NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH

A quarterly summary of NBER research

No. 2, June 2018

Program Report

Asset Pricing Program

Monika Piazzesi *

The 2007–09 financial crisis challenged many long-standing beliefs about asset markets. For example, it raised questions about the applicability of the law of one price, it coincided with a period of extraordinary house price volatility, and it witnessed changing patterns of asset demand on the part of households and financial institutions alike. Over the last decade, researchers in the Asset Pricing Program have carried out a wide range of studies that are motivated by, or try to respond to, these challenges.

This report focuses on studies that exemplify post-crisis research on these three specific developments. The report is not a comprehensive review of research in the three areas, but is rather a collection of illustrative studies. Many other related papers have been distributed in the NBER Working Papers series.

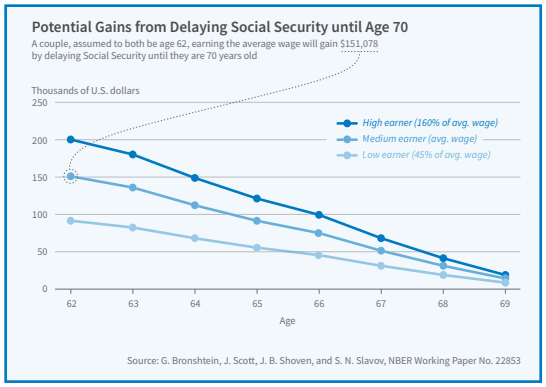
Exploring Violations of the Law of One Price

The law of one price holds that two investment strategies that have exactly the same payoffs in the future should have the same value today. This principle is at the core of asset pricing theory and is usually taught at the beginning of any course in finance. Before the crisis, the law of one price was extraordinarily useful for thinking about financial markets. It was hard to come up with examples of buy-sell strategies that would generate profitable arbitrages, at least after accounting for the transaction costs that would be involved in trading based on these strategies. This suggested that violations of the law of one price did not exist, or that if they did, they were short-lived and quickly arbitraged away.

The crisis profoundly changed this situation, as the law of one price appeared to be violated in many settings. Why? The standard explana-

* Monika Piazzesi, the Joan Kenney Professor of Economics at Stanford University, is director of the NBER's Asset Pricing Program and co-organizer of the NBER conference series New Developments in Long-term Asset Management.

ALSO IN THIS ISSUE



Implicit Taxes on Work at Older Ages 7

The Shrinking Universe of Public Firms: Facts, Causes, and Consequences 12

The Competitive Saving Motive in China Implications for Savings, the Current Account, and Housing Prices 16

Firm Learning and Market Equilibrium 21

NBER News 24

Conferences 25

Program and Working Group Meetings 31

NBER Books 38

NBER Reporter

Requests for subscriptions, changes of address, and cancellations should be sent to *Reporter*, National Bureau of Economic Research, Inc., 1050 Massachusetts Avenue, Cambridge, MA 02138-5398 (please include the current mailing label), or by email to subs@nber.org. Print copies of the *Reporter* are only mailed to subscribers in the U.S. and Canada; those in other nations may request electronic subscriptions at www.nber.org/drsubscribe/.

tion has been weak balance sheets: Financial institutions were aware of the arbitrage opportunities but were unable to take the positions necessary to eliminate them. Some violations have persisted and are still observed today, even though balance sheets of financial institutions have recovered.

There have been particularly salient questions about price determination in foreign exchange markets. In these markets, the law of one price implies the covered interest rate parity (CIP) condition. It compares two investment strategies that do not involve risk. For example, one might be investing U.S. dollars domestically at the short-term interest rate, while the other could be investing dollars in Switzerland at the same maturity. In the latter case, the investor would exchange dollars for Swiss francs today, invest the francs at the Swiss short-term rate, and then convert them back into dollars at the current futures exchange rate. The CIP condition states that the return on these two strategies should be the same.

Wenxin Du, Alexander Tepper, and Adrien Verdelhan document that the CIP condition held up well before the crisis, but broke down afterward in the markets for G-10 currencies.[1] Figure 1, on the next page, shows these violations in basis points. For most currencies, including the Swiss franc, the Japanese yen, and the euro, it is more profitable to borrow abroad and invest domestically.

The researchers find evidence that regulatory constraints, in particular capital requirements for European banks, are responsible for the CIP violations. European banks have to hold capital against quarter-end positions. The researchers also observe stronger CIP violations toward the end of the quarter. A week from the end of the quarter, for example, European banks do not like to engage in weeklong positions. Figure 2, also on the next page, shows the pattern of the CIP deviations in forward contracts toward the end of the quarter.

Du, Joanne Im, and Jesse Schreger point to another cause for CIP violations: the attractiveness of U.S. Treasuries as safe assets for investors across the world.[2] They document large and persistent CIP violations when rates are measured from government bonds instead of LIBOR. Foreign investors appear willing to give up roughly 25 basis points per year to hold currency-hedged U.S. Treasuries as opposed to their own countries' bonds.

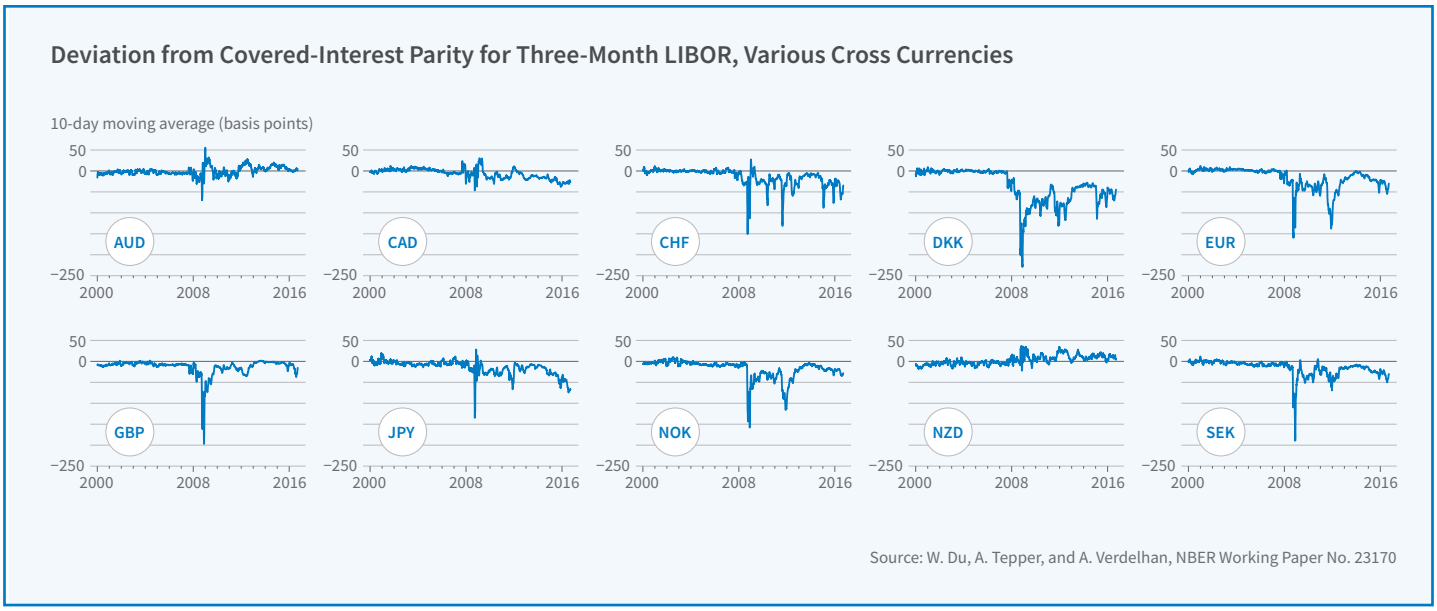


Figure 1

U.S. Treasuries are well known to be sought after as a safe asset. As a consequence, they have a convenience yield: their holders accept a lower interest rate than they could earn on other bonds because the Treasuries are more liquid than other bonds. The presence of the convenience yield leads to CIP violations even in the absence of financial frictions such as regulatory constraints, but during and after the crisis, the yield differential associated with liquidity expanded.

Zhengyang Jiang, Hanno Lustig, and Arvind Krishnamurthy argue that in times in which foreign investors assign a higher convenience yield to U.S. Treasuries, they earn a lower return on Treasuries in their own currency.[3] Their paper documents that this theoretical prediction is borne out in the data: a higher convenience yield on Treasuries coincides with an appreciation of the dollar, but predicts its future depreciation, lowering the return on Treasuries for foreign investors.

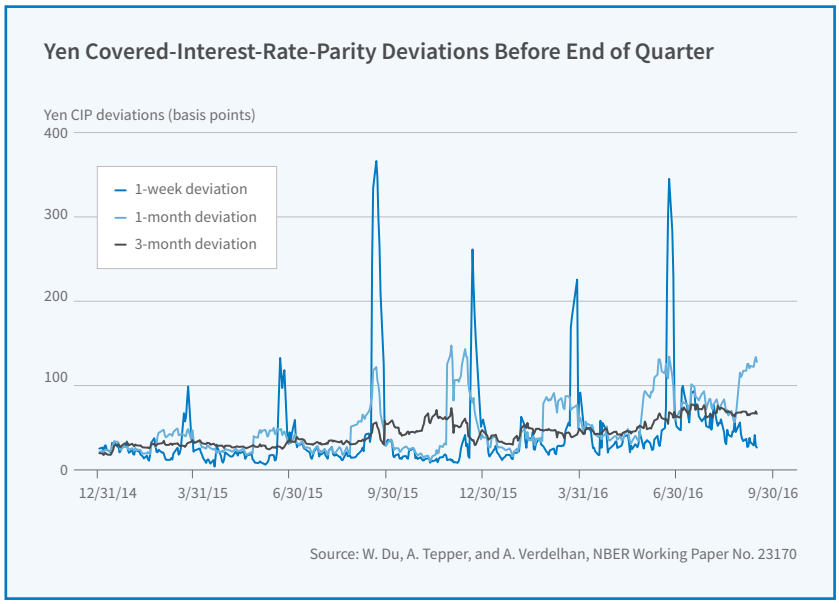


Figure 2

House Prices

Before the dramatic boom-bust episode of the early 2000s, housing markets attracted relatively little attention from asset pricing researchers. This was due, in part, to data availability. Researchers have easy access to copious data on individual stocks through the Center for Research in Security Prices (CRSP), while researchers studying house prices often must begin with the time-consuming process of putting together a basic dataset. Getting the data is usually costly, because individual housing transactions and mortgage information are only available through commercial data providers such as CoreLogic. These data need to be cleaned with many filters to eliminate transactions that were not made at market prices or that should be excluded for other reasons. We would know more today about booms and busts in housing markets if there was a CRSP database for housing and mortgages.

Despite the data challenges, there has been rapid progress in recent years in studying the dynamics of housing cycles. For example, Tim Landvoigt, Martin Schneider, and I analyze house purchases in the years 2000 and 2005 — the beginning and peak of the recent housing boom — and study the quality of houses that changed owners during those years.[4] We analyze the distribution of characteristics of the houses that sold in those years, and then ask what prices buyers were willing to pay for different categories of homes. Our study examines San Diego County,

a metropolitan area that experienced a strong boom-bust episode.

Repeat-sales data suggest that while house prices appreciated in all segments, houses in cheaper, lower-quality segments appreciated more than houses in expensive, higher-quality segments. Each dot in Figure 3 is a house that sold in 2000 and again in 2005. The figure also shows the estimated relationship between capital gains from 2000 to 2005, measured in percent, and the natural log of the initial price. Houses that were initially cheaper, as measured along the horizontal axis, experienced larger subsequent capital gains on the vertical axis.

The data suggest three reasons cheaper homes appreciated more. First, cheap credit — especially lower down-payment constraints, but also lower mortgage rates — enabled poorer households to spend more on a house or to purchase a house in the first place. Second, a larger fraction of the houses sold in 2005 were of either low or high quality relative to 2000. The quality distribution for houses traded at the peak of the boom had fatter tails than the corresponding distribution before the boom. Because fewer medium-quality houses were available, the marginal buyer of a low-quality house was richer in the boom and drove up prices of low-quality houses more, relative to prices of higher-quality houses. Third, at the peak of the boom, households were forecasting further house price appreciation; they were disappointed in the bust.

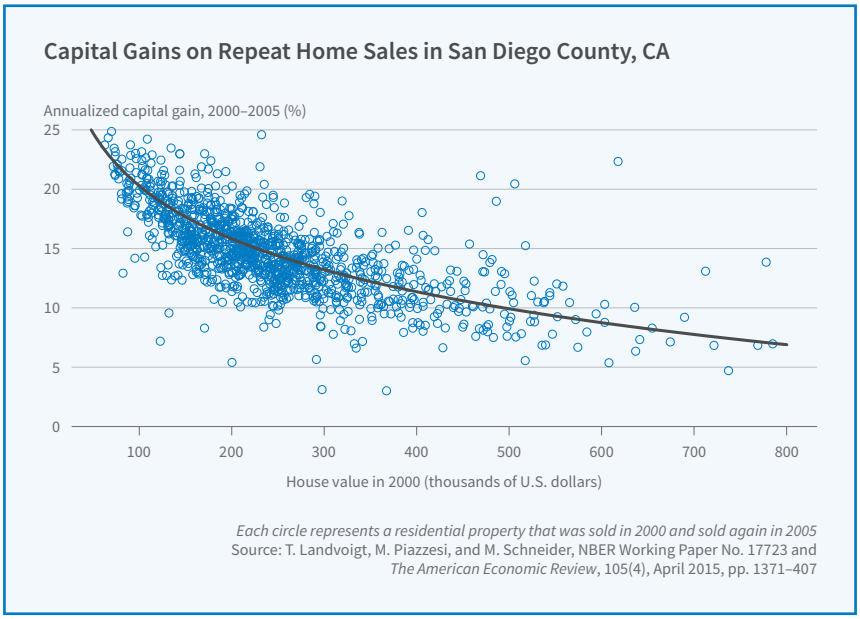


Figure 3

Another study of the recent evolution of the U.S. housing market examines how the decline in down-payment constraints during the early 2000s could have affected risk premia in housing markets, other asset markets, and house prices. Jack Favilukis, Sydney C. Ludvigson, and Stijn Van Nieuwerburgh observe that a closed economy — one without trade or capital flows — provides a useful benchmark to understand the interaction of down-payment constraints and risk premia.[5] In such an economy, credit has to flow from domestic saver households to domestic borrowers, intermediated by the banking system. Lower down-payment constraints will have two counteracting effects. First, they will improve risk-sharing opportunities between households, which lead to lower risk premia in all asset markets, including the housing market, and thereby to higher house prices. Second, improved risk-sharing will also lower precautionary saving. This decline in the supply of saving will raise equilibrium interest rates, which in turn will depress house prices. In the quantitative model developed by these researchers, the second effect dominates, and a decline in down-payment constraints is associated with higher interest rates and lower house prices — a pattern that is not consistent with the U.S. experience during the early 2000s.

The researchers point out that the United States is not a closed economy, and that during the early 2000s, it experienced a massive influx of foreign capital, particularly to domestic bond markets. This influx was quantitatively large enough to lower equilibrium interest rates, and in isolation, it would have pushed domestic savers out of bond markets and into other risky asset classes, thereby increasing risk premia. However, because the influx coincided with lower down-payment constraints that improved risk sharing among domestic households, and lowered risk premia across the board, the overall effect was a coincidence of lower interest rates, lower risk premia, and higher house prices.

Researchers have also studied the dynamics of housing markets in other countries, notably China. Hanming Fang, Quanlin Gu, Wei Xiong, and Li-An Zhou provide evidence that the Chinese house price boom of the last decade has been supported by strong growth in household incomes in most cities.[6] Edward Glaeser, Wei Huang, Yueran Ma, and Andrei Shleifer argue that the demand for real estate in China is so strong that current house price developments might be sustainable, especially given the sparse alternative investments for Chinese households.[7]

House price data have not only been used to study housing market dynamics, but also for other purposes. One novel use is the estimation of discount rates for payoffs that arrive in the distant future. Stefano Giglio, Matteo Maggiori, and Johannes Stroebel document significant price differences between houses in the U.K. that provide the buyer an unlimited property right to the land (freeholds) and those where the property right expires after a predetermined number of years (leaseholds).[8] The underlying differences across properties are attributable to differences in contractual provisions that were adopted hundreds of years ago, when large holdings were first divided. The observed price differences today imply that ownership of land that only begins far in the future is

highly valued in the housing market. The researchers estimate a long-term discount rate of about 2.5 percent per year. This estimate could find application in a number of settings beyond the housing market, for example in discounting the costs and benefits of environmental policies.

Other research is directed at understanding the role of beliefs and expectations in affecting house prices and the behavior of home buyers. Schneider and I use data from the Michigan household survey and document that, from the beginning to the peak of the 2000s housing boom, the share of optimistic households who were convinced that housing is a good investment because house prices would further appreciate doubled from 10 percent of households to 20 percent.[9] We stress that because houses trade in an illiquid search market — less than 10 percent of the housing stock trades in any given year — a small number of optimists is enough to have a major impact on the few transactions that we observe in the housing market. Craig Burnside, Martin Eichenbaum, and Sergio Rebelo describe the social dynamics of how households pass on their optimism about house prices to other households with an epidemiological model of infectious diseases.[10] The work by Greg Kaplan, Kurt Mitman, and Giovanni L. Violante suggests that shifting beliefs about the future trajectory of house prices played a key role in the boom-bust house price cycle.[11] Understanding the factors that contribute to such shifts in expectation formation is an active area of research.

Positions and Asset Prices

Why do households and institutions hold certain assets, and what effect do their asset demands have on asset prices? The traditional approach in asset pricing specifies models of optimal consumption-savings behavior and tests these models with data on aggregate or individual consumption of households, as well as asset price data. Recent research on "positions-based asset pricing" tries to understand individual asset positions of households and financial institutions and to connect these positions to asset prices.

There is a large literature that develops models to explain households' asset demands. For example, if households face collateral constraints and an uncertain income that increases over their life cycle, it is possible to explain both large, mortgaged positions in housing and low rates of participation in the stock market by young households. While leveraged positions in a single asset are often associated with hedge funds, they can also make sense for young households with a large claim on human capital: future labor income. Since human capital is relatively safe, it can be optimal to invest the remainder of a young household's portfolio in a highly risky financial position.

Another strand of research, which seeks to explain the behavior of financial institutions, uses a variety of modeling approaches that range from simple descriptions of the risk-return tradeoffs that these institutions face to dynamic optimization models that capture agency frictions or regulatory frictions such as leverage or liquidity constraints. This work builds heavily on the classic contributions in corporate finance. The sharp distinction between contributions to the fields of asset pricing and corporate finance has been eroding, and many research studies are now presented at meetings of both the Asset Pricing and the Corporate Finance Programs.

Empirical work on "positions-based asset pricing" relies on detailed data on the holdings of households and financial institutions. The most comprehensive data source for U.S. household positions is the Survey of Consumer Finances, the Federal Reserve Board's triennial survey of families' balance sheets, pensions, income, and demographic characteristics. Data on positions of financial institutions are drawn from regulatory filings such as the Consolidated Reports of Condition and Income (Call Reports) that banks fill out quarterly.

These detailed data specify positions in many individual assets — many more assets than any model could possibly accommodate. Therefore it has become useful to rely on classic findings in the empirical asset pricing literature that document a strong factor structure in asset returns. The highly complicated problem of choosing between many different assets can then be rephrased as a much simpler problem of choosing exposures to a small set of factors. Factor investing is an interesting example of a technique that has become popular in both the asset management industry and in the latest academic research.

One recent study examines whether the asset demand decisions of financial institutions affect the prices of particular stocks, whether the price impact of these decisions varies over time, and whether these decisions contribute to the volatility of stock returns. Ralph S. J. Koijen and Motohiro Yogo study the stock investment behavior of financial institutions such as insurance companies, mutual funds, pension funds, hedge funds, and endowments.[12] They first define, for each financial institution separately, the universe of stocks from which each chooses. Some institutions publish descriptions of the investment universe that they consider. For example, mutual funds publish a prospectus that describes the type of stocks in which they invest. Some invest passively to track the S&P 500 Index; others may track an industry index, such as health care or energy. If an institution does not publish a prospectus, the researchers construct the investment universe by looking at past stock holdings from regulatory filings of Form 13F to the Securities and Exchange Commission.

They then solve a mean-variance portfolio choice problem with heterogeneous beliefs and short sale constraints to describe the institution's demand for stocks with specific characteristics, such as market capitalization or profitability. In equilibrium, the aggregate demand for stocks by financial institutions, plus household demand, must clear the market. In this framework, the researchers find that the price impact of individual institutions has decreased over time, especially for the least liquid stocks. Moreover, their analysis suggests that about 30 percent of the variance in stock returns is due to variations in the assets under management of different investor types, while 60 percent is attributable to

other demand factors. Variations in the supply of stocks with various characteristics, for example from share issues or repurchases or from changes in the characteristics of such stocks like a change in dividend payouts, explain only about 10 percent of the return variance.

Juliane Begenau, Schneider, and I use quarterly data from the Call Reports together with return data on fixed income instruments to document the risk exposures of individual banks.[13] These exposures are a central focus of macroprudential policy. We develop an approach to measuring exposure to interest rate risk and credit risk, the two factors that explain much of the return variation in fixed income instruments on bank balance sheets. Our approach can be used to represent many different bank positions — including those in derivatives — in terms of simple factor portfolios. A transparent algorithm delivers exposure estimates for each bank, individual position, and date that are comparable across banks and positions.

Our findings indicate that large banks built up considerable exposures to interest-rate risk through both derivatives and other business during the recent boom, while small banks are highly exposed to the credit risk factor through their loan portfolios. To illustrate this point, consider U.S. banks' aggregate net fixed income holdings at the end of 2013. While the net value of these holdings was $2.3 trillion, the interest-rate risk of their positions was comparable to that of a leveraged portfolio with a $4 trillion long position in safe long-term bonds and a similar-sized short position in cash. Interest rate derivatives positions show a similar pattern: They are equivalent to a highly leveraged portfolio with a long position of $1.2 trillion in long-term bonds — which is their exposure to the interest-rate factor — and a $1.1 trillion short position in cash. Both derivatives and other positions decline in value when interest rates rise, so the derivatives do not provide a source of diversification. These results suggest that maturity transformation, which has long been recognized as a goal of banks' traditional business, is also an objective in their investment business. This is reflected in their derivatives positions.

---

[1] *W. Du, A. Tepper, and A. Verdelhan, "Deviations from Covered Interest Rate Parity," NBER Working Paper No. 23170, February 2017.*
Return to Text

[2] *W. Du, J. Im, and J. Schreger, "The U.S. Treasury Premium,"* Journal of International Economics *112: pp.167–81, NBER Working Paper No. 23759, August 2017, and the* Journal of Finance*, 73(3), 2018, pp. 915–57.*
Return to Text

[3] *Z. Jiang, A. Krishnamurthy, and H. Lustig, "Foreign Safe Asset Demand and the Dollar Exchange Rate," NBER Working Paper No. 24439, March 2018.*
Return to Text

[4] *T. Landvoigt, M. Piazzesi, and M. Schneider, "The Housing Market(s) of San Diego," NBER Working Paper No. 17723, January 2012, and the* American Economic Review*, 105(4), 2015, pp.1371–407.*
Return to Text

[5] *J. Favilukis, S. Ludvigson, and S. Van Nieuwerburgh, "The Macroeconomic Effects of Housing Wealth, Housing Finance, and Limited Risk-Sharing in General Equilibrium," NBER Working Paper No. 15988, May 2010, and the* Journal of Political Economy*, 125(1), 2017, pp. 140–223.*
Return to Text

[6] *H. Fang, Q. Gu, W. Xiong, and L. Zhou, "Demystifying the Chinese Housing Boom," NBER Working Paper No. 21112, April 2015.*
Return to Text

[7] *E. Glaeser, W. Huang, Y. Ma, and A. Shleifer, "A Real Estate Boom with Chinese Characteristics," NBER Working Paper No. 22789, October 2016, and the* Journal of Economic Perspectives*, 31(1), 2017, pp. 93–116.*
Return to Text

[8] *S. Giglio, M. Maggiori, and J. Stroebel, "Very Long-Run Discount Rates," NBER Working Paper No. 20133, May 2014, and the* Quarterly Journal of Economics*, 130(1), 2015, pp. 1–53.*
Return to Text

[9] *M. Piazzesi and M. Schneider, "Momentum Traders in the Housing Market: Survey Evidence and a Search Model," NBER Working Paper No. 14669, January 2009, and* The American Economic Review*, 99(2), pp. 406–11.*
Return to Text

[10] *C. Burnside, M. Eichenbaum, and S. Rebelo, "Understanding Booms and Busts in Housing Markets," NBER Working Paper No. 16734, January 2011, and the* Journal of Political Economy *124(4), pp. 1088–147.*
Return to Text

[11] *G. Kaplan, K. Mitman, and G. Violante, "The Housing Boom and Bust: Model Meets Evidence," NBER Working Paper No. 23694, August 2017.*
Return to Text

[12] *R. Koijen and M. Yogo, "An Equilibrium Model of Institutional Demand and Asset Prices," NBER Working Paper No. 21749, November 2015, and forthcoming in the* Journal of Political Economy.
Return to Text

[13] *J. Begenau, M. Piazzesi, and M. Schneider, "Banks' Risk Exposures," NBER Working Paper No. 21334, July 2015.*
Return to Text

Implicit Taxes on Work at Older Ages

Gopi Shah Goda, John B. Shoven, and Sita N. Slavov

The biggest financial challenge for most Americans is funding their retirement. In recent decades, working lives have not kept pace with increasing life expectancies, leading to longer retirements.[1] Longer retirements are more challenging to finance, whether through private savings or federal entitlement programs such as Social Security and Medicare. The structure of retirement programs can produce large implicit taxes and subsidies for work at older ages as well as for alternative strategies to tap into retirement resources. These implicit taxes and subsidies can distort behavior, and failure to understand them can result in households passing up six-figure arbitrage opportunities.

The three of us, together with a set of outstanding coauthors, have been writing about these issues for more than a decade. This article summarizes our work, drawing on the results of several studies.

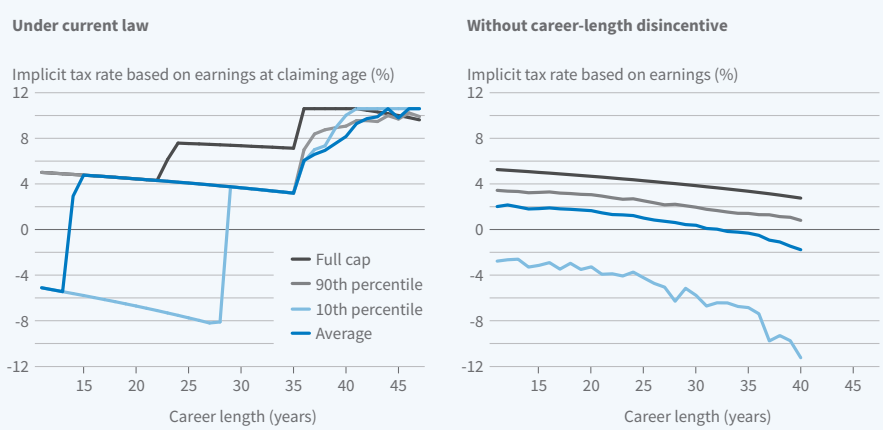
We first describe the implicit taxes on wages earned by the elderly that are embedded in Social Security retirement and disability insurance and Medicare. Then we cover the subsidy or actuarial advantage of delaying the commencement of Social Security, a decision that for many people will involve working longer. A clearer understanding of the work and claiming incentives embodied in federal programs can help policymakers improve their design and avoid unintended consequences.

Implicit Taxes for Older Workers

Our earliest study of implicit taxes on wages earned at older ages focuses on the Social Security retirement program. The study documents that current Social Security tax and benefit rules lead to an increasing implicit tax on work at longer career lengths.[2] Social Security benefits are based on the average of the highest 35 years of earnings, indexed for economy-wide average wage growth. A progressive formula is applied to this average to arrive at the monthly Social Security benefit. We show that as career length increases and career average earnings rise, benefits rise less quickly than earnings and taxes, resulting in implicit net taxes. Once 35 years of earnings are reached, additional years of earnings have little or no effect on Social Security benefits, resulting in an implicit tax that approximates the full 10.6 percent payroll tax rate. The implicit tax rates for four stylized workers are shown in the left panel of Figure 1.[3]

We also analyze three policy changes that could collectively reduce implicit taxes: (1) basing benefits on the highest 40 years of indexed earnings; (2) changing the benefit formula so that short careers with high earnings are treated differently than long careers with low earnings; and (3) eliminating the payroll tax for individuals who have reached 40 years of work. The resulting implicit taxes generated by the retirement program of Social Security are shown in the right panel of the figure. These changes could be implemented in a revenue-neutral way that maintains average benefits.

We find a similar effect for Social Security disability insurance.[4] To be eligible for disability insurance, a claimant must have worked in at least five of the past 10 years. Thus, workers who are within five years of full retirement age — at which point disability benefits are converted to retirement benefits — can maintain eligibility for dis-



Source: G. S. Goda, J. B. Shoven, and S. N. Slavov, NBER Working Paper No. 13110 and J. R. Brown, J. B. Liebman, and D. A. Wise, eds., *Social Security Policy in a Changing Environment,* University of Chicago Press, June 2009, pp. 21-38

Figure 1

Gopi Shah Goda is a senior fellow and the deputy director of the Stanford Institute for Economic Policy Research (SIEPR) at Stanford University. She is a faculty research fellow at the National Bureau of Economic Research, where she is affiliated with the NBER Aging Program, and a fellow of the Society of Actuaries.

Goda's research is primarily related to topics in the economics of aging in the United States that inform economic policymaking. Her recent studies include an examination of perceptual and behavioral biases and their relationship to retirement saving decisions and the effects of long-term care insurance on family members' work and location decisions. Her work has appeared in a variety of leading economics journals and has been supported by the Social Security Administration, the National Institute on Aging, the Alfred P. Sloan Foundation, and the TIAA Institute. She was the director of SIEPR's Young Scholars Program, 2009–16.

Prior to joining SIEPR, she was a Robert Wood Johnson Scholar in Health Policy Research at Harvard University. She earned her PhD in economics from Stanford University in 2007 and her BS in mathematics and actuarial science from the University of Nebraska-Lincoln in 2000. She lives in Stanford with her husband and two sons.

ability benefits regardless of whether they work, although they continue to pay the 1.8 percent payroll tax to fund the program. Moreover, even though workers who are more than five years from full retirement age will lose eligibility if they stop working entirely, the incentive to earn income beyond the minimum required to maintain coverage weakens as they age because the length of time over which any potential disability benefits would be paid shrinks.

We have also studied the implicit taxes resulting from the Medicare as Secondary Payer (MSP) provision.[5] Requiring employer-sponsored health insurance to be the primary payer for Medicare-eligible workers increases the cost to employers of hiring these workers and reduces the pay they are willing to offer. The provision effectively forces Medicare-eligible individuals to forgo their Medicare coverage if they work for an employer that offers health insurance. Using data on Medicare costs, we estimate that this implicit tax is between 15 and 20 percent of wages at age 65 for average earners. It increases to 25–35 percent by age 70.[6] These implicit taxes are on top of the 15.3 percent payroll tax that funds the retirement, disability, and Medicare programs.

For workers under age 65, employer-sponsored health insurance has in the past offset some of these work disincentives. Our research shows that, among workers with access to employer-provided health insurance, those who are also eligible for subsidized retiree health insurance have a one-year departure rate that is 36–49 percent greater at ages 62 to 64 than those who are not.[7] We also show that providing retiree health insurance for public sector workers increases the probability of their switching to part-time work in their late 50s and increases the probability of stopping work in their early 60s.[8] Retiree health insurance is relatively rare: Less than a quarter of large firms that offer employee health insurance also offer retiree health insurance.[9] However, since 2014, the Affordable Care Act has effectively made subsidized retiree health insurance available to all individuals. Our research suggests that the availability of such coverage is likely to encourage pre-Medicare retirements.

Gains from Delaying Social Security

While much research has been done on the optimal level and allocation of retirement wealth, less attention has been paid to the optimal strategy for drawing down on that wealth. Social Security is the largest retirement asset for most Americans. Benefits may be claimed at any age between 62 and 70, with later claims resulting in higher monthly benefits. The increase is more than actuarially fair, given recent mortality rates and real interest rates. We have examined optimal Social Security claiming and the coordination of Social Security claiming with withdrawals from private retirement savings.

We show that some degree of delay in claiming Social Security benefits maximizes the expected present value of retirement wealth for a large subset of people. The gains from delay are largest for primary earners. Since Social Security is paid as a joint and survivor annuity, primary earners who delay claiming boost not only their own monthly benefit but also the survivor benefit they leave to their spouse. Most primary earners maximize lifetime income by claiming at age 70. However, even singles boost their expected lifetime incomes by delaying to 70. Most surprisingly, even single males who are in poorer-than-average health and face mortality rates twice the average can maximize lifetime income by claiming at age 65 rather than 62.[10] These gains from delay have increased substantially in the past 20 years due to rising life expectancy, changes in Social Security rules, and historically low real interest rates. Panel (a) of Table 1, on the following page, shows the wealth-maximizing claiming ages, as well as the potential increase in expected lifetime income, relative to claiming at age 62, for a variety of stylized households, with average mortality for their cohort and gender. The panel suggests that gains from delay were small for the 1930 (and 1932 for sec-

ondary earners) birth cohort but large for the 1951 (and 1953 for secondary earners) birth cohort. Panel (b) decomposes the impact of the three factors that contributed to the gains from delay by holding mortality and interest rates constant. Mortality is held to 1951/1953 levels and the real interest rate is held to 2.9 percent.[11]

If the gains from delaying Social Security are so large, why don't most people delay? We investigate the role of liquidity constraints by examining whether individuals who claim early have sufficient private savings to finance a significant delay, assuming they also stop working. We find that around a third of those who claim before full retirement age have Individual Retirement Account (IRA) assets sufficient to finance a two-year delay. In addition, many people who claim before full retirement age wait until they are 70½, when they are required by law to take distributions from their IRAs. Thus, liquidity constraints alone cannot explain why most people do not delay.[12] We fielded an original survey asking people about their rationale for claiming when they did, as well as their satisfaction with their claiming decisions. Our survey results suggest that claiming Social Security upon stopping work and claiming at full retirement age are strong social norms.[13]

Since delaying Social Security benefits involves a tradeoff between current and future income, it is difficult to say that early claimers are making a mistake even if their choice does not maximize expected retirement wealth. However, we show that primary earners who either purchase a retail annuity or take an annuity payout from a defined benefit plan when a lump sum is available, while simultaneously failing to delay Social Security, are purchasing relatively expensive annuities when a cheaper annuity — the increased lifetime payments resulting from delaying Social Security — is available. They could enjoy higher income in every year of their lives if they used their retirement savings or lump sum payout to delay Social Security. Figure 2 shows the magnitude of the potential arbitrage gains from delaying Social Security to age 70 for married primary earners, broken down by

Wealth Maximizing Social Security Claiming Ages

	Actual interest rates and mortality		Constant interest rates and mortality	
Single persons	**Optimal claiming age**	**Percent gain***	**Optimal claiming age**	**Percent gain***
Male born 1930	62	0	64	2.1
Male born 1951	69	12.6	67	1.7
Female born 1930	63	0.5	65	3.8
Female born 1951	70	17.8	68	4.9
Single-earner married couples				
Earner born 1930	64	1.2	65	5.2
Non-earning spouse born 1932	63		65	
Earner born 1951	69	16.7	68	7.0
Non-earning spouse born 1953	67		66	
Two-earner couples				
Primary earner born 1930	65	1.1	65	4.0
Secondary earner born 1932	62		62	
Primary earner born 1951	70	17.1	70	7.0
Secondary earner born 1953	67		62	

**Percent gain reflects increase in present value of benefits relative to claiming at age 62*

Source: J. B. Shoven and S. N. Slavov, NBER Working Paper No. 19370 and *Journal of Financial Planning*, 27(3), 2014, pp. 32-41

Table 1

John B. Shoven is the Charles R. Schwab Professor of Economics at Stanford University and the Buzz and Barbara McCoy Senior Fellow of the Hoover Institution. He has been on the Stanford faculty since 1973, has been a research associate of the NBER for more than 40 years, and directed the Stanford Institute for Economic Policy Research for 20 years. He was chairman of the Stanford economics department from 1986–9 and was dean of the School of Humanities and Sciences from 1993 to 1998. He is a member of the American Academy of Arts and Sciences and the Econometrics Society.

The focus of Shoven's work has changed over the course of his career. Initially, he worked on developing applied general equilibrium models of the economy to be used for tax policy evaluation. Then, in the 1980s, he began to focus on pensions, retirement, and empirical finance. In the past 10 years, he has written extensively on Social Security. Over the years, he has written more than 100 professional articles and has authored or edited more than 20 books.

In the private sector, he is the Chairman of the Board of Cadence Design Systems and is a member of the boards of Exponent Inc., Financial Engines, and American Century Funds.

Sita Nataraj Slavov is a professor of public policy at the Schar School of Policy and Government at George Mason University, and a faculty research fellow at the NBER. She also directs the public policy PhD program at the Schar School and is a visiting scholar at the American Enterprise Institute. Previously she was a resident scholar at the American Enterprise Institute, an associate professor at Occidental College, and a senior economist at the Council of Economic Advisers. She received her PhD in economics from Stanford University and her BA from the College of William and Mary.

Slavov's research focuses primarily on public finance and the economics of aging. She has published numerous articles and book chapters on Social Security, retirement, retiree health insurance, and health expenditures among older people. Her work has been published in peer-reviewed journals such as the *Journal of Health Economics*, the *Journal of Public Economics*, and the *Journal of Public Economic Theory*. In addition, she has published many op-eds and blog posts in outlets such as the *New York Times*, the *Los Angeles Times,* and Real Clear Markets.

Slavov teaches a variety of courses at the undergraduate and graduate levels, including public finance, economic policy analysis, economics of aging, and research design for public policy.

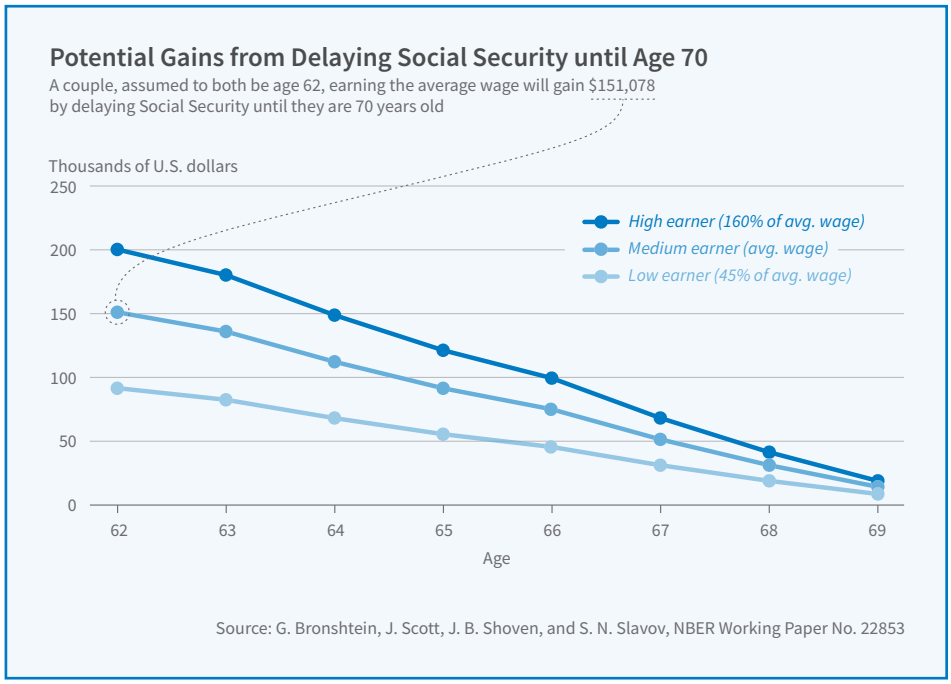


Figure 2

claiming/annuity purchase age and level of income.[14]

We recognize that for many people delaying Social Security will involve working longer, whether due to liquidity constraints or to social norms. And we have calculated the impact of working longer and simultaneously delaying Social Security on the level of sustainable consumption in retirement. Figure 3 shows — for various real investment returns and ages — the number of months of additional work and Social Security delay that would produce the same increase in retirement consumption as saving an additional 1 percent of income through age 66. For example, for 46-year-olds, working an extra 2.4 months produces the same increase in retirement

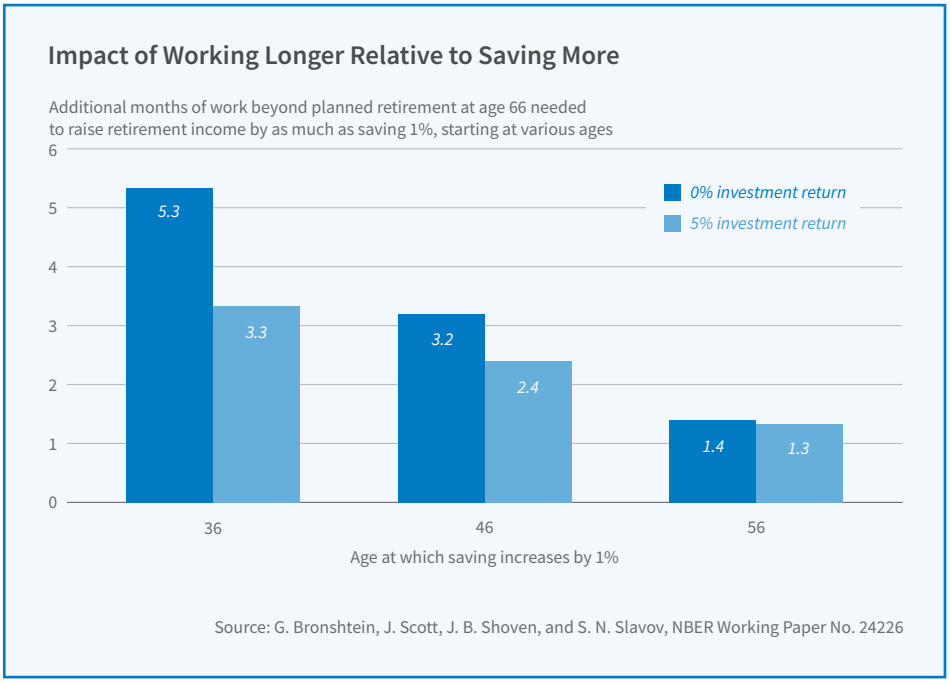


Figure 3

consumption as saving an additional 1 percent of income over the next 20 years if real investment returns are zero.

Working longer increases consumption in retirement for several reasons. First, individuals can save a portion of the income they earn during the extra time worked. Second, individuals can earn additional returns on accumulated savings. Third, they will have fewer years of retirement to finance. Finally, delaying Social Security increases monthly benefits. The last factor is by far the largest for most people.[15]

Conclusion

Implicit taxes on work at older ages can be remarkably large. For those 65 and over, the total implicit tax resulting from the Social Security retirement and disability programs plus Medicare can easily top 40 percent. Alternative policies could substantially reduce these implicit taxes and have a large impact on labor supply, particularly given that older workers supply labor more elastically than younger ones. The actuarial advantage of delaying claiming Social Security is equally large, and even a single male with twice the average mortality risk (for example, a smoker) could gain in expected value terms from some delay. We find that many households fail to get the most out of their retirement resources. Some can and do pass up a six-figure arbitrage opportunity that could have made their retirement standard of living significantly higher.

---

[1] *See, for example, B. Cushing-Daniels and C. E. Steuerle, "Retirement and Social Security: A Time Series Approach," Center for Retirement Research at Boston College, Working Paper No. 2009-1, January 2009.*
Return to Text

[2] *G. S. Goda, J. B. Shoven, and S. N. Slavov, "Removing the Disincentives in Social Security for Long Careers," NBER Working Paper No. 13110, May 2007, and in J. R. Brown, J. B. Liebman, and D. A. Wise, eds.,* Social Security Policy in a Changing Environment, *Chicago, Illinois: University of Chicago Press, June 2009, pp. 21–38.*
Return to Text

[3] *The jagged profile is caused by the bend points in the benefit formula.*
Return to Text

[4] *G. S. Goda, J. B. Shoven, and S. N. Slavov, "Work Incentives in the Social Security Disability Benefit Formula," NBER Working Paper No. 21708, November 2015, and forthcoming in the* Journal of Pension Economics and Finance.
Return to Text

[5] *G. S. Goda, J. B. Shoven, and S. N. Slavov, "A Tax on Work for the Elderly: Medicare as Secondary Payer," NBER Working Paper No. 13383, September 2007.*
Return to Text

[6] *A summary of these findings, as well as the findings for Social Security, was published by G. S. Goda, J. B. Shoven, and S. N. Slavov, "Implicit Taxes on Work from Social Security and Medicare," in J. Brown, ed.,* Tax Policy and the Economy, *Volume 25, Chicago, Illinois: University of Chicago Press, September 2011, pp. 69–88.*
Return to Text

[7] *S. Nyce, S. Schieber, J. B. Shoven, S. N. Slavov, and D. A. Wise, "Does Retiree Health Insurance Encourage Early Retirement?" NBER Working Paper No. 17703, December 2011, and* Journal of Public Economics, *104, 2013, pp. 40–51.*
Return to Text

[8] *J. B. Shoven and S. N. Slavov, "The Role of Retiree Health Insurance in the Early Retirement of Public Sector Employees," NBER Working Paper No. 19563, October 2013, and "Retiree Health Insurance for Public School Employees: Does It Affect Retirement?"* Journal of Health Economics *(Special section: Health Insurance and the American Public Sector Labor Market), 38, 2014, pp. 99–108.*
Return to Text

[9] *Kaiser Family Foundation and Health Research and Educational Trust, "Employer Health Benefits 2016 Annual Survey,"* http://files.kff.org/attachment/Report-Employer-Health-Benefits-2016-Annual-Survey
Return to Text

[10] *J. B. Shoven and S. N. Slavov, "The Decision to Delay Social Security Benefits: Theory and Evidence," NBER Working Paper No. 17866, February 2012; and J. B. Shoven and S. N. Slavov, "When Does It Pay to Delay Social Security? The Impact of Mortality, Interest Rates, and Program Rules," NBER Working Paper No. 18210, July 2012, combined and published as "Does It Pay to Delay Social Security?" in* Journal of Pension Economics and Finance, *13(2), 2014, pp. 121–44.*
Return to Text

[11] *J. B. Shoven and S. N. Slavov, "Recent Changes in the Gains from Delaying Social Security," NBER Working Paper No. 19370, August 2013, and* Journal of Financial Planning, *27(3), 2014, pp. 32–41.*
Return to Text

[12] *G. S. Goda, S. Ramnath, J. B. Shoven, and S. N. Slavov, "The Financial Feasibility of Delaying Social Security: Evidence from Administrative Tax Data," NBER Working Paper No. 21544, September 2015, and forthcoming in* Journal of Pension Economics and Finance.
Return to Text

[13] *J. B. Shoven, S. N. Slavov, and D. A. Wise, "Social Security Claiming Decisions: Survey Evidence," NBER Working Paper No. 23729, August 2017.*
Return to Text

[14] *G. Bronshtein, J. Scott, J. B. Shoven, and S. N. Slavov, "Leaving Big Money on the Table: Arbitrage Opportunities in Delaying Social Security," NBER Working Paper No. 22853, November 2016.*
Return to Text

[15] *G. Bronshtein, J. Scott, J. B. Shoven, and S. N. Slavov, "The Power of Working Longer," NBER Working Paper No. 24226, January 2018.*
Return to Text

The Shrinking Universe of Public Firms: Facts, Causes, and Consequences

René M. Stulz

There are fewer firms listed on U.S. exchanges than 40 years ago. In 1976, the United States had 4,943 firms listed on exchanges. By 2016, it had only 3,627 firms. From 1976 to 2016, the U.S. population increased from 219 million to 324 million, so the U.S. went from 23 listed firms per million inhabitants to 11. These changes are dramatic and they raise a number of important questions: How did we get here? Why did the universe of public firms shrink so much? Will it keep shrinking? How have the listed firms changed as a result of this evolution? And perhaps most importantly, what is the overall economic impact of such dramatic change in the composition of listed firms? The research I report on in this summary addresses some of these questions.

How Did We Get Here?

The decrease in the number of listed firms is a recent phenomenon. Figure 1 shows the evolution of the number of listed firms since 1975.[1] The number of listed firms follows an inverted U-shape: It increased by 54 percent from 1975 to the listing peak in 1997 and decreased strongly since then. During the period from 1975 to the listing peak, the number of listings decreased in only eight years with no more than three years of consecutive declines. In contrast, the number of listings dropped every year since 1997, except for 2013.

When listings drop, more firms delist than new firms acquire a listing.[2] U.S. firms typically acquire a listing through an IPO. Firms delist because they have to when they no longer meet

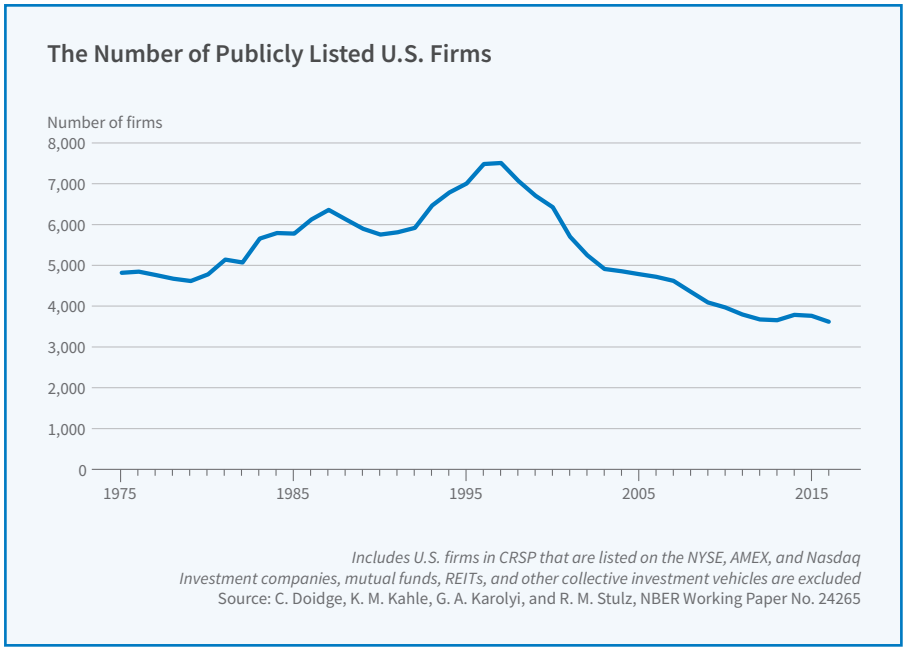


Figure 1

René M. Stulz is the Everett D. Reese Chair of Banking and Monetary Economics and director of the Dice Center for Research in Financial Economics at The Ohio State University. His research has touched many areas of financial economics, but especially areas in corporate finance and international finance. His most cited papers concern the benefits and costs of corporate diversification, capital structure theory, financial contagion across borders, the theory of corporate risk management, the valuation of cross-listed firms, the empirical determinants of the home bias, the shareholder wealth impact of corporate acquisitions, and the determinants of cash holdings by firms.

Stulz was the editor of the *Journal of Finance* for 12 years. He is a past president of the American Finance Association and of the Western Finance Association, and a fellow of the American Finance Association, the European Corporate Governance Institute, the Financial Management Association, and the Wharton Financial Institutions Center. At the NBER, he is a research associate in the Asset Pricing and Corporate Finance Programs and leads the Risk of Financial Institutions Working Group with Mark Carey. He chairs the Scientific Council of the Swiss Finance Institute.

He obtained his PhD from the Massachusetts Institute of Technology. He has also taught at the Massachusetts Institute of Technology, the University of Chicago, and the University of Rochester. He was awarded a Marvin Bower Fellowship from the Harvard Business School and a Doctorat Honoris Causa from the University of Neuchâtel.

the exchange's listing requirements (delists for cause), when they want to go dark or private, or because they are acquired. The largest contributor to the drop in listings is the fact that we have had an extremely large number of mergers. Delists for cause constitute the second-most important cause for delists. Finally, though voluntary delists have garnered considerable attention, they are not economically important in explaining the decline in listings. It is often stated that Sarbanes-Oxley Act of 2002 plays an important role in the decline in listings because of firms going private or dark. The problem with that view is that the number of firms that voluntarily delist is small and the wave of delists is well advanced by the time Sarbanes-Oxley affects smaller firms.

An obvious question about the evolution in the number of listings is whether it is unique to the U.S.[3] Not surprisingly, there are other countries that have lost listings since 1997, but few have experienced a greater percentage decrease in listings. Further, the U.S. is in bad company in terms of the percentage decrease in listings — just ahead of Venezuela. The literature shows that the number of listings per capita is higher for more developed countries and for countries that respect shareholder rights more.[4] Estimating a model that explains the number of listings per capita around the world, it turns out that the U.S. has developed a listing gap and that the size of this gap has become large in recent years. In the 1990s, the U.S. had as many listings per capita as expected based on the relation between listings and country characteristics. However, by 2012, the U.S. had more than 5,000 too few listings given the size of its population, its economic development, its financial development, and its respect for shareholder rights.

A country's industry composition changes all the time. Hence, we would expect some industries to lose listings and others to gain listings. A striking feature of the decrease in listings since 1997 is that it affects all industries in the following way: If one computes the ratio of the number of listed firms to the number of private and public firms with more than 20 employees, this ratio decreases for all industries.

In the debates concerning the decrease in listings, much has been made of the decrease in IPOs. This decrease in the U.S. occurs during a period when many countries have an increase in IPOs.[5] It has been argued that the U.S. markets have become unfriendly to the smallest firms. Perhaps as a result, the size of listed firms has grown sharply. The firms that were small exchange-listed firms in the 1990s are no longer listed (accounting for inflation). One way to see the disappearance of small firms on exchanges is to look at the fraction of listed firms with assets of less than $100 million in 2015 dollars. In 1975, that was 61.5 percent of listed firms; in 1995, it was 43.9 percent. By 2015, only 22.6 percent of firms had less than $100 million in assets.[6] It is perhaps not surprising, therefore, that the whole size distribution of listed firms has shifted so that average market capitalization and median market capitalization accounting for inflation increased by a factor of 10 from 1975 to 2015. This evolution is in contrast to the pattern in the distribution of firm size outside the exchanges, as the proportion of non-listed firms that would have been small firms on exchanges has not fallen.[7]

How Have Firms Changed?

Most importantly, but not only because of technological change, the nature of investment has changed for U.S. firms, as they invest much more in intangible assets. Consequently, intangible assets have become much more important for these firms. The increase in the role of intangible assets has two important effects I focus on. First, it causes small young firms to stay out of the exchanges. Second, the fact that young small firms stay out of the exchanges leads exchange-listed firms to be older and larger. At the peak of listings, the average age of a listed firm was 12 years. Now, the average age is 20 years. Older firms invest less in fixed assets and pay out more.[8] As such, the aging of American firms may help explain why investment in fixed assets fell following the peak in listings, and why payouts have been so large. I first discuss evidence on the increasing role of intangible assets and the implications of the increase in intangible assets on firm balance sheets. I then turn to evidence on payouts.

Until 2000, annual average capital expenditures of listed firms were almost never below 8 percent of assets. From 2002 to 2015, average capital expenditures of listed firms were never above 6 percent.[9] While capital expenditures have fallen, average expenditures on R&D as a percentage of assets have increased considerably. Before 2001, average expenditures on R&D were always less than capital expenditures. From 2002 to 2015, average R&D as a percentage of assets always exceeded average capital expenditures as a percentage of assets.

A consequence of higher investment in R&D is that intangible assets have grown considerably in importance. There are other forms of intangible investment. Firms can invest in their workforce, in their organization, and in their brand names. Investment in these other forms of intangibles has grown as well. However, investment in intangibles is mostly expensed under generally accepted accounting principles (GAAP), so that it does not create assets on balance sheets. As a result, balance sheets that satisfy GAAP offer an increasingly distorted view of the assets held by corporations. Further, investments in intangibles make accounting earnings less relevant. The fact that GAAP accounting is less instructive about the economic value of firms with more intangibles works especially against young firms. An established firm with high intangibles will have an easier time convincing markets of its economic value. As a result, the growth in the importance of intangibles makes it less likely that young firms will want to join the exchanges and more likely that they will seek private funding or be acquired.

The composition of assets on the reported balance sheets of corporations has also dramatically changed: U.S. firms hold a lot more cash than they used to.[10]

Average cash to assets has grown from 9.2 percent in 1975 to 21.6 percent in 2015. This pattern is so strong that the average firm had more cash than fixed assets in 2015. The dramatic change in R&D investment also accounts for most of the change in the asset side of the balance sheets of U.S. corporations. To understand why, it is important to note that the holdings of cash are particularly large among high-R&D firms, which tend to have high volatility and poor collateral for borrowing.[11] The U.S. has a larger proportion of such firms than other countries, with the cash holdings of U.S. firms that do not have high-R&D investments being similar to the holdings of firms in comparable countries.[12]

The fact that intangible assets represent poor collateral for debt partly explains why the typical firm has much lower leverage when taking cash into account than it used to. Average net leverage, which is debt minus cash divided by assets, has fallen from 17 percent in 1975 to 2 percent in 2016. Since 2000, every year between 40 and 50 percent of firms have more cash than debt. In contrast, in 1975, 24 percent of firms had negative net leverage.

As mentioned, investment in intangible assets is expensed, so that a firm that invests $1 more in R&D and reduces capital expenditures by $1 experiences a decrease in earnings. Young firms that are in the building phase of their lifecycle are therefore more likely to have poor earnings if they are firms whose main investments are investments in intangibles. The fraction of firms with earnings losses in a given year has increased substantially. In 1975, 13 percent of firms had losses. In contrast, 37 percent of firms had losses in 2016. The most successful established firms have considerable earnings. As a result, earnings have become more concentrated. In 2015, the top 200 firms by earnings had total earnings exceeding the total earnings of all public firms combined. In other words, the total earnings of the 3,281 firms that were not in the top 200 firms by earnings were negative.[13] The fact that young firms investing in intangibles tend to have GAAP losses even though they are creating economic value provides another reason why many firms may want to stay away from public markets.

Given the earnings accumulated by the most successful firms and the decrease in the number of young firms on exchanges, it is perhaps not surprising that U.S. public firms have on net been returning equity to investors rather than raising new equity from them. Repurchases became more important than dividends in the second half of the 1990s. The magnitude of repurchases since the listing peak has been extremely large as firms have repurchased shares in excess of newly issued shares for an amount of $3.6 trillion in 2015 dollars. On net, since the listing peak, exchanges have not been funneling new capital to corporations but have been a mechanism for corporations to return equity to shareholders.[14]

The evolution of U.S. firms toward larger and older firms has implications for investors as well. Larger and older firms are less volatile. As a result, the change in firm characteristics has contributed to a decrease in firm volatility. Of course, total firm volatility depends both on firm characteristics and on events affecting the economy as a whole. However, as a result of changing firm characteristics, the part of volatility that can be explained by firm characteristics has decreased substantially since the early 2000s. In fact, one would have to go back to the 1960s to find a period in which firm-specific volatility was as low as in the post-crisis years.[15]

Making Sense of the Changes

The changes in public firms likely hold the key to understanding why the number of public firms has fallen so much. Participating in public markets is not as beneficial for firms that invest in intangibles as it is for firms that invest in fixed assets, especially when these firms are small and young. If a firm builds a recognizable product and requires capital to expand its production, it is relatively straightforward for it to explain to potential investors how their money will be put to use. As the firm explains its needs, it does not endanger its ownership of its assets. It is rather difficult to steal a firm's plants. If a firm invests in intangibles, it is much more difficult for its management to convince investors that it will make good use of its money. If the firms give too much detail, which they could be forced to do by disclosure laws if public, their competitors can use the information. If they give too little detail, investors will pay little for their shares. It is not surprising, therefore, that for such firms, participation in public markets with their disclosure requirements is likely to be onerous. It is much easier for such firms to provide detailed information to a handful of private equity investors who have specialized knowledge that enables them to assess a firm's investments in intangibles. This evolution of firms and of markets has many implications. Many of these implications have yet to be investigated.

---

1 *The figure is from C. Doidge, K. M. Kahle, G. A. Karolyi, and R. M. Stulz, "Eclipse of the Public Corporation or Eclipse of the Public Markets?," NBER Working Paper No. 24265, January 2018, and* Journal of Applied Corporate Finance*, 30(1), 2018, pp. 8–16.*
Return to Text

2 *For a detailed analysis of the evolution in listings, see C. Doidge, G. A. Karolyi, and R. M. Stulz, "The U.S. Listing Gap," NBER Working Paper No. 21181, May 2015, and published as "The U.S. Listing Gap,"* Journal of Financial Economics*, 123(3), 2017, pp. 464–87.*
Return to Text

3 *The econometric model of the listing gap is presented in C. Doidge, G. A. Karolyi, and R. M. Stulz, "The U.S. Listing Gap," NBER Working Paper No. 21181, May 2015, and published as "The U.S. Listing Gap,"* Journal of Financial Economics*, 123(3), 2017, pp. 464–87.*
Return to Text

4 *R. Porta, F. López-de-Silanes, A. Shleifer, and R. Vishny, "Legal Determinants of External Finance,"* Journal of Finance*, 52(3), 2012, pp. 1131–50.*
Return to Text

[5] *For a detailed analysis of the evolution of IPOs around the world, C. Doidge, G. A. Karolyi, and R. M. Stulz, "The U.S. Left Behind: The Rise of IPO Activity around the World," NBER Working Paper No. 16916, March 2011, and published as "The U.S. Left Behind? Financial Globalization and the Rise of IPOs Outside the U.S.,"* Journal of Financial Economics*, 110(3), 2013, pp. 546–73.*
Return to Text

[6] *K. M. Kahle and R. M. Stulz, "Is the U.S. Public Corporation in Trouble?" NBER Working Paper No. 22857, November 2016, and* Journal of Economic Perspectives*, 31(3), 2017, pp. 67–88.*
Return to Text

[7] *The comparison between public and private firms can only be made using the number of employees. See C. Doidge, G.. A. Karolyi, and R. M. Stulz, "The U.S. Listing Gap," NBER Working Paper No. 21181, May 2015, and published as "The U.S. Listing Gap,"* Journal of Financial Economics*, 123(3), 2017, pp. 464–87.*
Return to Text

[8] *For dividends, see H. DeAngelo, L. DeAngelo, and R. M. Stulz, "Dividend Policy, Agency Costs, and Earned Equity," NBER Working Paper No. 10599, July 2004; also published as "Dividend Policy and the Earned/Contributed Capital Mix: A Test of the Life-cycle Theory,"* Journal of Financial Economics*, 81(2), 2006, pp. 227–54; for payouts and investment, see C. Loderer, R. M. Stulz, and U. Waelchli, "Limited Managerial Attention and Corporate Aging," NBER Working Paper No. 19428, September 2013, and published as "Firm Rigidities and the Decline in Growth Opportunities,"* Management Science*, 63(9), 2016, pp. 3000–20.*
Return to Text

[9] *K. M. Kahle and R. M. Stulz, "Is the U.S. Public Corporation in Trouble?" NBER Working Paper No. 22857, November 2016, and* Journal of Economic Perspectives*, 31(3), 2017, pp. 67–88.*
Return to Text

[10] *T. W. Bates, K. M. Kahle, and R. M. Stulz, "Why Do U.S. Firms Hold So Much More Cash Than They Used To?" NBER Working Paper No. 12534, September 2006, and* Journal of Finance*, 64(5), 2009, pp. 1985–2021.*
Return to Text

[11] *S. Bartram, G. Brown, and R. M. Stulz, "Why Do Foreign Firms Have Less Idiosyncratic Risk than U.S. Firms?" NBER Working Paper No. 14931, April 2009, and published as "Why Are U.S. Stocks More Volatile?"* Journal of Finance*, 67(4), 2012, pp. 1329-70.*
Return to Text

[12] *L. Pinkowitz, R. M. Stulz, and R. Williamson, "Multinationals and the High Cash Holdings Puzzle," NBER Working Paper No. 18120, June 2012, and published as "Do U.S. Firms Hold More Cash than Foreign Firms Do?"* The Review of Financial Studies*, 29(2), 2016, pp. 309–48.*
Return to Text

[13] *K. M. Kahle and R. M. Stulz, "Is the U.S. Public Corporation in Trouble?" NBER Working Paper No. 22857, November 2016, and* Journal of Economic Perspectives*, 31(3), 2017, pp. 67–88.*
Return to Text

[14] *D. Lee, S. Shin, and R. M. Stulz, "Why Does Capital No Longer Flow More to the Industries with the Best Growth Opportunities?" NBER Working Paper No. 22924, December 2016.*
Return to Text

[15] *S. M. Bartram, G. W. Brown, and R. M. Stulz, "Why Has Idiosyncratic Risk Been Historically Low in Recent Years?" NBER Working Paper No. 24270, January 2018.*
Return to Text

The Competitive Saving Motive in China: Implications for Savings, the Current Account, and Housing Prices

Shang-Jin Wei

The competitive saving motive refers to saving for the purpose of raising one's relative status in the competition for dating and marriage partners. Unlike the standard life cycle and precautionary motives, it is all about competition with others. The higher an individual's savings relative to others in the same age and gender cohort, the better the individual's competitive position.

Competitive saving can be motivated from an evolutionary point of view, since it refers to the accumulation of wealth to gain an edge in the race to satisfy biological and physiological desires. If not having a sex partner implies a big loss of well-being, people are willing to do a lot to improve their competitiveness on that front. When the competition intensifies, those in the race may adjust their saving rates significantly.

Competitive saving as an explanation for patterns in the Chinese economy was initially proposed in a series of studies by Xiaobo Zhang, Qingyuan Du, and me. We also explore its implications for asset markets, especially housing prices, and for economic growth. The competitive saving motive could be present in any economy, including one with a balanced sex ratio, but its effects are easier to detect in an economy with an unbalanced or changing sex ratio for the marriage age cohort. A shock to the competitiveness of the dating and marriage market, such as a change in the ratio of marriage-age men to women due to sex-selective abortions or infanticide, wars, famines, or immigration can have a profound effect on savings, interest rates and other asset prices, work effort, and economic growth.

Empirical Motivation and Theory

Zhang and I were the first to propose the concept of a competitive saving motive. We estimated that a heightened competitive saving motive, triggered by a sharp rise in China's male-to-female ratio in the premarital age cohort since 2000, contributed about 50 percent of the rise in the Chinese savings rate since 2000.[1] In fact, many countries, including Singapore, India, Vietnam, Korea, and Taiwan, also have exhibited unbalanced sex ratios in the premarital age cohorts. The competitive saving motive may have played a quantitatively important role in the evolution of these countries' saving rates as well.

Du and I formalized a theory of the competitive saving motive. Our model clarified the conditions under which the competitive saving motive at an individual level can translate into major changes in economy-wide aggregate savings.[2] Our central theoretical findings include:

- The saving rate of the gender that is in excess supply will tend to rise. When males are in relative surplus, men, and, importantly, parents of unmarried sons will tend to increase their saving rate whenever the probability of marriage declines. This is because higher savings is considered an effective signal and competitive instrument in the dating and marriage market.

- The impact of greater competition on the saving rate of the gender that is in shorter supply is indeterminate. On the

Shang-Jin Wei is the N.T. Wang Professor of Chinese Business and Economy at Columbia University's Graduate School of Business and School of International and Public Affairs. An expert on international finance, trade, macroeconomics, and China, he was chief economist of the Asian Development Bank and director general of the bank's Economic Research and Regional Cooperation Department from 2014 through 2016. He is the director of the NBER's Working Group on the Chinese Economy and is affiliated with the programs in International Finance and Macroeconomics, International Trade and Investment, and Development Economics.

Prior to joining the Columbia faculty in 2007, Wei was assistant director and chief of the Trade and Investment Division at the International Monetary Fund. He has also been an associate professor of public policy at Harvard University and the New Century Chair in Trade and International Economics at the Brookings Institution. Wei holds an M.S. in finance and a PhD in economics from the University of California, Berkeley. Wei received the Sun Yefang Prize for Distinguished Contributions to Economics for his research on the competitive saving motive, the Zhang Peifang Prize for Contributions to the Economics of Development for his research on the measurement of global value chains, and the Chinese Economist Society's Gregory Chow Award for best research paper.

one hand, women and their parents may not save as much as they might otherwise, in anticipation of the higher savings of their future husbands. On the other hand, the desire of women to outcompete each other to be matched with the best possible men could induce them to raise, rather than to lower, their saving rate. Moreover, women may desire to save more in order to maintain bargaining power *vis-à-vis* savings-rich husbands. *A priori,* it is unclear which effect dominates.

- The economy-wide saving rate goes up unambiguously in response to greater gender imbalance. This result may need some explanation. If women or families with a daughter also raise their saving rate in response to a greater imbalance, it is easy to see that the aggregate saving rate would go up. What if they choose to reduce their saving rate? Even in this case, our model predicts that the increase in saving rate of men and their parents from the sex ratio imbalance would tend to outweigh any reduction in saving by women or their parents, due to men's combination of the competition motive and the desire to smooth consumption in anticipation of marrying a spouse who has saved less.

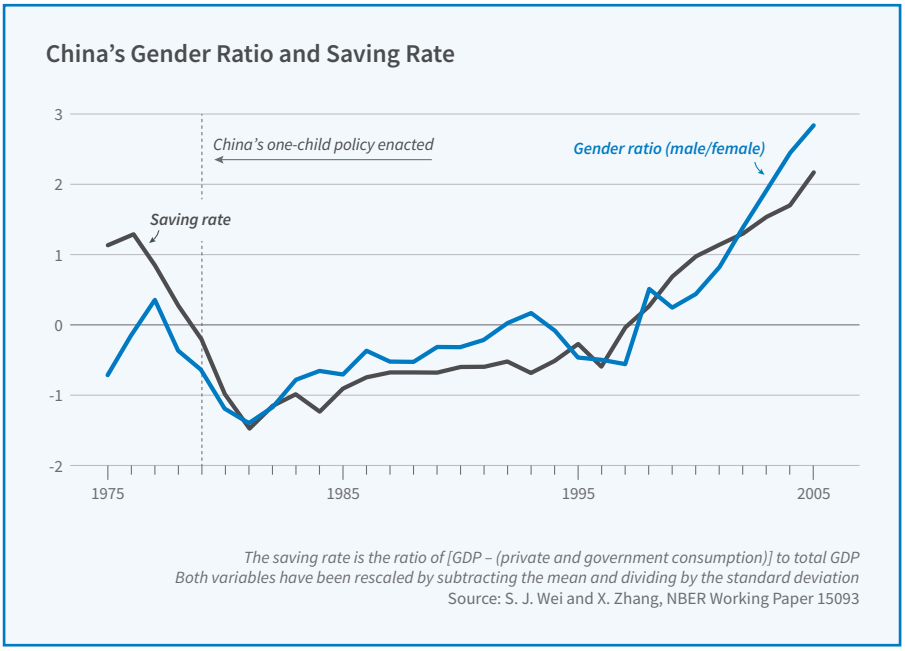
- Although the rise in aggregate savings due to an increase in the sex imbalance may be a transitional phenomenon, the resultant distortions can require a long time to correct.

A rise in the aggregate saving rate that is triggered by an increase in the sex ratio is socially inefficient. While all young men and their parents hope to improve their chances of marriage by increasing saving and reducing consumption, such hopes cannot be realized in the aggregate, as the total number of unmarried young men for the country as a whole is ultimately determined by the sex ratio, and not by the aggregate saving rate. The economy thus has excess savings that could be consumed with no change to the marriage outcome.

In principle, a surplus of either males or females can trigger a rise in the saving rate via the competitive saving motive. The amount of incremental savings could differ in the two cases if men and women have a different tolerance for involuntary singlehood.

Evidence and Findings

Empirically, there is abundant evidence that relative wealth helps one to gain status in the dating and marriage market. For example, wealthy Chinese men have little trouble finding wives. Du and I investigated patterns of gender imbalance and private-sector saving rates across countries. Specifically, we ran a non-linear panel regression of the aggregate saving rate on the sex ratio and other control variables, including country and year fixed effects over the period from 1990 to 2010. The sex ratio is defined as the male-to-female ratio for the premarital age group of 10–24 (from the United Nations Population Division). We found that countries with a more skewed sex ratio tend to have a higher saving rate. For robustness, our regressions also controlled for the effects of per capita income, the dependency ratio, the government fiscal deficit, and a proxy for financial development. The basic conclusion still held.



Household Level Evidence

Zhang and I also go beyond cross-country evidence and examine household-level evidence. We focus on China, as it is geographically large and there are significant differences in the degree of gender imbalance across regions. At the national level, the sex ratio for the Chinese premarital cohort increased from near-balance in 1990 to about 115 young men per 100 young women in 2007. China's household saving rate (out of disposable income) almost doubled, from 16 percent to 30 percent, during the same period. The time series data on the national saving rate and the sex ratio for the premarital cohort clearly move together.

The time series pattern is suggestive; the household-level evidence across regions is even more revealing. While

China as a whole exhibits a rising male-to-female ratio, the extent of the gender imbalance varies widely across the country. For example, Anhui Province has a very unbalanced sex ratio, on the order of 120 young men per 100 young women, whereas Inner Mongolia is almost balanced. As it is uncommon for people to migrate across regions for marriage, we can examine how saving rates respond to changes in local marriage market conditions. The competitive saving theory predicts that families with an unmarried son living in a region with a more unbalanced sex ratio are likely to have a higher saving rate. This pattern is not predicted by more standard theories of saving behavior.

To examine the empirical relationship between household saving rates out of disposable income and sex ratios at the county or city level, we run regressions, taking into account other determinants of saving rates such as household income, the age of the head of household, gender, ethnicity, education level, children's ages, and whether family members have major health problems. The interaction effect predicted by our theory is strongly borne out in the data. Zhang and I found that families with unmarried sons living in rural areas of regions with a more skewed male sex ratio indeed tended to have higher saving rates. In comparison, the saving rates of families with an unmarried daughter appeared uncorrelated with the gender imbalance at the local level. Across Chinese cities, saving rates of both families with unmarried sons and those with unmarried daughters tended to rise as gender imbalance increased.

These patterns are consistent with the basic prediction of the competitive saving theory: Saving tends to be higher in regions with greater imbalance, especially among families with unmarried sons. The patterns of saving by households with unmarried daughters are also consistent with a model that allows for intra-family bargaining. When women or their parents are concerned about the erosion of bargaining power *vis-à-vis* their prospective husbands or their families, they may choose not to reduce their saving rate in response to the gender imbalance. When the effect of intra-family bargaining dominates, the saving rate of families with unmarried daughters could rise in response to an increase in the number of males to females.

Implications

The conventional determinants of saving behavior form only part of the explanation for the high saving rates in Asian countries. A rise in the sex ratio in many of these countries may have played an important role in sustaining or elevating high saving rates in recent years.

By extension, the sex ratio imbalance is a "missing" fundamental variable underlying many of these countries' current account surpluses, since a country's current account is the difference between national saving and investment. A one-off increase in the sex ratio can cause a temporary — but large — rise in the current account. The latter will shift to the long-run equilibrium level when all cohorts in the society have adjusted fully to the new male-to-female ratio. Nonetheless, the transition period can be as long as a decade. If, instead of a one-off increase, there is a sustained rise in the gender imbalance, as is the case in China, the economy's current account surplus could last even longer. If a large country such as China runs a surplus when competitive saving motives are heightened, the rest of the world has to collectively run a current account deficit during the transition period.

Gender imbalances exacerbate the competitive saving motive, which may have created the erroneous impression of an undervalued real exchange rate for China.[3] If governments were to artificially appreciate the nominal exchange rate to reduce a current account surplus whose root cause is a rise in competitive saving triggered by heightened gender imbalance, they would be creating distortions rather than resolving them. My research suggests that instead of simply focusing on the nominal exchange rate, a broader look at structural determinants of saving and current accounts may turn out to be more productive and helpful in the long run for policy discussions of global imbalances and their correction.

The competitive saving motive has implications for asset prices too, especially housing prices. The standard theory regards houses as both a consumption good and as an investment. The competitive saving theory suggests that there may be a third dimension: Home ownership is also a tool for status competition, including competition for relative social standing in the dating and marriage market. This feature can be relevant in economies with or without a sex ratio imbalance. In a calibrated model, Zhang, Yin Liu, and I show that both house prices and the house price-to-rent ratio would be higher in the presence of the status competition motive than in its absence, even in an economy with a balanced sex ratio. A skewed sex ratio could substantially raise the quantitative relevance of the status competition consideration in understanding housing prices.[4]

To improve one's standing in the dating and marriage market, raising the saving rate is not the only possible strategy. Increasing labor supply and engaging in more high-risk, high-return activities, including entrepreneurship, are also possible strategies. These behaviors could have implications for economic growth. Indeed, Zhang and I find that regions within China with more skewed sex ratios in 1995 tend to exhibit a stronger growth in the number of private-sector firms in the subsequent decade. Households that simultaneously have an unmarried son at home and live in a region with a more skewed sex ratio for the dating age cohort tend to supply more labor. We estimate that the increased sex ratio in China may have boosted real GDP growth by as much as 2 percentage points per year in recent years. Importantly, we point out that this additional growth may not correspond to an improvement in welfare.[5] In this sense, a skewed sex ratio can produce immiserizing growth.

---

[1] *S.-J. Wei and X. Zhang, "The Competitive Saving Motive: Evidence from Rising Sex Ratios and Savings Rates in China," NBER Working Paper No. 15093, June 2009, and* Journal of Political Economy, *119(3), 2011, pages 511–64.*
Return to Text

[2] *Q. Du and S.-J. Wei, "A Sexually Unbalanced Model of Current Account Imbalances," NBER Working Paper No. 16000, May 2010; and "A Theory of the Competitive Saving Motive," NBER Working Paper No. 18911, March 2013, and* Journal of International Economics*, 91(2), 2013, pp. 275–89.*
Return to Text

[3] *Q. Du and S.-J. Wei, "A Darwinian Perspective on 'Exchange Rate Undervaluation'," NBER Working Paper No. 16788, February 2011, and European Economic Review, 83, 2016, pp.111–38.*
Return to Text

[4] *S.-J. Wei, X. Zhang, and Y. Liu, "Status Competition and Housing Prices," NBER Working Paper No. 18000, April 2012, and published as "Home Ownership as Status Competition: Some Theory and Evidence,"* Journal of Development Economics*, 127, 2017, pp. 169–86.*
Return to Text

[5] *S.-J. Wei and X. Zhang, "Sex Ratios, Entrepreneurship, and Economic Growth in the People's Republic of China," NBER Working Paper No. 16800, February 2011.*
Return to Text.

Firm Learning and Market Equilibrium

Ariel Pakes

One goal of the field of industrial organization is to predict the response of markets to environmental or policy changes. A market, for our purposes, is a collection of firms that produce and sell competing products or services. Since the consequence of, say, a price change by a given firm depends on the prices of competing firms, realism requires analyzing these changes in the interacting agent frameworks supplied to us by our game theory colleagues. If a firm had set a profit maximizing price before an environmental change, that price was unlikely to be optimal after, say, a tariff or merger induced a price change by a competitor. It is important to take account of the price adjustments that followed the initial price change.

An explicit model of firm behavior might let the price change by firm A lead to a response by firm B, which would lead to a further price change from firm A, and so on. Rather than following this modelling strategy, a substantial body of applied work focuses on finding the Nash equilibrium after an environmental change. There is an intuitive appeal to proceeding in this way. Sticking with the pricing example, in a Nash equilibrium each firm's price maximizes its own profits given the prices of every other firm. So as long as firms are trying to maximize profits, the Nash equilibrium will constitute a "rest point" to any model of how the responses to the change actually occur. In a Nash equilibrium, no firm has an incentive to change its price (to "deviate"), and away from such an equilibrium at least one firm has an incentive to change its price, so further changes are likely to occur.

My research, spanning several decades, has focused on the use of the Nash equilibrium concept in empirical research and the estimation of demand and production functions that are key inputs to firm behavior. Early contributions on estimating demand functions with Steven Berry and James Levinsohn,[1] on estimating production functions with G. Steven Olley,[2] and on the use of Nash equilibrium in dynamic contexts with Richard Ericson,[3] led to shifts in the paradigms used to analyze price and productivity responses to environmental change. However, when the concept of Nash equilibrium was extended to analyze investment responses, the cognitive requirements of both agents and researchers seemed unrealistic.[4] This led Chaim Fershtman and me to consider how firms learn to achieve their goals.[5]

Understanding the learning process has two further advantages. First, it takes time to get from one equilibrium to another, and if we only analyze equilibria, we give up on investigating how long that takes and what is likely to happen in the interim. There is also a more subtle point: In many situations there can be more than one Nash equilibrium. If firm A chooses x it may well be an equilibrium for firm B to choose x', while if firm A had chosen y, which differs from x, we would expect that firm B's equilibrium response would differ from x'. Since the different equilibria can have different properties, this not only impacts our ability to predict the implications of a given environmental change, but also impacts the desirability of the change. A realistic model of how firms react to changes would not only provide information on the transition path to a new equilibrium, but might also indicate which equilibria are more likely to occur.

My recent research with Ulrich Doraszelski and Gregory Lewis examines the process by which firms learn.[6] We follow the sequence of events in the electricity market for frequency response (FR) in the United Kingdom immediately after deregulation. We investigate how firms react to the change with an eye to formulating a framework for analyzing behavioral responses to change in the economic environment.

FR is a product needed to keep the electricity grid running in the face of shocks to demand or supply that could not be predicted when the auction designed to clear the market occurred. FR gives the operator/owner of the electricity grid (National Grid) the ability to take over generators and change the power they generate to ensure that the frequency in the wires that transport the electricity stays within a safe range specified by a regulator.

Historically, electricity-generating firms had been required to provide FR to National Grid at a fixed price. On November 1, 2005 the market for FR was deregulated, and we follow the market for six years from that date. In the deregulated market, firms submit bids for each of their generators during the month prior to the month where it is relevant. Firms own stations and stations contain several generators of the same type and vintage. If called upon, the generator gets paid a holding payment equal to its bid times the quantity of electricity (in megawatt hours) that the operator can access, and the operator has the right to take over the generator when it wishes. There is also an adjustment made to compensate the generator for changes in the energy cost of running the generator when it is called for FR. A supercomputer running a proprietary program chooses generators to supply FR to minimize the cost of FR to the operator subject to the legal requirements for FR and various technological constraints.

All market participants in the first 3½ years post-deregulation had been active prior to deregulation and were familiar with demand conditions. Also, cost conditions were relatively stable over this period. For the latter part of our sample there was some entry, and more substantial changes in both factor costs and in market institutions. As a result, the initial bid changes can largely be attributed to firms learning how to adapt to the new rules, though later on we expect to see responses to further environmental changes.

There was a lot to learn. Initially firms did not know how their competitors were likely to bid, nor did they know how the

computer program would respond to the changes in their bids given their competitors' bids. We focus on the behavior of the 10 largest firms that, as a group, accounted for about 85 percent of the revenue generated by the FR market during our sample period. Figure 1 provides the share-weighted and simple averages of the bids. The dotted lines separate three periods. The first period sees climbing prices, the second sees falling prices, and in the third period, the period that hosted changes in the underlying market conditions, prices appeared to stay within a narrow range.

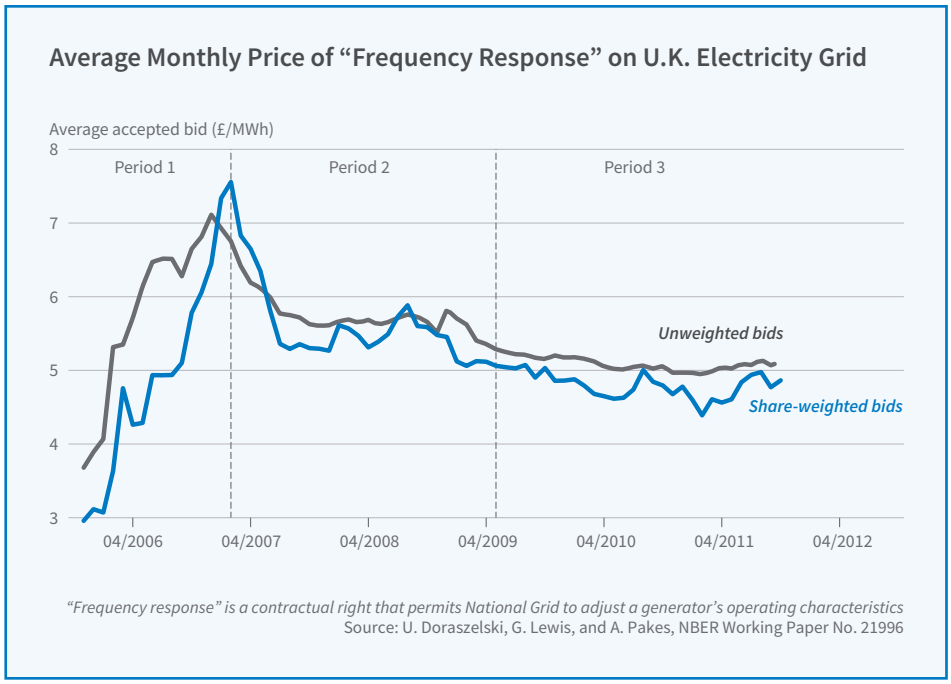


Figure 1

Figure 2 provides the sample paths of the bids of the eight largest firms in each period.

The timing and extent of price increases in the first period varied over firms generating extensive inter-firm bid variance. Drax, a firm whose generators are favored by National Grid and which eventually earns the most revenues, has bids that increase only after it hires a person to manage the bidding process. The first period was also the only period in which there was any noticeable within-station variance in bids. Within-station variance is likely an indication of experimenting, as there is no within-station variance in either generator type or access to the grid.

At the beginning of the second period, Seabank and Barking decrease their bids and steal significant market share from Drax. This is followed by a series of price cuts by firms with high bids. In late 2007, Drax increases its bids significantly, holds its bids at the higher value for exactly two periods, and when it sees that its competitors do not follow it upward, heads back down. There were similar attempts by others later on. By the end of this period the inter-firm variance in bids had decreased dramatically. In the third period there was very little variance in bids either across firms, or within firms over time, and this despite the fact that this was the period in which market conditions changed most noticeably.

We did not know of a useable interacting agent model that allowed for experimentation and the extreme differences in behavior we observe in the first period, so we

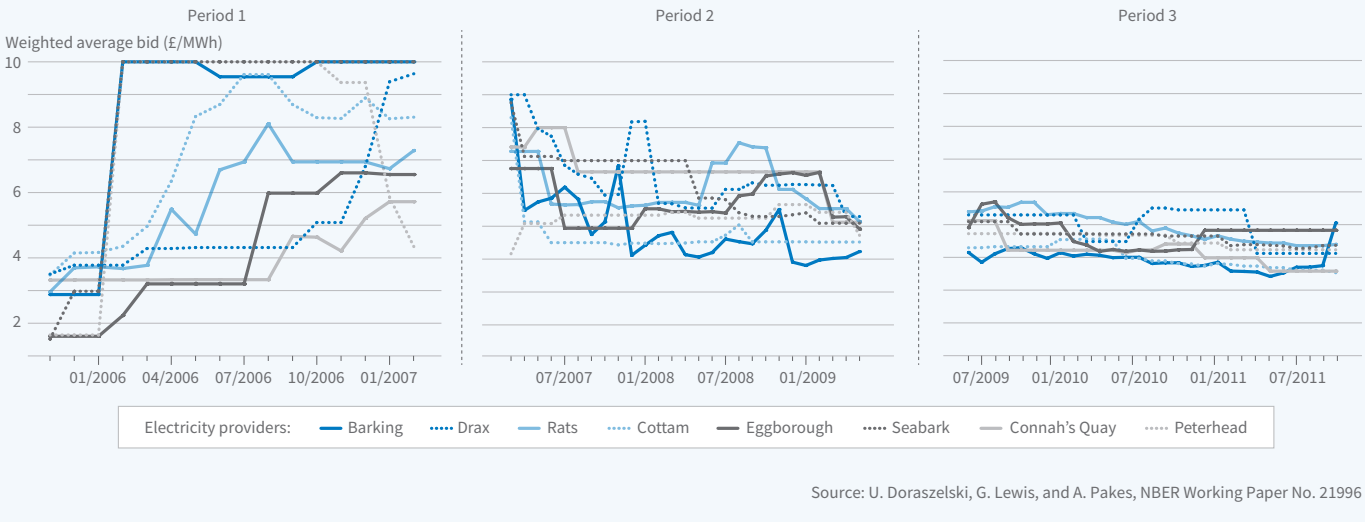


Figure 2

Ariel Pakes is the Thomas Professor of Economics in the Department of Economics at Harvard University and a research associate in the NBER's Programs on Productivity, Innovation, and Entrepreneurship, and Industrial Organization. He received the Frisch Medal of the Econometric Society in 1986. He was elected a fellow of that society in 1988, a fellow of the American Academy of Arts and Sciences in 2002, and a fellow of the National Academy of Sciences in 2017. He was the Distinguished Fellow of the Industrial Organization Society in 2007. He received the Jean-Jaques Laffont Prize in 2017 and the BBVA Foundation Frontiers of Knowledge Award in 2018.

Pakes' research focuses on developing methods for empirically analyzing market responses to environmental and policy changes. This includes the analysis of demand systems and price changes, productivity, and the evolution of markets over time. He also has developed techniques for constructing a more accurate Consumer Price Index. He and his co-authors have applied these tools to analysis of the automobile, electric utility, health care, and telecommunications equipment industries.

Pakes has mentored more than 60 doctoral students, many of whom are now leading researchers. Much of his methodological research has been incorporated into the work of government agencies.

He is married with two children, a son-in-law, and a granddaughter. They all enjoy hiking, jazz, and watching the NBA.

focused our analysis on the second and third periods. The analysis is based on agents' perceptions of the profits they were likely to earn from different bids. We assume they know the costs of supplying FR—largely the wear and tear on machines—from the pre-deregulation period, and estimate it assuming agents do not err on average in the third period, after the bids have settled down. These estimates were consistent with prior information on costs. We also estimated actual demand using a logit model with firm and time-specific fixed effects, data on the position of the firm in the main market, and bids.

The cost and demand parameters enabled us to compute an upper bound to lost profits by assuming each firm had full knowledge of both its competitors' bids and the demand parameters. The difference between the upper bound and the actual profits averaged only 3.5 percent. This may explain the slow adjustment process. As George Akerlof and Janet Yellen recognized, and Figure 1 illustrates, even small departures from optimal behavior may lead to aggregate behavior that is quite different from equilibrium.[7]

Given costs, all that is needed in order to formulate a bid are perceptions of the parameters of demand and perceptions of their competitors' behavior. To analyze beliefs about competitors' play, we assume that firms believe their competitors' play will be a random draw from the vector of their past plays, with the weight given to prior months' bids declining geometrically in a parameter we estimate. To analyze beliefs about demand parameters, we focus on adaptive learning models. In adaptive learning, the beliefs about parameters are obtained from an econometric analysis of the data available to agents when they form their bids. Throughout we compare the predictions from the learning models to each other and to the predictions obtained from a Nash equilibrium. The comparisons are made both in terms of mean square prediction error and in terms of predicting the cost of FR to National Grid.

All measures of fit indicated that in the second period, the model that did best was one that used a fictitious play parameter that weighted more recent past play more than distant past play combined with an adaptive learning model that only needed to learn about the price coefficient. The difference between these models and the equilibrium model was both economically and statistically significant. It is easy to see why by looking at Figure 3. Only changes in cost and demand conditions affect the equilibrium

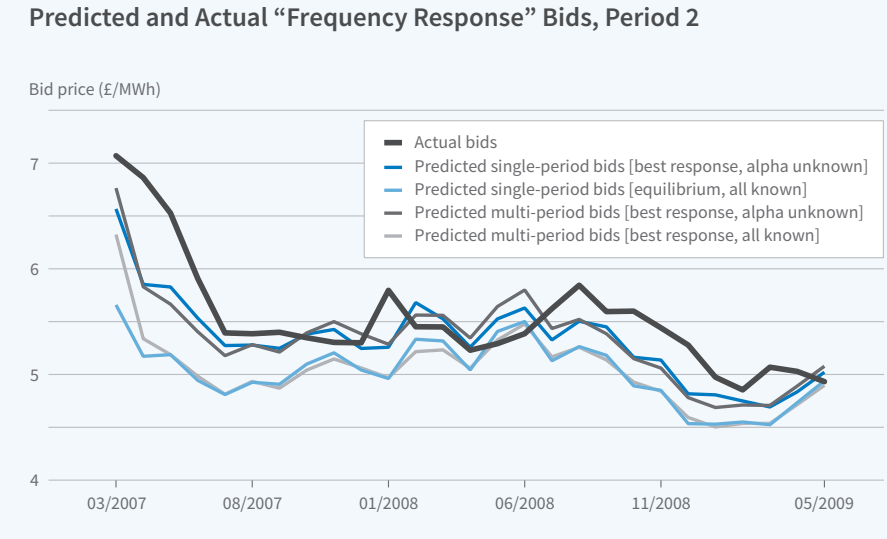


Figure 3

predictions, and in the early periods they are small, so the equilibrium predictions go almost directly to the predictions of the learning models at the end of the period. In contrast, the model's prediction falls much more slowly and so do the actual bids. By the end of the second period, the equilibrium is close to our best model predictions.

Comparison of predicted costs for the third period tells a very different story. [See Figure 4]. Now the Nash equilibrium and the learning models seem to mimic one another and both are much closer to the actual data. Relatedly, the mean square error of the bid prediction is one-third of the value in the second period. Recall that this is the only period with extensive environmental change post-deregulation.

We conclude that after changes large enough to cause a reevaluation of both the demand parameters and likely competitor play, the learning models generated by our theory and macro colleagues provided a better explanation of behavior than did Nash equilibrium. The fit of these models was not perfect, and there were attempts at more coordinated behavior, but these attempts were not successful. On the other hand, once the participants gathered sufficient information on the demand response to price and competitors' behavior, they seemed to be able to react to changes in a way that was very similar to what the Nash equilibrium predicted, albeit with a short lag.

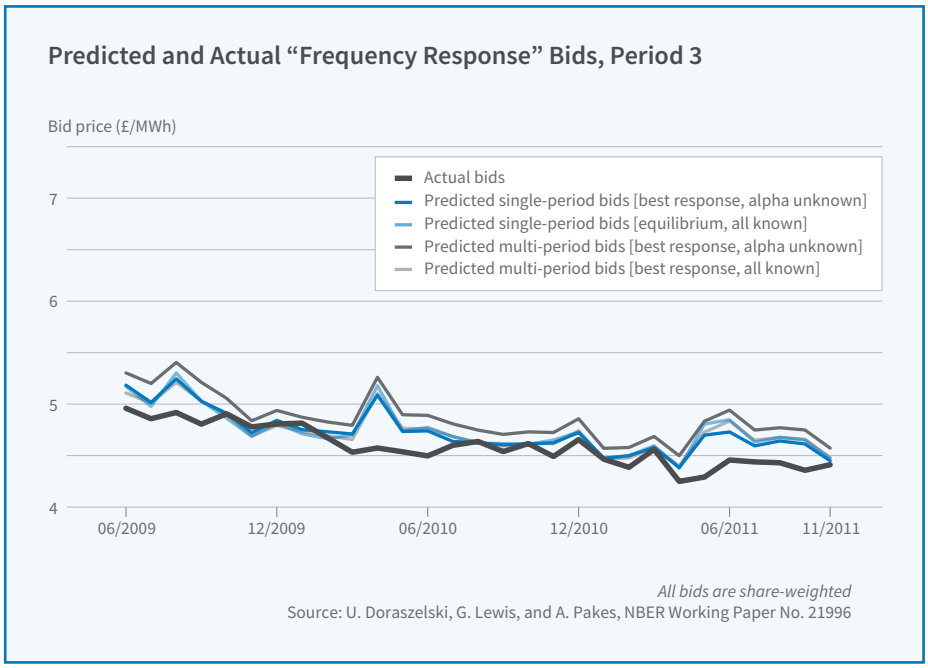


Figure 4

---

[1] *S. Berry, J. Levinsohn, and A. Pakes, "Automobile Prices in Market Equilibrium: Part I and II," NBER Working Paper No. 4264, January 1993, and published as "Automobile Prices in Market Equilibrium,"* Econometrica*, 1995, 63(4), pp. 841–90; S. Berry, J. Levinsohn, and A. Pakes, "Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market," NBER Working Paper No. 6481, March 1998, and* Journal of Political Economy*, 2004, 112(1), pp. 68–105.*
Return to Text

[2] *G. S. Olley and A. Pakes, "The Dynamics of Productivity in the Telecommunications Equipment Industry," NBER Working Paper No. 3977, January 1992; and* Econometrica*, 1996, 64(6), pp. 1263–97.*
Return to Text

[3] *R. Ericson and A. Pakes, "Markov-Perfect Industry Dynamics: A Framework for Empirical Work,"* Review of Economic Studies*, 1995, 62(1), pp. 53–82.*
Return to Text

[4] *A. Pakes, "Methodological Issues in Analyzing Market Dynamics," NBER Working Paper No. 21999, February 2016.*
Return to Text

[5] *C. Fershtman and A. Pakes, "Dynamic Games with Asymmetric Information: A Framework for Empirical Work,"* Quarterly Journal of Economics*, 2012, 127(4), pp. 1611–61.*
Return to Text

[6] *U. Doraszelski, G. Lewis, and A. Pakes, "Just Starting Out: Learning and Equilibrium in a New Market," NBER Working Paper No. 21996, February 2016.*
Return to Text

[7] *G. Akerlof and J. Yellen, "Can Small Deviations from Rationality Make Significant Differences to Economic Equilibria?"* American Economic Review*, 1985, 75(4), pp. 708–20.*
Return to Text

Emi Nakamura and Jón Steinsson Are New Co-Directors of Monetary Economics Program


Emi Nakamura


Jón Steinsson

Emi Nakamura, a professor at the Columbia Business School and Department of Economics, and Jón Steinsson, a professor of economics at Columbia University, are the new co-directors of the NBER's Program on Monetary Economics, succeeding Christina Romer and David Romer of the University of California, Berkeley.

Nakamura and Steinsson are frequent co-authors whose research interests touch on many of the core topics in monetary economics. Their work has contributed to the understanding of price setting and inflation, the mechanisms by which monetary policy affects real activity, the impacts of fiscal stimulus, and the measurement of price indices. They have been affiliates of the Monetary Economics Program since 2007.

Nakamura is a co-editor of the *American Economic Review* and a member of the Congressional Budget Office's Panel of Economic Advisers. She received the Elaine Bennett Research Prize from the American Economic Association (AEA) in 2014. She is currently a member of the AEA's Committee on National Statistics. An undergraduate at Princeton University, she received her PhD from Harvard University.

Steinsson is the foreign editor of the *Review of Economic Studies* and an associate editor of the *Quarterly Journal of Economics* and the newly launched *American Economic Review: Insights*. He is a member of the advisory board of the *NBER Macroeconomics Annual*. Steinsson also received his undergraduate degree at Princeton and his PhD from Harvard.

In the fall of 2018, Nakamura and Steinsson will join the faculty of the University of California, Berkeley.

Erik Hurst Joins *Macroeconomics Annual* Editorial Team


Erik Hurst

Erik Hurst, who is the V. Duane Rath Professor of Economics at the University of Chicago Booth School of Business and the deputy director of the Becker Friedman Institute, will be a co-organizer and co-editor of the *NBER Macroeconomics Annual* beginning in 2019. Hurst is a wide-ranging applied macroeconomist whose work has touched on labor markets, household finance, and household financial behavior. His research has been recognized with the Ewing Marion Kauffman Prize Medal for Distinguished Research in Entrepreneurship and the TIAA-CREF Paul A. Samuelson Prize for Research on Lifetime Financial Security. He is a past co-editor of the *Journal of Political Economy*.

An NBER affiliate since 2003, Hurst is a research associate in the Economic Fluctuations and Growth, Public Economics, and Aging Programs. He received his BS from Clarkson University and his PhD from the University of Michigan.

Hurst will join current co-organizers Martin Eichenbaum, the Charles Moskos Professor of Economics at Northwestern University, and Jonathan Parker, the Robert C. Merton Professor of Finance at the MIT Sloan School of Management, in convening the 2019 Annual Conference on Macroeconomics. Parker will step down from the organizing team after that meeting, and Eichenbaum and Hurst will organize subsequent conferences.

Conferences

Capital Flows, Currency Wars, and Monetary Policy

A conference on Capital Flows, Currency Wars, and Monetary Policy took place in Cambridge on April 5–6. Research Associates Emmanuel Farhi of Harvard University and Sebnem Kalemli-Ozcan of the University of Maryland organized the meeting. These researchers' papers were presented and discussed:

- **Ricardo J. Caballero** and **Alp Simsek**, MIT and NBER, "A Model of Fickle Capital Flows and Retrenchment" (NBER Working Paper No. 22751)
- **Silvia Miranda-Agrippino**, Bank of England; and **Hélène Rey**, London Business School and NBER, "U.S. Monetary Policy and the Global Financial Cycle" (NBER Working Paper No. 21722)
- **Manuel Amador**, University of Minnesota and NBER; **Javier Bianchi**, Federal Reserve Bank of Minneapolis and NBER; **Luigi Bocola**, Northwestern University and NBER; and **Fabrizio Perri**, Federal Reserve Bank of Minneapolis, "Foreign Reserve Management"
- **Ozge Akinci**, Federal Reserve Bank of New York, and **Albert Queralto Olive**, Federal Reserve Board, "Balance Sheets, Exchange Rates, and International Monetary Spillovers"
- **Tarek Alexander Hassan**, Boston University and NBER; **Thomas Mertens**, Federal Reserve Bank of San Francisco; and **Tony Zhang**, University of Chicago, "Currency Manipulation" (NBER Working Paper No. 22790)
- **Emine Boz**, International Monetary Fund; **Gita Gopinath**, Harvard University and NBER; and **Mikkel Plagborg-Møller**, Princeton University, "Global Trade and the Dollar" (NBER Working Paper No. 23988)
- **Olivier Jeanne**, Johns Hopkins University and NBER, "Currency Wars, Trade Wars and Global Demand"
- **Toni Ahnert** and **Christian Friedrich**, Bank of Canada; **Kristin Forbes**, MIT and NBER; and **Dennis Reinhardt**, Bank of England, "Macroprudential FX Regulations: Shifting the Snowbanks of FX Vulnerability"
- **Agnès Bénassy-Quéré** and **Pauline Wibaux**, Paris School of Economics, and **Matthieu Bussière**, Banque de France, "Trade and Currency Weapons"
- **Stefan Avdjiev** and **Catherine Koch**, Bank for International Settlements, and **Hyun Song Shin**, Bank for International Settlements and NBER, "Exchange Rates and the Transmission of Global Liquidity"

Summaries of these papers are at www.nber.org/confer/2018/CWs18/summary.html

33rd Annual Conference on Macroeconomics

The NBER's 33rd Annual Conference on Macroeconomics took place in Cambridge on April 12–13. Research Associates Martin S. Eichenbaum of Northwestern University and Jonathan A. Parker of MIT organized the meeting. These researchers' papers were presented and discussed:

- **Michael Woodford**, Columbia University and NBER, "Monetary Policy Analysis when Planning Horizons are Finite" (NBER Working Paper No. 24692)

- **Loukas Karabarbounis**, University of Minnesota and NBER, and **Brent Neiman**, University of Chicago and NBER, "Accounting for Factorless Income" (NBER Working Paper No. 24404)

- **Omar Barbiero**, Harvard University; **Emmanuel Farhi** and **Gita Gopinath**, Harvard University and NBER; and **Oleg Itskhoki**, Princeton University and NBER, "The Economics of Border Adjustment Taxes" (NBER Working Paper No. 24702)

- **Julian Kozlowski**, New York University, and **Laura Veldkamp** and **Venky Venkateswaran**, New York University and NBER, "The Tail that Keeps the Riskless Rate Low" (NBER Working Paper No. 24362)

- **Andrew Atkeson**, **Andrea L. Eisfeldt,** and **Pierre-Olivier Weill**, University of California, Los Angeles and NBER; and **Adrien D'Avernas**, Stockholm School of Economics, "The Financial Soundness of U.S. Banks"

- **Kerwin Kofi Charles** and **Erik Hurst**, University of Chicago and NBER; and **Mariel Schwartz**, University of Chicago, "The Transformation of Manufacturing and the Decline in U.S. Employment" (NBER Working Paper No. 24468)

Summaries of these papers are at www.nber.org/confer/2018/Macro18/summary.html

Innovation Policy and the Economy

The 2018 Innovation Policy and the Economy Conference took place on April 17 in Washington, DC. Research Associates Josh Lerner of Harvard University and Scott Stern of MIT organized the meeting, which was sponsored by the Ewing Marion Kauffman Foundation. These researchers' papers were presented and discussed:

- **Nicholas Bagley**, University of Michigan; **Amitabh Chandra**, Harvard University and NBER; **Craig Garthwaite**, Northwestern University and NBER; and **Ariel Dora Stern**, Harvard University, "Precision Medicine and the Orphan Drug Act"

- **Pian Shu**, Georgia Institute of Technology, and **Claudia Steinwender**, MIT and NBER, "Innovating in a Global Economy"

- **Joshua Gans**, **Ajay K. Agrawal**, and **Avi Goldfarb**, University of Toronto and NBER, "The Economics of Artificial Intelligence"

- **Pierre Azoulay**, MIT and NBER; **Erica Fuchs**, Carnegie Mellon University; **Michael Kearney**, MIT; and **Anna Goldstein**, Stanford University, "Funding Breakthrough Research: Promises and Challenges of the 'ARPA Model' " (NBER Working Paper No. 24674)

- **Lee G. Branstetter**, Carnegie Mellon University and NBER; **Britta Glennon**, Carnegie Mellon University; and **J. Bradford Jensen**, Georgetown University and NBER, "The IT Revolution and the Globalization of R&D" (NBER Working Paper No. 24707)

- **Jason Furman**, Harvard Kennedy School, and **Robert Seamans**, New York University, "Artificial Intelligence and the Economy"

Summaries of these papers are at www.nber.org/confer/2018/IPEs18/summary.html

Economics of Culture and Institutions

A conference on the Economics of Culture and Institutions took place on April 27–28 in Cambridge. Research Associates Alberto Bisin of New York University and Paola Giuliano of the University of California, Los Angeles organized the meeting. These researchers' papers were presented and discussed:

- **Benjamin Enke**, Harvard University and NBER, "Kinship Systems, Cooperation, and the Evolution of Culture" (NBER Working Paper No. 23499)
- **Daniel L. Chen**, Institute for Advanced Study in Toulouse; **Elliott Ash**, University of Warwick; and **Suresh Naidu**, Columbia University and NBER, "Ideas Have Consequences: The Impact of Law and Economics on American Justice"
- **Sara Lowes**, Università Bocconi, and **Eduardo J. Montero**, Harvard University, "Blood Rubber"
- **Jacob Moscona**, MIT; **Nathan Nunn**, Harvard University and NBER; and **James A. Robinson**, University of Chicago and NBER, "Social Structure and Conflict: Evidence from Sub-Saharan Africa" (NBER Working Paper No. 24209)
- **Klaus Desmet**, Southern Methodist University, and **Romain Wacziarg**, University of California, Los Angeles and NBER, "The Cultural Divide" (NBER Working Paper No. 24630)
- **Christian Dippel**, University of California, Los Angeles and NBER, and **Stephan Heblich**, University of Bristol, "Leadership and Social Norms: Evidence from the Forty-Eighters in the Civil War" (NBER Working Paper No. 24656)

Summaries of these papers are at www.nber.org/confer/2018/CIs18/summary.html

The Role of Immigrants and Foreign Students in Science, Innovation, and Entrepreneurship

A conference on The Role of Immigrants and Foreign Students in Science, Innovation, and Entrepreneurship took place on April 27 in Cambridge. Ina Ganguli of the University of Massachusetts, Amherst; Shulamit Kahn of Boston University, and Research Associate Megan MacGarvie of Boston University organized the meeting, which was sponsored by the National Science Foundation Science of Science and Innovation Policy Program and the Ewing Marion Kauffman Foundation. These researchers' papers were presented and discussed:

- **Michael Roach**, Cornell University; **Henry Sauermann**, European School of Management and Technology and NBER; and **John Skrentny**, University of California, San Diego, "U.S. Immigration Policies and the STEM Entrepreneurial Workforce"
- **J. David Brown**, U.S. Bureau of the Census, and **John S. Earle**, **Mee Jung Kim**, and **Kyung-Min Lee**, George Mason University, "Are Immigrants More Innovative? Evidence from the Annual Survey of Entrepreneurs"
- **Stefano Breschi**, Università Bocconi; and **Francesco Lissoni** and **Ernest Miguelez**, Université de Bordeaux, "Returnee Migrants' Self-selection: Evidence for Indian Inventors in the U.S."
- **Kirk B. Doran** and **Chungeun Yoon**, University of Notre Dame, "How Reducing Immigration Affects Innovation: Evidence from the Closing of America's Borders to Southern and Eastern Europe"
- **Gaurav Khanna** and **Munseob Lee**, University of California, San Diego, "High-Skill Immigration, Innovation, and Creative Destruction"

- **Anna Maria Mayda**, Georgetown University; **Francesc Ortega**, Queens College and Graduate Center CUNY; **Giovanni Peri**, University of California, Davis and NBER; **Chad Sparber**, Colgate University; and **Kevin Y. Shih**, Rensselaer Polytechnic Institute, "The Effect of H-1B Visas on Firms: Evidence from Publicly Traded Firms"

- **Sari Pekkala Kerr**, Wellesley College, and **William R. Kerr**, Harvard University and NBER, "High-Skilled Immigrant Networking and Innovation"

- **Ina Ganguli** and **Patrick Gaule**, CERGE-EI, "Will the U.S. Keep the Best and the Brightest (as Post-docs)? Career and Location Preferences of Foreign STEM PhDs"

Summaries of these papers are at www.nber.org/confer/2018/IIs18/summary.html

New Developments in Long-Term Asset Management

A conference on New Developments in Long-Term Asset Management took place on May 3–4 in New York. Research Associates Monika Piazzesi of Stanford University and Luis M. Viceira of Harvard University organized the meeting, which was sponsored by the Norwegian Finance Initiative. These researchers' papers were presented and discussed:

- **Lars A. Lochstoer**, University of California, Los Angeles, and **Paul Tetlock**, Columbia University, "What Drives Anomaly Returns?"

- **Shmuel Baruch**, University of Utah, and **Xiaodi Zhang**, University of Central Florida, "Is Index Trading Benign?"

- **Kewei Hou**, The Ohio State University; **Chen Xue**, University of Cincinnati; and **Lu Zhang**, The Ohio State University and NBER, "Replicating Anomalies" (NBER Working Paper No. 23394)

- **Marcin Kacperczyk**, **Savitar Sundaresan**, and **Tianyu Wang**, Imperial College London, "Do Foreign Investors Improve Market Efficiency?"

- **Arpit Gupta**, New York University, and **Kunal Sachdeva**, Columbia University, "Skin or Skim? Inside Investment and Hedge Fund Performance"

- **Bryan T. Kelly**, Yale University and NBER; **Seth Pruitt**, Arizona State University; and **Yinan Su**, University of Chicago, "Characteristics Are Covariances: A Unified Model of Risk and Return" (NBER Working Paper No. 24540)

- **Stephen G. Dimmock**, Nanyang Technological University; **Neng Wang**, Columbia University and NBER; and **Jinqiang Yang**, Shanghai University of Finance and Economics, "The Endowment Model and Modern Portfolio Theory"

- **Valentin Haddad** and **Tyler Muir**, University of California, Los Angeles and NBER, "Do Intermediaries Matter for Aggregate Asset Prices?"

Summaries of these papers are at www.nber.org/confer/2018/LTAMs18/summary.html

Trade and Agriculture

A conference on Trade and Agriculture took place on May 17–18 in Cambridge. Research Associate Dave Donaldson of MIT organized the meeting, which was sponsored by the Economic Research Service at the U.S. Department of Agriculture and the Giannini Foundation at the University of California. These researchers' papers were presented and discussed:

- **Jayson Beckman**, U.S. Department of Agriculture; **Carmen Estrades** and **Manuel Flores**, Universidad de la República (Uruguay); and **Angel H. Aguiar**, Purdue University, "The Impacts of Export Taxes on Agricultural Trade"
- **Douglas Gollin**, University of Oxford, and **Casper W. Hansen** and **Asger Wingender**, University of Copenhagen, "Two Blades of Grass: The Impact of the Green Revolution"
- **Christophe Gouel**, INRA-AgroParisTech, and **David Laborde**, IFPRI, "The Crucial Role of International Trade in Adaptation to Climate Change"
- **Jonathan I. Dingel**, University of Chicago and NBER; **Solomon M. Hsiang**, University of California, Berkeley and NBER; and **Kyle C. Meng**, University of California, Santa Barbara and NBER, "The Spatial Structure of Productivity, Trade, and Inequality: Evidence from the Global Climate"
- **Osea Giuntella**, University of Pittsburgh; **Matthias Rieger**, Erasmus University; and **Lorenzo Rotunno**, Aix-Marseille University, "Weight Gains from Trade in Foods: Evidence from Mexico"
- **Marshall Burke**, Stanford University and NBER; **Lauren F. Bergquist**, Becker Friedman Institute; and **Edward Miguel**, University of California, Berkeley and NBER, "Sell Low and Buy High: Arbitrage and Local Price Effects in Kenyan Markets" (NBER Working Paper No. 24476)
- **Thibault Fally**, University of California, Berkeley and NBER, and **James E. Sayre**, University of California, Berkeley, "Commodity Trade Matters"
- **Uris Baldos** and **Thomas Hertel**, Purdue University, and **Frances Moore**, University of California, Davis, "The Biophysical and Economic Geographies of Global Climate Impacts on Agriculture"
- **Colin A. Carter**, University of California, Davis, and **Sandro Steinbach**, ETH Zurich, "Trade Diversion and the Initiation Effect: A Case Study of U.S. Trade Remedies in Agriculture"
- **Kari Heerman**, U.S. Department of Agriculture, and **Ian M. Sheldon**, The Ohio State University, "Gravity and Comparative Advantage: Estimation of Trade Elasticities for the Agricultural Sector"
- **Shilpa Aggarwal**, Indian School of Business; **Brian J. Giera**, Amazon Research; **Dahyeon Jeong** and **Alan Spearot**, University of California, Santa Cruz; and **Jonathan Robinson**, University of California, Santa Cruz and NBER, "Market Access, Trade Costs, and Technology Adoption: Evidence from Northern Tanzania"

Summaries of these papers are at www.nber.org/confer/2018/TAs18/summary.html

Trans-Atlantic Public Economics Symposium

The 2018 Trans-Atlantic Public Economics Symposium, cosponsored by the NBER and STICERD, the Suntory-Toyota International Centre for Economics and Related Disciplines at the London School of Economics (LSE) was held at the LSE on June 4–5. Research Associate Hilary W. Hoynes of the University of California, Berkeley, and Camille Landais and Johannes Spinnewijn, both of LSE, organized the meeting. These researchers' papers were presented and discussed:

- **Jenna E. Stearns**, University of California, Davis, "The Long-Run Effects of Wage Replacement and Job Protection: Evidence from Two Maternity Leave Reforms in Great Britain"
- **Andreas Kuhn**, Swiss Federal Institute for Vocational Education and Training; **Stefan Staubli**, University of Calgary and NBER; and **Jean-Philippe Wuellrich** and **Josef Zweimueller**, University of Zurich, "Fatal Attraction? Extended Unemployment Benefits, Labor Force Exits, and Mortality"
- **Michael Graber**, University of Chicago, "Labor Income Dynamics over the Business Cycle"
- **Orazio Attanasio**, University College London and NBER; **Richard Blundell**, University College London and IFS; and **Gabriella Conti** and **Giacomo Mason**, University College London, "Inequality in Noncognitive Skills: a Cross-Cohort Comparison"
- **Joseph P. Ferrie**, Northwestern University and NBER; **Claudia Goldin**, Harvard University and NBER; **Quentin O. Brummet**, U.S. Bureau of the Census; **Claudia Olivetti**, Boston College and NBER; **Karen Rolf**, University of Nebraska, Omaha; and **Elizabeth Mokyr Horner**, American Institutes for Research, "Early-Life Education and Late-Life Outcomes: Exposure to Pre-School 1943–46 and Well-Being After Age 50"
- **Hyejin Ku**, **Uta Schonberg**, and **Ragnhild C. Schreiner**, University College London, "Do Place-Based Tax Incentives Create Jobs?"
- **Fabian Kindermann**, University of Bonn; **Lukas Mayr**, European University Institute; and **Dominik Sachs**, University of Munich, "Inheritance Taxation and Wealth Effects on the Labor Supply of Heirs"
- **Camille Terrier**, MIT, IZA, and CEP, and **Matthew W. Ridley**, MIT, "Fiscal and Education Spillovers from Charter Expansion"
- **Bruce D. Meyer**, University of Chicago and NBER, and **James X. Sullivan**, University of Notre Dame, "Inequality in the Joint Distribution of Consumption and Time Use"
- **Lorenz Kueng**, Northwestern University and NBER; **Scott R. Baker**, Northwestern University; **Michaela Pagel**, Columbia University and NBER; and **Steffen Meyer**, University of Hannover, "Measurement Error in Imputed Consumption"

Summaries of these papers are at www.nber.org/confer/2018/TAPES18/summary.html

Program and Working Group Meetings

Public Economics

Members of the NBER's Public Economics Program met April 5–6 in Cambridge. Program Directors Raj Chetty of Stanford University and Amy Finkelstein of MIT and Faculty Research Fellow Stefanie Stantcheva of Harvard University organized the meeting. These researchers' papers were presented and discussed:

- **Simon Jaeger**, MIT and NBER; **Benjamin Schoefer**, University of California, Berkeley; and **Josef Zweimueller**, University of Zurich, "Marginal Jobs and Job Surplus: Evidence from Separations and Unemployment Insurance"
- **Matthew C. Weinzierl**, Harvard University and NBER, "A Welfarist Role for Nonwelfarist Rules" (NBER Working Paper No. 23587)
- **Jeff Larrimore**, Federal Reserve Board, and **Jake Mortenson** and **David Splinter**, Joint Committee on Taxation, "Household Incomes in Tax Data: Using Addresses to Move from Tax Unit to Household Income Distributions"
- **Ugo Troiano**, University of Michigan and NBER, "Do Taxes Increase Economic Inequality? A Comparative Study Based on the State Income Tax" (NBER Working Paper No. 24175)
- **John Beshears**, **David Laibson**, and **Brigitte C. Madrian**, Harvard University and NBER; **James J. Choi**, Yale University and NBER; and **Bill Skimmyhorn**, United States Military Academy, "Borrowing to Save? The Impact of Automatic Enrollment on Debt"
- **Matthew Davis**, University of Pennsylvania, and **Fernando V. Ferreira**, University of Pennsylvania and NBER, "Housing Disease and Public School Finances" (NBER Working Paper No. 24140)
- **John Guyton**, **Kara Leibel**, **Mark Payne**, and **Brenda Schafer**, Internal Revenue Service; **Dayanand S. Manoli**, University of Texas at Austin and NBER; and **Ankur Patel**, U.S. Department of the Treasury, "Tax Enforcement and Tax Policy: Evidence on Taxpayers' Responses to EITC Correspondence Audits" (NBER Working Paper No. 24465)
- **Niels Johannesen**, University of Copenhagen; **Patrick Langetieg**, Internal Revenue Service; **Daniel Reck**, London School of Economics; **Max Risch**, University of Michigan; and **Joel Slemrod**, University of Michigan and NBER, "Taxing Hidden Wealth: The Consequences of US. Enforcement Initiatives on Evasive Foreign Accounts" (NBER Working Paper No. 24366)
- **John L. Voorheis**, U.S. Bureau of the Census, "Air Quality, Human Capital Formation and the Long-term Effects of Environmental Inequality at Birth"
- **Kavan J. Kucko**, Boston University; **Kevin Rinz**, U.S. Bureau of the Census; and **Benjamin Solow**, Georgetown University, "Labor Market Effects of the Affordable Care Act: Evidence from a Tax Notch"
- **Adam Bee** and **Joshua Mitchell**, U.S. Bureau of the Census, "Do Older Americans Have More Income than We Think?"
- **Hunt Allcott**, New York University and NBER; **Benjamin Lockwood**, University of Pennsylvania and NBER; and **Dmitry Taubinsky**, University of California, Berkeley and NBER, "Ramsey Strikes Back: Optimal Commodity Taxes and Redistribution in the Presence of Salience Effects" (NBER Working Paper No. 24233)
- **Naomi Feldman**, Federal Reserve Board; **Elena Patel**, U.S. Department of the Treasury; and **Laura Kawano** and **Nirupama S. Rao**, University of Michigan, "Do Publicly-Traded Firms Invest Myopically? Evidence from U.S. Tax Data"

Summaries of these papers are at www.nber.org/confer/2018/PEs18/summary.html

Asset Pricing

Members of the NBER's Asset Pricing Program met on April 6 in Chicago. Research Associate Ravi Bansal of Duke University and Faculty Research Fellow Camelia M. Kuhnen of the University of North Carolina at Chapel Hill organized the meeting. These researchers' papers were presented and discussed:

- **Mariano Massimiliano Croce**, University of North Carolina at Chapel Hill; **Tatyana Marchuk**, BI Norwegian Business School; and **Christian Schlag**, Goethe University Frankfurt, "The Leading Premium"
- **Darrell Duffie**, Stanford University and NBER, and **Samuel Antill**, Stanford University, "Augmenting Markets with Mechanisms" (NBER Working Paper No. 24146)
- **Jiangze Bian**, University of International Business and Economics; **Zhiguo He**, University of Chicago and NBER; **Kelly Shue**, Yale University and NBER; and **Hao Zhou**, Tsinghua University, "Leverage-Induced Fire Sales and Stock Market Crashes"
- **Itamar Drechsler** and **Alexi Savov**, New York University and NBER; and **Alan Moreira**, University of Rochester, "Liquidity Creation as Volatility Risk"
- **Arna Olafsson**, Copenhagen Business School, and **Michaela Pagel**, Columbia University and NBER, "The Ostrich in Us: Selective Attention to Financial Accounts, Income, Spending, and Liquidity" (NBER Working Paper No. 23945)
- **Zhenyu Gao**, Chinese University Hong Kong; **Michael Sockin**, University of Texas at Austin; and **Wei Xiong**, Princeton University and NBER, "Learning about the Neighborhood"

Summaries of these papers are at www.nber.org/confer/2018/APs18/summary.html

Corporate Finance

Members of the NBER's Corporate Finance Program met on April 6 in Chicago. Research Associates Carola Frydman of Northwestern University and Gregor Matvos of the University of Texas at Austin organized the meeting. These researchers' papers were presented and discussed:

- **Christopher Martin** and **Alexander Ufier**, Federal Deposit Insurance Corporation; and **Manju Puri**, Duke University and NBER, "Deposit Inflows and Outflows in Failing Banks: The Role of Deposit Insurance" (NBER Working Paper No. 24589)
- **Sergey Chernenko** and **Isil Erel**, The Ohio State University; and **Robert Prilmeier**, Tulane University, "Nonbank Lending"
- **Pat Akey**, University of Toronto, and **Ian R. Appel**, Boston College, "The Limits of Limited Liability: Evidence from Industrial Pollution"
- **Peter Koudijs**, Stanford University and NBER, and **Laura Salisbury**, York University and NBER, "For Richer, For Poorer: Banker's Liability and Risk Taking in New England, 1867–80"
- **Adair Morse**, University of California, Berkeley and NBER, and **Robert P. Bartlett III**, **Richard Stanton**, and **Nancy Wallace**, University of California, Berkeley, "Consumer-Lending Discrimination in the FinTech Era"

- **Harald Hau**, University of Geneva; **Yi Huang**, The Graduate Institute, Geneva; and **Hongzhe Shan**, Swiss Finance Institute, "TechFin at Ant Financial: Credit Market Completion and its Growth Effect"

- **Atif R. Mian**, Princeton University and NBER, and **Amir Sufi**, University of Chicago and NBER, "Credit Supply, Beliefs, and Speculation: Private Label Securitization and the Housing Cycle of 2000 to 2010"

- **Gita Gopinath** and **Jeremy C. Stein**, Harvard University and NBER, "Banking, Trade, and the Making of a Dominant Currency" (NBER Working Paper No. 24485)

Summaries of these papers are at www.nber.org/confer/2018/CFs18/summary.html

Behavioral Finance

The NBER's Working Group on Behavioral Finance met April 7 in Chicago. Working Group Director Nicholas C. Barberis of Yale University organized the meeting. These researchers' papers were presented and discussed:

- **Olivier Dessaint**, University of Toronto; **Clemens Otto**, Singapore Management University; **Jacques Olivier**, HEC Paris; and **David Thesmar**, MIT, "CAPM-Based Company (Mis)valuations"

- **Pedro Bordalo**, University of Oxford; **Nicola Gennaioli**, Università Bocconi; **Yueran Ma**, Harvard University; and **Andrei Shleifer**, Harvard University and NBER, "Overreaction in Macroeconomic Expectations"

- **Stephen Foerster**, Western University; **Juhani T. Linnainmaa**, University of Southern California and NBER; **Brian T. Melzer**, Federal Reserve Bank of Chicago; and **Alessandro Previtero**, Indiana University and NBER, "Financial Advisors and Risk-Taking"

- **Kent D. Daniel**, Columbia University and NBER; **Lorenzo Garlappi**, University of British Columbia; and **Kairong Xiao**, Columbia University, "Monetary Policy and Reaching for Income"

- **Kelly Shue**, Yale University and NBER, and **Richard Townsend**, University of California, San Diego, "Money Illusion in Asset Pricing"

- **James J. Choi**, Yale University and NBER, and **Adriana Z. Robertson**, University of Toronto, "What Matters to Individual Investors? Evidence from the Horse's Mouth"

Summaries of these papers are at www.nber.org/confer/2018/BFs18/summary.html

Program on Children

Members of the NBER's Program on Children met on April 12 in Cambridge. Program Directors Anna Aizer of Brown University and Janet Currie of Princeton University organized the meeting. These researchers' papers were presented and discussed:

- **Martha J. Bailey**, University of Michigan and NBER, and **Shuqiao Sun** and **Brenden D. Timpe**, University of Michigan, "Prep School for Poor Kids: The Long-Run Impacts of Head Start on Human Capital and Self-Sufficiency"

- **Emilia Simeonova**, Johns Hopkins University and NBER; **Randall Akee**, University of California, Los Angeles and NBER; and **Elizabeth Costello**, **William Copeland**, and **John B. Holbein**, Duke University, "Family Income and the Intergenerational Transmission of Civic Participation: Evidence from a Cash Transfer Program and Parent and Child Voting Behaviors"

- **Chloe N. East**, University of Colorado Denver; **Marianne E. Page**, University of California, Davis and NBER; **Sarah Miller**, University of Michigan and NBER; and **Laura R. Wherry**, University of California, Los Angeles, "Multigenerational Impacts of Childhood Access to the Safety Net: Early Life Exposure to Medicaid and the Next Generation's Health" (NBER Working Paper No. 23810)

- **Timothy Halliday**, University of Hawaii at Manoa; **Bhashkar Mazumder**, Federal Reserve Bank of Chicago; and **Ashley Wong**, Northwestern University, "Intergenerational Health Mobility in the U.S."

- **Francisco Gallego**, Pontificia Universidad Catolica de Chile; **Ofer Malamud**, Northwestern University and NBER; and **Cristian Pop-Eleches**, Columbia University and NBER, "Parental Monitoring and Children's Internet Use: The Role of Information, Control, and Cues" (NBER Working Paper No. 23982)

- **Diane E. Alexander**, Federal Reserve Bank of Chicago, and **Molly Schnell**, Princeton University, "Closing the Gap: The Impact of the Medicaid Primary Care Rate Increase on Access and Health"

- **Diva Dhar**, Indian Statistical Institute; **Tarun Jain**, Indian School of Business; and **Seema Jayachandran**, Northwestern University and NBER, "Reshaping Adolescents' Gender Attitudes: Evidence from a School-Based Experiment in India"

Summaries of these papers are at www.nber.org/confer/2018/CHEDs18/summary.html

Economics of Education

Members of the NBER's Economics of Education Program met on April 13 in Cambridge. Program Director Caroline M. Hoxby of Stanford University organized the meeting. These researchers' papers were presented and discussed:

- **Stephanie Cellini**, George Washington University and NBER; **Rajeev Darolia**, University of Kentucky; and **Lesley J. Turner**, University of Maryland and NBER, "Where Do Students Go When For-Profit Colleges Lose Federal Aid?" (NBER Working Paper No. 22967)

- **Peter S. Bergman** and **Magdalena Bennett Colomer**, Columbia University, "Better Together? Social Networks in Truancy and the Targeting of Treatment"

- **Rebecca A. Johnson**, Princeton University, and **Dalton Conley**, Princeton University and NBER, "Tags and a Leaky Pipeline in School Districts' Allocations to Students"

- **Karthik Muralidharan**, University of California, San Diego and NBER, and **Abhijeet Singh**, Stockholm School of Economics, "Understanding the Flailing State: Experimental Evidence from a Large-Scale School Governance Improvement Program in India"

- **Evan Riehl**, Cornell University, "Fairness in College Admission Exams: From Test Score Gaps to Earnings Inequality"

- **Meltem Daysal**, University of Southern Denmark; **Todd Elder**, University of Michigan; **Judith K. Hellerstein**, University of Maryland and NBER; **Scott A. Imberman**, Michigan State University and NBER; and **Chiara Orsini**, London School of Economics, "Parental Human Capital Traits and Autism Spectrum Disorder in Children"

Summaries of these papers are at www.nber.org/confer/2018/CHEDs18/summary1.html

Organizational Economics

The NBER's Working Group on Organizational Economics met April 20–21 in Cambridge. Working Group Director Robert S. Gibbons of MIT organized the meeting. These researchers' papers were presented and discussed:

- **Florian Englmaier**, **Stefan Grimm**, and **Simeon Schudy**, Ludwig Maximilian University of Munich, and **David Schindler**, Tilburg University, "The Effect of Incentives in Non-Routine Analytic Team Tasks — Evidence from a Field Experiment"
- **Daniel V. Barron**, **George Georgiadis**, and **Jeroen Swinkels**, Northwestern University, "Optimal Contracts with a Risk-Taking Agent"
- **Colleen M. Cunningham**, London Business School, and **Florian Ederer** and **Song Ma**, Yale University, "Killer Acquisitions"
- **Diego Battiston**, **Jordi Blanes**, and **Tom Kirchmaier**, London School of Economics, "Face-to-Face Communication in Organizations"
- **Steven Callander and Nicolas S. Lambert**, Stanford University; and **Niko Matouschek**, Northwestern University, "Communication in a Complicated World"
- **Timothy J. Besley**, London School of Economics, and **Torsten Persson**, Institute for International Economic Studies and NBER, "Organizational Dynamics: Culture, Design, and Performance"
- **Christopher T. Stanton**, Harvard University and NBER, and **Catherine Thomas**, London School of Economics, "Experience Markets: An Application to Outsourcing and Hiring"
- **Decio Coviello**, HEC Montreal; **Erika Deserranno**, Northwestern University; and **Nicola Persico**, Northwestern University and NBER, "Minimum Wage and Worker Productivity: Evidence From a large U.S. Retailer"
- **Benjamin Enke**, Harvard University and NBER, "Kinship Systems, Cooperation, and the Evolution of Culture" (NBER Working Paper No. 23499)
- **Maria Guadalupe** and **Lucia Del Carpio**, INSEAD, "More Women in Tech? Evidence from a Field Experiment Addressing Social Identity"

Summaries of these papers are at www.nber.org/confer/2018/OEs18/summary.html

Political Economy

Members of the NBER's Program on Political Economy met April 27 in Cambridge. Program Director Alberto F. Alesina of Harvard University organized the meeting. These researchers' papers were presented and discussed:

- **Vincent Pons**, Harvard University, and **Clémence Tricaud**, École Polytechnique, Université Paris-Saclay, "Expressive Voting and Its Cost: Evidence from Runoffs with Two or Three Candidates"
- **Daron Acemoglu**, MIT and NBER; **Giuseppe De Feo**, University of Strathclyde; and **Giacomo De Luca**, University of York, "Weak States: Causes and Consequences of the Sicilian Mafia" (NBER Working Paper No. 24115)

- **Michel Serafinelli**, University of Toronto, and **Guido Tabellini**, Innocenzo Gasparini Institute for Economic Research, "Creativity over Time and Space"

- **Sascha O. Becker**, University of Warwick; **Irena Grosfeld** and **Ekaterina Zhuravskaya**, Paris School of Economics; **Pauline Grosjean**, The University of New South Wales; and **Nico Voigtländer**, University of California, Los Angeles and NBER, "Forced Migration and Human Capital Accumulation: Evidence from Post-WWII Population Transfers" (NBER Working Paper No. 24704)

- **Boaz Abramson**, Stanford University, and **Moses Shayo**, Hebrew University, "Grexit vs. Brexit: International Integration under Endogenous Social Identities"

- **Laurent Bouton**, Georgetown University and NBER; **Micael Castanheira**, ECARES, Université libre de Bruxelles; ; and **Allan Drazen**, University of Maryland and NBER, "A Theory of Small Campaign Contributions" (NBER Working Paper No. 24413)

Summaries of these papers are at www.nber.org/confer/2018/POLs18/summary.html

Health Economics

Members of the NBER's Program on Health Economics met on May 4 in Cambridge. Program Director Michael Grossman of the City University of New York and Research Associates Theodore J. Joyce of the City University of New York and Christopher Carpenter of Vanderbilt University organized the meeting. These researchers' papers were presented and discussed:

- **Emilia Simeonova**, Johns Hopkins University and NBER, and **Andreas Madestam**, Stockholm University, "Children of the Pill: The Effect of Subsidizing Oral Contraceptives on Children's Health and Well-being"

- **Scott Cunningham** and **Andrea Schlosser**, Baylor University; **Jason M. Lindo**, Texas A&M University and NBER; **Caitlin K. Myers**, Middlebury College, "How Far Is Too Far? New Evidence on Abortion Clinic Closures" (NBER Working Paper No. 23366)

- **Jessamyn Schaller**, University of Arizona and NBER; **Lisa Schulkind**, University of North Carolina, Charlotte; and **Teny Maghakian Shapiro**, Santa Clara University, "The Effects of Perceived Disease Risk and Access Costs on Infant Immunization" (NBER Working Paper No. 23923)

- **Ofer Malamud**, Northwestern University and NBER; **Andreea Mitrut**, University of Gothenburg; and **Cristian Pop-Eleches**, Columbia University and NBER, "The Effect of Education on Mortality and Health: Evidence from a Schooling Expansion in Romania" (NBER Working Paper No. 24341)

- **Martin Andersen**, University of North Carolina at Greensboro, "Effects of Medicare Coverage for the Chronically Ill on Health Insurance, Utilization, and Mortality: Evidence from Coverage Expansions Affecting People with End-Stage Renal Disease"

- **Christopher Carpenter** and **Casey Warman**, Dalhousie University and NBER, "Do 'All-Age' Bicycle Helmet Laws Work? Evidence from Canada" (NBER Working Paper No. 24644)

Summaries of these papers are at www.nber.org/confer/2018/HEs18/summary.html

Cohort Studies

The NBER's Working Group on Cohort Studies met on May 11–12 in Cambridge. Working Group Director Dora Costa of the University of California, Los Angeles organized the meeting, which honored Robert Fogel. These researchers' papers were presented and discussed:

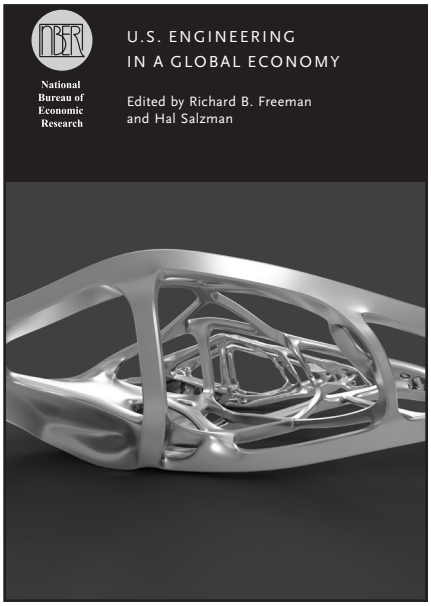
- **Martha J. Bailey**, University of Michigan and NBER, and **Alfia Karimova** and **Michael J. Murto**, University of Michigan, "The Determinants of Life Expectancy in the 20th Century U.S.: Evidence from the LIFE-M Project"
- **Joseph P. Ferrie**, Northwestern University and NBER, "Socioeconomic Status & Child Mortality in the U.S., 1850–1940"
- **Richard H. Steckel**, The Ohio State University and NBER, "Height and Happiness"
- **Dora Costa**, University of California, Los Angeles and NBER, "Intergenerational Transmission of Wartime Trauma"
- **Hoyt Bleakley**, University of Michigan and NBER, "The Hookworm Again"
- **Chulhee Lee**, Seoul National University, "Nutrition, Health, and Human Capital Development: Evidence from South Korea, 1946–1977"
- **Sok Chul Hong**, Seoul National University, "Shortened Lifespan: A Legacy of Exposure to Malaria Risk in Early Life"
- **Claudia Goldin**, Harvard University and NBER, and **Adriana Lleras-Muney**, University of California, Los Angeles and NBER, "XX>XY? The Changing Female Advantage in Life Expectancy" (NBER Working Paper No. 24716)
- **Maryaline Catillon**, Harvard University; **David M. Cutler**, Harvard University and NBER; and **Thomas Getzen**, Temple University, "Two Hundred Years of Medical Care and Health"

Summaries of these papers are at www.nber.org/confer/2018/CSs18/summary.html

NBER Books

U.S. Engineering in a Global Economy

Edited by Richard B. Freeman and Hal Salzman
$130 (cloth)

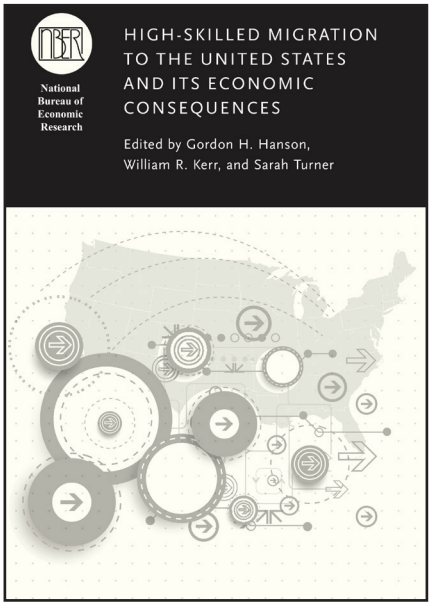


Since the late 1950s, the engineering job market in the United States has been fraught with fears of a shortage of engineering skill and talent. *U.S. Engineering in a Global Economy* brings clarity to issues of supply and demand in this important market. Following a general overview of engineering-labor market trends, the volume examines the educational pathways of undergraduate engineers and their entry into the labor market, the impact of engineers working in firms on productivity and innovation, and different dimensions of the changing engineering labor market, from licensing to changes in demand and guest worker programs.

U.S. Engineering in a Global Economy also provides insights on engineering education, practice, and careers that can inform educational institutions, funding agencies, and policymakers about the challenges facing the United States in developing its engineering workforce in the global economy.

High-Skilled Migration to the United States and Its Economic Consequences

Edited by Gordon H. Hanson, William R. Kerr, and Sarah Turner
$130 (cloth)



Immigration policy is one of the most contentious public policy issues in the United States today. High-skilled immigrants represent an increasing share of the U.S. workforce, particularly in science and engineering fields. These immigrants affect economic growth, patterns of trade, education choices, and the earnings of workers with different types of skills. The chapters in this volume go beyond the traditional question of how the inflow of foreign workers affects native employment and earnings to explore effects on innovation and productivity, wage inequality across skill groups, the behavior of multinational firms, firm-level dynamics of entry and exit, and the nature of comparative advantage across countries.

NBER Macroeconomics Annual 2017, Volume 32

Edited by Martin Eichenbaum and Jonathan A. Parker
$90 (cloth)

Volume 32 of the *NBER Macroeconomics Annual* features six theoretical and empirical studies of important issues in contemporary macroeconomics, and a keynote address by former IMF chief economist Olivier Blanchard. In one study, SeHyoun Ahn, Greg Kaplan, Benjamin Moll, Thomas Winberry, and Christian Wolf examine the dynamics of consumption expenditures in non-representative-agent macroeconomic models. In another, John Cochrane asks which macro models most naturally explain the post-financial-crisis macroeconomic environment, which is characterized by the coexistence of low and nonvolatile inflation rates, near-zero short-term interest rates, and an explosion in monetary aggregates. Manuel Adelino, Antoinette Schoar, and Felipe Severino examine the causes of the lending boom that precipitated the recent U.S. financial crisis and Great Recession. Steven Durlauf and Ananth Seshadri investigate whether increases in income inequality cause lower levels of economic mobility and opportunity. Charles Manski explores the formation of expectations, considering the efficacy of directly measuring beliefs through surveys as an alternative to making the assumption of rational expectations. In the final research paper, Efraim Benmelech and Nittai Bergman analyze the sharp declines in debt issuance and the evaporation of market liquidity that coincide with most financial crises. Blanchard's keynote address discusses which distortions are central to understanding short-run macroeconomic fluctuations.

Tax Policy and the Economy, Volume 32

Edited by Robert A. Moffitt
$60 (cloth)

The six research studies in Volume 32 of *Tax Policy and the Economy* analyze the U.S. tax and transfer system, in particular its effects on revenues, expenditures, and economic behavior. James Andreoni examines donor-advised funds, which are financial vehicles offered by investment houses to provide savings accounts for tax-free charitable giving, and weighs their effects on donations against their tax cost. Caroline Hoxby analyzes the use of tax credits by students enrolled in online post-secondary education. Alex Rees-Jones and Dmitry Taubinsky explore taxpayers' psychological biases that lead to incorrect perceptions and understanding of tax incentives. Jeffrey Clemens and Benedic Ippolito investigate the implications of block grant reforms of Medicaid for receipt of federal support by different states. Andrew Samwick examines means-testing of Medicare and federal health benefits under the Affordable Care Act. Bruce Meyer and Wallace Mok study the incidence and effects of disability among U.S. women from 1968 to 2015, examining the impacts of disability on income, consumption, and public transfers.

For information on ordering and electronic distribution, see www.press.uchicago.edu/books/orders.html or to place an order you may also contact the University of Chicago Press Distribution Center, at telephone: 1-800-621-2736 or email: orders@press.uchicago.edu

NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH

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

Change Service Requested