entrepreneurship-program-meeting-spring-2021)
Labor Studies

Members of the NBER’s Labor Studies Program met March 26 online. Program Directors David Autor of the Massachusetts Institute of Technology and Alexandre Mas of Princeton University organized the meeting. These researchers’ papers were presented and discussed:


- **Zoe B. Cullen**, Harvard University; **Will S. Dobbie**, Harvard University and NBER; and **Mitchell Hoffman**, University of Toronto and NBER, “Measuring Labor Demand for Workers with a Criminal Conviction”


- **Chao Fu** and **Alan T. Sorensen**, University of Wisconsin-Madison and NBER, and **Junjie Guo** and **Adam Smith**, University of Wisconsin-Madison, “Students’ Heterogeneous Preferences and the Uneven Spatial Distribution of Colleges”

Summaries of these papers are at [www.nber.org/conferences/labor-studies-program-meeting-spring-2021](http://www.nber.org/conferences/labor-studies-program-meeting-spring-2021)

Chinese Economy

The NBER’s Chinese Economy Working Group met April 1-3 online. Working Group Director Shang-Jin Wei of Columbia University and Research Associates Nancy Qian of Northwestern University and Daniel Xu of Duke University organized the meeting. These researchers’ papers were presented and discussed:

- **Meng Miao**, Renmin University; **Jacopo Ponticelli**, Northwestern University and NBER; and **Yi Shao**, Peking University, “Eclipses and the Memory of Revolutions: Evidence from China”

- **Panle Jia Barwick** and **Shanjun Li**, Cornell University and NBER; **Luming Chen**, Cornell University; and **Xiaobo Zhang**, Peking University, “Entry Deregulation, Market Turnover, and Efficiency: China’s Business Registration Reform”

• **Wei Chen**, Chinese University of Hong Kong; **Ernest Liu**, Princeton University; and **Zheng Michael Song**, Chinese University of Hong Kong, “Decentralized Industrial Policy”

• **Wolfgang Keller** and **Carol H. Shiue**, University of Colorado Boulder and NBER, “The Economic Consequences of the Opium War”

• **Ting Chen**, Hong Kong Baptist University, and **James K. Kung**, University of Hong Kong, “The Rise of Communism in China”

• **Laura Alfaro**, Harvard University and NBER; **Ge Bao**, University of International Business and Economics; **Maggie Chen**, George Washington University; **Junjie Hong**, UIBE; and **Claudia Steinwender**, MIT and NBER, “Omnia Juncta in Uno: Foreign Powers and Trademark Protection in Shanghai’s Concession Era”

• **Clair Yang**, University of Washington, Seattle, and **Yasheng Huang**, MIT, “The Great Political Divergence”


• **Qiaoyi Chen**, **Zhao Chen**, and **Zhikuo Liu**, Fudan University, and **Juan Carlos Suárez Serrato** and **Daniel Xu**, Duke University and NBER, “Regulating Conglomerates: Evidence from an Energy Conservation Program in China”

• **Zhiguo He**, University of Chicago and NBER; **Guanmin Liao**, Renmin University of China; and **Baolian Wang**, University of Florida, “Incentives and Firm Investment: Evidence from China’s Reform”

Summaries of these papers are at [www.nber.org/conferences/chinese-economy-working-group-meeting-spring-2021](http://www.nber.org/conferences/chinese-economy-working-group-meeting-spring-2021)

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**Public Economics**

Members of the NBER’s Public Economics Program met April 1–2 online. Research Associate Julie Berry Cullen of the University of California, San Diego and Faculty Research Fellows Manasi Deshpande of the University of Chicago and Jacob Goldin of Stanford University organized the meeting. These researchers’ papers were presented and discussed:

• **Juan Carlos Suárez Serrato** and **Daniel Xu**, Duke University and NBER, and **Zhao Chen**, **Zhikuo Liu** and **Qiaoyi Chen**, Fudan University, “Regulating Conglomerates: Evidence from an Energy Conservation Program in China”


• **Abhijit Banerjee** and **Benjamin A. Olken**, MIT and NBER; **Rema Hanna**, Harvard University and NBER; **Elan Satriawan**, Universitas Gadjah Mada; and **Sudarno Sumarto**, National Team for the Acceleration of Poverty Reduction, Jakarta, “Food vs. Food Stamps: Evidence from an At-Scale Experiment in Indonesia” (NBER Working Paper 28199)

• **Joseph S. Shapiro** and **Reed Walker**, University of California, Berkeley and NBER, “Is Air Pollution Regulation Too Stringent?” (NBER Working Paper 28542)
Elena C. Derby, Joint Committee on Taxation, “Does Growing Up in Tax-Subsidized Housing Lead to Higher Earnings and Educational Attainment?”

Lee Lockwood, University of Virginia and NBER, “Anti Insurance: Health Insurance Worsens Risk Exposure”

Christine L. Dobridge, Federal Reserve Board; Rebecca Lester, Stanford University; and Andrew Whitten, US Treasury Department, “IPOs and Corporate Tax Planning”

Neil Thakral, Brown University, and Linh T. Tô, Boston University, “Anticipation and Consumption”

Adam M. Lavecchia, McMaster University, and Alisa Tazhitdinova, University of California, Santa Barbara and NBER, “Permanent and Transitory Responses to Capital Gains Taxes: Evidence from a Lifetime Exemption in Canada” (NBER Working Paper 28514)


Thiago Scot, UC Berkeley Haas School of Business; Felipe Lobel, University of California, Berkeley; and Pedro Zúñiga, Servicio de Administración de Rentas, “Corporate Taxation and Evasion Responses: Evidence from a Minimum Tax in Honduras”

Summaries of these papers are at www.nber.org/conferences/public-economics-program-meeting-spring-2021

Corporate Finance

Members of the NBER’s Corporate Finance Program met April 2 online. Research Associates Viral V. Acharya of New York University and Kelly Shue of Yale University organized the meeting. These researchers' papers were presented and discussed:

Ivan Alfaro, BI Norwegian Business School; Nicholas Bloom, Stanford University and NBER; and Xiaoji Lin, University of Minnesota, “The Finance Uncertainty Multiplier” (NBER Working Paper 24571)


Mara Faccio, Purdue University and NBER, and John J. McConnell, Purdue University, “Impediments to the Schumpeterian Process in the Replacement of Large Firms” (NBER Working Paper 27871)

Michael Faulkender, University of Maryland; Stephen Miran; and Robert Jackman, US Treasury Department, “The Job-Preservation Effects of Paycheck Protection Program Loans”

Karsten Müller, Princeton University, and Emil Verner, MIT, “Credit Allocation and Macroeconomic Fluctuations”

Jialan Wang and Jeyul Yang, University of Illinois at Urbana-Champaign; Benjamin Iverson, Brigham Young University; and Renhao Jiang, University of California, Santa Cruz, “Bankruptcy and the COVID-19 Crisis”
• **Ashwini Agrawal**, London School of Economics, and **Daniel Kim**, BI Norwegian Business School, “Municipal Bond Insurance and the US Drinking Water Crisis”

• **Ivan T. Ivanov**, Federal Reserve Board; **Luke Pettit**, United States Senate; and **Toni Whited**, University of Michigan and NBER, “Taxes Depress Corporate Borrowing: Evidence from Private Firms”

Summaries of these papers are at [www.nber.org/conferences/corporate-finance-program-meeting-spring-2021](http://www.nber.org/conferences/corporate-finance-program-meeting-spring-2021)

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**Environment and Energy Economics**

Members of the NBER’s Environment and Energy Economics Program met April 8–9 online. Research Associates Catherine Hausman of the University of Michigan and Wolfram Schlenker of Columbia University organized the meeting. These researchers’ papers were presented and discussed:

• **Charles A. Taylor**, Columbia University, and **Hannah Druckenmiller**, University of California, Berkeley, “Draining the Swamp: Wetlands, Flooding, and the Clean Water Act”


• **Peter Christensen**, **Paul Francisco**, and **Erica Myers**, University of Illinois at Urbana-Champaign; and **Mateuz Souza**, Charles III University of Madrid, “Decomposing the Wedge between Projected and Realized Returns in Energy Efficiency Programs”

• **Patrick Baylis**, University of British Columbia, and **Judson Boomhower**, University of California, San Diego and NBER, “Building Codes and Community Resilience to Natural Disasters”

• **Rafael Araujo**, Getúlio Vargas Foundation; **Francisco Costa**, University of Delaware and Escola Brasileira de Economia e Finanças; and **Marcelo Sant’Anna**, Escola Brasileira de Economia e Finanças, “Efficient Forestation in the Brazilian Amazon: Evidence from a Dynamic Model”


• **Meera Mahadevan**, University of California, Irvine, “The Price of Power: Costs of Political Corruption in Indian Electricity”

• **Ryan M. Abman**, San Diego State University; **Teevrat Garg**, University of California, San Diego; **Yao Pan**, Aalto University; and **Saurabh Singhal**, Lancaster University, “Agriculture and Deforestation”

• **Christopher Costello**, University of California, Santa Barbara and NBER, and **Matthew Kotchen**, Yale University and NBER, “Policy Instrument Choice with Coasean Provision of Public Goods” (NBER Working Paper 28130)

Summaries of these papers are at [www.nber.org/conferences/environment-and-energy-economics-program-meeting-spring-2021](http://www.nber.org/conferences/environment-and-energy-economics-program-meeting-spring-2021)
Asset Pricing

Members of the NBER's Asset Pricing Program met April 9 online. Research Associates Hanno Lustig of Stanford University and Annette Vissing-Jorgensen of the University of California, Berkeley organized the meeting. These researchers’ papers were presented and discussed:

- Svetlana Bryzgalova, Christian Julliard, and Jiantao Huang, London School of Economics, “Bayesian Solutions for the Factor Zoo: We Just Ran Two Quadrillion Models”
- Leonid Kogan, MIT and NBER; Winston Wei Dou, University of Pennsylvania; and Wei Wu, Texas A&M University, “Common Fund Flows: Flow Hedging and Factor Pricing”
- Robert Jay Kahn, Office of Financial Research, and Daniel Barth, Federal Reserve Board of Governors, “Hedge Funds and the Treasury Cash-Futures Disconnect”
- Xavier Gabaix, Harvard University and NBER, and Ralph S. J. Koijen, University of Chicago and NBER, “In Search of the Origins of Financial Fluctuations: The Inelastic Markets Hypothesis”
- Mikhail Chernov, University of California, Los Angeles and NBER; Magnus Dahlquist, Stockholm School of Economics; and Lars A. Lochstoer, University of California, Los Angeles, “Pricing Currency Risks” (NBER Working Paper 28260)

Summaries of these papers are at www.nber.org/conferences/asset-pricing-program-meeting-spring-2021

Race and Stratification

The NBER’s Working Group on Race and Stratification met April 9 online. Working Group Director Trevon Logan of The Ohio State University and Research Associates Isaiah Andrews of Harvard University, Rodney Andrews of the University of Texas at Dallas, Renee Bowen of the University of California, San Diego, and Ebonya L. Washington of Yale University organized the meeting. These researchers’ papers were presented and discussed:

- David Arnold, University of California, San Diego; Will S. Dobbie, Harvard University and NBER; and Peter Hull, University of Chicago and NBER, “Towards a Non-Discriminatory Algorithm in Selected Data”
- Lena Song, New York University, “Discrimination and Media Diversity: Historical Evidence from US Radio Stations”
- Dan McGee, Princeton University, “Emergence of Stereotypes under Group Competition”
- Ellora Derenoncourt, University of California, Berkeley; Chi Hyun Kim, German Institute for Economic Research (DIW Berlin); and Moritz Kuhn and Moritz Schularick, University of Bonn, “The Racial Wealth Gap, 1860–2020”
- Francisca Antman, University of Colorado, and Kalena Cortes, Texas A&M University and NBER, “The Long-Run Impacts of Mexican-American School Desegregation”

Summaries of these papers are at www.nber.org/conferences/working-group-race-and-stratification-spring-2021
Organizational Economics

The NBER’s Organizational Economics Working Group met April 15–17 online. Working Group Director Robert S. Gibbons of the Massachusetts Institute of Technology organized the meeting. These researchers’ papers were presented and discussed:

- **Steven Callander**, Dana Foarta, and Takuo Sugaya, Stanford University, “Market Competition and Political Influence: An Integrated Approach”

- **Susan Helper**, Case Western Reserve University and NBER, and Abdul Munasib, Bureau of Economic Analysis, “Economies of Scope and Relational Contracts”

- **Serguey Braguinsky**, University of Maryland and NBER; Atsushi Ohyama, Hitotsubashi University; Tetsuji Okazaki, University of Tokyo; and Chad Syverson, University of Chicago and NBER, “Product Innovation, Product Diversification, and Firm Growth: Evidence from Japan’s Early Industrialization” (NBER Working Paper 26665)

- **Laurence Prusak**, Columbia University, “The Practice of Knowledge Management in Organizations”

- **German Gieczewski**, Princeton University, and Svetlana Kosterina, University of Pittsburgh, “Endogenous Experimentation in Organizations”

- **Devesh Rustagi**, University of Nottingham, “The Interdependence of Formal Rules and Civic Capital in Commons Management”

- **Felix Zhiyu Feng** and Mark Westerfield, University of Washington, and Curtis Taylor and Feifan Zhang, Duke University, “Setbacks, Shutdowns, and Overruns”

- **Manaswini Rao**, University of California, San Diego, and Ashish Shenoy, University of California, Davis, “Got (Clean) Milk? Governance, Incentives, and Collective Action in Indian Dairy Cooperatives”


- **Rocco Macchiavello**, London School of Economics, and Ameet Morjaria, Northwestern University, “Acquisitions, Management and Efficiency: Evidence from Rwanda’s Coffee Industry”

- **Stephen Michael Impink**, New York University; Andrea Prat, Columbia University; and Raffaella Sadun, Harvard University and NBER, “Communication within Firms: Evidence from CEO Turnovers”

- **Miguel Espinosa**, Universitat Pompeu Fabra and Barcelona GSE, and Christopher T. Stanton, Harvard University and NBER, “Worker Skills and Organizational Spillovers: Evidence from Linked Training and Communications Data”

- **Erika Deserranno**, Northwestern University; Gianmarco León, Universitat Pompeu Fabra and Barcelona Graduate School of Economics; and Philipp M. Kastrau, Universitat Pompeu Fabra, “Promotions and Productivity: The Role of Meritocracy and Pay Progression in the Public Sector”

- **Chong-En Bai**, Tsinghua University; Ruixue Jia, University of California, San Diego and NBER; Hongbin Li, Stanford University; and Xin Wang, Chinese University of Hong Kong, “Entrepreneurial Reluctance: Talent and Firm Creation in China”
• Jordi Brandts, Institut d’Anàlisi Econòmica, and David J. Cooper, Florida State University, “Managerial Leadership, Truth-Telling and Efficient Coordination”

Summaries of some of these papers are at  www.nber.org/conferences/organizational-economics-meeting-spring-2021

Behavioral Finance

The NBER’s Behavioral Finance Working Group met April 16 online. Working Group Director Nicholas C. Barberis of Yale University organized the meeting, which was supported by Bracebridge Capital and Fuller and Thaler Asset Management. These researchers’ papers were presented and discussed:

• Stefano Cassella, Tilburg University; Benjamin Golez and Peter Kelly, University of Notre Dame; and Huseyin Gulen, Purdue University, “Horizon Bias in Expectations Formation”

• Spencer Yongwook Kwon and Johnny Tang, Harvard University, “Reactions to News and Reasoning by Exemplars”

• Theis I. Jensen and Lasse H. Pedersen, Copenhagen Business School, and Bryan T. Kelly, Yale University and NBER, “Is There a Replication Crisis in Finance?” (NBER Working Paper 28432)

• Francesca Bastianello and Paul Fontanier, Harvard University, “Partial Equilibrium Thinking in General Equilibrium”

• Ricardo De la O, University of Southern California, and Sean Myers, University of Pennsylvania Wharton School, “Real Cash Flow Expectations and Asset Prices”

• Anna Pavlova and Taisiya Sikorskaya, London Business School, “Benchmarking Intensity”

Summaries of these papers are at  www.nber.org/conferences/behavioral-finance-working-group-meeting-spring-2021

Political Economy

Members of the NBER’s Political Economy Program met April 22–23 online. Program directors Francesco Trebbi of the University of California, Berkeley andEbonya L. Washington of Yale University organized the meeting. These researchers’ papers were presented and discussed:

• Alexander Wolitzky, MIT, and Anton Kolotilin, University of New South Wales, “The Economics of Partisan Gerrymandering”

• Andrei Markevich, New Economics School, Moscow; Natalya Naumenko, George Mason University; and Nancy Qian, Northwestern University and NBER, “The Political Economic Causes of the Soviet Great Famine, 1932–33”

• Ceren Baysan, University of Essex, “Persistent Polarizing Effects of Persuasion: Experimental Evidence from Turkey”

• Thomas Fujiwara, Princeton University and NBER; Karsten Müller, Princeton University; and Carlo Schwarz, Bocconi University, “The Effect of Social Media on Elections: Evidence from the United States”

• Alessandra Casella, Columbia University and NBER, and Jeffrey Guo and Michelle Jiang, Columbia University, “Minority Turnout and Representation under Cumulative Voting. An Experiment.” (NBER Working Paper 28674)

• Bei Qin, Hong Kong Baptist University; David Stromberg, Stockholm University; and Yanhui Wu, University of Hong Kong, “Social Media and Protests in China”

• Pellumb Reshidi, Princeton University, and Alessandro Lizzieri and Leeat Yariv, Princeton University and NBER, “Individual and Collective Information Acquisition: An Experimental Study”

Summaries of these papers are at www.nber.org/conferences/political-economy-program-meeting-spring-2021

Economics of Education

Members of the NBER’s Economics of Education Program met April 29–30 online. Program Director Caroline M. Hoxby of Stanford University organized the meeting. These researchers’ papers were presented and discussed:

• Nathan Jones, Boston University; Matthew A. Kraft and John Papay, Brown University; and Leigh R. Wedenoja, Rockefeller Institute of Government, “The Benefits of Early and Unconstrained Hiring: Evidence from Teacher Labor Markets”

• Christina Brown, University of California, Berkeley; Supreet Kaur, University of California, Berkeley and NBER; Geeta Kingdon, University College London Institute of Education; and Heather Schofield, University of Pennsylvania, “Attention As Human Capital”

• Daniel Herbst, University of Arizona; Miguel Palacios, University of Calgary; and Constantine Yannelis, University of Chicago and NBER, “Equity and Incentives in Human Capital Investment”

• Michela M. Tincani and Enrico Miglino, University College London, and Fabian Kosse, Ludwig Maximilian University Munich, “Subjective Beliefs and Inclusion Policies: Evidence from College Admissions”

• Barbara Biasi and Song Ma, Yale University and NBER, “The Education-Innovation Gap”

• Joseph G. Altonji, Yale University and NBER, and Zhengren Zhu, Yale University, “Returns to Specific Graduate Degrees: Estimates Using Texas Administrative Records”

• Felipe H. Arteaga Ossa, University of California, Berkeley; Adam Kapor and Christopher Neilson, Princeton University and NBER; and Seth D. Zimmerman, Yale University and NBER, “Smart Matching Platforms and Heterogeneous Beliefs in Centralized School Choice”

• Anjali Adukia, University of Chicago and NBER; Alex Eble, Columbia University; and Emileigh Harrison, Hakizumwami B. Runesha, and Teodora B. Szasz, University of Chicago, “What We Teach About Race and Gender: Representation in Images and Text of Children’s Books”

• **Xiaoxiao Li**, Villanova University; **Sebastian Linde**, Medical College of Wisconsin; and **Hajime Shimao**, Santa Fe Institute, “Major Complexity Index and College Skill Production”


• **Jake Anders**, **Alex Bryson**, and **Hedvig Horvath**, University College London, and **Bilal Nasim**, Institute of Education, “The Effects of Pay Decentralisation on Teachers’ Pay and Teacher Retention”

Summaries of these papers are at [www.nber.org/conferences/economics-education-program-meeting-spring-2021](http://www.nber.org/conferences/economics-education-program-meeting-spring-2021)

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**Health Economics**

Members of the NBER’s Health Economics Program met May 6–7 online. Program Director Christopher Carpenter of Vanderbilt University and Research Associate Sara Markowitz of Emory University organized the meeting. These researchers’ papers were presented and discussed:

• **Marcus Dillender**, University of Illinois at Chicago and NBER, “The Health Impacts of Public Health Funding: Evidence and Lessons from the Fight against HIV/AIDS”

• **Gabriella Conti**, University College London, and **Paul Rodríguez-Lesmes**, Universidad del Rosario, “Early Childhood Health Inequalities and In Utero Health Interventions: Evidence from the Treatment of Gestational Diabetes”

• **Nicolás Badaracco**, University of Wisconsin-Madison; **Marguerite Burns**, University of Wisconsin School of Medicine and Public Health; and **Laura Dague**, Texas A&M University and NBER, “In-Kind Welfare Benefits and Recidivism Risk: Evidence from Medicaid”

• **Alice Chen**, University of Southern California; **Elizabeth L. Munnich**, University of Louisville; **Stephen Parente**, University of Minnesota; and **Michael R. Richards**, Baylor University, “Provider Turf Wars and Medicare Payment Rules”

• **Timothy J. Moore**, Purdue University and NBER; **Benjamin Hansen**, University of Oregon and NBER; and **William W. Olney**, Williams College, “Importing the Opioid Crisis? Trade, Smuggling, and Fentanyl Overdoses”


Summaries of these papers are at [www.nber.org/conferences/health-economics-program-meeting-spring-2021](http://www.nber.org/conferences/health-economics-program-meeting-spring-2021)
The *NBER Macroeconomics Annual 2020* presents research by leading scholars on central issues in contemporary macroeconomics. George-Marios Angeletos, Zhen Huo, and Karthik Sastry analyze expectation formation and find that, in response to business cycle shocks, expectations underreact initially but eventually overshoot. This pattern supports models with dispersed, noisy information and overextrapolation of expectations.

Esteban Rossi-Hansberg, Pierre-Daniel Sarte, and Nicholas Trachter contrast the patterns of rising aggregate firm market concentration with falling market concentration over time at the local level. Some associate rising concentration with less competition and more market power, but since most product markets are local, studying changes in local competition, as opposed to trends in aggregate competition, provides important insights.

Adam Guren, Alisdair McKay, Emi Nakamura, and Jón Steinsson develop a novel econometric procedure to recover structural parameters using cross-region variation. They apply this procedure to estimate the effect of housing wealth changes on household consumption.

Peter Klenow and Huiyu Li quantify the contribution of innovation to economic growth. They find that young firms generate roughly half of all productivity growth, that most of the changes in productivity during the mid-1990s were accounted for by developments at older firms, and that most growth results from quality improvements on existing products, rather than the introduction of new products.

Fatih Guvenen, Greg Kaplan, and Jae Song use panel data from the Social Security Administration to assess changes over time in the share of women in the top 1 percent and top 0.1 percent of the earnings distribution.

Joachim Hubmer, Per Krusell, and Anthony Smith Jr. explore the sources of growing wealth inequality. They argue that the significant drop in tax progressivity in the United States starting in the late 1970s was the most important contributor to increasing wealth inequality. Neither the increase in earnings inequality nor the falling labor share can account for a large share of the increase.
This volume presents six new studies on current topics in taxation and government spending.

Benjamin B. Lockwood, Afras Sial, and Matthew Weinzierl investigate the design of income tax schedules when there is uncertainty about the way taxation affects household behavior. Youssef Benzarti studies the costs of income tax filing, which have risen over time because of the numerous tax forms families have to fill out when filing their taxes and because of increased costs of itemizing deductions, and explores ways to simplify filing and reduce those costs.

Diane Whitmore Schanzenbach and Michael R. Strain provide new and comprehensive estimates of the impact of the US Earned Income Tax Credit on the employment of low-income men and women, finding that the great majority of the various expansions of that credit over the last 40 years have increased employment of single mothers. Zhao Chen, Yuxuan He, Zhikuo Liu, Juan Carlos Suárez Serrato, and Daniel Yi Xu review the structure of business taxation in China, and describe a number of tax distortions and potential inefficiencies in the system.

Mark Duggan, Gopi Shah Goda, and Gina Li consider how the Affordable Care Act has affected the health insurance and labor market choices of individuals who are between the ages of 60 and 64, and finds increases in insurance coverage and reductions in employment for some groups. Jeffrey Clemens, Joshua D. Gottlieb, and Jeffrey Hicks consider how reimbursement rates for health care providers under various government insurance programs affect providers’ willingness to take on new patients and expand patient capacity.
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