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Program Report

The Development of the American Economy Program

Leah Boustan, William Collins, and Claudia Goldin*

The mission of the Development of the American Economy Program is to research historical aspects of the American economy broadly defined. Its members are economic historians whose specific interests span many subfields within economics. Economic history is a distinct field, like macro, public finance, and labor, with a group of practitioners who self-identify as economic historians. Economic historians study parts of the past that are relevant to the issues of our day.

Recent work by Ran Abramitzky has demonstrated that economic historians have increasingly become more integrated into mainstream economics.[1] During the past 20 years, an increasing fraction of articles in top economics journals have been in the field of economic history and have been written by economic historians. Historical data and episodes are used, Abramitzky notes, to test theory, to improve policy, to identify channels of causation, and to understand big questions through the natural experiments history offers. The methods used by those who self-identify as economic historians are increasingly like those of other economists, and new Ph.Ds in economic history have prospects similar to those in other fields. Furthermore, economists of all stripes are doing more economic history. Still, there are differences that make the field and its practitioners distinct.

In recent years, the topics of health and mortality, intergenerational mobility, the environment, education, banks, financial crises, the Great Depression, migration and immigration, and corporate governance have led the research interests of associates of the DAE Program. Big data and record

**Claudia Goldin, the Henry Lee Professor of Economics at Harvard University, has served as director of the NBER Program on the Development of the American Economy since 1989. Leah Boustan, professor of economics at Princeton University, and William Collins, Terence E. Adderley Jr. Professor of Economics at Vanderbilt University, will succeed her, becoming co-directors of the program beginning July 2017.*

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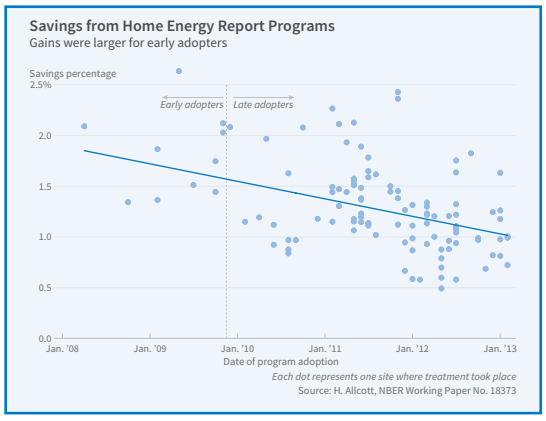

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linkage are among the new methodological areas of interest. This report highlights research in three areas: health and economic growth, immigration and migration, and the Great Depression and the New Deal.

Health and Economic Growth

Health is among the most important aspects of well-being that is not included in standard measures of national income. Studying health changes over the long run reveals both positive and negative dimensions of economic growth. Historically, greater income per capita has improved health through better nutrition.[2] Income growth during the last century has enabled the innovation and diffusion of effective medicines and medical treatments. But economic growth has also fouled air and water, producing setbacks and occasional reversals in measures of health.

Health has been an important research topic for DAE members since the beginning of the program. In the past several years, they have made progress in understanding the magnitude of the negative side of economic growth and also have sought to learn when the detrimental consequences of economic growth were abated, whether through advances in science or intervention of enlightened professionals and dedicated public officials. This research is highly relevant for a number of current issues in both developing and developed nations.

Infant mortality was high in general in the past, and higher still in urban and industrial areas. Even in rich countries, historical infant mortality rates were higher than rates in the poorest nations today.[3] But infant mortality began to decline around the turn of the 20th century. How this happened is explored by Marcella Alsan and Claudia Goldin in a study of Massachusetts, the first state to collect vital statistics and one of the earliest to commit vast resources to secure pure water for its citizens, pass laws to protect its watersheds, and build a mammoth sewerage system to service the area around its largest city, Boston.[4] Using sharp changes in the years that the water and sewerage projects were completed across 54 cities and towns, Alsan and Goldin estimate that the two projects accounted for 37 percent of the total decline in infant mortality among fully treated municipalities during the 1880–1915 period.

Not every state had statistics as reliable as those from Massachusetts. Because mortality rates are computed from two separate series — births and deaths — and because not all states were reporting complete data until 1933, serious data issues can arise. In fact, as shown by Katherine Eriksson, Gregory T. Niemesh, and Melissa Thomasson, because deaths were better reported than births, infant mortality rates have been overstated for much of the 1915–40 period, particularly in southern states and for African Americans.[5] In consequence, the long-run decline in infant mortality for certain groups has been overstated.

Industrialization was one of the great engines of economic growth, but it reduced life expectancy in the factory towns of 19th century England. Walker Hanlon has cleverly figured out how to identify the impact of industrial growth on mortality and has shown that industrial pollution was a major cause of mortality in that era, particularly in urban areas.[6] Hanlon investigates the impact of "dirty" coal on British city growth and separates the positive impact of industrial growth from the negative pollution externalities.[7] Cleaner ways to power industry with coal existed but were not adopted due to low coal prices, a lack of regulations, and the external costs that firms imposed on others. Hanlon shows that had Britain adopted more efficient coal use, it would have been substantially more urbanized by the early 20th century.

Babies were the proverbial "canaries in the coal mine" and died at higher rates as coal-fired electricity generation plants spread in the United States. Exploiting the expansion of the electric grid, Karen Clay, Josh Lewis, and Edson Severnini show the impact of coal pollution on infant deaths from 1938 to 1962, a period of rapid electricity expansion and unregulated emissions.[8] In a related paper, they find that the deadly influenza pandemic of 1918–19 was considerably worse in areas heavily polluted by coal smoke from electric generating plants.[9] Bituminous coal use for home heating varied across states, years, and months for various reasons. Using that variation, Alan Barreca, Clay, and Joel Tarr show the extent to which the reduction in soft coal use from 1945 to 1960, due largely to the greater availability of natural gas, saved both adult and infant lives.[10]

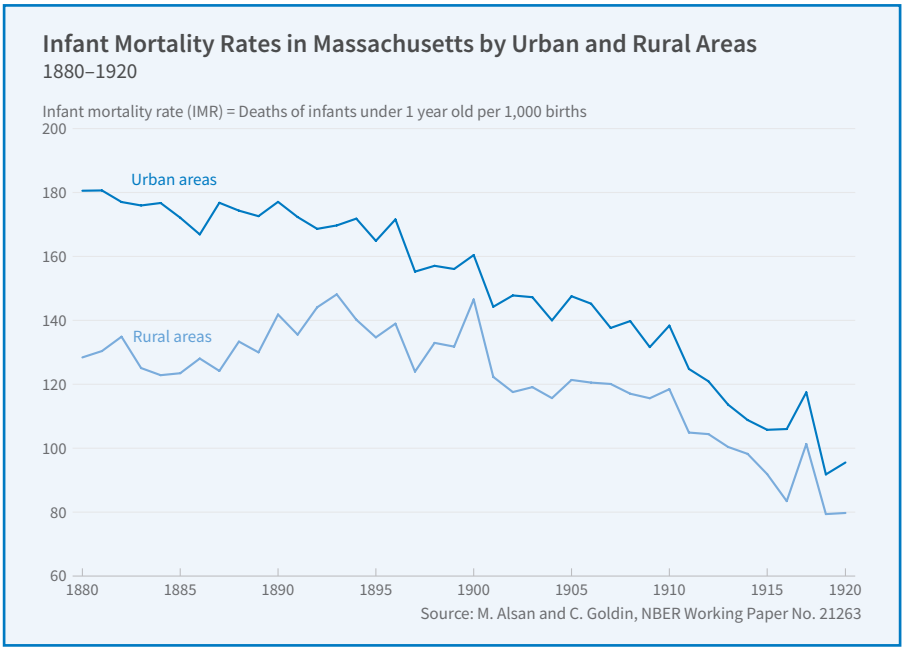

Figure 1

The bottom line is that pollution from coal use in industry, electricity generation, and home heating had measurable and strong negative effects on health and life expectancy.

Economic growth has also led to enormous advances in health since the 1940s with the advent of modern antibiotics and scores of medical techniques and procedures. But some people were ill-served. Not only were they harmed at the time, but the legacy of their neglect is a mistrust of physicians and medicine more generally, as shown by Alsan and Marianne Wanamaker in their insightful analysis of the Tuskegee study.[11] Black men with syphilis went untreated despite the existence of effective antibiotics so that the progression of the disease could be observed. Following disclosure of this in 1972, they show, distrust of medicine increased and persisted among black men, whose lower medical use led to reduction in their life expectancy amounting to about 35 percent of the life expectancy gap between black and white men in 1980.

Immigration and Migration

Immigration has long contributed to population growth and economic activity in the United States. However, immigration rates fluctuate due to changes

The Development of the American Economy (DAE) Program

The Development of the American Economy (DAE) Program was one of the first research programs launched by Martin Feldstein in 1978, when the NBER's headquarters moved from New York to Cambridge. Robert W. Fogel, its founding director, served until 1989, when Claudia Goldin was appointed as his successor. In July 2017, Leah Boustan and William Collins will begin co-directing the program.

in economic conditions and immigration policy. From 1850 to 1920, a period known as the Age of Mass Migration, 14 percent of the U.S. population was foreign born. After a long lull in immigration due to a series of restrictive quotas, the foreign-born share of the population has recently returned to its historical high.

Abramitzky and Boustan survey the historical literature on the economics of immigration, including migrant selection from the home country, immigrant assimilation into the U.S. labor market and society, and the effect of immigrants on native workers.[12] A better understanding of past immigration waves, they note, can inform current thinking about the benefits and challenges of mass migration. DAE program members have broken new ground in the study of historical immigration flows, often by collecting new micro datasets that follow large samples of immigrants over time and by focusing on interesting subsamples of the immigrant population. Related work on migration within the United States has informed discussion about the recent slowdown in geographic mobility and the continued levels of racial residential segregation.

Linked data provide new evidence on questions of migrant selection and assimilation in the early 20th century. Abramitzky, Boustan, and Eriksson have pioneered the creation of large panel datasets of immigrants to the United States. One such matched sample links immigrants from Norway to their childhood homes, providing direct evidence on migrant selection.[13] The results suggest that men with poorer economic prospects were more likely to migrate in the late 19th century. The fathers of migrants tended to have fewer assets and lower occupation-based earnings than the fathers of non-migrants. A similar pattern holds for internal migration within Norway.[14]

Another data collection effort links migrants from 16 sending countries across the U.S. censuses of 1900, 1910, and 1920. The received wisdom is that immigrants began with an earnings disadvantage relative to natives but readily overcame this pay gap over time. These conclusions are drawn from cross-sectional data that compare recently arrived immigrants to immigrants of greater duration in the country. But the linked data show that the typical immigrant did not face a large initial earnings penalty upon arrival relative to native workers and moved up the occupational ladder at the same pace as natives.[15] Differences across methods are due to lower skill levels among the more recent immigrant arrival cohorts, which cause initial earnings differences to appear larger, and the departure of negatively selected return migrants from the longer-standing cohorts. Immigrants did experience a substantial degree of cultural assimilation with time spent in the United States. Abramitzky, Boustan, and Eriksson show that, in the 1910s and 1920s, immigrant and native parents chose from different sets of first names for their children, but that immigrants erased half of this naming gap after spending 20 years in the country.[16]

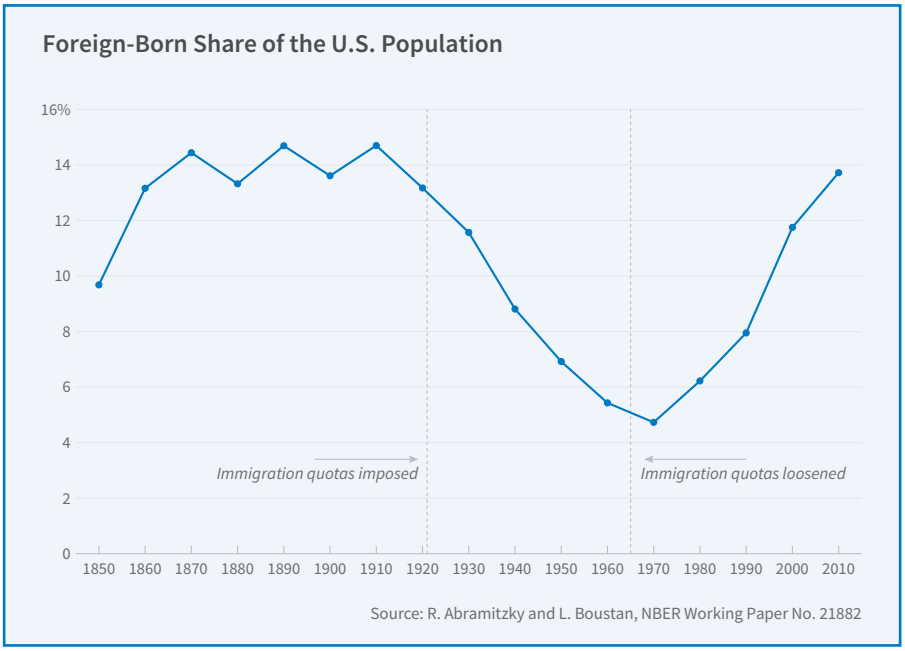

Figure 2

Immigrants with singular skills can have an outsized effect on the economy, beyond their numbers. Petra Moser, Alessandra Voena, and Fabian Waldinger study the effect of one such immigration flow — the 130,000 German Jews who fled the Nazi regime — on innovation.[17] About 2,500 of these arrivals were university professors. The study focuses on academic chemists and finds spillover effects on U.S. scientists. Patenting rates increased in the patent subclasses in which German Jewish chemists had specialized before the war, particularly among young scientists who had never patented before.

The effect of the Age of Mass Migration on the U.S. economy did not end with the tightening of the border in the 1920s. Sandra Sequeira, Nathan Nunn, and Nancy Qian find a positive relationship between migration flows to a county during the Age of Mass Migration and local income and education levels today.[18] They isolate a causal effect of historical immigration flows at the local level by studying variation in the decade in which a county was first connected to the railroad, a link that had a stronger effect on subsequent in-migration if it occurred during a national immigration boom rather than during a lull.

Just as international migration to the United States has undergone dramatic swings, so too has mobility within the country, though the latter is not attributable to regulation. Raven Molloy, Christopher Smith, and Abigail Wozniak

document that, after a period of high and relatively stable internal mobility from 1950 to 1990, interstate migration declined by half in recent years, from 3 percent to 1.5 percent of the population switching states annually.[19] The researchers reject explanations rooted in demographic shifts and instead point to concurrent declines in job transitions, an intriguing topic that should encourage future work.

High rates of internal mobility in the mid-20th century were prompted, in part, by specific migration flows, including black migration out of the rural South and Dust Bowl migration from the Great Plains. Collins and Wanamaker create linked census datasets of black and white southern migrants observed in 1910 and 1930 and find that migrants who moved within or outside the South showed few signs of being positively selected.[20] Instead, migration was widespread regardless of literacy or occupational status.

The Great Migration of black Americans to northern and western cities received book-length treatment by Boustan in a volume published in the DAE series *Long-Term Factors in Economic Development*.[21] Traditionally, the Great Migration has been lauded as a path to black economic progress. Boustan argues that the migrants themselves gained tremendously — more than doubling their earnings by moving to the North — but the new arrivals competed with existing black workers, limiting black-white wage convergence in northern labor markets. Furthermore, many white households responded to black in-migration by relocating to the suburbs. "White flight" was motivated not only by neighborhood racial change but also by the desire to avoid having to pay for the public services and fiscal obligations of increasingly diverse cities.

Internal mobility both across and within regions contributed to a dramatic rise in residential racial segregation in the United States from 1880 to 1940. By 1940, the high levels of racial segregation that characterize U.S. locations today already were well established. Trevon Logan and John Parman have developed a new measure of racial segregation that exploits the complete digitized census manuscripts of 1880 and 1940 and the fact that census enumerators tended to survey neighboring households in order.[22]

The Logan-Parman segregation index — the first to cover the entire nation — doubles in magnitude from 1880 to 1940 and increases at a similar rate in both urban and rural areas. Allison Shertzer and Randall Walsh develop a panel dataset following neighborhoods at the decadal level in the 10 largest northern cities from 1900 to 1930.[23] They find sizable evidence as early as 1910 of white flight from neighborhoods that were attracting black migrants, with each black arrival prompting at least two white departures. Shertzer, Tate Twinam, and Walsh document that municipal zoning codes, first introduced in the 1920s, were used to direct high-density development toward black neighborhoods, further entrenching patterns of residential segregation.[24]

The Great Depression and the New Deal

Economic growth has not been without major reversals, most recently the recession of 2007–09 and most famously the Great Depression of the 1930s. DAE researchers have long worked toward a better understanding of the mechanisms that drive major recessions, as well as the effects of policy responses to macroeconomic crises. Several recent studies revisit the Great Depression, bringing new data and methods to bear on longstanding questions and often offering comparisons with the more recent downturn.

Public bond markets collapsed in the early years of the Depression, constraining the ability of firms with debt coming due to finance their operations. Thus, firms in the same market and subject to similar shocks may have been differentially affected by the Depression depending on the size and maturity structure of their preexisting debt. To study the effect of firms' ability to obtain credit in the early 1930s, Efraim Benmelech, Carola Frydman, and Dimitris Papanikolaou build a dataset that includes the value and maturity of large industrial firms' long-term debt.[25] They find that firms with long-term debt coming due in the early 1930s cut employment by substantially more than others. Firms at the 90th percentile of the distribution of firms by the total amount of debt reaching maturity cut employment by 5 percent more than firms without maturing debt. The effect of financial frictions on employment was especially strong in areas where commercial banks failed, since this curtailed firms' ability to substitute bank loans for bonds. In the aggregate, financial frictions appear to have caused large

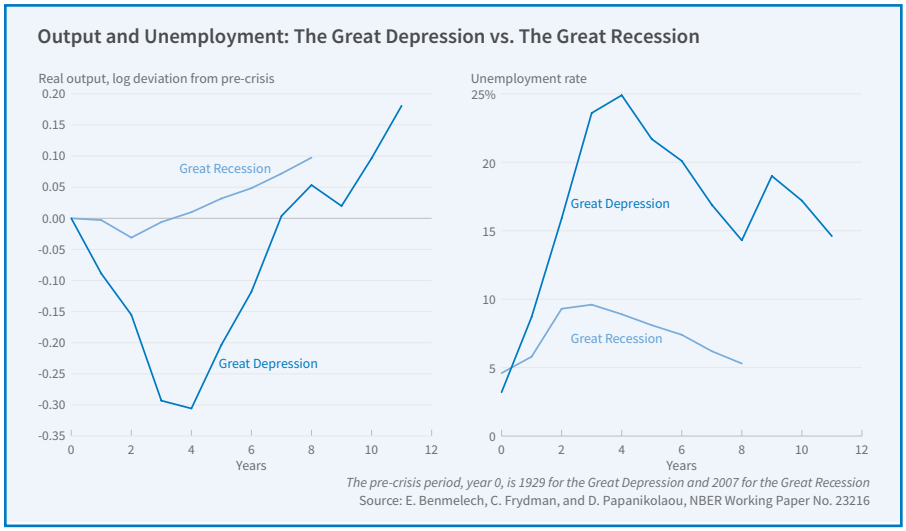

Figure 3

declines in employment in large firms during the Depression, with effects that may have been two to five times larger than in the Great Recession.

Banking crises are a central theme in the economics of the Great Depression, and yet there is still much to learn about how the banking system's distress spread geographically and was communicated to the real economy. Kris Mitchener and Gary Richardson closely examine the pyramidal structure of the interbank deposit network to understand how, during banking panics, heavy withdrawals by banks transmitted distress through balance-sheet effects and reduced lending prior to the bank holiday of 1933.[26] Ultimately, because the Fed did not provide sufficient liquidity to distressed correspondent banks, withdrawals of interbank balances worsened the Depression. The researchers compare the role of bank distress during the Depression with the role of sharp reductions in lending by "shadow banks" in 2007–08.

In a related paper, Jon Cohen, Kinda Cheryl Hachem, and Richardson focus on "relationship lending," in which commercial banks and businesses have a long-term relationship that provides banks with substantial information about the quality of borrowers.[27] Bank suspensions in areas characterized by high levels of relationship lending, they find, had relatively large effects on economic activity, such that approximately one-third of the economic contraction in the early 1930s could be attributed to the collapse of commercial banking.

Shifting from studies of the descent into Depression to studies of the recovery, Joshua Hausman, Paul Rhode, and Johannes Wieland investigate how the dollar's devaluation in 1933 boosted the agricultural sector and thereby yielded significantly positive macroeconomic effects.[28] They show that this "farm channel" was an important impetus to growth in industrial output from March to July 1933. The empirical connection is revealed in the geographic pattern of demand for automobiles in the spring of 1933, when farming areas had large increases in demand. This may reflect the relatively high marginal propensity to consume among farmers who were heavily burdened with debt prior to devaluation and disproportionately benefited from the policy change. The researchers caution that in other settings — modern Japan, for example — redistribution through devaluation could have unintended consequences by redistributing income away from groups with relatively high marginal propensities to consume.

Many DAE researchers have studied the range of programs and policies established under Roosevelt's New Deal, the central legislative response to the Great Depression. Price Fishback has been a key scholar in the area. His summary of the vast literature about the New Deal provides an appreciation for the multiplicity of programs and goals in play. Some programs worked at cross-purposes and others had unintended consequences, for better or worse.[29] Fishback clarifies that whether the New Deal is considered a "success" depends largely on the specific policy, time frame, and subpopulation one has in mind.

Old Age Assistance (OAA) was one of several important social insurance programs implemented during the 1930s. Daniel Fetter and Lee Lockwood exploit the full-count 1940 census of population to measure how this program affected older men's labor supply.[30] Established under the Social Security Act of 1935, OAA provided matching funds to state-administered, means-tested old-age support programs. Using variation across states in program generosity, they find clear labor supply effects of the OAA program. They report that OAA reduced the labor force participation rate of 65- to 74-year-old men by 5.7 percentage points in 1940, in part due to high implicit tax rates in OAA means testing. They add, however, that the social welfare costs of the work disincentives were small.

In related work, Fetter studies how state-level variation in the design of the OAA program influenced payments to the elderly and the fraction of the elderly that received program support.[31] Before the Depression, support for the low-income elderly was a family and local responsibility. The New Deal greatly increased federal and state involvement. Using variation across states in requirements for local funding, Fetter finds that shifting funding responsibility from localities to states increased payments per elderly person, primarily by raising the number of benefit recipients. The results suggest that if states had not taken on some funding responsibility for the federal match, OAA recipiency would have been far lower than it was — 5 percent rather than 22 percent of the elderly.

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Evaluating Energy Efficiency Policies

Hunt Allcott

One of the great mysteries in environmental and energy economics is what's called the "energy efficiency gap." Since the 1980s, a series of influential analyses has constructed energy efficiency cost curves — engineering estimates of the costs of conserving energy. These engineering analyses consistently find that individuals and firms fail to adopt significant privately profitable energy efficiency investments. For example, a widely publicized study by McKinsey & Company found that the U.S. economy could reduce energy demand by 23 percent through privately profitable investments that have a net present value of $700 billion.[1] These findings are closely related to "takeup problems" in other areas, such as "Why don't more farmers use fertilizer and high-yielding variety seeds?" and "Why don't firms adopt privately profitable management technologies?"

If these results are correct, improving energy efficiency presents a remarkable "win-win opportunity" to both lower energy costs and reduce emissions of carbon dioxide and other pollutants. Policymakers have seized on this argument, and there was a remarkable expansion of energy efficiency policy over the past decade: the Bush and Obama administrations both tightened fuel economy standards and appliance energy efficiency standards, and more than half of states have now passed Energy Efficiency Resource Standards that require utilities to run energy conservation programs.

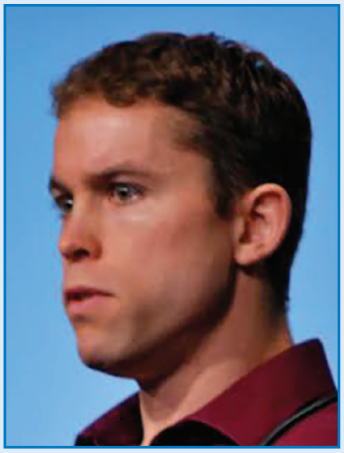
This argument raises two questions. First, for privately profitable energy efficiency investments to remain unadopted, there must be some market failure(s). What are these market failures, and how large are they? An alternative explanation for low adoption of seemingly profitable investments is that the investments are in fact not profitable, and that the engineering analyses by McKinsey and others overstate private net benefits. A further question is: Are the energy efficiency policies now in place well-designed to address the market failures? In this summary, I describe my research on these and other questions, much of it done with a great group of collaborators and colleagues.[2]

The 'Consumer Protection' Rationale for Energy Efficiency Policy

In addition to concern about environmental externalities, policymakers often use a "consumer protection," or "paternalistic," rationale for energy efficiency policy, suggesting that imperfect information and "behavioral" mistakes could explain why consumers don't take up privately profitable energy efficiency investments. One example of the argument is from the U.S. government's 2010 Regulatory Impact Analysis for Corporate Average Fuel Economy (CAFE) standards:

> *"Although the economy-wide or 'social' benefits from requiring higher fuel economy represent an important share of the total economic benefits from raising CAFE standards, NHTSA estimates that benefits to vehicle buyers themselves will significantly exceed the costs of complying with the stricter fuel economy standards this rule establishes. [...] This raises the question of why current purchasing patterns do not result in higher average fuel economy, and why stricter fuel efficiency standards should be necessary to achieve that goal. To address this issue, the analysis examines possible explanations for this apparent paradox, including discrepancies between the consumers' perceptions of the value of fuel savings and those calculated by the agency."*[3]

In 2007, Ian Parry, Margaret Walls, and Winston Harrington described the state of knowledge on these potential behavioral biases: "Unfortunately, there is little in the way of solid empirical (as opposed to anecdotal) evidence on



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Professor Allcott is an applied microeconomist who studies topics in environmental and energy economics, industrial organization, public economics, behavioral economics, and development microeconomics. He uses a variety of tools, including both structural and reduced form econometrics, applied theory, and randomized experiments.

In his spare time, he loves playing sports; his current goal is to become a triathlete. He grew up in Eugene, Oregon and now lives with his fiancée, Anna.

this hotly contested issue."[4]

Since then, three empirical strategies have been used to measure systematic consumer "mistakes" in purchases of energy-using durables such as cars, air conditioners, and lightbulbs. These strategies have close connections to behavioral economics work in other domains, such as tax salience, health, and retirement savings.[5]

The first strategy builds on the insight that, absent credit constraints, consumers should care only about a good's total user cost, not the share of that cost that comes from purchase price versus energy costs versus other costs. For example, consumers should be indifferent between a $1 increase in purchase price and a $1 increase in present discounted energy costs. A seminal 1979 paper by Jerry Hausman tests this indifference condition using a cross-sectional discrete choice model.[6] One problem with Hausman's paper and many subsequent analyses is that more expensive or higher fuel economy cars could have different unobserved characteristics, which would bias the comparison of vehicle price and energy cost elasticities. Several papers, including one that I wrote with Nathan Wozny, have made progress on this issue by studying used-vehicle markets.[7] When gas prices increase, low fuel economy vehicles should lose value relative to high fuel economy vehicles because the present value of future fuel costs increases more. Using estimates of vehicle lifetimes, utilization, and discount rates, we can predict how much the relative price of, say, a three-year-old Honda Civic DX should decrease relative to, say, a five-year-old Honda Civic Hybrid if consumers fully value fuel costs. We tested this prediction using data from 86 million used vehicle transactions from 1999 to 2008. Used vehicle prices were sharply responsive to gasoline prices, but slightly less than our model predicted, suggesting that consumers slightly undervalued fuel costs.

A second empirical strategy is to measure the effect of energy cost information on demand. If an information intervention has significant effects, this suggests that consumers would be imperfectly informed or inattentive in the absence of the intervention. On the other hand, if information has no effect, this suggests that imperfect information and inattention do not systematically affect demand. Dmitry Taubinsky and I formalized a model of consumer misoptimization and implemented two randomized experiments to identify the necessary parameters for welfare analysis.[8] We found that consumers are at most moderately inattentive or misinformed. In our model, while a $2 to $3 subsidy for energy-efficient lightbulbs increases welfare, a ban on traditional incandescents does not. Christopher Knittel and I extended this approach with two field experiments with new vehicle buyers. In both experiments, we found no effect of fuel economy information on the fuel economy of vehicles purchased, with standard errors tight enough to rule out economically meaningful systematic inattention or misinformation.[9]

A third empirical strategy for measuring "mistakes" is to measure consumers' beliefs directly and compare them to an objective benchmark. To do this, I implemented a large, nationally representative survey that elicited beliefs about gas costs for the vehicles that people currently own and for other vehicles. I combined the elicited beliefs with choice data to estimate a structural demand model, then used the model to predict differences in market outcomes and welfare in the absence of belief errors. In the data, consumers have at most a small systematic bias in their perceptions of fuel cost savings from higher fuel economy vehicles, and welfare losses are thus small.[10]

This body of research suggests two conclusions. First, the optimal energy efficiency policies calibrated with the empirical estimates discussed above are not very stringent relative to some policies currently in place. For example, Sendhil Mullainathan, Taubinsky, and I develop a formal model of optimal taxation with misoptimizing consumers along with a simulation model of the auto market. In our model, the optimal fuel economy standards are less stringent than the standards currently in place.[11] Knittel and I find similar results in a more stylized model. Second, if consumers have heterogeneous information or bias, it is important to consider the targeting of energy efficiency policy. Knittel, Taubinsky, and I show that adopters of major energy efficiency subsidies tend to be more informed about and attentive to energy costs than non-adopters, implying that better-targeted policies might generate larger welfare gains.[12]

Evaluating Energy Conservation Nudges

In recent years, interest in "behavior-based" energy conservation programs has increased significantly. In this context, "behavior-based" refers to using approaches from applied psychology, such as goal setting and social comparisons, to encourage energy conservation. Interest in such approaches is not limited to energy efficiency: they are also used to encourage smoking cessation, healthy eating, retirement savings, charitable giving, and other choices thought to have individual or social benefits.

Perhaps the most salient example of behavior-based energy conservation is the Home Energy Report, a letter that compares a household's energy use with that of its neighbors and provides energy conservation tips. As a measure of the program's importance, the leading Home Energy Report provider, Opower, works with about 100 utilities, sending Home Energy Reports to 15 million households. In most programs, people receive Home Energy Reports every month or every few months over several years.

Several academic papers, including one that I wrote, evaluate early Home Energy Report programs.[13] In my first paper on this topic, I studied the first 10 Home Energy Report programs, finding that they were highly cost effective. Relative to traditional conservation programs like weatherization subsidies, they caused more conservation at less cost to the utility.

In subsequent work, I have addressed additional questions about these programs. First, would the program's initial evaluation results generalize to other sites? This extrapolation problem is of course fundamental to empirical work, regardless of the exact setting. In a 2015 paper, I analyze results from the 101 sites that followed the first 10.[14] I show that there had been "site selection bias": early sites were selected from later sites through mechanisms correlated with the

treatment effect, some of which could be explained through intuitive observable mechanisms, and some of which reflected selection on unobservables. Just as individuals endogenously select into treatment in the absence of random assignment, these results show how sites endogenously select into evaluations. This paper is of interest in the program evaluation literature because it shows that even many replications may not be enough to make correct policy implementation decisions. In some cases, either we need an evaluation in a fully representative population, or we need to focus on theoretical insights that might be more generalizable than a treatment effect estimate.

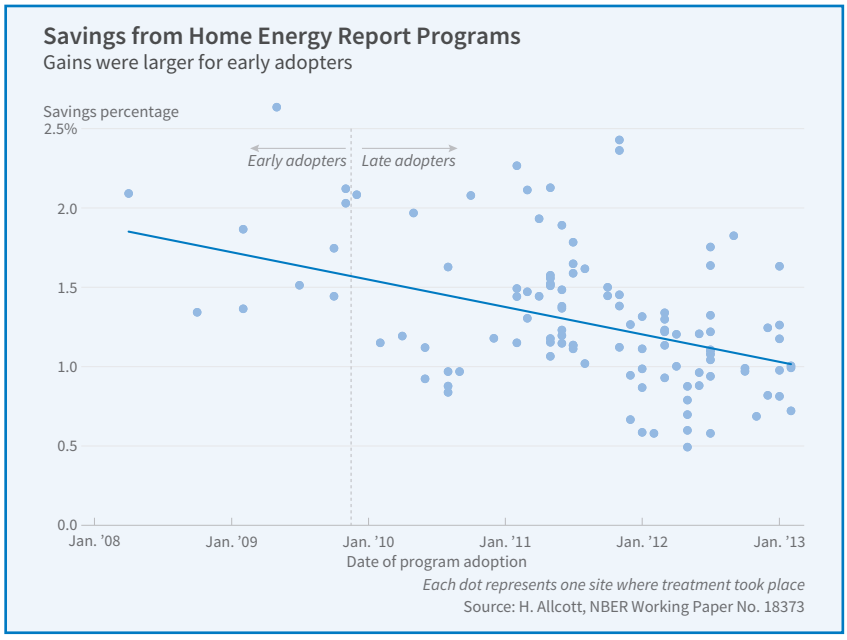

Figure 1

Second, to what extent are the results driven by malleable attention? Using hundreds of millions of observations of daily electricity-use data, Todd Rogers and I show that responses to repeated Home Energy Reports are consistent with a "cue theory" or time-varying persuasive advertising model: the reports draw attention to energy conservation for about 10 days, after which the effect decays until the next report is received.[15] Eventually, consumers begin to change their capital stock, and the treatment effects become persistent even after the intervention is discontinued. Rogers and I were not able to definitively measure the extent to which the capital stock changes reflected new physical capital investments versus different utilization habits. A more recent paper shows that the bulk of these changes were in fact physical capital.[16]

Third, what are the program's social welfare effects? "Nudges" in many domains are evaluated using cost effectiveness metrics — how much did the program cost to implement, and how much did behavior change? — instead of social welfare assessment. Many economists have questioned whether such interventions are truly welfare enhancing; Edward Glaeser and others have argued that some nudges are "emotional taxes" that guilt individuals into behavior change without the benefit of raising revenue.[17] Home Energy Reports are perhaps the ideal setting to evaluate welfare effects of a "nudge" intervention, because they are a private good that can be sold, allowing us to use experienced recipients' willingness to pay as a measure of consumer welfare effects. In partnership with Opower and a partner utility, Judd Kessler and I sold future Home Energy Reports to thousands of prior recipients using an incentive-compatible multiple price list.[18] We combine willingness to pay with the value of externality reduction in a full social welfare evaluation and find that while the program increased welfare, traditional evaluations substantially overstate welfare gains.

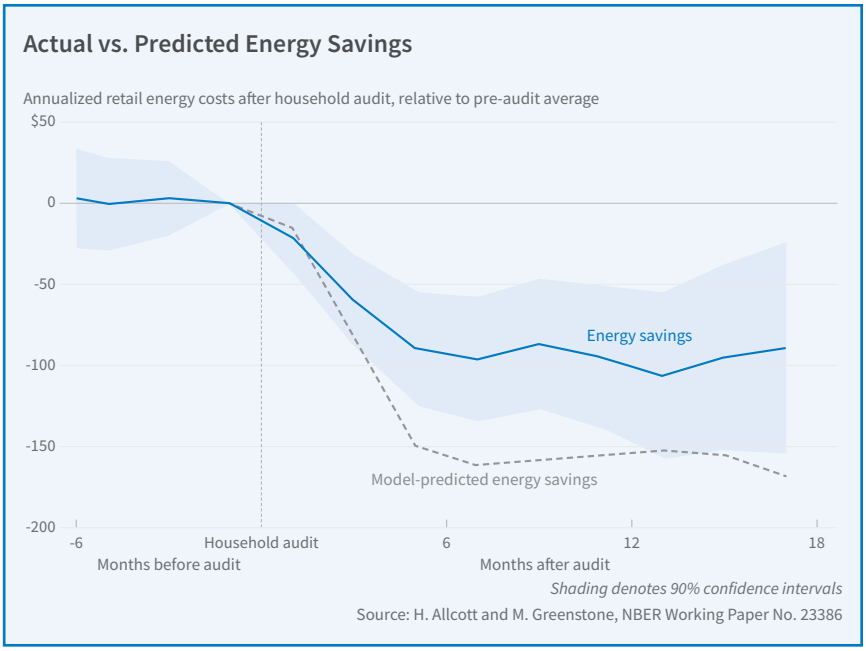

Figure 2

Measuring Welfare Effects

One theme that connects several of the above papers is the selective use of revealed preferences to carry out welfare analyses in situations with potential informational or behavioral market failures. I continue this line of thought in research with Michael Greenstone.[19] This paper empirically quantifies two concerns with energy efficiency cost curve analyses such as the aforementioned McKinsey study. First, we show that the engineering models substantially over-

state actual, empirically estimated energy savings in our context. Our work, along with related research by Meredith Fowlie, Greenstone, and Catherine Wolfram, suggests that findings that consumers fail to adopt seemingly profitable energy efficiency investments may be at least partially explained by the investments not being profitable, not by market failures that reduce adoption.[20] Second, we use investment takeup data to show that energy efficiency investments entail substantial non-monetary costs and benefits that the engineering analyses ignore. We combine experimental and quasi-experimental data in a simple structural model to measure the welfare effects of a large federally funded energy efficiency program. In the context of our model, the program reduces welfare.

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5 *I describe these connections and provide a more detailed overview of this work in H. Allcott, "Paternalism and Energy Efficiency: An Overview," NBER Working Paper No. 20363, August 2014, and* Annual Review of Economics, *8(1), 2016, pp. 145–76.*
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7 *H. Allcott and N. Wozny, "Gasoline Prices, Fuel Economy, and the Energy Paradox," NBER Working Paper No. 18583, November 2012, and* The Review of Economics and Statistics, *96(10), 2014, pp. 779–95; M. Busse, C. Knittel, and F. Zettelmeyer, "Are Consumers Myopic? Evidence from New and Used Car Purchases,"* American Economic Review, *103(1), 2013, pp. 220–56; and J. Sallee, S. West, and W. Fan, "Do Consumers Recognize the Value of Fuel Economy? Evidence from Used Car Prices and Gasoline Price Fluctuations," NBER Working Paper No. 21441, July 2015, and* Journal of Public Economics, *135, 2016, pp. 61–73.*
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9 *H. Allcott and C. Knittel, "Are Consumers Poorly Informed about Fuel Economy? Evidence from Two Experiments," NBER Working Paper No. 23076, January 2017.*
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10 *H. Allcott, "The Welfare Effects of Misperceived Product Costs: Data and Calibrations from the Automobile Market,"* American Economic Journal: Economic Policy, *5(3), 2013, pp. 30–66; and H. Allcott, "Consumers' Perceptions and Misperceptions of Energy Costs,"* American Economic Review, Papers and Proceedings, *101(3), 2011, pp. 98–104.*
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11 *H. Allcott, S. Mullainathan, and D. Taubinsky, "Energy Policy with Externalities and Internalities,"* Journal of Public Economics, *112 (April), 2014, pp. 72–88.*
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12 *H. Allcott, C. Knittel, and D. Taubinsky, "Tagging and Targeting of Energy Efficiency Subsidies,"* American Economic Review, Papers and Proceedings, *105(5), 2015, pp. 187–91.*
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13 *H. Allcott, "Social Norms and Energy Conservation,"* Journal of Public Economics, *95(9–10), 2011, pp. 1082–95; I. Ayres, S. Raseman, and A. Shih, "Evidence from Two Large Field Experiments that Peer Comparison Feedback Can Reduce Residential Energy Usage," NBER Working Paper No. 15386, September 2009; and D. Costa and M. Kahn, "Energy Conservation 'Nudges' and Environmentalist Ideology: Evidence from a Randomized Residential Electricity Field Experiment," NBER Working Paper No. 15939, April 2010.*
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Developments in the Asset Management Industry

Itzhak Ben-David

Itzhak (Zahi) Ben-David is a research associate with the NBER Corporate Finance Program. He is the Neil Klatskin Chair in Real Estate and Finance at the Fisher College of Business at The Ohio State University and the academic director of the Ohio State Center for Real Estate.

Professor Ben-David's research program spans several areas. In regard to equity markets, Ben-David explores the impact of passive and active institutional investors on financial markets (e.g., prices, arbitrage). In behavioral finance, Ben-David examines how psychological biases impact the behavior of investors and managers. Finally, in the area of real estate research, Ben-David has contributed to the understanding of the microfoundations of the housing bubble of the early 2000s. His work includes an investigations of borrower fraud and misaligned incentives of loan officers and appraisers, as well as the effects of financial education and predatory lending.

Ben-David's academic work has been published in top economics and finance journals and is widely cited in both academic literature and general media. Ben-David holds a Ph.D. and an M.B.A. from the University of Chicago, an M.Sc. in Finance from London Business School, and a B.Sc. and an M.Sc. in Industrial Engineering and a B.A. in Accounting from Tel Aviv University. Prior to joining academia, Ben-David worked in the real estate industry.

Ben-David lives in Columbus, Ohio, with his wife Ayelet and is blessed with four delightful daughters: Shelly, Maia, Romy, and Talia.

Over the last two decades, the asset management industry has witnessed dramatic developments in both industrial organization and product offerings. Two or three decades ago, the industry was dominated by small asset managers primarily offering active portfolio management services. Today, the industry is significantly more concentrated and the leading products are index-based passive investment vehicles. My recent research examines some of the consequences of these developments.

The asset management industry is significantly more concentrated today than a few decades ago. Figure 1 shows the dramatic increase in industry concentration: in the United States, the top 10 managers owned about 5 percent of the U.S. stock market in 1980, whereas in 2016 they owned about 23 percent. Francesco Franzoni, Rabih Moussawi, John Sedunov, and I find that this development has increased the volatility of the underlying securities in the U.S. stock market.[1] Our hypothesis is that this increase in concentration has led to disproportionately larger trades by asset managers, which in turn has led to greater volatility in the underlying securities.

There are many anecdotal examples of this phenomenon. For example, the September 2014 departure of Bill Gross, co-founder of PIMCO, the largest bond fund, led to large withdrawals. In turn, PIMCO's Total Return Fund had to liquidate a large fraction of its holdings, leading to an impact on bond and futures prices. Other examples include trades by the London Whale in JP Morgan and the computer glitch at the large broker Knight Capital that led to massive selloff of equities in 2012. But massive trades by large institutions are not necessarily a result of cataclysmic events. They may be the result of portfolio rebalancing, or correlated trades across units

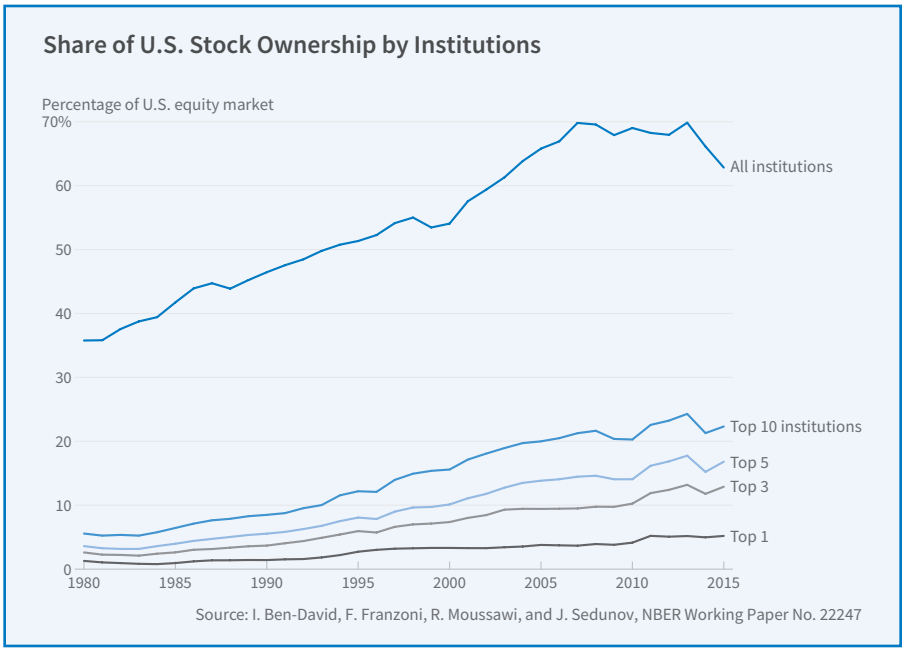

Figure 1

within the organization — for example, if units use the same information provided by a single research department, or flows from investors are driven by a marketing effort of the organization. Nevertheless, large institutions could cause market disruptions since their trades are large relative to typical market volume.

We identify the causal effect of large institutional investors on volatility using two main techniques: First, we exploit the fact that prior research documented that top institutional ownership is higher for local stocks, thus allowing a plausibly exogenous shock to top institutional ownership. Second, we examine the change in institutional ownership following the 2009 merger of Barclays Global Investors, the largest asset manager, and BlackRock, the 14th largest. Following the merger, the size of the largest asset manager increased by 40 percent. Using these identification strategies, we find that the large trades of the top institutional investors increase volatility. We suggest that these trades introduce noise to prices, and that the effects are particularly strong during times of market stress.

Another significant development in the asset management industry is the introduction of exchange-traded funds (ETFs). These investment instruments have been one of the fastest-growing asset classes over the last two decades. ETF securities were first issued in the mid-1990s. Today, they account for over 10 percent of the U.S. stock market capitalization and over 35 percent of traded volume. By investing in ETFs, investors have indirect exposure to a basket of securities, typically defined based on an index, and enjoy continuous trading in real time as well as low transaction and management costs. While ETFs can provide some advantages to investors, these novel securities may also pose challenges to the integrity of the securities market. My research examines some of the possibly unintended effects of the growth of ETFs.[2] The discussion presented here is based on my recent survey of the literature, which was co-authored with Franzoni and Moussawi.[3]

ETFs are structured as funds that hold a basket of securities, or hold derivatives, in a way that replicates the performance of an index. The funds issue shares against these assets, and thus allow investors to hold and trade shares that are backed by a basket of securities. In this respect, their structure is similar to that of closed-end funds. Investors who trade the shares of an ETF, like those who trade in closed-end funds, trade with each other in the secondary market. There is, however, an important distinction between closed-end funds and ETFs. One of the major disadvantages of closed-end funds is that the secondary market often shows a premium or a discount of the fund's share price relative to the underlying basket's net asset value (NAV). This can make the fund unappealing to investors who wish to track the underlying index closely.

There are two arbitrage mechanisms that force the ETF share price to track net asset value very closely. One form is operationalized by approved participants (APs), financial agents designated by the ETF sponsor who arbitrage the ETF shares against the securities in the underlying basket. If the price of the ETF is greater than the NAV, then an AP would buy the basket of underlying securities in the market and exchange it with the ETF sponsor for newly created ETF shares, which will be sold later in the market. The reverse transaction takes place when the ETF is undervalued relative to the basket's NAV: the AP buys the ETF in the open market and sells it to the ETF sponsor in exchange for a basket of the underlying securities. Later, the AP sells the basket of securities in the open market. These transactions create price pressure on both the ETF shares and the shares of the underlying securities, narrowing the price discrepancy. This form of arbitrage is effectively an expansion and contraction of the supply of ETF shares in real time in response to mispricing.

The other form of arbitrage is done by market participants (arbitrageurs). Whenever an arbitrage opportunity arises, they buy the cheap asset and short-sell the expensive one. With sufficient price pressure, the price gap between the assets closes. This means

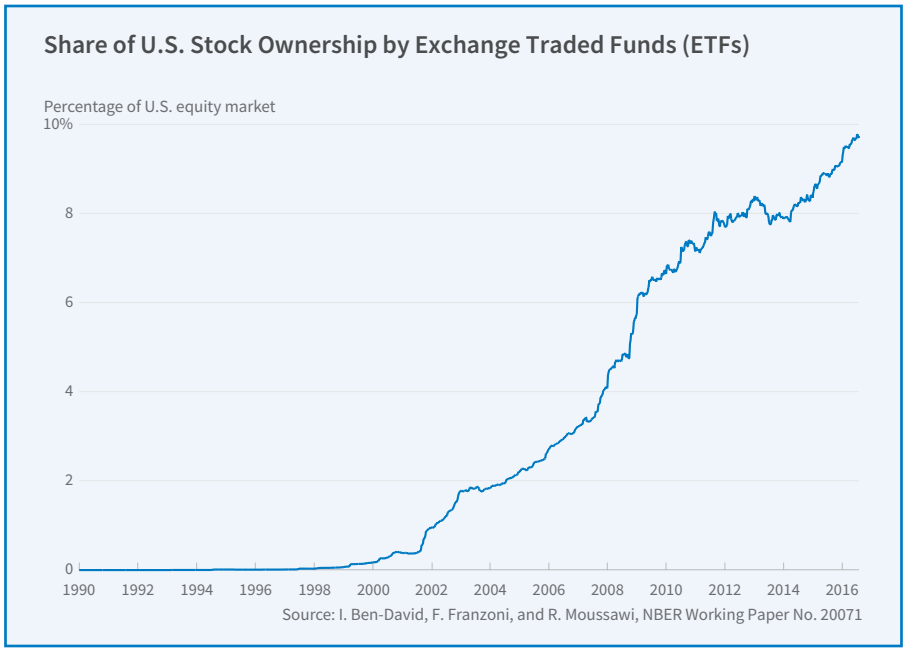

Figure 2

that the ETF effectively tracks the basket of underlying securities very closely.

While there is broad agreement that ETFs broaden investment possibilities and provide low-cost and diversified vehicles for investors, there is an ongoing debate about their effects on the volatility, correlation structure, and liquidity of the underlying securities. The apparently advantageous feature of continuous trading and tight arbitrage may sometimes impair the pricing of securities in the underlying portfolio. Whenever there is a deviation between the prices of the ETF and that of the underlying portfolio, APs and arbitrageurs have an incentive to engage in trading. Any divergence in prices will trigger arbitrage, even if its source of mispricing is a temporary liquidity shock to the ETF. Consider what happens if a large hedge fund chooses to rebalance its portfolio and purchases a large number of ETF shares. This increase in demand does not bear fundamental information about the underlying value of the index and thus, in theory, should not result in an increase in the value of the underlying securities. However, through the arbitrage mechanism, this demand shock will translate into an increase in the price of the underlying securities. The large purchase transaction increases the market price of the ETF, leading to overpricing of the ETF relative to the price of the underlying securities. This leads APs and arbitrageurs to short sell the ETF and to purchase the underlying portfolio, creating price pressure on both types of securities. The result is that the non-fundamental disturbance in ETF pricing due to a non-fundamental shock is transmitted to the underlying stocks through the arbitrage mechanism.

Franzoni, Moussawi, and I find evidence that stock ownership by ETFs leads to an increase in the volatility of the securities in the underlying portfolios.[4] The main empirical challenge is determining whether ETF ownership actually causes the increase in volatility. Our approach is to compare stock volatility and ETF ownership for stocks that switch between the Russell 1000 and Russell 2000 indices. FTSE Russell maps stocks to their indices broadly according to the stocks' market capitalization. The largest 1000 U.S. stocks constitute the Russell 1000 and the following 2000 smaller stocks make up the Russell 2000. Both indices are value-weighted. What makes this classification interesting is that stocks in the top of the Russell 2000 have significantly higher weight in that index than stocks in the bottom of the Russell 1000 in their index. When a stock's market capitalization declines enough to move the stock from the Russell 1000 to the Russell 2000, the demand among ETFs to hold the stock increases dramatically following the move. In an opposite manner, when a stock moves from the Russell 2000 to the Russell 1000, ETF ownership decreases. This discrete jump in ETF ownership allows us to test the hypothesis that an increase in ETF ownership causes an increase in volatility, and a reverse effect when ETF ownership decreases. Our empirical analysis confirms that stocks that were reclassified experience a sharp increase in ETF ownership [see Figure 3] and a simultaneous increase in volatility. The increase in volatility appears to stem from the arbitrage activity between ETF prices and the prices of the underlying portfolio. We also find that stock returns following large ETF flows tend to revert, suggesting that the increase in volatility reflects greater noise in stock prices.

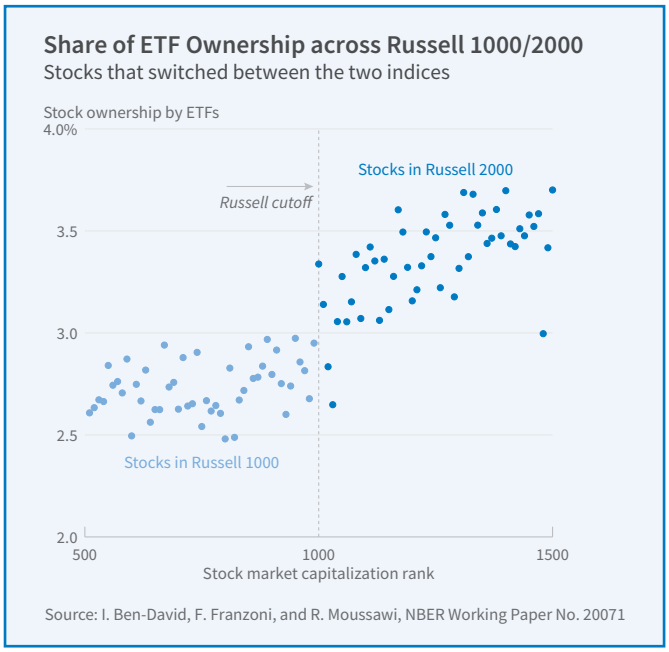

Figure 3

In recent years there is mounting evidence that arbitrage activity does not always match the textbook example, as seen in the case of ETFs. In another project, Franzoni, Moussawi, and I examine arbitrage activity by hedge funds in the U.S. stock market prior to and during the financial crisis of 2007–09.[5] We often think about hedge funds as textbook arbitrageurs that take positions in securities in the face of mispricings, and therefore help correct them. In contrast, our study finds that hedge funds significantly reduced their holdings in U.S. stocks ahead of the crash of 2008. This activity was driven primarily by funding constraints, where hedge funds that were leveraged and hedge funds that experienced investor withdrawals reduced their equity positions the most. Overall, this evidence shows that hedge funds did not contribute to stabilizing prices in the financial crisis of 2007–09.

Hedge funds do not only abstain from the market in volatile times, they may also increase the noise in prices. In a study by Franzoni, Augustin Landier, Moussawi, and I, we document that hedge funds manipulate stock prices around reporting dates.[6]

In particular, we report that stock prices that are owned by hedge funds at the end of the month experience a temporary price jump in the last minutes of the trading day. The effect reverses the following morning. This price pressure is likely to be targeted at inflating monthly returns and performance compensation.

The rising concentration in the asset management industry and the rise of ETFs not only change the way investors invest, but also affect the character of the securities market. Large asset managers induce non-fundamental volatility through large trades, and ETFs propagate liquidity shocks originated by investors. Furthermore, arbitrageurs, and specifically hedge funds, may not always absorb and correct these shocks and may even contribute to the noise in prices. These findings suggest that the performance and risk of securities is not only determined by their cash flows and prospects but also by the nature of their investors.

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[1] *I. Ben-David, F. Franzoni, R. Moussawi, and J. Sedunov, "The Granular Nature of Large Institutional Investors," NBER Working Paper No. 22247, May 2016.*
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[2] *I primarily discuss ETFs, which are the largest investment vehicle among exchange traded pooled investment vehicles. These vehicles are collectively called exchange traded products (ETPs), and include ETFs; exchange traded notes (ETNs), which are senior debt notes and do not invest in a portfolio of securities or a portfolio of derivatives on those securities; and exchange traded commodities (ETCs), which provide investors exposure to individual commodities or baskets and can be structured as funds or notes.*
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[3] *I. Ben-David, F. Franzoni, R. Moussawi, "Exchange Traded Funds (ETFs)," NBER Working Paper No. 22829, November 2016.*
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[4] *I. Ben-David, F. Franzoni, and R. Moussawi, "Do ETFs Increase Volatility?" NBER Working Paper No. 20071, April 2014.*
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[5] *I. Ben-David, F. Franzoni, and R. Moussawi, "Hedge Fund Stock Trading in the Financial Crisis of 2007–09,"* The Review of Financial Studies *25(1), 1–54, November 2011.*
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[6] *I. Ben-David, F. Franzoni, A. Landier, and R. Moussawi, "Do Hedge Funds Manipulate Stock Prices?"* The Journal of Finance *68(6), 2383–434, November 2013.*
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Price Dispersion and Bargain Hunting in the Macroeconomy

Greg Kaplan

In macroeconomic models, product markets are typically very simple. Consumers are treated as price-takers while firms trade against fixed demand curves. There is little that either households or firms can do to affect the terms of trade that they face in product markets.

But in reality there are many actions that buyers can take to influence the prices they pay. For example, in the retail market, households can pay more attention to price comparisons, travel to different stores, visit stores more frequently, switch brands, buy in bulk, or use coupons. In the wholesale market, firms can devote more resources to negotiating purchasing contracts or to exploring alternative suppliers. I refer to these actions collectively as *bargain hunting*. Similarly, sellers can take actions to alter the effective elasticity of demand that they face — for example, by expanding their presence in product markets through advertising, introducing new products, entering new geographic or demographic markets, or investing in long-term customer acquisition.

My research, carried out with a number of collaborators, has explored the implications of exerting effort in product markets for the behavior of the macroeconomy, both empirically and theoretically.

Different People, Different Prices

Bargain hunting presupposes that it is actually possible for a buyer to purchase the same product at more than one price. And if bargain hunting is indeed going on, then we should expect to see buyers differ in the prices they ultimately pay, in a way that is correlated with the effort they exert. A good area to start investigating bargain hunting is among final consumers in retail markets, because of the availability of detailed data on retail prices and household shopping behavior. Guido Menzio and I built on a long literature documenting price dispersion among identical goods by conducting a comprehensive investigation into the nature of price dispersion in the retail sector, with a view to relating this dispersion to bargain hunting.[1]

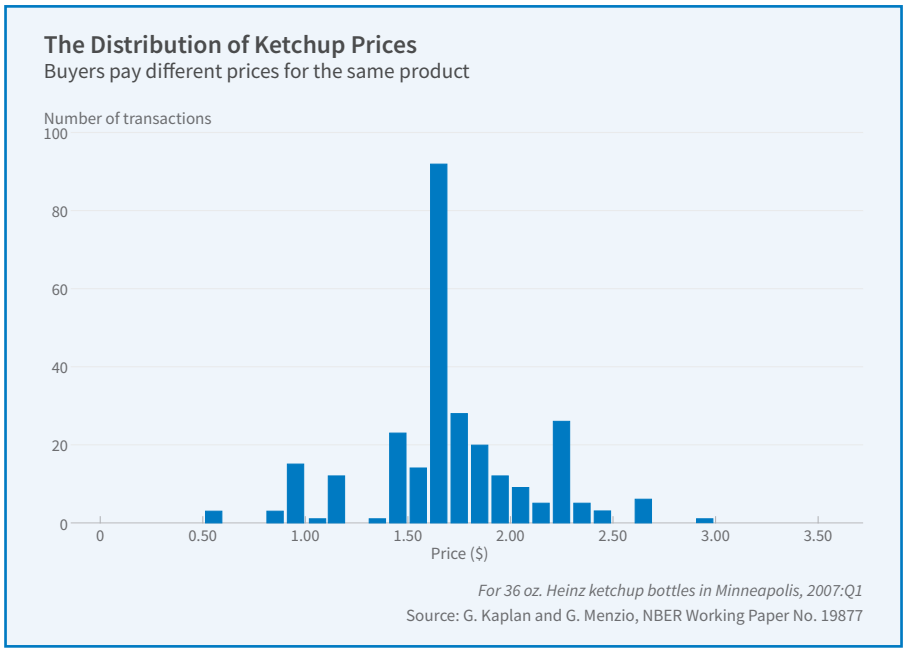

Figure 1

Consistent with previous studies, we confirmed that price distributions for identical goods (as defined by their bar codes) in a given geographic market and time period, are highly dispersed; on average the standard deviation of log prices is around 20 percent. However, perhaps surprisingly, only a small fraction of this dispersion arises because some stores are more expensive than other stores. We can infer this because our scanner data allows us to observe the same store selling lots of different goods, the same good sold at lots of different stores, and the same good being sold at the same store in many different transactions. Most of the observed dispersion in prices actually takes place *within* stores. About half is due to a transaction component that captures both temporal variation in the price of a good at a given store due to temporary sales and other price changes and the fact that not all customers pay the same price for the same good on the same day because, for example, some use coupons or loyalty cards. The other half is due to persistent differences in the prices charged for a given product across stores that are equally expensive on average.

We refer to this latter component as *relative price dispersion*; in a follow-up paper with Nicholas Trachter and Leena Rudanko, we confirmed its existence using a much larger scanner dataset and more systematic methods.[2] We borrowed our empirical approach from labor economics, decomposing price distributions into components with different dynamic properties. This allowed us to measure how much of within-store price dispersion is due to tem-

poral variation, like sales, and how much is due to persistent price differences. An important feature of relative price dispersion is that it implies asymmetries in the average price of different goods at different retailers: one seller may price high in one good and low in another, while another seller sets a low price for the former good and a high price for the latter good, even though on average the two sellers charge the same price for the bundle.

Price dispersion arising from either temporal variation or persistent price differences is amenable to bargain hunting. For example, temporary sales present the opportunity to time purchases in order to take advantage of lower prices; while relative price dispersion presents the opportunity to split shopping across multiple stores in order to buy each product where it is cheapest. Both types of bargain hunting require effort on the part of households, the extent of which differs across households and responds to idiosyncratic and aggregate shocks.

But households don't subsist on a single good — rather they consume large bundles of goods. Does all this heterogeneity in prices wash out at the level of the household bundle? Or is there dispersion also in household-level price indexes, i.e. in the price of bundles? Following the approach of Mark Aguiar and Erik Hurst, who investigated differences in prices paid between working-age households and retirees,[3] we also examined price index distributions, and performed a similar decomposition into store components, store-good components, and transaction components. We found that there is about half as much dispersion in household price indexes as there is in prices — a standard deviation of logs of around 10 percent. Less than half of this dispersion arises because different households concentrate their shopping at different sets of stores. Rather, price index dispersion arises predominantly because different households exhibit a variety of shopping patterns at the same set of stores — shopping more or less frequently, visiting more or fewer stores on a given shopping trip, timing purchases more or less effectively, using or not using coupons.

The natural next question is which households pay lower prices and which bargain hunting activities enable them to do so. We confirmed Aguiar and Hurst's finding that older households pay lower prices than younger households. We also found that households with more employed members pay significantly higher prices than households with fewer employed members, even conditional on age. Both age and employment can be interpreted as proxies for the shadow value of time, so these findings are consistent with a setting in which bargain hunting is a time-consuming activity. Indeed,

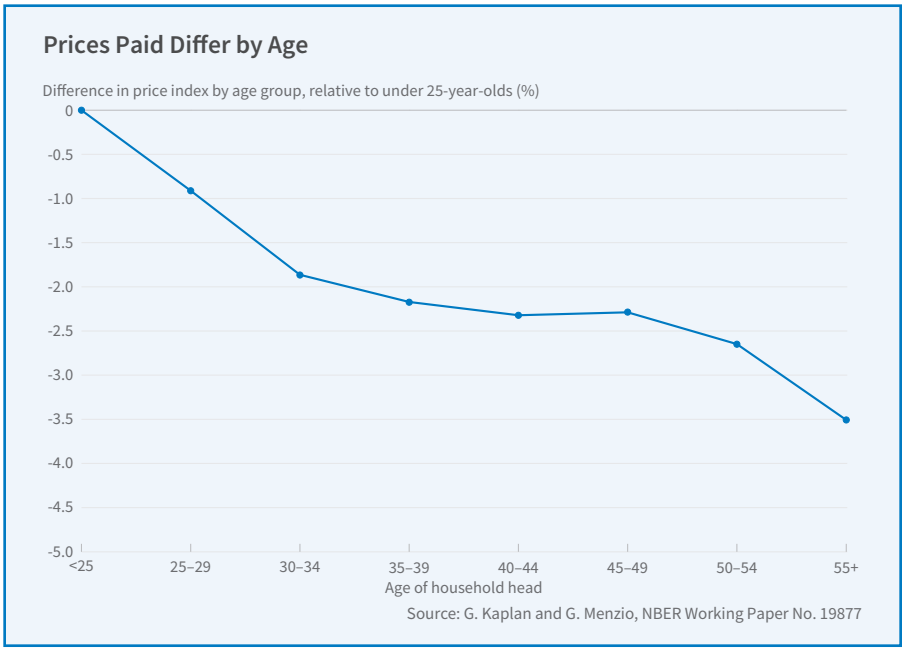

Figure 2

Greg Kaplan is professor of economics at the University of Chicago. His research spans macroeconomics, labor economics and applied microeconomics, with a focus on the distributional consequences of economic policies and economic forces. He has published extensively on the topics of inequality, risk sharing, unemployment, household formation, migration, fiscal policy, and monetary policy.

Kaplan previously was a professor and assistant professor in the Department of Economics at Princeton University, assistant professor in the Department of Economics at the University of Pennsylvania, and an economist in the Research Department of the Federal Reserve Bank of Minneapolis. He has held visiting positions at the University of New South Wales and the Reserve Bank of Australia. He is an editor at the *Review of Economic Dynamics,* a research associate in the NBER's Economic Fluctuations and Growth Program, and a research fellow at the Institute for Fiscal Studies.

Kaplan received a Ph.D. from New York University in 2009, an M.Sc. from the London School of Economics in 2002, and a B.Com. with honors from Macquarie University in 2000.

regressing household price indexes on the frequency of shopping trips, the number of stores visited, and intensity of coupon usage reveals that all three are strongly associated with paying lower prices. Visiting more stores has a particularly strong effect on household price indexes.

The Inflation Rate?

Macroeconomists care about inflation, so Sam Schulhofer-Wohl and I wondered whether the vast heterogeneity in price levels translates into heterogeneity in inflation and, if so, whether household inflation is linked to bargain hunting.[4] This is potentially important for monetary policy because it means that measured inflation may, in part, be determined by changes in the aggregate amount of bargain hunting.

It turns out that this is the case. Using household-level scanner data, we measured differences across households in their realized inflation rates. We found that although the distribution of realized inflation rates is centered around the aggregate inflation rate, there is tremendous inflation heterogeneity across households. The inter-quartile range of inflation rates in a typical year is around 7 percentage points. This implies huge differences across households in realized inflation — an order of magnitude larger than the time-series variation in the Consumer Price Index. Most of this variation is not attributable to differences across households in the particular products that they purchase; rather it is attributable to differences across households in the prices they pay for identical goods. In other words, inflation heterogeneity is a consequence of the price index heterogeneity described above. Moreover, inflation heterogeneity seems also to be related to bargain hunting: we found an increase in the number of shopping trips to be associated with a decrease in inflation, and vice versa.

We then explored the time-series properties of household-level inflation rates to ascertain whether time-variation in realized inflation rates for a given household causes inflation heterogeneity to wash out at longer horizons. This would be the case if, for example, household inflation rates were strongly negatively correlated over time. We find that inflation rates are only mildly negatively correlated, with an auto-correlation of −0.1 to −0.2, implying that price levels are persistent but not permanent, with a serial correlation of about 0.7 to 0.8.

To put the extent of this inflation heterogeneity and persistence in perspective, it is useful to ask how much of the overall inflation volatility experienced by a typical household is due to fluctuations in the aggregate inflation rate, as opposed to fluctuations in the deviation of its realized idiosyncratic inflation from aggregate inflation. Our findings suggest that over the last decade, fluctuations in the aggregate inflation rate contribute almost nothing to the fluctuations in inflation that households actually experience. In the recent environment of relative aggregate price stability, our findings suggest that bargain hunting, in addition to monetary policy, matters for the prices that individual households pay.

From Bargain Hunting to Price Dispersion and Vice Versa

Understanding the macroeconomic consequences of price index dispersion, inflation heterogeneity, and bargain hunting requires a theoretical framework. Although countless theories of price dispersion have been proposed over the last 40 years, most of this literature pertains to pricing of a single good rather than bundles of goods, and so cannot speak to price index dispersion, nor to relative price dispersion. Menzio, Rudanko, Trachter, and I developed a theory of relative price dispersion based on heterogeneity in bargain hunting in the population.[5] Our theory adds two ingredients to the existing literature. First, it does not rely on temporal variation in prices, and hence is applicable to the persistent components of price dispersion. Second, it delivers the asymmetric pricing outcomes across equally expensive stores that is the hallmark of relative price dispersion.

Our theory extends the single-good models of price dispersion through bargain hunting developed by Gerard R. Butters,[6] Kenneth Burdett and Kenneth L. Judd,[7] and Menzio and Trachter.[8] In our model, each household consumes a bundle of two goods and a large number of stores set prices for each good. Our key assumption is that buyers are heterogeneous in the extent to which they engage in bargain hunting, in a way that is correlated with their valuation of the goods. We assume that one type of household, which we call *busy*, has a high valuation of the goods and needs to buy both goods at the same store. The other type of household, which we call *cool*, has a lower valuation of the goods but can purchase each good at a different store, if it desires. As in Butters and Burdett and Judd, we assume that on any given day, some buyers can access only a single seller, whereas others can access multiple sellers.

The equilibrium of this model features relative price dispersion and asymmetric pricing strategies, which come about as a result of price discrimination. The difference in valuation between the busy buyers and cool buyers gives sellers a reason to try to price discriminate. The difference in the ability of the busy buyers and cool buyers to make their purchases at different stores gives sellers a way to price discriminate. By charging a high price for one good and a low price for the other, rather than the same price for both, the seller can sell more of the lower-priced good to cool customers without losing any busy customers. Relative price dispersion emerges because bargain hunting, in the sense of shopping at multiple stores, is more common among the households that value the goods less.

Bargain Hunting Matters for Macro

By embedding a product market in which price dispersion arises from bargain hunting into a general equilibrium model of the labor market, Menzio and I found that bargain hunting can have profound

implications for aggregate employment.[9] We considered a model in the spirit of the one developed by Dale Mortensen and Christopher Pissarides[10] in which the output of a worker-firm match must be traded in a product market similar to the one described above. Consistent with the shopping patterns documented in our empirical work, we assume that unemployed workers purchase fewer goods and engage in more intensive bargain hunting than employed workers.

These differences in the shopping behavior of the employed and unemployed mean that when a firm hires an additional worker, it imparts externalities on other firms. In addition to the negative congestion externality that is standard in labor markets with matching frictions, in our model there are two positive shopping externalities. When a previously unemployed worker becomes employed, this generates a demand externality because the worker purchases more goods from other firms, and it also generates a market power externality because the worker engages in less bargain hunting. Both shopping externalities increase the profitability of other firms, to which they respond by expanding their presence in the product market. In the Mortensen-Pissarides model, this is achieved by posting additional vacancies, and if the shopping externalities are sufficiently large relative to the congestion externality, then the vacancy posting decisions of different firms become strategic complements and multiple equilibria may arise.

We infer the size of the shopping externalities from the aforementioned evidence on price distributions, price index distributions, differences in prices paid across employment states, and differences in time spent shopping across employment states. We find that these differences are indeed large enough to lead to multiple equilibria and self-fulfilling fluctuations in employment. Interestingly, we find that the market power externality is about twice as large as the demand externality, but both externalities are needed for the model to admit multiple equilibria with parameters that are consistent with the empirical evidence on shopping behavior. This finding contrasts sharply with existing models of spillovers through the product market, which typically rely on demand externalities affecting the quantity of goods sold by other firms, rather than on market power externalities affecting the terms of trade faced by other firms.

There are many fruitful directions for future research integrating household shopping behavior into incomplete market heterogeneous agent models. Moreover, because bargain hunting is likely to be important throughout the production chain, future work will also hopefully take more seriously the macroeconomic consequences of the marketing, innovation, and expansion activities in which firms routinely engage. For monetary and fiscal policies, a natural framework to start exploring these activities on either side of the product market would be Heterogeneous Agent New Keynesian models, which marry sticky price models with models of heterogeneous households and incomplete markets.

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5 *G. Kaplan, G. Menzio, L. Rudanko, and N. Trachter, "Relative Price Dispersion: Evidence and Theory," NBER Working Paper No. 21931, January 2016.*
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The Dynamics of Air Pollution Impacts

Matthew J. Neidell

Anthropogenic air pollution dates at least as far back as ancient Rome, and attempts to regulate it are known to have arisen as early as the 13th century. Although the nature and scale of this externality has changed dramatically since the Industrial Revolution, research on the health effects has typically been in the domain of epidemiologists and toxicologists. Economists have only recently contributed to this topic, having made several important contributions.

First, economists explicitly recognized how optimizing behavior, particularly in the form of residential sorting, can lead to endogenous pollution exposure. For example, since air quality is capitalized into housing prices, households with higher incomes may live in neighborhoods with better air quality. If these households also make other investments in their health, failing to account for them biases estimates of the effects of pollution. To address this, economists have employed a wide range of quasi-experimental techniques to provide causal estimates of the effect of pollution on health and human capital.

Second, stemming from this optimizing framework, economists have placed a considerable focus on avoidance behavior. Since the consequences of exposure to pollution are costly, individuals may engage in activities to avert them. This can bias estimates of the biological relationship between pollution and health. Furthermore, given that the activities that people engage in to avoid pollution are costly, avoidance behavior is a component of the social costs of poor environmental quality.

More recently, economic research has expanded the focus of analysis beyond traditional health outcomes to focus on a broader range of human capital outcomes, including worker productivity. Many of these impacts, particularly those where no health care services are used, are subtle and may be more pervasive throughout the economy than more extreme outcomes such as mortality and hospitalizations. If worker productivity is adversely affected by ambient pollution levels, environmental regulations that reduce these levels may increase the value of workers' human capital.

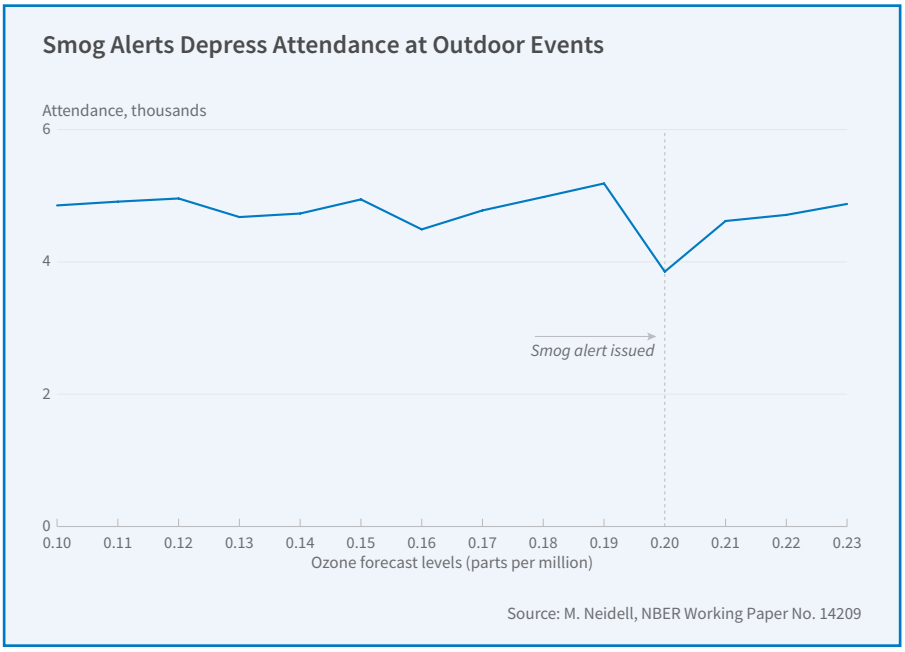

Figure 1

Avoidance Behavior

My early research explored whether people respond to public information about pollution by reducing time spent outside, and how these responses affect the estimated relationship between ozone and health.[1] This work focused on smog alerts, which are issued when ground-level ozone is expected to exceed a particular threshold. The alerts are disseminated to encourage susceptible individuals, such as children and the elderly, to minimize time outdoors. Using originally collected data on daily attendance at two major outdoor facilities in Southern California, I explored whether people respond to smog alerts by reducing attendance at these facilities. Employing a regression discontinuity design to compare attendance on days just above versus just below the smog alert threshold to control for potential confounding, I found that there are significant declines in daily attendance on days when smog alerts are announced. This pattern is shown in Figure 1: all variables evolve smoothly with higher ozone levels, but only attendance abruptly drops when ozone reaches the value at which smog alerts are issued.

Since alerts are only issued when ozone is expected to be particularly high, failing to account for behavioral responses to the alerts can lead to an underestimation of the relationship between ozone and health. To assess this, I explored how accounting for potential responses to smog

alerts affects estimates of the relationship between ozone and asthma hospitalizations. Consistent with expectations, estimates of the effect of ozone that account for smog alerts are significantly larger than estimates that do not. This relationship is depicted in Figure 2, which shows the dose-response relationship between ozone and asthma without adjusting for smog alerts (light blue line) and limiting to days without smog alerts (dark blue line).

While this paper doesn't get at the costs of avoidance behavior — it focuses on its existence and implications — a follow-on paper with Joshua Graff Zivin attempts to do so by looking at intertemporal avoidance behavior.[2] In particular, responses may differ depending on how frequently alerts are issued. To assess this, we explore the impact of smog alerts issued on consecutive days on outdoor activities. Changing activities in response to alerts imposes costs on individuals since they forgo activities they would otherwise have chosen. These costs likely increase as alerts become more common, suggesting a decreased response after successive alerts. Consistent with this hypothesis, we find that responses on the second day of back-to-back alerts are considerably smaller than responses on the first day, a finding that underscores the unmeasured and potentially sizeable costs of avoidance behavior.

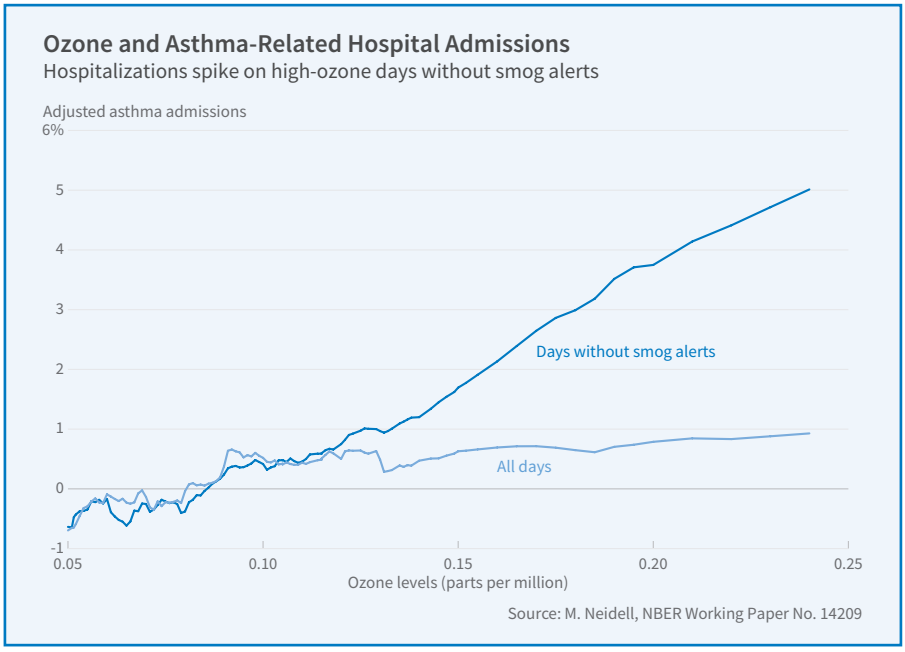

Figure 2

Worker Productivity

Focusing on more extreme outcomes, such as hospitalizations and mortality, only captures part of the full range of effects from pollution exposure. People may feel subtle insults from exposure, such as ear, nose, and throat irritation, but not require formal health care. Such effects may go undetected — possibly even by the person experiencing them — but they may represent a significant part of the total welfare effects if they are sufficiently widespread. Quantifying and valuing these subtle effects is a major challenge given the inherent difficulty in observing them.

Graff Zivin and I first confront this by focusing on the effect of pollution on worker productivity.[3] We hypothesize that workers' fatigue from these more minor insults lowers their productivity. As such, productivity can be seen as a summary measure of these insults. Studying pollution and economic output, however, introduces a simultaneity bias: because pollution is an output of industrial production, it can both cause

Matthew Neidell is an economics professor in the Department of Health Policy and Management at Columbia University's Mailman School of Public Health. He received his Ph.D. in economics from UCLA, and was a post-doc at the University of Chicago prior to joining Columbia. He has held visiting positions at the European University Institute and the Property and Environment Research Center. His fields of specialization are environmental, health, and labor economics, with research primarily focused at the intersections of these. His most recent work applies the latest empirical methods to examine the relationship between the environment and a wide range of measures of well-being, including worker productivity, human capital, and decision making. Neidell is currently a co-editor at the *Journal of the Association of Environmental and Resource Economists*, a research associate in the NBER's Health Economics and Environment and Energy Economics programs, and a research fellow at the Institute of Labor Economics (IZA).

declines in worker productivity and also be caused by increases in worker productivity. To address this issue, we collect data on worker productivity at a farm in California where workers are paid piece-rate, so we have daily measures of their productivity. We relate daily changes in pollution — which are not driven by the decisions of the farm but by the plethora of industrial activities in the region — to daily changes in productivity, holding time-invariant characteristics of the worker fixed. One advantage of focusing on these workers is that it solves the problem with avoidance behavior; since farm workers go out into the field and return at the same time, they are unable to choose their exposure. This is something we also directly test because we have measures of labor supply, and find that avoidance behavior is minimal to nonexistent in this setting. We find that increases in ozone significantly decrease productivity. Importantly, effects arise at relatively low levels of ozone where obvious health symptoms are not present in healthy populations, suggesting that we uncover more subtle effects.

While a large fraction of people around the globe is employed in agriculture, only a small fraction is in the nations with the strongest institutional capacity for regulating the environment. Tom Chang, Graff Zivin, Tal Gross, and I extend the worker-impact research to focus on the manufacturing sector, which represents a larger share of the workforce in higher income countries.[4] Since workers in this sector are typically indoors, we switch focus to PM 2.5, a fine particulate pollutant that penetrates indoors. We use data from a pear factory, where workers are paid piece-rate based on the number of boxes of pears they pack. Using a similar daily level analysis as in the farm worker study, we find that higher PM 2.5 levels decrease the number of boxes workers pack. PM 2.5 also has effects on productivity at levels below air quality standards, but is not related to labor supply. Based on approximate calculations that apply these estimates to all manufacturing, the worker productivity effects represent roughly 25 percent of the total benefits, as measured by changes in housing values, from improvements in air quality, suggesting the magnitude of productivity effects is quite large.

These studies focus largely on low-skilled tasks. To explore sectors of the economy where workers have the highest value added, we study the effect of PM 2.5 on the output of call-center workers, an important part of the service sector.[5] The study crosses international borders, by obtaining data from China's largest travel agency, the same one used to study the effects of working from home.[6] In this setting, worker output is routinely monitored because the workers are compensated in part based on the number of phone calls completed, thus providing precise measures of each worker's daily output. As with the manufacturing study, workers are in an indoor environment where PM 2.5 is likely to be present. We find that as pollution increases, workers reduce the number of calls they place or receive, an effect largely driven by an increase in the number of breaks taken throughout the day. As with the previous studies, no effects were found for labor supply. Unlike the previous two studies, however, the effect only arose when air quality levels exceeded the current air quality standards. This difference could reflect many factors, such as the different nature of the work and/or poorer-quality measures of pollution.

The aforementioned studies omit the highest-skilled sector, where tracking of performance is most scarce. Anthony Heyes, Soodeh Saberian, and I attempt to close this gap, albeit indirectly, by investigating the effect of pollution on stock market returns.[7] We hypothesize that the physiological changes induced by pollution lead to decreases in risk taking by traders, thereby lowering returns. We find that daily changes in PM 2.5 in Manhattan over a 15-year period reduce daily returns of the S&P 500, one of the most commonly used benchmarks for the overall New York Stock Exchange. Since the stocks quoted on the S&P 500 come from firms widely differentiated by activity and geography, it is unlikely that daily variations in the fundamentals that determine the fair value of those firms correlate with daily variations in air quality in the vicinity of Wall Street. As a test for this, we regress S&P 500 returns on air quality measures throughout the country, and find that only air quality in New York City matters for returns. Consistent with risk aversion as a potential explanation for this effect, we find the air pollution affects the volatility index, a commonly used measure of fear amongst traders.

Effects from Long-run Exposure

The previously discussed studies focus solely on the effects from short-run exposure. A more recent endeavor in my research aims at understanding effects of long-run exposure to pollution. As we know from the smoking literature, only after several years of smoking do health effects start materializing, and the same likely holds true for pollution. The empirical challenges for identifying the effects of long-run exposure, however, are magnified because there is more time to adjust to environmental changes. For example, most studies on the effects of short-run exposure exploit unexpected changes in pollution for which individuals have not fully compensated. As people learn about these changes over time, however, their differential responses to potential exposures raise the possibility that other health-related individual attributes may confound the measurements.

Nick Sanders, Alan Barreca, and I explore effects of long-run exposure by exploiting the Acid Rain Program, a cap and trade program that reduces sulfur dioxide and, eventually, PM 2.5.[8] This program has two impor-

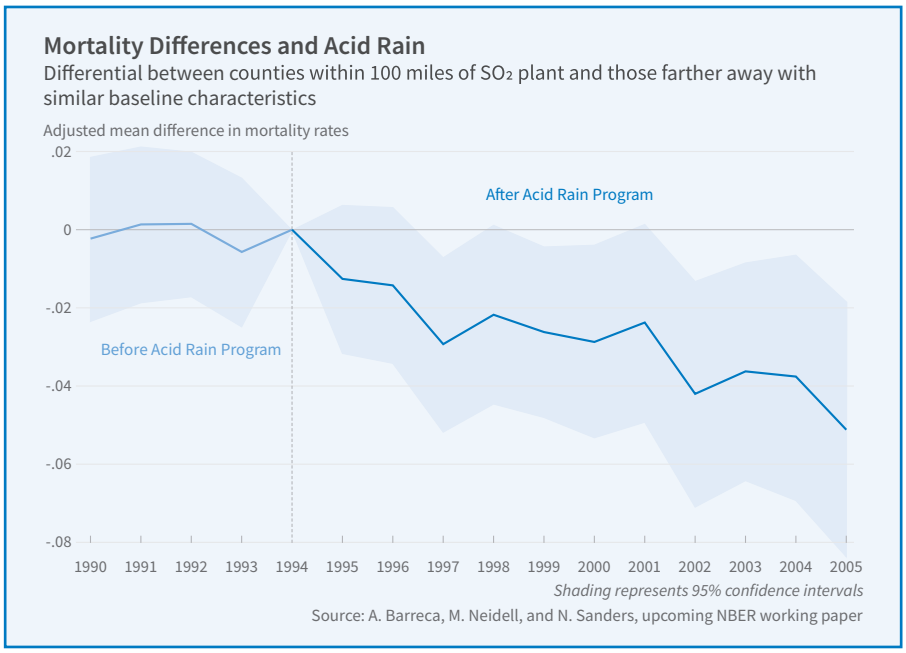

Figure 3

tant features for identifying effects from long -run exposure: the drop in SO_2 is a persistent shift, allowing us to observe changes in long-run pollution, and the distances that SO_2 and PM 2.5 travel are vast — around 100 miles on average — so that changes in economic activity are likely subsumed by defining broad treatment areas. For example, evidence suggests plant closures affect housing prices in a radius of less than 2 miles.

Using an event study design that controls for county fixed effects, we compare the change in mortality over time in counties close to regulated SO_2 plants (<100 miles) relative to counties far away (> 100 miles). We find that mortality differences in treatment counties decrease slowly after the introduction of the Acid Rain Program, with this relative mortality improvement growing steadily over time [Figure 3]. Since this study focuses on people age 35–64, these changes in mortality represent a significant change in life expectancy and economic productivity, which means that commonly used estimates of the value of statistical life more readily apply for valuing mortality benefits. Given the mortality effects from long-run exposure, it is plausible that avoidance behavior and worker productivity are affected by long-run exposure as well, topics worthy of future investigation.

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[7] *A. Heyes, M. Neidell, and S. Saberian, "The Effect of Air Pollution on Investor Behavior: Evidence from the S&P 500," NBER Working Paper No. 22753, October 2016.*
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[8] *A. Barreca, M. Neidell, and N. Sanders, "Long-Run Pollution Exposure and Adult Mortality: Evidence from the Acid Rain Program," NBER Working Paper No. 23524, June 2017.*
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Donaldson Wins John Bates Clark Medal

NBER Research Associate Dave Donaldson of Stanford University has been named this year's recipient of the John Bates Clark Medal, which is awarded by the American Economic Association (AEA) to the American economist under the age of 40 who has made the most substantial contribution to economic thought and knowledge.

Donaldson is an empirical trade economist whose research interests span central topics in international economics as well as issues in regional and development economics. According to the citation drafted by the AEA Honors and Awards Committee, "He has not only established himself as a leader in the field, but he has also formed and become the principal practitioner of a distinctive style of research based on important conceptual questions, careful data work, and credible identification combined with state-of-the-art structural methods." Donaldson has provided important new evidence on the efficiency gains and welfare effects of international and intranational trade, and also has developed insightful tests of the theory of comparative advantage and other central propositions in trade theory.

Donaldson is a research associate in three NBER programs: Development Economics, Development of the American Economy, and International Trade and Investment. A native of Toronto, he received his undergraduate degree in physics from Oxford University and his Ph.D. in economics from the London School of Economics.

Other current NBER research associates who have received the Clark Medal include Daniel McFadden, Martin Feldstein, Joseph Stiglitz, James Heckman, Jerry Hausman, Sanford Grossman, Paul Krugman, Lawrence Summers, David Card, Kevin Murphy, Andrei Shleifer, Steven Levitt, Daron Acemoglu, Susan Athey, Emmanuel Saez, Esther Duflo, Jonathan Levin, Amy Finkelstein, Raj Chetty, Matthew Gentzkow, and Roland G. Fryer, Jr. Other NBER associates who have won the Clark Medal are Franklin Fisher, now an emeritus member of the Board of Directors, and the late research associates Gary Becker, Milton Friedman, and Zvi Griliches.

Carl Christ, 1923–2017

Carl Christ, an emeritus member and former chair of the NBER's Board of Directors, passed away on April 21 at the age of 93. Christ was first elected to the NBER Board in 1975. He served as the American Economic Association representative to the NBER for many years, and held board leadership roles as vice-chair (1996–99) and chair (1999–2002).

Christ received his undergraduate degree in physics from the University of Chicago in 1943. Immediately following graduation he worked as a junior physicist on the Manhattan Project, the research effort that led to creation of the atomic bomb. After a short postwar stint as a physics instructor at Princeton University, Christ returned to Chicago for graduate studies in economics.

Christ joined the faculty at Johns Hopkins University in 1950, and — with the exception of a brief period when he taught at Chicago in the late 1950s and early 1960s — he remained at Hopkins for his entire career. He held the Abram G. Hutzler Professorship, and was chair of the economics department from 1961 to 1966 and again from 1969 to 1970. At the time of his death, Christ was Professor of Economics, Emeritus.

Christ did pioneering work on simultaneous equation estimation and developed a number of the early macroeconometric models of the United States. He was an influential economics educator, and his econometrics textbook, *Econometric Models and Methods,* was a standard reference for many years.

Conferences

Measuring and Accounting for Innovation in the 21st Century

The NBER hosted a Conference on Research in Income and Wealth (CRIW) meeting, "Measuring and Accounting for Innovation in the 21st Century," in Washington, D.C., on March 10–11. Carol Corrado of The Conference Board, Javier Miranda of the U.S. Bureau of the Census, Jonathan Haskel of Imperial College London, and Research Associate Daniel Sichel of Wellesley College organized the meeting. These researchers' papers were presented and discussed:

- **Charles Hulten**, University of Maryland and NBER, and **Leonard Nakamura**, Federal Reserve Bank of Philadelphia, "We See the Digital Revolution Everywhere Except in Real GDP"
- **Katharine Abraham** and **John Haltiwanger**, University of Maryland and NBER, and **Kristin Sandusky** and **James Spletzer**, Bureau of the Census, "Measuring the Gig Economy: Current Knowledge and Open Issues"
- **Dominique Guellec** and **Caroline Paunov**, OECD, "Digital Innovation and the Distribution of Income"
- **Lucia Foster**, **Cheryl Grim**, and **Zoltan Wolf**, Bureau of the Census, and **John Haltiwanger**, "Innovation, Productivity Growth, and Productivity Dispersion"
- **Wesley Cohen**, Duke University and NBER, and **You-Na Lee** and **John Walsh**, Georgia Institute of Technology, "Measuring the Several Faces of Innovation"
- **Emin Dinlersoz**, **Nathan Goldschlag**, and **Nikolas Zolas**, Bureau of the Census, and **Amanda Myers**, Patent and Trademark Office, "An Anatomy of Trademarking by Firms in the United States"
- **Nathan Goldschlag**, **Ron Jarmin**, and **Nikolas Zolas**, Bureau of the Census, and **Julia Lane**, New York University, "The Link between University R&D, Human Capital, and Business Startups"
- **Javier Miranda** and **Nikolas Zolas**, "Measuring the Impact of Household Innovation Using Administrative Data"
- **Pierre Mohnen**, Maastricht University (Netherlands), and **Michael Polder** and **George van Leeuwen**, Statistics Netherlands, "ICT and Innovation"
- **Wen Chen**, **Bart Los**, and **Marcel Timmer**, University of Groningen (Netherlands), "Measuring the Returns to Intangibles: A Global Value Chain Approach"
- **Alexis Grimm**, Bureau of Economic Analysis, "Trends in U.S. Trade in Information and Communications Technology (ICT) Services and in ICT-Enabled Services"
- **Kenneth Flamm**, University of Texas at Austin, "Has Moore's Law Been Suspended or Repealed? An Empirical Economic Analysis of the Pace of Innovation in Semiconductors"
- **David Byrne**, Federal Reserve Board, and **Carol Corrado**, "Accounting for Innovation in Consumer ICT Services"
- **David Byrne, Carol Corrado,** and **Daniel Sichel,** Wellesley College and NBER, "The Rise of Cloud Computing: Minding Your Ps and Qs"
- **Ana Aizcorbe** and **David Wasshausen**, Bureau of Economic Analysis, "BEA Deflators for Information and Communications Technology Goods and Services: Historical Analyses and Future Plans"

Summaries of these papers are at: http://www.nber.org/confer/2017/CRIWs17/summary.html

Trade and Geography

An NBER Conference, "Trade and Geography," took place in Cambridge on March 30. International Trade and Investment Program Director Stephen J. Redding and Research Associate Esteban Rossi-Hansberg, both of Princeton University, organized the meeting. These researchers' papers were presented and discussed:

- **Emi Nakamura** and **Jón Steinsson**, Columbia University and NBER, and **Jósef Sigurdsson**, Stockholm University, "The Gift of Moving: Intergenerational Consequences of a Mobility Shock" (NBER Working Paper No. 22392)
- **Pablo Fajgelbaum**, University of California, Los Angeles, and NBER, and **Edouard Schaal**, CREI (Barcelona), "Optimal Transport Networks in Spatial Equilibrium" (NBER Working Paper No. 23200)
- **Enghin Atalay**, University of Wisconsin-Madison; **Mary Jialin Li**, University of Chicago; and **Ali Hortaçsu** and **Chad Syverson**, University of Chicago and NBER, "How Wide Is the Firm Border?"
- **Melanie Morten**, Stanford University and NBER, and **Jaqueline Oliveira**, Rhodes College, "The Effects of Roads on Migration and Trade: Evidence from a Planned Capital City"
- **David Lagakos**, University of California, San Diego, and NBER; **Ahmed M. Mobarak**, Yale University and NBER; and **Michael E. Waugh**, New York University and NBER, "The Welfare Effects of Encouraging Rural-Urban Migration"
- **Ariel Burstein**, University of California, Los Angeles, and NBER; **Gordon Hanson**, University of California, San Diego, and NBER; **Lin Tian**, Columbia University; and **Jonathan Vogel**, Columbia University and NBER, "Tradability and the Labor-Market Impact of Immigration: Theory and Evidence from the U.S." (NBER Working Paper No. 23330)

Summaries of these papers are at: http://www.nber.org/confer/2017/TGs17/summary.html

32nd Annual Conference on Macroeconomics

The NBER's 32nd Annual Conference on Macroeconomics took place in Cambridge on April 7–8. Research Associates Martin Eichenbaum of Northwestern University and Jonathan Parker of MIT organized the meeting. These researchers' papers were presented and discussed:

- **Charles Manski**, Northwestern University and NBER, "Survey Measurement of Probabilistic Macroeconomic Expectations: Progress and Promise" (NBER Working Paper No. 23418)
- **John H. Cochrane**, Stanford University and NBER, "Michelson-Morley, Occam, and Fisher: The Radical Implications of Stable Inflation at Near-Zero Interest Rates"
- **Steven N. Durlauf**, University of Wisconsin-Madison and NBER, and **Ananth Seshadri**, University of Wisconsin-Madison, "Understanding the Great Gatsby Curve"
- **Manuel Adelino**, Duke University; **Antoinette Schoar**, MIT and NBER; and **Felipe Severino**, Dartmouth College, "Dynamics of Housing Debt in the Recent Boom and Bust"
- **Efraim Benmelech**, Northwestern University and NBER, and **Nittai Bergman**, MIT and NBER, "Credit Market Freezes"

- **SeHyoun Ahn** and **Christian Wolf**, Princeton University; **Greg Kaplan**, University of Chicago and NBER; **Benjamin Moll**, Princeton University and NBER; and **Thomas Winberry**, University of Chicago and NBER, "When Inequality Matters for Macro and Macro Matters for Inequality"

Summaries of these papers are at: http://www.nber.org/confer/2017/Macro17/summary.html

Economics of Culture and Institutions

An NBER conference, "Economics of Culture and Institutions," took place in Cambridge on April 21–22. Research Associates Alberto Bisin of New York University and Paola Giuliano of University of California, Los Angeles, organized the meeting. These researchers' papers were presented and discussed:

- **Oded Galor**, Brown University and NBER; **Ömer Özak**, Southern Methodist University; and **Assaf Sarid**, University of Haifa (Israel), "Geographical Origins and Economic Consequences of Language Structures"
- **Leonardo Bursztyn**, University of Chicago and NBER; **Thomas Fujiwara**, Princeton University and NBER; and **Amanda Pallais**, Harvard University and NBER, " 'Acting Wife': Marriage Market Incentives and Labor Market Investments" (NBER Working Paper No. 23043)
- **Sascha O. Becker**, University of Warwick (U.K.), and **Luigi Pascali**, Pompeu Fabra University (Barcelona), "Religion, Division of Labor, and Conflict: Anti-Semitism in German Regions over 600 Years"
- **Felipe Valencia Caicedo**, University of Bonn (Germany), "The Mission: Human Capital Transmission, Economic Persistence, and Culture in South America"
- **Ruixue Jia**, University of California, San Diego, and **Hongbin Li**, Stanford University, "Access to Elite Education, Wage Premium, and Social Mobility: The Truth and Illusion of China's College Entrance Exam"
- **Filipe R. Campante**, Harvard University and NBER, and **Davin Chor**, National University of Singapore, " 'Just Do Your Job': Obedience, Routine Tasks, and the Pattern of Specialization"

Summaries of these papers are at: http://www.nber.org/confer/2017/CIs17/summary.html

Economic Effects of State Business Taxation

An NBER conference, "Economic Effects of State Business Taxation," supported by the Smith Richardson Foundation, took place in Cambridge on May 5. NBER President James M. Poterba of MIT and Research Associate Joshua Rauh of Stanford University organized the meeting. These researchers' papers were presented and discussed:

- **Scott R. Baker**, Northwestern University, and **Lorenz Kueng**, Northwestern University and NBER, "Shopping for Lower Sales Tax Rates"
- **Julian Atanassov**, University of Nebraska-Lincoln, and **Xiaoding Liu**, University of Oregon, "Taxes, Pledgeable Income, and Innovation"
- **Juan Carlos Suárez Serrato**, Duke University and NBER, and **Owen M. Zidar**, University of Chicago and NBER, "The Structure of State Corporate Taxation and Its Impact on State Tax Revenues and Economic Activity"

- **Mark Curtis**, Wake Forest University, and **Ryan Decker**, Federal Reserve Board, "Entrepreneurship and State Policy"
- **Clemens Fuest**, CESifo (Munich), and **Andreas Peichl** and **Sebastian Siegloch**, University of Mannheim (Germany), "Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany"
- **Evan E. Mast**, Stanford University, "Race to the Bottom? Local Tax Break Competition and Business Location"

Summaries of these papers are at: http://www.nber.org/confer/2017/SBTs17/summary.html

Understanding Productivity Growth in Agriculture

An NBER Conference, "Understanding Productivity Growth in Agriculture," took place in Cambridge on May 11–12. The conference was supported by the Economic Research Service at the U.S. Department of Agriculture and the Giannini Foundation at the University of California, Davis. Research Associate Wolfram Schlenker of Columbia University organized the meeting. These researchers' papers were presented and discussed:

- **Jayson L. Lusk**, Oklahoma State University, and **Jesse B. Tack** and **Nathan P. Hendricks**, Kansas State University, "Heterogeneous Yield Impacts from Adoption of Genetically Engineered Corn and the Importance of Controlling for Weather"
- **Hsing-Hsiang Huang**, Environmental Protection Agency, and **Michael Moore**, University of Michigan, "Farming under Weather Risk: Adaptation, Moral Hazard, and Selection on Moral Hazard"
- **Cecilia Bellora**, CEPII (Paris); **Elodie Blanc**, MIT; **Jean-Marc Bourgeon**, INRA (Paris); and **Eric Strobl**, École Polytechnique (France), "Estimating the Impact of Crop Diversity on Agricultural Productivity in South Africa"
- **Christine L. Carroll**, California State University, Chico, and **Colin A. Carter**, **Rachael Goodhue**, and **C.-Y. Cynthia Lin Lawell**, University of California, Davis, "Crop Disease and Agricultural Productivity"
- **Sun Ling Wang**, **Eldon Ball**, **Richard Nehring**, and **Ryan Williams**, U.S. Department of Agriculture, and **Truong Chau**, Pennsylvania State University, "Impacts of Climate Change and Extreme Weather on U.S. Agricultural Productivity: Evidence and Projection"
- **Mark Brown**, Statistics Canada; **Shon M. Ferguson**, Research Institute of Industrial Economics (Stockholm); and **Crina Viju**, Carleton University (Ottawa), "Agricultural Trade Reform, Reallocation, and Technical Change: Evidence from the Canadian Prairies"
- **Wyatt Brooks** and **Kevin Donovan**, University of Notre Dame, "Eliminating Uncertainty in Market Access: The Impact of New Bridges in Rural Nicaragua"
- **Sebastian Sotelo**, University of Michigan, "Domestic Trade Frictions and Agriculture"
- **Reena Badiani**, World Bank, and **Katrina Jessoe**, University of California, Davis, "Electricity Prices, Groundwater, and Agriculture: The Environmental and Agricultural Impacts of Electricity Subsidies in India"
- **Hannah Krovetz**, University of California, Davis, and **Rebecca Taylor** and **Sofia Villas-Boas**, University of California, Berkeley, "Willingness to Pay for Low Water Footprint Food Choices during Drought"

Summaries of these papers are at: http://www.nber.org/confer/2017/PGAs17/summary.html

New Developments in Long-Term Asset Management

An NBER conference, "New Developments in Long-Term Asset Management," supported by Norges Bank Investment Management, took place in London on May 19–20. Asset Pricing Program Director Monika Piazzesi of Stanford University and Research Associate Luis M. Viceira of Harvard University organized the meeting. These researchers' papers were presented and discussed:

- **Marcin Kacperczyk** and **Emiliano Pagnotta**, Imperial College London, "Chasing Private Information"
- **Nicolae B. Gârleanu**, University of California, Berkeley, and NBER, and **Lasse H. Pedersen**, Copenhagen Business School, "Efficiently Inefficient Markets for Assets and Asset Management" (NBER Working Paper No. 21563)
- **Matthijs Breugem**, Frankfurt School of Finance and Management, and **Adrian Buss**, INSEAD (France), "Institutional Investors and Information Acquisition: Implications for Asset Prices and Informational Efficiency"
- **Gabriel Chodorow-Reich**, Harvard University and NBER; **Andra C. Ghent**, University of Wisconsin-Madison; and **Valentin Haddad**, University of California, Los Angeles, and NBER, "Asset Insulators"
- **Anton Lines**, London Business School, "Do Institutional Incentives Distort Asset Prices?"
- **Marco Di Maggio**, Harvard University and NBER; **Francesco Franzoni** and **Carlo Sommavilla**, Swiss Finance Institute; and **Amir Kermani**, University of California, Berkeley, and NBER, "The Relevance of Broker Networks for Information Diffusion in the Stock Market"
- **Kevin Pan**, Harvard University, and **Yao Zeng**, University of Washington, "ETF Arbitrage under Liquidity Mismatch"
- **Erik Stafford**, Harvard University, "Replicating Private Equity with Value Investing, Homemade Leverage, and Hold-to-Maturity Accounting"

Summaries of these papers are at: http://www.nber.org/confer/2017/LTAMs17/summary.html

Transporting Hydrocarbons

An NBER conference, "Transporting Hydrocarbons," took place in Washington, D.C., on May 23. The meeting was supported by the Alfred P. Sloan Foundation. It was organized by Research Associates James B. Bushnell of the University of California, Davis; Ryan Kellogg of the University of Chicago; and Erin T. Mansur of Dartmouth College. These researchers' papers were presented and discussed:

- **Thomas Covert**, and **Ryan Kellogg**, both University of Chicago and NBER, "Crude by Rail, Option Value, and Pipeline Investment"
- **Frank A. Wolak**, Stanford University and NBER, and **Wesley W. Wilson**, University of Oregon, "Regulation by Price Benchmarks: Protecting Small Shippers from the Exercise of Railroad Market Power"
- **James B. Bushnell,** University of California, Davis, and NBER, **Jonathan E. Hughes,** University of Colorado Boulder; and **Aaron Smith,** University of California, Davis, "Food vs. Fuel? Impacts of Petroleum Shipments on Agricultural Prices"
- **Charles Mason**, University of Wyoming, "Analyzing the Risk of Transporting Crude Oil by Rail"

- **Shaun McRae**, ITAM (Mexico City), "Crude Oil Price Differentials and Pipeline Infrastructure"

- **Evan M. Herrnstadt**, Harvard University, and **Richard Sweeney**, Boston College, "What Lies Beneath: Pipeline Awareness and Aversion"

- **Karen Clay**, Carnegie Mellon University and NBER; **Akshaya Jha**, Carnegie Mellon University; **Nicholas Muller**, Middlebury College and NBER; and **Randall Walsh**, University of Pittsburgh and NBER, "The Social Cost from Moving Crude Oil by Pipelines and Railroads: Evidence from the Bakken"

- **Erich Muehlegger**, University of California, Davis, and NBER, and **Richard Sweeney**, Boston College, "Competition and Pass-Through of Input Cost Shocks: Evidence from the U.S. Fracking Boom"

- **Nida Çakir Melek**, Federal Reserve Bank of Kansas City, and **Michael Plante** and **Mine K. Yücel**, Federal Reserve Bank of Dallas, "A Macroeconomic Analysis of Lifting the U.S. Crude Export Ban"

Summaries of these papers are at: http://www.nber.org/confer/2017/ENERs17/summary.html

Economics of Energy Markets

An NBER conference, "Economics of Energy Markets," took place in Washington, D.C., on May 24. The meeting was supported by the U.S. Department of Energy and the National Science Foundation. It was organized by Research Associates Meredith Fowlie of the University of California, Berkeley and Christopher R. Knittel of MIT. These researchers' papers were presented and discussed:

- **Joseph E. Aldy**, Harvard University and NBER, "Boutique Fuel Markets and Security-Environment-Economic Tradeoffs"

- **Christiane J.S. Baumeister**, University of Notre Dame; **Reinhard Ellwanger**, Bank of Canada; and **Lutz Kilian**, University of Michigan, "Did the Renewable Fuel Standard Shift Market Expectations of the Price of Ethanol?"

- **Gabriel E. Lade** and **Ivan J. Rudik**, Iowa State University, "The Costs of Inefficient Regulation: Evidence from the Bakken"

- **Sebastien Houde**, University of Maryland, and **Erica Myers**, University of Illinois at Urbana-Champaign, "Quantifying Inattention to Local Energy Prices: A Novel Approach and New Evidence for Nine Appliance Markets"

- **Steven E. Sexton** and **Bryan Bollinger**, Duke University, and **Kenneth Gillingham**, Yale University and NBER, "Household Demand for Solar PV and Price Discriminating Subsidies"

- **Sharat Ganapati**, Yale University; **Joseph S. Shapiro**, Yale University and NBER; and **Reed Walker**, University of California, Berkeley, and NBER, "The Incidence of Carbon Taxes in U.S. Manufacturing: Lessons from Energy Cost Pass-Through"

- **Thomas P. Tangerås**, Research Institute of Industrial Economics (Stockholm), and **Frank A. Wolak**, "Optimal Network Tariffs for Renewable Electricity Generation"

- **Richard G. Newell**, Resources for the Future and NBER, and **Brian C. Prest**, Duke University, "Informing SPR Policy through Oil Futures and Inventory Dynamics"

Summaries of these papers are at: http://www.nber.org/confer/2017/ENERs17/summary.html

Program and Working Group Meetings

Development of the American Economy

The NBER's Program on the Development of the American Economy met in Cambridge on March 18. Program Director Claudia Goldin of Harvard University organized the meeting. These researchers' papers were presented and discussed:

- **James J. Feigenbaum,** Princeton University and NBER; **James Lee,** Cornerstone Research; and **Filippo Mezzanotti,** Northwestern University, "Capital Destruction and Economic Growth: The Effects of Sherman's March, 1850–1920"
- **Trevon Logan**, Ohio State University and NBER, "Do Black Politicians Matter?"
- **Henry S. Farber** and **Ilyana Kuziemko**, Princeton University and NBER, and **Suresh Naidu**, Columbia University and NBER, "Unions and Inequality in Historical Perspective"
- **Efraim Benmelech**, **Carola Frydman**, and **Dimitris Papanikolaou**, Northwestern University and NBER, "Financial Frictions and Employment during the Great Depression" (NBER Working Paper No. 23216)
- **Daniel K. Fetter**, Wellesley College and NBER, "Local Government and Old Age Support in the New Deal" (NBER Working Paper No. 22760)
- **Walker Hanlon**, University of California, Los Angeles, and NBER, and **Katherin Sudol**, Quinnipiac University, "Pollution and Maternal Mortality: Evidence from the London Fog"

Summaries of these papers are at: http://www.nber.org/confer/2017/DAEs17/summary.html

Productivity, Innovation, and Entrepreneurship

The NBER's Program on Productivity, Innovation, and Entrepreneurship met in Cambridge on March 24. Program Directors Nicholas Bloom of Stanford University and Josh Lerner of Harvard University organized the meeting. These researchers' papers were presented and discussed:

- **Miguel Antón** and **Mireia Giné**, IESE Business School (Barcelona); **Florian Ederer**, Yale University; and **Martin C. Schmalz**, University of Michigan, "Innovation: The Bright Side of Common Ownership?"
- **Lorenz Kueng**, Northwestern University and NBER; **Nicholas Li**, University of Toronto; and **Mu-Jeung Yang**, University of Washington, "The Impact of Emerging Market Competition on Innovation and Business Strategy: Evidence from Canada" (NBER Working Paper No. 22840)
- **Daron Acemoglu**, MIT and NBER, and **Pascual Restrepo**, Boston University, "Robots and Jobs: Evidence from U.S. Labor Markets" (NBER Working Paper No. 23285)
- **Dan R. Andrews**, **Chiara Criscuolo**, and **Peter N. Gal**, OECD, "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms, and the Role of Public Policy"
- **Oriana Bandiera**, London School of Economics; **Stephen Hansen**, University of Oxford; **Andrea Prat**, Columbia University; and **Raffaella Sadun**, Harvard University and NBER, "CEO Behavior and Firm Performance"

- **Bilal Zia**, World Bank, "Pathways to Profits: Identifying Separate Channels of Small Firm Growth through Business Training"

- **Achyuta Adhvaryu**, University of Michigan and NBER; **Namrata Kala**, Harvard University; and **Anant Nyshadham**, Boston College, "The Skills to Pay the Bills: Returns to On-The-Job Soft Skills Training"

Summaries of these papers are at: http://www.nber.org/confer/2017/PRs17/summary.html

Corporate Finance

The NBER's Program on Corporate Finance met in Chicago on March 24. Faculty Research Fellow Martin Oehmke of Columbia University and Research Associate Adriano A. Rampini of Duke University organized the meeting. These researchers' papers were presented and discussed:

- **Jean-Noël Barrot** and **Erik Loualiche**, MIT; **Matthew C. Plosser**, Federal Reserve Bank of New York; and **Julien Sauvagnat**, Bocconi University (Milan), "Import Competition and Household Debt"

- **Francesco D'Acunto** and **Alberto G. Rossi**, University of Maryland, "Ditching the Middle Class with Financial Regulation"

- **Vyacheslav Fos**, Boston College, and **Andres Liberman** and **Constantine Yannelis**, New York University, "Debt and Human Capital: Evidence from Student Loans"

- **Gustaf Bellstam**, **Sanjai Bhagat**, and **J. Anthony Cookson**, University of Colorado Boulder, "A Text-Based Analysis of Corporate Innovation"

- **Peter M. DeMarzo**, Stanford University and NBER, and **Zhiguo He**, University of Chicago and NBER, "Leverage Dynamics without Commitment" (NBER Working Paper No. 22799)

- **Manuel Adelino**, Duke University and NBER; **Kristopher Gerardi**, Federal Reserve Bank of Atlanta; and **Barney Hartman-Glaser**, University of California, Los Angeles, "Are Lemons Sold First? Dynamic Signaling in the Mortgage Market"

- **Shai Bernstein**, Stanford University and NBER; **Emanuele Colonnelli**, Stanford University; **Xavier Giroud**, MIT and NBER; and **Ben Iverson**, Northwestern University, "Bankruptcy Spillovers" (NBER Working Paper No. 23162)

- **Julian Franks** and **Vikrant Vig**, London Business School, and **Oren Sussman**, University of Oxford, "The Privatization of Bankruptcy: Evidence from Financial Distress in the Shipping Industry"

Summaries of these papers are at: http://www.nber.org/confer/2017/CFs17/summary.html

Asset Pricing

The NBER's Program on Asset Pricing met in Chicago on March 24. Faculty Research Fellow Ralph Koijen and Research Associate Itamar Drechsler, both of New York University, organized the meeting. These researchers' papers were presented and discussed:

- **Markus K. Brunnermeier** and **Wei Xiong**, Princeton University and NBER, and **Michael Sockin**, University of Texas at Austin, "China's Model of Managing the Financial System"
- **Nina Boyarchenko** and **Matthew C. Plosser**, Federal Reserve Bank of New York, and **Valentin Haddad**, University of California, Los Angeles, and NBER, "The Federal Reserve and Market Confidence"
- **Tano Santos**, Columbia University and NBER, and **Pietro Veronesi**, University of Chicago and NBER, "Habits and Leverage" (NBER Working Paper No. 22905)
- **Peter Diep** and **Scott Richardson**, AQR Capital Management, and **Andrea L. Eisfeldt**, University of California, Los Angeles, and NBER, "Prepayment Risk and Expected MBS Returns" (NBER Working Paper No. 22851)
- **Hui Chen** and **Jiang Wang**, MIT and NBER, and **Anton Petukhov**, MIT, "The Dark Side of Circuit Breakers"
- **Serhiy Kozak**, University of Michigan; **Stefan Nagel**, University of Michigan and NBER; and **Shrihari Santosh**, University of Maryland, "Shrinking the Cross-Section"

Summaries of these papers are at: http://www.nber.org/confer/2017/APs17/summary.html

Behavioral Finance

The NBER's Working Group on Behavioral Finance met in Chicago on March 24–25. Working Group Director Nicholas C. Barberis of Yale University organized the meeting. These researchers' papers were presented and discussed:

- **Juhani T. Linnainmaa**, University of Southern California and NBER, and **Michael R. Roberts**, University of Pennsylvania and NBER, "The History of the Cross Section of Stock Returns" (NBER Working Paper No. 22894)
- **Robin Greenwood** and **Andrei Shleifer**, Harvard University and NBER, and **Yang You**, Harvard University, "Bubbles for Fama" (NBER Working Paper No. 23191)
- **Ming Dong**, York University (Toronto), and **David Hirshleifer** and **Siew Hong Teoh**, University of California, Irvine, "Stock Market Overvaluation, Moon Shots, and Corporate Innovation"
- **Kent D. Daniel**, Columbia University and NBER; **Alexander Klos**, University of Kiel (Germany); and **Simon Rottke**, University of Münster (Germany), "Overpriced Winners"
- **Tobias J. Moskowitz**, Yale University and NBER, "Asset Pricing and Sports Betting"
- **Samuel M. Hartzmark**, University of Chicago, and **David H. Solomon**, University of Southern California, "The Dividend Disconnect"

Summaries of these papers are at: http://www.nber.org/confer/2017/BFs17/summary.html

International Trade and Investment

The NBER's Program on International Trade and Investment met in Cambridge on March 31 and April 1. Program Director Stephen J. Redding of Princeton University organized the meeting. These researchers' papers were presented and discussed:

- **Treb Allen**, Dartmouth College and NBER, and **Costas Arkolakis**, Yale University and NBER, "The Welfare Effects of Transportation Infrastructure Improvements"
- **Giulia Brancaccio**, Princeton University; **Myrto Kalouptsidi**, Harvard University and NBER; and **Theodore Papageorgiou**, McGill University, "Geography, Search Frictions, and Trade Costs"
- **Raymond Owens** and **Pierre-Daniel Sarte**, Federal Reserve Bank of Richmond, and **Esteban Rossi-Hansberg**, Princeton University and NBER, "Rethinking Detroit" (NBER Working Paper No. 23146)
- **Dávid K. Nagy**, CREI (Barcelona), "City Location and Economic Development"
- **Cheng Chen**, University of Hong Kong, and **Claudia Steinwender**, Harvard University, "Import Competition, Heterogeneous Preferences of Managers, and Productivity"
- **Federica Coelli**, **Andreas Moxnes**, and **Karen H. Ulltveit-Moe**, University of Oslo, "Better, Faster, Stronger: Global Innovation and Trade Liberalization" (NBER Working Paper No. 22647)
- **George Alessandria**, University of Rochester and NBER; **Horag Choi**, Monash University (Melbourne); and **Dan Lu**, University of Rochester, "Trade Integration and the Trade Balance in China"
- **Nicholas Bloom**, Stanford University and NBER; **Kalina Manova**, University of Oxford; **John Van Reenen**, MIT and NBER; **Stephen Sun**, Peking University (Beijing); and **Zhihong Yu**, Nottingham University (U.K.), "Managing Trade: Evidence from China and the U.S."

Summaries of these papers are at: http://www.nber.org/confer/2017/ITIs17/summary.html

International Finance and Macroeconomics

The NBER's Program on International Finance and Macroeconomics met in Cambridge on March 31. Research Associates Laura Alfaro and Emmanuel Farhi, both of Harvard University, organized the meeting. These researchers' papers were presented and discussed:

- **Markus K. Brunnermeier** and **Wei Xiong**, Princeton University and NBER, and **Michael Sockin**, University of Texas at Austin, "China's Model of Managing the Financial System"
- **George A. Alessandria**, University of Rochester and NBER; **Horag Choi**, Monash University (Melbourne); and **Dan Lu**, University of Rochester, "Trade Integration and the Trade Balance in China"
- **Ethan Ilzetzki**, London School of Economics, and **Carmen M. Reinhart** and **Kenneth S. Rogoff**, Harvard University and NBER, "Exchange Arrangements Entering the 21st Century: Which Anchor Will Hold?" (NBER Working Paper No. 23134)
- **Tarek A. Hassan**, University of Chicago and NBER; **Thomas Mertens**, Federal Reserve Bank of San Francisco; and **Tony Zhang**, University of Chicago, "Currency Manipulation" (NBER Working Paper No. 22790)

- **Anusha Chari**, University of North Carolina at Chapel Hill and NBER, and **Karlye Stedman** and **Christian Lundblad**, University of North Carolina at Chapel Hill, "Taper Tantrums: QE, Its Aftermath, and Emerging Market Capital Flows"

- **Alessandro Dovis**, University of Pennsylvania and NBER, and **Rishabh Kirpalani**, Pennsylvania State University, "Fiscal Rules, Bailouts, and Reputation in Federal Governments"

- **Andrei Levchenko**, University of Michigan and NBER, and **Nitya Pandalai-Nayar**, Princeton University, "TPF, News, and 'Sentiments': The International Transmission of Business Cycles" (NBER Working Paper No. 21010)

Summaries of these papers are at: http://www.nber.org/confer/2017/IFMs17/summary.html

Public Economics

The NBER's Program on Public Economics met in Cambridge on April 6–7. Program Directors Amy Finkelstein of MIT and Raj Chetty of Stanford University and Faculty Research Fellow Nathaniel Hendren of Harvard University organized the meeting. These researchers' papers were presented and discussed:

- **Caroline Hoxby**, Stanford University and NBER, "The Returns to Online Education"

- **Shanthi Ramnath**, Department of the Treasury, and **Patricia Tong**, RAND Corporation, "The Persistent Reduction in Poverty from Filing a Tax Return"

- **Magne Mogstad**, University of Chicago and NBER, and **Thibaut Lamadon** and **Bradley J. Setzler**, University of Chicago, "Earnings Dynamics, Mobility Costs, and Transmission of Firm and Market Level Shocks"

- **Randall Akee**, University of California, Los Angeles, and NBER, and **Maggie Jones** and **Sonya Porter**, Bureau of the Census, "Adding Insult to Injury: Racial Disparity in an Era of Increasing Income Inequality"

- **Jacob Mortenson**, Joint Committee on Taxation, and **Andrew Whitten**, Department of the Treasury, "Bunching to Maximize Tax Credits: Evidence from Kinks in the U.S. Tax Schedule"

- **Annette Alstadsæter**, Norwegian University of Life Sciences; **Niels Johannesen**, University of Copenhagen; and **Gabriel Zucman**, University of California, Berkeley, and NBER, "Tax Evasion and Inequality"

- **Alex Rees-Jones**, University of Pennsylvania, and **Dmitry Taubinsky**, Dartmouth College and NBER, "Heuristic Perceptions of the Income Tax: Evidence and Implications for Debiasing" (NBER Working Paper No. 22884)

- **Manasi Deshpande**, University of Chicago and NBER, and **Yue Li**, University of Albany, "Who is Screened Out? Application Costs and the Targeting of Disability Programs"

- **Hunt Allcott**, New York University and NBER, and **Judd B. Kessler**, University of Pennsylvania and NBER, "The Welfare Effects of Nudges: A Case Study of Energy Use Social Comparisons" (NBER Working Paper No. 21671)

- **Johannes Spinnewijn** and **Camille Landais**, London School of Economics; and **David G. Seim**, **Peter Nilsson**, and **Arash Nekoei**, Stockholm University, "Adverse Selection in Unemployment Insurance: Evidence and Implications"

- **Liran Einav**, Stanford University and NBER; **Amy Finkelstein**; and **Neale Mahoney**, University of Chicago and NBER, "Provider Incentives and Health Care Costs: Evidence from Long-Term Care Hospitals" (NBER Working Paper No. 23100)

- **Benjamin R. Handel**, University of California, Berkeley, and NBER; **Igal Hendel**, Northwestern University and NBER; and **Michael D. Whinston**, MIT and NBER, "The Welfare Impact of Long-Term Health Insurance Contracts"

Summaries of these papers are at: http://www.nber.org/confer/2017/PEs17/summary.html

Insurance

The NBER's Working Group on Insurance met in Cambridge on April 7–8. Group co-directors Benjamin R. Handel of University of California, Berkeley, and Motohiro Yogo of Princeton University organized the meeting. These researchers' papers were presented and discussed:

- **Michael Geruso**, University of Texas at Austin and NBER, and **Timothy J. Layton** and **Daniel Prinz**, Harvard University, "Screening in Contract Design: Evidence from the ACA Health Insurance Exchanges" (NBER Working Paper No. 22832)
- **Lorenzo Casaburi**, University of Zurich, and **Jack J. Willis**, Harvard University, "Time vs. State in Insurance: Experimental Evidence from Contract Farming in Kenya"
- **Zach Y. Brown**, Columbia University, "An Empirical Model of Price Transparency and Markups in Health Care"
- **Colleen Carey**, Cornell University, "A Time to Harvest: Evidence on Consumer Choice Frictions from a Payment Revision in Medicare Part D"
- **Hanming Fang**, University of Pennsylvania and NBER, and **Zenan Wu**, Peking University (Beijing), "Multidimensional Private Information, Market Structure, and Insurance Markets" (NBER Working Paper No. 22773)
- **Kate Ho**, Columbia University and NBER, and **Robin S. Lee**, Harvard University and NBER, "Equilibrium Provider Networks: Bargaining and Exclusion in Health Care Markets"

Summaries of these papers are at: http://www.nber.org/confer/2017/INSs17/summary.html

Cohort Studies

The NBER's Working Group on Cohort Studies met in Los Angeles on April 14–15. Working Group Director Dora Costa of the University of California, Los Angeles, organized the meeting. These researchers' papers were presented and discussed:

- **Kent Thornburg**, Oregon Health and Science University, "Early Life Origins of Disease"
- **Gunnar Brandén**, Uppsala University (Sweden); **Mikael Lindahl**, University of Gothenburg (Sweden); and **Björn Öckert**, Institute for Evaluation of Labour Market and Education Policy (Sweden), "The Importance of Nature-Nurture Interactions in Skill Formation: Evidence from a Large Sample of Swedish Adoptees"
- **Lewina Lee** and **Avron Spiro**, Boston University, "Early Psychosocial Experiences and Trajectories of Cardiometabolic Risk in Later Life: Findings from the VA Normative Aging Study"
- **Kris Inwood**, University of Guelph (Ontario); **Les Oxley**, University of Waikato (New Zealand); and **Evan Roberts**, University of Minnesota, "Such a Rash Act: Wartime Experiences and Suicides after the Great War"

- **Daniel Belsky**, **Avshalom Caspi**, **Terrie Moffitt** and **Jasmin Wertz**, Duke University, and **Richie Poulton**, University of Otago (New Zealand), "Do Polygenic Influences on Educational Attainment Predict Crime? Findings from Two Birth Cohorts"

- **Daniel Barth**, University of Southern California; **Nicholas Papageorge**, Johns Hopkins University; and **Kevin Thom**, New York University, "Genetic Ability, Wealth, and Financial Decision-Making"

- **Weili Ding**, Queen's University (Ontario), and **Steven Lehrer**, Queen's University (Ontario) and NBER, "Are Genetic Markers of Interest for Economic Research?"

- **Maya Rossin-Slater**, University of California, Santa Barbara, and NBER, and **Miriam Wüst**, Danish National Centre for Social Research, "What is the Added Value of Preschool? Long-Term Impacts and Interactions with a Health Intervention" (NBER Working Paper No. 22700)

- **Mary McEniry**, University of Wisconsin-Madison; **Carmen Elisa Flórez**, Del Rosario University (Colombia); **Renata Pardo**, health consultant, Bogotá, Colombia; **Rafael Samper-Ternent**, University of Texas Medical Branch; and **Carlos Cano-Gutierrez**, Pontifical Xavierian University (Colombia), "Examining the Multigenerational Effects of Obesity and Stunting in a Latin American Middle Income Country: The Case of Colombia"

- **Mayvis Rebeira**, University of Toronto, "The Effect of Pension Income on Mortality: Evidence from Civil War Confederate Veterans"

- **Arun Hendi**, Duke University; **Irma Elo**, University of Pennsylvania; and **Pekka Martikainen**, University of Helsinki, "Birth Cohorts, Synthetic Cohorts, and Educational Differentials in Life Expectancy"

- **Adriana Lleras-Muney**, University of California, Los Angeles, and NBER, and **Flavien Moreau**, University of California, Los Angeles, "A Unified Law of Mortality: Implications for Economic Analysis"

- **Audrey Lai** and **Andrew Noymer**, University of California, Irvine, and **Tsuio Tai**, National Taipei University, "The Geometry of Mortality Change: Convex Hulls for Demographic Analysis"

- **Vellore Arthi**, University of Essex; **Brian Beach**, College of William and Mary; and **Walker Hanlon**, University of California, Los Angeles, and NBER, "Estimating the Recession-Mortality Relationship when Migration Matters"

- **Valentina Duque**, University of Michigan; **Maria Rosales Rueda**, University of California, Irvine; and **Fabio Sanchez**, University of Los Andes (Colombia), "Integrating Early Life Shocks and Human Capital Investments on Educational Outcomes"

- **Achyuta Adhvaryu**, University of Michigan and NBER, and **Snaebjorn Gunnsteinsson**, University of Maryland, "Resilience to Early Life Shocks"

Summaries of these papers are at: http://www.nber.org/confer/2017/CSs17/summary.html

Chinese Economy

The NBER's Working Group on the Chinese Economy met in Cambridge on April 14–15. Working Group Director Shang-Jin Wei of Columbia University, Faculty Research Fellow Nancy Qian of Northwestern University, and Research Associate Daniel Xu of Duke University organized the meeting. These researchers' papers were presented and discussed:

- **Jie Bai**, Harvard University, "Melons as Lemons: Asymmetric Information, Consumer Learning, and Seller Reputation"
- **Zhao Chen**, Fudan University (Shanghai); **Zhikuo Liu**, Shanghai University of Finance and Economics; and **Juan Carlos Suárez Serrato** and **Daniel Xu**, Duke University and NBER, "Notching R&D Investment with Corporate Income Tax Cuts in China"
- **Ernest Liu**, MIT, "Industrial Policies and Economic Development"
- **Bei Qin**, University of Hong Kong; **David Strömberg**, Stockholm University; and **Yanhui Wu**, University of Southern California, "Media Bias in China"
- **Susan Ou** and **Heyu Xiong**, Northwestern University, "Linguistic Barriers to State Capacity and Ideology: Evidence from Communist China"
- **Yu Liu**, Fudan University (Beijing), and **Xiaoxue Zhao**, Yale University, "State Capacity and Economic Development under Capital Mobility: Evidence from China"
- **Zhuo Chen** and **Chun Liu**, Tsinghua University (Beijing), and **Zhiguo He**, University of Chicago and NBER, "The Financing of Local Government in China: Stimulus Loan Wanes and Shadow Banking Waxes"
- **Lin William Cong** and **Jacopo Ponticelli**, University of Chicago, "Credit Allocation under Economic Stimulus: Evidence from China"
- **Davide Cantoni**, University of Munich; **David Y. Yang**, Stanford University; **Noam Yuchtman**, University of California, Berkeley, and NBER; and **Y. Jane Zhang**, Hong Kong University of Science and Technology, "Are Protests Games of Strategic Complements or Substitutes? Experimental Evidence from Hong Kong's Democracy Movement" (NBER Working Paper No. 23110)

Summaries of these papers are at: http://www.nber.org/confer/2017/CEs17/summary.html

Innovation Policy and the Economy

The NBER's Working Group on Innovation Policy, supported by the Ewing Marion Kauffman Foundation, met in Washington, D.C., on April 18. Working Group Director Scott Stern of MIT and Research Associate Josh Lerner of Harvard University organized the meeting. These researchers' papers were presented and discussed:

- **Glenn Ellison**, MIT and NBER, and **Sara Fisher Ellison**, MIT, "Search and Obfuscation in a Technologically Changing Retail Environment: Some Thoughts on Implications and Policy"
- **Steven N. Kaplan**, University of Chicago and NBER, "Are U.S. Companies Too Short-Term Oriented? Some Thoughts"
- **Aaron Chatterji**, Duke University and NBER, "Innovation and American K-12 Education"

- **Andreas Nilsson**, Sonanz (Germany), and **David T. Robinson**, Duke University and NBER, "What is the Business of Business?"

- **Olav Sorenson**, Yale University, "Innovation Policy in a Networked World" (NBER Working Paper No. 23431)

Summaries of these papers are at: http://www.nber.org/confer/2017/IPEs17/summary.html

Health Economics

The NBER's Program on Health Economics met in Cambridge on April 20–21. Program Director Michael Grossman of the Graduate Center, CUNY, and Research Associate Theodore J. Joyce of Baruch College organized the meeting. These researchers' papers were presented and discussed:

- **Willa H. Friedman**, University of Houston, and **Nicholas Wilson**, Reed College, "Money, Masculinity, and Men's Health: Experimental Evidence on Demand for a Preventive Health Input"

- **Christopher Carpenter**, Vanderbilt University and NBER, and **Emily C. Lawler**, Vanderbilt University, "Direct and Spillover Effects of Middle School Vaccination Requirements" (NBER Working Paper No. 23107)

- **Daniel S. Grossman** and **Umair Khalil**, West Virginia University, "Neighborhood Networks and Program Participation"

- **John Cawley**, Cornell University and NBER; **Euna Han**, Yonsei University (Seoul); **Jiyoon Kim**, Indiana University – Purdue University Fort Wayne; and **Edward C. Norton**, University of Michigan and NBER, "Testing for Peer Effects Using Genetic Data"

- **Adam Leive**, University of Virginia, "Dying to Win? Olympic Gold Medals and Longevity"

- **Ali Moghtaderi**, George Washington University, and **Avi Dor**, George Washington University and NBER, "Immunization and Moral Hazard: The HPV Vaccine and Uptake of Cancer Screening" (NBER Working Paper No. 22523)

Summaries of these papers are at: http://www.nber.org/confer/2017/HEs17/summary.html

Political Economy

The NBER's Program on Political Economy met in Cambridge on April 21. Program Director Alberto Alesina of Harvard University organized the meeting. These researchers' papers were presented and discussed:

- **Ruben Enikolopov** and **Maria Petrova,** Institute of Political Economy and Governance (Barcelona), and **Alexey Makarin**, Northwestern University, "Social Media and Protest Participation: Evidence from Russia"

- **Nicola Fontana**, London School of Economics, and **Tommaso Nannicini** and **Guido Tabellini**, Bocconi University (Milan), "Historical Roots of Political Extremism: The Effects of Nazi Occupation of Italy"

- **Samuel A. Bazzi**, Boston University; **Arya Gaduh**, University of Arkansas; **Alexander D. Rothenberg**, RAND Corporation; and **Maisy Wong**, University of Pennsylvania, "Unity in Diversity? Ethnicity, Migration, and Nation Building in Indonesia"

- **Alberto F. Alesina**; **Stefanie Stantcheva**, Harvard University and NBER; and **Edoardo Teso**, Harvard University, "Intergenerational Mobility and Preferences for Redistribution" (NBER Working Paper No. 23027)

- **Patrick Francois** and **Kairong Xiao**, University of British Columbia, and **Francesco Trebbi**, University of British Columbia and NBER, "Factions in Nondemocracies: Theory and Evidence from the Chinese Communist Party" (NBER Working Paper No. 22775)

- **Klaus Desmet**, Southern Methodist University; **Joseph F. Gomes**, University of Navarra (Spain); and **Ignacio Ortuño-Ortín**, Carlos III University of Madrid, "The Geography of Linguistic Diversity and the Provision of Public Goods"

Summaries of these papers are at: http://www.nber.org/confer/2017/POLs17/summary.html

Education and Children

The NBER's Program on Children and the NBER's Program on Education met in Chicago on April 20–21. Co-directors of the NBER Program on Children Janet Currie of Princeton University and Anna Aizer of Brown University and Director of the NBER's Program on Education Caroline M. Hoxby of Stanford University organized this joint meeting. These researchers' papers were presented and discussed:

- **Esther Duflo**, MIT and NBER; **Pascaline Dupas**, Stanford University and NBER; and **Michael Kremer**, Harvard University and NBER, "The Impact of Free Secondary Education: Experimental Evidence from Ghana"

- **Natalie Bau**, University of Toronto, and **Jishnu Das**, World Bank, "The Misallocation of Pay and Productivity in the Public Sector: Evidence from the Labor Market for Teachers"

- **Nicola Bianchi**, Northwestern University, and **Michela Giorcelli**, University of California, Los Angeles, "Scientific Education and Innovation: From Technical Diplomas to University STEM Degrees"

- **Barbara Biasi**, Stanford University, "Unions, Salaries, and the Market for Teachers: Evidence from Wisconsin"

- **Matthew A. Kraft**, Brown University, "Teacher Effects on Complex Cognitive Skills and Social-Emotional Competencies"

- **David N. Figlio**, Northwestern University and NBER; **Paola Giuliano**, University of California, Los Angeles, and NBER; **Umut Özek**, American Institutes for Research; and **Paola Sapienza**, Northwestern University and NBER, "Long-Term Orientation and Educational Performance" (NBER Working Paper No. 22541)

- **Elaine M. Liu**, University of Houston and NBER, and **Xuejing Zuo**, University of Houston, "Cultural Assimilation, Peer Effects, and the Evolution of the Gender Gap in Risk Preferences"

- **Kasey Buckles** and **Daniel M. Hungerman**, University of Notre Dame and NBER, and **Steven Lugauer**, University of Kentucky, "Fertility Is a Leading Economic Indicator"

- **Rucker Johnson**, University of California, Berkeley, and NBER, and **C. Kirabo Jackson**, Northwestern University and NBER, "Reducing Inequality through Dynamic Complementarity: Evidence from Head Start and Public School Spending"

- **Michael L. Anderson**, University of California, Berkeley, and NBER; **Justin Gallagher**, Case Western Reserve University; and **Elizabeth Ramirez Ritchie**, University of California, Berkeley, "School Lunch Quality and Academic Performance" (NBER Working Paper No. 23218)

- **Douglas Almond**, Columbia University and NBER, and **Yi Cheng**, Columbia University, "Perinatal Health among One Million American-Born Chinese"

Summaries of these papers are at: http://www.nber.org/confer/2017/CHEDs17/summary.html

Organizational Economics

The NBER's Working Group on Organizational Economics met in Cambridge on April 28–29. Working Group Director Robert S. Gibbons of MIT organized the meeting. These researchers' papers were presented and discussed:

- **David Cooper**, Florida State University; **Christos Ioannou**, University of Southampton (U.K.); and **Shi Qi**, College of William and Mary, "Coordination with Endogenous Contracts: Incentives, Selection, and Strategic Anticipation"

- **Claudine M. Gartenberg**, New York University; **Andrea Prat**, Columbia University; and **George Serafeim**, Harvard University, "Corporate Purpose and Financial Performance"

- **Marshall Ganz**, Harvard University, "Leading Change: Stories, Strategy, and Structure"

- **Mitchell Hoffman**, University of Toronto and NBER, and **Steven Tadelis**, University of California, Berkeley, and NBER, "How Do Managers Matter? Evidence from Performance Metrics and Employee Surveys in a Firm"

- **Avidit R. Acharya**, Stanford University, and **Juan M. Ortner**, Boston University, "Progressive Learning"

- **Maija Halonen-Akatwijuka** and **In-Uck Park**, University of Bristol (U.K.), "Coordination of Humanitarian Aid by Mediated Communication"

- **Marta Troya-Martinez**, New Economic School (Moscow), and **Liam Wren-Lewis**, Paris School of Economics, "Relational Incentive Contracts with Collusion"

- **Ricard Gil**, Johns Hopkins University; **Myongjin Kim**, University of Oklahoma; and **Giorgio Zanarone**, CUNEF (Madrid), "The Value of Relational Adaptation in Outsourcing: Evidence from the 2008 Shock to the U.S. Airline Industry"

- **Klaus Schmidt**, University of Munich, and **Fabian Herweg**, University of Bayreuth (Germany), "Procurement with Unforeseen Contingencies"

- **Dalia Marin**, University of Munich; **Linda Rousova**, European Central Bank; and **Thierry Verdier**, Paris School of Economics, "Do Multinationals Transplant their Business Model?"

- **Laura Alfaro** and **Raffaella Sadun**, Harvard University and NBER; **Nicholas Bloom**, Stanford University and NBER; **Paola Conconi** and **Patrick Legros**, Université Libre de Bruxelles (Belgium); **Harald Fadinger**, University of Mannheim (Germany); **Andrew Newman**, Boston University; and **John Van Reenen**, MIT and NBER, "All Together Now: Integration, Delegation, and Management"

Summaries of these papers are at: http://www.nber.org/confer/2017/OEs17/summary.html

NBER Books

Social Security Programs and Retirement around the World: The Capacity to Work at Older Ages

Edited by David A. Wise
University of Chicago Press, 2017

In recent years, the retirement age for public pensions has increased across many countries, and additional increases are in progress or under discussion in many more. The seventh stage of an ongoing research project studying the relationship between social security programs and labor force participation, *Social Security Programs and Retirement around the World: The Capacity to Work at Older Ages* explores people's capacity to work beyond the current retirement age. It brings together an international team of scholars from 12 countries — Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, the United Kingdom, and the United States — to analyze this issue. Contributors find that many individuals have substantial capacity to work at older ages. They also consider how policymakers might divide gains in life expectancy between years of work and retirement, as well as the main impediments to longer work life. They consider factors that influence the demand for older workers, as well as the evolution of health and disability status, which may affect labor supply from the older population.

Tax Policy and the Economy, Volume 31

Edited by Robert A. Moffitt
University of Chicago Press, 2017

The papers in *Tax Policy and the Economy, Volume 31* are directly related to important and often long-standing issues, such as how transfer programs affect tax rates and behavior. In the first paper, Alan Auerbach, Laurence Kotlikoff, Darryl Koehler, and Manni Yu take a lifetime perspective on the marginal tax rates facing older individuals and families arising from a comprehensive set of sources. In the second, Gizem Kosar and Robert A. Moffitt provide new estimates of the cumulative marginal tax rates facing low-income families over the period 1997–2007. In the third, Emmanuel Saez presents evidence on the elasticity of taxable income with respect to tax rates, drawing on data from the 2013 federal income tax reform. In the fourth paper, Conor Clarke and Wojciech Kopczuk survey the treatment of business income taxation in the United States since the 1950s, providing new data on how business income and its taxation have evolved over time. In the fifth, Louis Kaplow argues that the reduction in statutory tax rates from base-broadening may not reduce effective marginal tax rates on households.

NBER Macroeconomics Annual 2016, Volume 31

Edited by Martin Eichenbaum and Jonathan Parker
University of Chicago Press, 2017

The *NBER Macroeconomics Annual* features a collection of theoretical and empirical studies on central issues in contemporary macroeconomics. Pierre-Olivier Gourinchas, Thomas Philippon, and Dimitri Vayanos analyze the causes of the Greek crisis of 2010 and the policy efforts that ensued. Next, Olivier Blanchard, Christopher J. Erceg, and Jesper Lindé demonstrate that under plausible modeling assumptions, fiscal expansion by the core euro area economies would likely have a substantial positive effect on the GDP of nations on the periphery of the euro area, provided the European Central Bank holds policy rates low. Òscar Jordà, Moritz Schularick, and Alan M. Taylor introduce a new set of stylized facts about economic growth and financial ratios, and a new macro-financial database for the study of historical financial booms and busts. Jeffrey R. Campbell, Jonas D. M. Fisher, Alejandro Justiniano, and Leonardo Melosi study the historical effects of Federal Reserve efforts to provide guidance about the future path of the funds rate and conclude that forward guidance did not lead to macroeconomic expansion until late 2011, when the Fed introduced "calendar-based" communications. Fernando Alvarez, Francesco Lippi, and Juan Passadore explore the distinctions between models of price setting and associated nominal frictions using data on price setting behavior. Paul Beaudry, Dana Galizia, and Franck Portier consider the possibility that the economy displays nonlinear dynamics that lead to cycles rather than long-term convergence to a steady state. Finally, Lawrence Summers discusses the decline in the rate of global economic growth, and causes and implications of the relatively low cumulative rate of U.S. per capita income growth since the onset of the Great Recession in December 2007.

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