

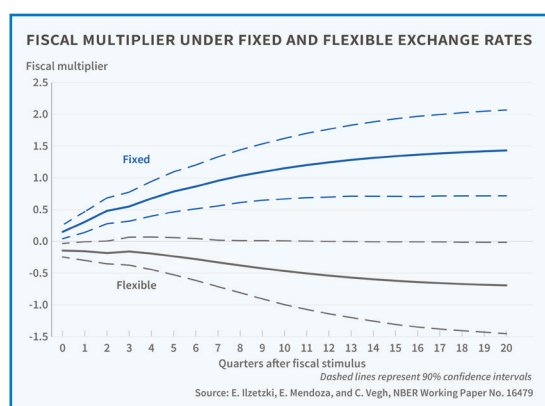
NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH

A quarterly summary of NBER research

2015 Number 4

ALSO IN THIS ISSUE



Fiscal Policy in Emerging Markets: Procyclicality and Graduation	8
Energy and Environmental Technology	13
Recessions and Retirement: How Stock Market and Labor Market Fluctuations Affect Older Workers	17
Menu Choices in Defined Contribution Pension Plans	21
NBER News	24
Conferences	25
Program and Working Group Meetings	28
NBER Books	39

Program Report

Measuring the Economy of the 21st Century

Charles R. Hulten

The first meeting of the [Conference on Research in Income and Wealth](#) (CRIW) occurred in late January of 1936 in the midst of the Great Depression. The general objective of the conferees at this meeting and those that followed was to help fill the void created by the absence of a national statistical system. The CRIW provided conceptual support for the task of developing such a system, and a complex task it was indeed. A national economy is a system of interconnected flows of quantities and payments involving a vast number of goods and services. Fitting all this together into a national accounting framework has justifiably been called one of the “great inventions of the 20th Century.”¹

We are now well into the 21st century, and as with many other great inventions, there are constant challenges in updating the national statistical system to reflect the current technological environment. GDP is an aggregate measure of the flows of goods and services through product and factor markets, one that provides a statistical portrait of the economy as it evolves over time. However, the process of evolution itself has altered these flows in ways that undermine the accuracy or relevance of past concepts and data sources. The rapid transformation of the U.S. economy brought about by the revolution in information technology has introduced a profusion of new products and processes, new market channels, and greater organizational complexity. Parts of the statistical system are struggling to keep up.

The problem is nowhere more evident than in the difficulties associated with the Internet’s contribution to GDP. Valuing the ‘net and the wide range of applications offered with little or no direct charge is challenging because there is no reliable monetary yardstick to guide measurement, and their omission or undervaluation surely affects GDP.

This is important for the recent debate over future living standards and employment. The two percent growth rate of real U.S. GDP since the end of the Great Recession has lagged the long-term historical rate of three percent, inviting speculation about the emergence of a New

The National Bureau of Economic Research is a private, nonprofit research organization founded in 1920 and devoted to objective quantitative analysis of the American economy. Its officers and board of directors are:

President and Chief Executive Officer — *James M. Poterba*
 Controller — *Kelly Horak*
 Corporate Secretary — *Alterra Milone*

BOARD OF DIRECTORS

Chairman — *Martin B. Zimmerman*
 Vice Chairman — *Karen N. Horn*
 Treasurer — *Robert Mednick*

DIRECTORS AT LARGE

Peter Aldrich	Mohamed El-Erian	Michael H. Moskow
Elizabeth E. Bailey	Linda Ewing	Alicia H. Munnell
John H. Biggs	Jacob A. Frenkel	Robert T. Parry
John S. Clarkeson	Judith M. Gueron	James M. Poterba
Don R. Conlan	Robert S. Hamada	John S. Reed
Kathleen B. Cooper	Peter Blair Henry	Marina v. N. Whitman
Charles H. Dallara	Karen N. Horn	Martin B. Zimmerman
George C. Eads	John Lipsky	
Jessica P. Einhorn	Laurence H. Meyer	

DIRECTORS BY UNIVERSITY APPOINTMENT

Timothy Bresnahan, <i>Stanford</i>	Benjamin Hermalin, <i>California, Berkeley</i>
Pierre-André Chiappori, <i>Columbia</i>	Marjorie B. McElroy, <i>Duke</i>
Alan V. Deardorff, <i>Michigan</i>	Joel Mokyr, <i>Northwestern</i>
Ray C. Fair, <i>Yale</i>	Andrew Postlewaite, <i>Pennsylvania</i>
Edward Foster, <i>Minnesota</i>	Cecilia Elena Rouse, <i>Princeton</i>
John P. Gould, <i>Chicago</i>	Richard L. Schmalensee, <i>MIT</i>
Mark Grinblatt, <i>California, Los Angeles</i>	David B. Yoffie, <i>Harvard</i>
Bruce Hansen, <i>Wisconsin</i>	

DIRECTORS BY APPOINTMENT OF OTHER ORGANIZATIONS

Jean Paul Chavas, *Agricultural and Applied Economics Association*
 Martin Gruber, *American Finance Association*
 Arthur Kennickell, *American Statistical Association*
 Jack Kleinhenz, *National Association for Business Economics*
 William W. Lewis, *Committee for Economic Development*
 Robert Mednick, *American Institute of Certified Public Accountants*
 Alan L. Olmstead, *Economic History Association*
 Peter L. Rousseau, *American Economic Association*
 Gregor W. Smith, *Canadian Economics Association*
 William Spriggs, *American Federation of Labor and Congress of Industrial Organizations*
 Bart van Ark, *The Conference Board*

The NBER depends on funding from individuals, corporations, and private foundations to maintain its independence and its flexibility in choosing its research activities. Inquiries concerning contributions may be addressed to James M. Poterba, President & CEO, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138-5398. All contributions to the NBER are tax deductible.

The *Reporter* is issued for informational purposes and has not been reviewed by the Board of Directors of the NBER. It is not copyrighted and can be freely reproduced with appropriate attribution of source. Please provide the NBER's Public Information Department with copies of anything reproduced.

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/dsubscribe/.

Normal. [See Figure 1.] This view is reinforced by Robert Gordon's recent suggestion that the growth effects of the information revolution are not of the same order of importance as those of previous technological revolutions and are, in any event, playing out.² The future may look very different if recent GDP growth is significantly understated because of the mismeasurement of new goods and services.

Sorting out the many issues involved in "measuring" the economy of the 21st century has dominated the CRIW agenda since the early stages of the information revolution; it is a large job, and will occupy the CRIW for years to come. Past and current efforts are reviewed in this summary, starting with the importance of accurately accounting for new goods and improvements in the quality of existing ones, and the related

problem of measuring the output of the service-producing sectors of the economy. The following sections take a closer look at three of the most important service sectors: health care, education, and finance. Subsequent sections focus on capital and labor in the new economy, the role of entrepreneurship and company formation, and the problem of national income accounting in an increasingly globalized world. A final section sums up.

New Goods and Quality Change

In his discussion of "Effects of the Progress of Improvement upon the Real Price of Manufactures" in *The Wealth of Nations*, Adam Smith dodged the problem of changing product quality by saying "Quality, however, is so very disputable a matter, that I look upon all information of this kind as somewhat uncertain."³ He was referring to price trends in the production of cloth, but fast-forward more than two centuries, to William Nordhaus writing on the history of lighting, when he argues that official price indexes may "miss the most important

revolutions in economic history" because of the way they are constructed.⁴ The quality problem endures and, if anything, has gotten more difficult with the profusion of new and improved goods.

The quality change problem arises when a new version of a good is introduced that embodies characteristics that make it more desirable. The new model may not cost much more than the old, but represents a greater

effective amount of output from the user's standpoint. If the price per unit transacted in the market does not change, the substitution of a new unit for an older model

will not affect either nominal or apparent real GDP, because the apparent market price has not changed. However, effective real output has increased, and the benefits of the innovation are lost in the official data. Personal computers are an important example, and in the mid-1980s, the Bureau of Economic Analysis began adjusting computer prices to better reflect the technological gains in computing power.

The new goods variant of the product innovation problem is even more challenging because, unlike the quality change problem, there are no prior versions of the good on which to base price comparisons. Current procedures for incorporating new goods into existing price indexes are complicated, but may miss much of the value of these innovations. At the same CRIW meeting at which Nordhaus examined the history of lighting, Jerry Hausman examined the introduction of a new brand of breakfast cereal and found that the treatment (or non-treatment)

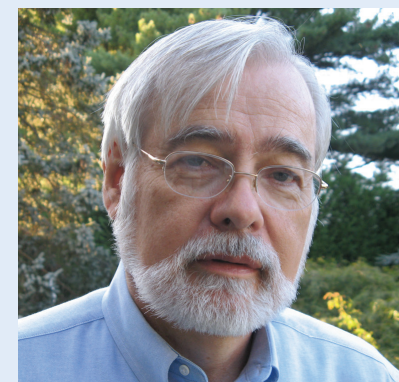
of new goods in official statistics resulted in a 20 percent upward bias in that component of the Consumer Price Index.⁵ He arrived at a similar conclusion in a subsequent paper on mobile cellular telephones, though the magnitude of the bias is larger.⁶ By implication, the benefits of important new information technology goods, like the Internet and the many applications it enables, may be subject to significant undervaluation.

Papers on various aspects of price measurement have appeared frequently in other CRIW proceedings, and in 2004 the CRIW hosted a conference on Price Index Concepts and Measurement devoted to the subject.⁷ Papers in [the resulting volume](#), published in 2009, ranged over theoretical areas in price measurement, from the reassessment of quality change in computer prices and the issue of outlet substitution bias to measurement problems in specific applications in finance, health, and education.⁸ An earlier volume, *Hard-to-Measure Goods and Services: Essays in Honor of Zvi Griliches*, published in 2007, included six papers devoted to price measurement. One, by Jaison Abel, Ernst Berndt, and Alan White, moves beyond the rapid increase in the power of computer hardware to show that improvements in software also are important.⁹

The question of how much product innovation has been omitted from estimates of real GDP is germane to the issues raised by Gordon. If the upward bias in price indexes is of the magnitude suggested by Nordhaus, Hausman, and others, then the growth in real GDP may be considerably greater than the official estimates suggest.¹⁰ Whether the bias has increased in recent years and is large enough to offset the apparent slowdown in recent growth is another matter. It is a subject that will undoubtedly be on the agendas of future CRIW conferences.

The Services Sector Problem

The private services-producing sectors of the U.S. economy constitute some four-fifths of recent private business value added. Not only do they account for a large fraction of GDP, these sectors are essential for understanding the trends in aggregate economic growth. In his [introduction to the CRIW volume](#) *Output Measurement in the Service*



Charles R. Hulten is a research associate of the National Bureau of Economic Research and professor of economics at the University of Maryland, where he has taught since 1985. He has served for 30 years as chairman of the NBER's Conference on Research in Income and Wealth, a forum in which academics, members of the policy community, and representatives of the statistical agencies meet regularly to discuss problems with the statistical system. The CRIW has produced 24 conference volumes during his tenure. He also is a member of the advisory committee of the federal Bureau of Economic Analysis.

Hulten's recent research includes work on measurement of intangible capital and effects of intangibles on innovation, economic growth, and corporate wealth. His research interests also include the measurement of economic depreciation, public and private capital formation, and productivity theory and analysis.

Before joining the University of Maryland, Hulten was a senior research associate at the Urban Institute and an assistant professor of economics at Johns Hopkins University. His undergraduate and Ph.D. degrees are from the University of California, Berkeley.

Sectors, Zvi Griliches wrote that the much-discussed productivity slowdown of the 1970s and 1980s might be due to

two factors: “Baumol’s disease,” in which the relative labor intensity and a high income elasticity of demand doom these sectors to slower productivity growth, and the possibility that the output of these sectors was inherently more difficult to measure.¹¹

Fast forward, again, to the 2007 CRIW paper by Barry Bosworth and Jack Triplett on service sector productivity.¹² This paper revisits and updates Griliches’ earlier finding that services were a drag on overall growth during the slowdown. Looking at a longer period, they report a speed-up in services relative to the goods-producing sectors: Labor productivity growth in services rose from an annual rate of 0.7 percent in 1987–1995 to 2.6 percent for 1995–2001, while the corresponding numbers for the goods-producing sectors were 1.8 percent and 2.3 percent, respectively. They also find that 80 percent of the increase in overall labor productivity growth after 1995 came from the contribution of information technology in the service sectors, contrary to the Baumol hypothesis that services were inherently resistant to productivity change.

Sorting out changing sectoral trends is made more difficult because the output of the services sectors is resistant to accurate measurement, in part because the quality change problem is particularly large in many of these sectors, and in part because of their very nature. Griliches also observed that a “problem arises because in many services sectors it is not exactly clear what is being transacted, what is the output, and what services correspond to the payments made to their providers.”¹³ A simple contingent-state model illustrates the problem. The outcome of expert advice or intervention (e.g., medical, legal, financial, educational, management consulting) can be thought of as a shift from an initial state of being to a post-intervention state, where “state” refers variously to the condition of wellness, legal or financial position, knowledge, etc. The subject purchases expert services, X , in the expectation or hope that they will have a positive outcome. However, the outcome also depends on the subject’s

own efforts and initial state of being. Measured GDP records the payment for X , and perhaps ancillary expenses incurred (e.g., joining a health club), but not necessarily the value of the outcome to the recipient, which may be different and is often complex and subjective.

A fundamental problem arises when trying to separate X into price and quantity components in order to measure real GDP: In what units do you measure X ? Doctors and lawyers may provide information but bill by the visit, or the hour, or the procedure. This is their “output,” and it is not measured in bits or bytes of expert information. The service providers usually do not sell guaranteed outcomes, since the advice they provide may not be heeded and outcomes are often uncertain. There is a parallel problem in the units in which outcomes are measured: Whatever these units are, they are not necessarily the same for buyers and sellers. But if there are no clear units of measurement, how is it possible to determine the level of output and tell if improvements in technology have increased outcome-based output over time? This is a problem for understanding the factors driving recent GDP growth, given the service sector’s technological dynamism in recent years and the increased availability of expert advice and information on the Internet.

Selected Service Industries

Rising health care costs and the aging of the baby boomers have focused much attention on the health services sector. Not surprisingly, the measurement of health care cost and output has been the subject of two recent CRIW meetings: the 2001 Medical Care Output and Productivity conference and the 2013 Measuring and Modeling Health Care Costs conference.¹⁴ The 31 papers in the two conference volumes range over a number of issues, many organized around what Berndt and David Cutler, the editors of the first volume, call the “outcomes movement” in health economics, which is the attempt to measure the health impact of medical care rather than the amount expended. The paper

by Triplett in this volume elaborates on this point, arguing that it is not the expenditure on health care inputs that is needed for the study of medical productivity, but the output associated with these inputs and how it has changed over time. Anyone who remembers a visit to the dentist in the 1950s can testify to the enormous gains in efficacy and patient comfort that have occurred. Huge advances have been made in diagnostics (e.g., the MRI), treatment (e.g., laparoscopic surgery), and drug therapies (e.g., statins). Any attempt to measure real output in the health sector and its contribution to real GDP growth must account for these advances. More technology is on the way, with gene-based therapies, robotic surgery, and diagnoses that make use of the potential of Big Data. A pure expenditure approach misses some of the most important technological advances of the last 50 years.

Adjusting expenditures (X) to reflect better outcomes is not a simple matter, as the contingent-state model illustrates. Outcomes have a subjective component, like improved quality of life, and depend on the pre-treatment state of health. Expenditures are price-denominated, whereas outcomes are not, at least not in their pure state. However, progress can be made by adjusting the price estimates used to deflate nominal-price expenditure data for those outcomes that can be measured (e.g., cures, survival rates), and by the use of disease-based price indexes to better reflect the bundle of services received by the consumer. This is an important step for measuring the growth in real GDP, given the growing size of the health sector and the manifest importance of advances in medical technology.

The same general line of analysis applies to the education sector. The overall objective of schooling is to move a student from one state of knowledge or capability to another. The “output” of the sector, as measured by educational attainment, has increased dramatically in the United States, as have per capita expenditures. The fraction of the adult population with a bachelor’s degree increased from less than 10 percent in

1960 to around 30 percent today, and some two-thirds of high school graduates go on to some form of tertiary education. The improvement in educational outcomes is another matter. The recent “Nation’s Report Card” from the National Assessment of Education Progress reported that literacy and numeracy scores of 12th graders have been stagnant in recent years, and that a majority of students are stuck at skill levels that are rated below proficient, with one-quarter of students below “basic” in reading and one-third below “basic” in mathematics.¹⁵ International comparisons have found similar results.

However, test scores are only one aspect of the educational process, and formal education is only part of the maturation and skill development process. In a paper presented at the 2015 CRIW conference on Education, Skills, and Technical Change: Implications for Future U.S. GDP Growth, Valerie Ramey and I note that factors like family and peer environments also matter, and that “cognitive and non-cognitive skills developed by age three have fundamental effects on life outcomes and on the ability to learn. Schools thus have little control over student characteristics, a key input into their production functions, and the deficits revealed by test score data are not simply a reflection of weak schools — though they undoubtedly contribute to the problem.”¹⁶ Initial conditions are important and affect the link between expenditures and outcomes. Still, the apparent lack of progress in test scores is of concern when assessing educational output in general and prospective gains from IT-related innovations like online education.

The difficulty that statisticians have

in keeping up with rapid changes in technology and markets is another complicating factor. This is nowhere more apparent than in the financial services sector in the years after the financial crisis and sharp economic downturn. Why wasn’t a crisis of such huge proportion more evident beforehand in official aggregate statistics of the economy? The papers presented at the CRIW conference that led to the 2015 volume *Measuring Wealth and Financial Intermediation and Their Links to the Real Economy* attempt to answer this question.¹⁷ In our summary, Marshall Reinsdorf and I argue that “The

the rate at which the accounts can change and the detail needed to anticipate disruptive change before it occurs.

Labor and Capital in the New Economy

The input side of the economy has also been affected by the digital revolution. This is apparent in the 2005 volume *Measuring Capital in the New Economy*, which is largely devoted to the growing importance of intangible capital formation.¹⁹ This form of capital investment includes scientific and other R&D,

brand equity, customer lists and reputation, worker training, and management and human resource systems. Carol Corrado, Daniel Sichel, and I find that investment in intangibles has become the dominant source of business capital formation, far outstripping the rate of investment in tangible plants and equipment, where the rate has been on a downward trajectory. [See Figure 2.] In 2010, the investment rate in the latter was around 8 percent, versus an estimated rate of 14 percent for intangibles.²¹ This is relevant for the debate over slowing productivity growth, since most of the studies do not include intangible capital and thus omit a major and growing source of technological and organizational innovation.

Measuring intangible capital presents a host of problems, since much of it is produced with firms on “own account” without a market transaction to fix prices and quantities. However, while the problems are difficult, progress is possible. In a major advance in innovation accounting, the Bureau of Economic Analysis successfully incorporated own-account R&D into the national accounts in 2013, along with artistic originals.

TANGIBLE AND INTANGIBLE INVESTMENT RATES
U.S. private nonfarm business sector

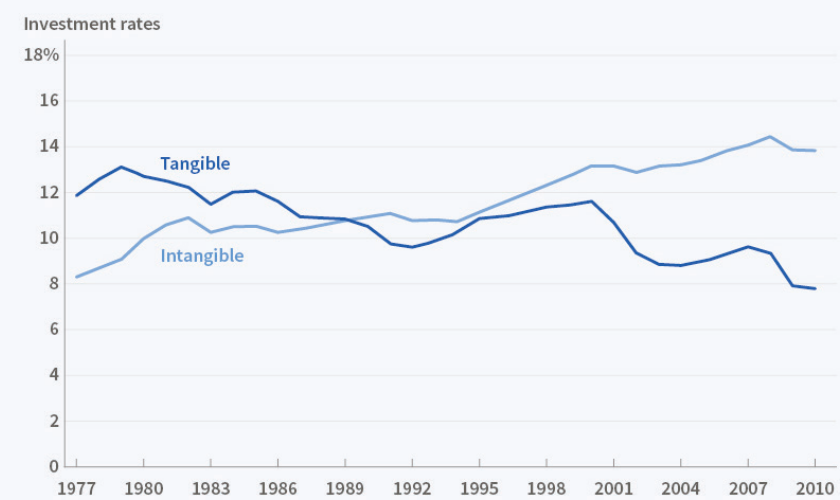


Figure 2

Source: C.A. Corrado and C.R. Hulten²⁰

possibilities introduced by the IT revolution transformed the way stocks were traded and financial markets were organized... facilitated innovations in the areas of securitized lending and financial derivatives... [and the] organization of the financial intermediation industry also changed as some activities migrated to unregulated industries with few data reporting requirements.”¹⁸ We go on to observe that new financial instruments and market innovations are disruptive and take time to understand and integrate into large scale macro data systems like the national accounts, which have requirements of temporal consistency and breadth of coverage that limit

Labor markets also are changing, and the 2010 volume *Labor in the New Economy* takes up some important issues, including the outsourcing of jobs, job security, “good” jobs versus “bad” jobs, the aging of the workforce, different forms of worker compensation, and rising wage inequality.²² The IT revolution has also affected the workplace through an increase in the demand for non-routine skills at the expense of jobs demanding routine skills, a central theme of the conference *Education, Skills, and Technical Change: Implications for Future U.S. GDP Growth*. Future changes in the labor market will undoubtedly inspire future CRIW research on issues like changing labor force demographics and participation rates, deindustrialization and technological obsolescence, wage inequality, and the rise of the “gig” economy, in which growing numbers of Americans no longer have long-term employment with a particular firm but work “gigs” for a number of clients.

Firm dynamics are another important dimension of innovation on the production side of the economy. The 2009 volume *Producer Dynamics: New Evidence from Micro Data* looks at the processes of firm entry, growth, and exit, which are integral parts of resource reallocation and growth in a market economy.²³ Advances in the construction and availability of microdata from statistical agencies, particularly longitudinal microdata, have enabled researchers to track new firms over their lifetimes. The papers in this volume cover a broad range of issues, including cross-country differences in firm dynamics, job openings and labor turnover, and the dynamics of young and small businesses. The firm dynamic issues are also the subject of the forthcoming conference volume *Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*, which includes papers on high-growth young firms, entrepreneurial quality and performance, venture capital, job creation in small and large firms, and immigrant entrepreneurship.²⁴

Globalization and International Trade

The globalization of the world economy has also received attention in the conference on International Trade in Services and Intangibles in the Era of Globalization.²⁵ The delivery of many services has traditionally involved physical proximity, but this is changing with the revolution in information and communication technology. The new technologies have enhanced the capacity for global trade in legal, financial, medical, and communication services as well as in software. The editors of *the conference volume* note that world trade has grown more rapidly than world production, and that trade in services has grown faster than trade in goods. These flows have added an international dimension to the pricing and quantity measurement problem already noted for services in general, and have added problems associated with currencies and taxes.

Summing Up

Since 2000, 15 CRIW conferences have been held, and the proceedings, published or in process, contain well over 200 papers. The great diversity of topics covered is impossible to summarize in a short review, and many important topics have been omitted.²⁶ Some measurement issues, in areas such as medical services, banking, price measurement, and education, have been considered in many conferences.

A full list of conferences, and links to the papers they contain, can be found at: <http://www.nber.org/CRIW/>.

¹ P. A. Samuelson and W. D. Nordhaus, cited in J. S. Landefeld, “GDP: One of the Great Inventions of the 20th Century,” Bureau of Economic Analysis, U.S. Department of Commerce, Survey of Current Business, January 2000.

[Return to text](#)

² R. J. Gordon, “Is U.S. Economic Growth Over? Faltering Innovation Confronts the Six Headwinds,” NBER Working Paper No. 18315, August 2012; Also, R. J. Gordon, The Rise and Fall of American Growth: The U.S. Standard of Living since the Civil

War, *The Princeton Economic History of the Western World*, Princeton, New Jersey: Princeton University Press, forthcoming January, 2016.

[Return to text](#)

³ A. Smith, *The Wealth of Nations*, volume 1, 1776, Irwin Paperback Classics in Economics, Homewood, Illinois: Richard D. Irwin, 1963, p. 195.

[Return to text](#)

⁴ W. D. Nordhaus, “Do Real Output and Real Wage Measures Capture Reality? The History of Lighting Suggests Not,” In T. Bresnahan and R. J. Gordon, eds., *The Economics of New Goods*, Studies in Income and Wealth, Vol. 58, Chicago, Illinois: The University of Chicago Press, 1997, pp. 29–66.

[Return to text](#)

⁵ J. Hausman, “Valuation of New Goods under Perfect and Imperfect Competition,” In T. Bresnahan and R. J. Gordon, eds., *The Economics of New Goods*, Chicago, Illinois: University of Chicago Press, 1996, pp. 209–37.

[Return to text](#)

⁶ J. Hausman, “Cellular Telephone, New Products, and the CPI,” NBER Working Paper No. 5982, March 1997, and Journal of Business & Economic Statistics, 17(2), 1999, pp. 188–94.

[Return to text](#)

⁷ W. E. Diewert, J. Greenlees, and C. R. Hulten, eds., *Price Index Concepts and Measurement*, Studies in Income and Wealth, No. 70, Chicago, Illinois: University of Chicago Press, 2009.

[Return to text](#)

⁸ R. C. Feenstra and C. Knittel, “Reassessing the U.S. Quality Adjustment to Computer Prices: The Role of Durability and Changing Software,” pp. 129–60; and J. Hausman and E. Leibtag, “CPI Bias from Supercenters: Does the BLS Know that Wal-Mart Exists?” pp. 203–31, both in W. E. Diewert, J. Greenlees and C. R. Hulten, eds., *Price Index Concepts and Measurement*, Studies in Income and Wealth, No. 70, Chicago, Illinois: University of Chicago Press, 2009.

[Return to text](#)

⁹ J. R. Abel, E. R. Berndt, and A. G. White, “Price Indexes for Microsoft’s Personal Computer Software Products,” In E. R. Berndt and C. R. Hulten, eds., *Hard-to-Measure*

Goods and Services: Essays in Honor of Zvi Griliches, Studies in Income and Wealth, Vol. 67, Chicago, Illinois: The University of Chicago Press, 2007, pp. 269–89.

[Return to text](#)

¹⁰ See, for example, M. Bils, and P. J. Klenow, “Quantifying Quality Growth,” NBER Working Paper No. 7695, May 2000, and American Economic Review, 91(4), 2001, pp. 1006–30.

[Return to text](#)

¹¹ Z. Griliches, ed., *Output Measurement in the Service Sectors*, Studies in Income and Wealth, Vol. 56, Chicago, Illinois: University of Chicago Press, 1992; See, also, Z. Griliches, “Productivity, R&D, and the Data Constraint,” American Economic Review, 84(1), 1994, pp. 1–23.

[Return to text](#)

¹² B. P. Bosworth and J. E. Triplett, “Services Productivity in the United States: Griliches’s Services Volume Revisited,” In E. R. Berndt and C. R. Hulten, eds., *Hard-to-Measure Goods and Services: Essays in Honor of Zvi Griliches*, Studies in Income and Wealth, Vol. 67, Chicago, Illinois: The University of Chicago Press, 2007, pp. 413–47.

[Return to text](#)

¹³ Griliches in his introduction to the CRIW volume *Output Measurement in the Service Sectors*, p. 7.

[Return to text](#)

¹⁴ D. M. Cutler and E. R. Berndt, eds., *Medical Care Output and Productivity*, Studies in Income and Wealth, Vol. 62, Chicago, Illinois: University of Chicago Press, 2001; and A. Aizcorbe, C. Baker, E. R. Berndt, and D. M. Cutler, eds., *Measuring and Modeling Health Care Costs*, forthcoming in NBER Book Series, Studies in Income and Wealth.

[Return to text](#)

¹⁵ The Nation’s Report Card, “Are the Nation’s Twelfth-Graders Making Progress in Mathematics and Reading?” National Assessment of Educational Progress (NAEP), U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress, 2013.

[Return to text](#)

¹⁶ C. R. Hulten and V. Ramey, “Skills, Education, and U.S. Economic Growth: Are

U.S. Workers Being Adequately Prepared for the 21st Century World of Work?” in *Education, Skills, and Technical Change: Implications for Future U.S. GDP Growth*, CRIW conference held October, 2015.

[Return to text](#)

¹⁷ C. R. Hulten and M. B. Reinsdorf, eds., *Measuring Wealth and Financial Intermediation and Their Links to the Real Economy*, Studies in Income and Wealth, Vol. 73, Chicago, Illinois: University of Chicago Press, 2015.

[Return to text](#)

¹⁸ C. R. Hulten and M. B. Reinsdorf, “Introduction” to *Measuring Wealth and Financial Intermediation and Their Links to the Real Economy*, Studies in Income and Wealth, Vol. 73, Chicago, Illinois: University of Chicago Press, 2015, p. 2.

[Return to text](#)

¹⁹ C. A. Corrado, J. Haltiwanger, and D. Sichel, eds., *Measuring Capital in the New Economy*, Studies in Income and Wealth, No. 65, Chicago, Illinois: University of Chicago Press, 2005.

[Return to text](#)

²⁰ C. A. Corrado and C. R. Hulten, “How Do You Measure a Technological Revolution?” American Economic Review, 100(2), 2010, pp. 99–104; and C. A. Corrado and C. R. Hulten, “Innovation Accounting,” in D. W. Jorgenson, J. S. Landefeld, and P. Schreyer, eds., *Measuring Economic Sustainability and Progress*, Studies in Income and Wealth, Vol. 72, Chicago, Illinois: The University of Chicago Press, 2014, pp. 595–628.

[Return to text](#)

²¹ C. A. Corrado, C. R. Hulten, and D. Sichel, “Measuring Capital and Technology: An Expanded Framework,” in C. A. Corrado, J. Haltiwanger, and D. Sichel, eds., *Measuring Capital in the New Economy*, Studies in Income and Wealth, Vol. 65, Chicago, Illinois: The University of Chicago Press, 2005, pp. 11–41. In a subsequent paper, the authors find that the growth in the stock of intangible capital has become the largest single systematic source of the growth in output per hour in the non-farm business sector over the period 1995–2007. C. A. Corrado, C. R. Hulten, and D. Sichel, “Intangible Capital and U.S.

Economic Growth,” NBER Working Paper No. 11948, January 2006, and Review of Income and Wealth, 55(3), 2009, pp. 661–685.

[Return to text](#)

²² K. G. Abraham, J. R. Spletzer, and M. J. Harper, eds., *Labor in the New Economy*, Studies in Income and Wealth, Vol. 71, Chicago, Illinois: University of Chicago Press, 2010.

[Return to text](#)

²³ T. Dunne, J. B. Jensen, and M. Roberts, eds., *Producer Dynamics: New Evidence from Micro Data*, Studies in Income and Wealth, Vol. 68, Chicago, Illinois: University of Chicago Press, 2009.

[Return to text](#)

²⁴ J. Haltiwanger, E. Hurst, J. Miranda, and A. Schoar, eds., *Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*, forthcoming in NBER Book Series, Studies in Income and Wealth, Chicago, Illinois: University of Chicago Press; Conference held December 16–17, 2014.

[Return to text](#)

²⁵ M. B. Reinsdorf and M. Slaughter, eds., *International Trade in Services and Intangibles in the Era of Globalization*, Studies in Income and Wealth, Vol. 69, Chicago, Illinois: University of Chicago Press, 2009.

[Return to text](#)

²⁶ There have been papers on measurement methodology, in keeping with the CRIW’s origins, including, as examples, papers on the “architecture” and design of the national accounts, the treatment of consumer expenditures, and the use of scanner data (D. W. Jorgenson, J. S. Landefeld and W. D. Nordhaus, eds., *A New Architecture for the U.S. National Accounts*, Studies in Income and Wealth, Vol. 66, Chicago, Illinois: University of Chicago Press, 2006; C. Carroll, T. Crossley, and J. Sabelhaus, eds., *Improving the Measurement of Consumer Expenditures*, Studies in Income and Wealth, Vol. 74, Chicago, Illinois: University of Chicago Press, 2015; R. C. Feenstra and M. D. Shapiro, eds., *Scanner Data and Price Indexes*, Studies in Income and Wealth, Vol. 64, Chicago, Illinois: University of Chicago Press, 2003).

[Return to text](#)



Fiscal Policy in Emerging Markets: Procyclicality and Graduation

Carlos A. Vegh

Five key questions have guided my research on fiscal policy in emerging markets:¹

1. How is fiscal policy conducted in emerging markets compared to industrial countries?
2. Why has fiscal policy often been procyclical in emerging markets?
3. Are there developing countries that have “graduated”—that is, switched from being procyclical to countercyclical?
4. Has fiscal policy been an effective countercyclical tool?
5. Is the recent experience of some euro-zone countries reminiscent of past fiscal behavior in emerging markets?

This summary describes the main findings that have resulted from this research agenda. In pursuing these issues, I have been very fortunate to work with many talented co-authors, whose many contributions will hopefully become clear below.

Fiscal Policy in Emerging Countries: When It Rains, It Pours

Figure 1, on the next page, shows the correlation between the cyclical components of real GDP and government spending for 96 countries (21 industrial and 75 developing) for the period 1960–2014.² Industrial countries are denoted by gray bars while blue bars represent emerging countries.

The visual impression is striking: With only two exceptions, Greece and Portugal, all grey bars lie to the left of the graph, indicating a negative correlation and hence countercyclical government spending in industrial countries, while 81 percent of

blue bars lie to the right of the graph, indicating a positive correlation and hence procyclical government spending in developing countries. In fact, the average correlation for industrial countries is -0.23, compared to 0.21 for developing countries. Both estimates are significantly different from zero at the one percent level.

Although much less documented—mainly because data on tax rates are much harder to come by—the same is true of tax policy. Based on a novel annual dataset that comprises value-added, corporate, and personal income taxes for 62 countries (20 industrial and 42 developing) for the period 1960–2013, Guillermo Vuletin and I have concluded that tax policy has been acyclical in industrial countries and mostly procyclical in developing economies.³ By procyclical tax policy, we mean that the correlation between the cyclical components of tax rates and GDP is negative; that is, it reinforces the business cycle.

The evidence thus strongly suggests that, unlike industrial countries, developing countries have historically pursued procyclical fiscal policy both on the spending and the revenue side. During bad times, with capital flowing out and the economy mired in recession, policymakers have often compounded the problem by contracting fiscal policy.

Why has Fiscal Policy been Procyclical in Emerging Markets?

A natural question is why policymakers in developing countries exacerbate already pronounced boom-bust cycles by pursuing procyclical fiscal policy. This has been a puzzle in search of an explanation. The

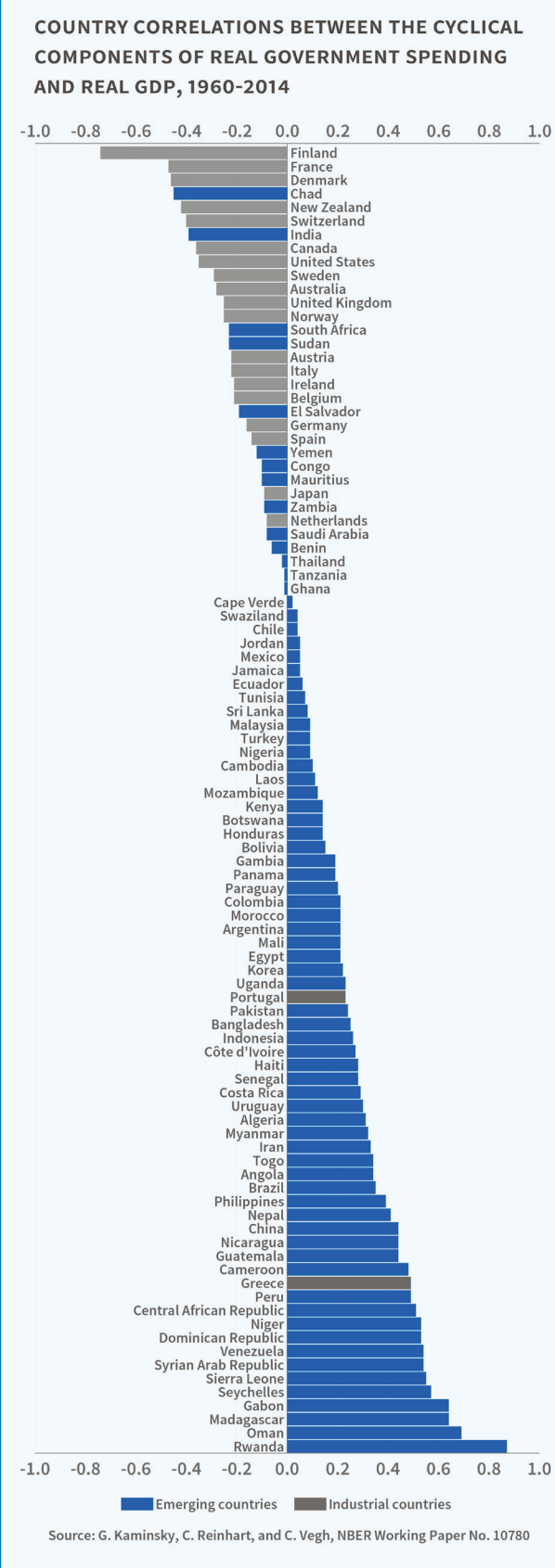


Figure 1

two most convincing explanations are arguably that they have limited access to international credit markets in bad times, and that political incentives and institutional weaknesses tend to encourage “excessive” public spending in good times.⁴

These two channels have in fact reinforced one another in bringing about procyclical fiscal policy. Emerging countries’ inability to borrow in bad times—often in conjunction with calls for “fiscal consolidation” from international creditors and organizations—has typically left them with little choice but to cut spending and raise taxes in the midst of severe recessions.

This situation has only been made worse by the tendency to save little, if any, during temporary booms fueled by surges in commodity prices and capital inflows.

Time and again, policymakers have insisted that good times were here to stay and spent accordingly. Spending proceeds that are temporary in nature as though they were permanent naturally forces governments to contract spending and raise taxes in bad times to satisfy the intertemporal budget constraint (or, alternatively, default). Put differently, the textbook recommendation of saving on sunny days for rainy days has been seldom, if ever, followed in emerging markets.

Graduation

Fortunately, fiscal policy is not an immutable phenomenon and

changes in market access and domestic financial institutions have enabled many developing countries over the last 15 years to switch from being procyclical to acyclical or even countercyclical, a phenomenon dubbed “graduation” in my work with Jeffrey Frankel and Vuletin.⁵

To see how fiscal policy cyclicality has evolved over time, Figure 2 shows, for each of the 96 countries in Figure 1, the correlation between real government spending and real GDP for the periods 1960–1999 and 2000–2014.⁶ By so doing, the plot is divided into four quadrants:

Established graduates (bottom-

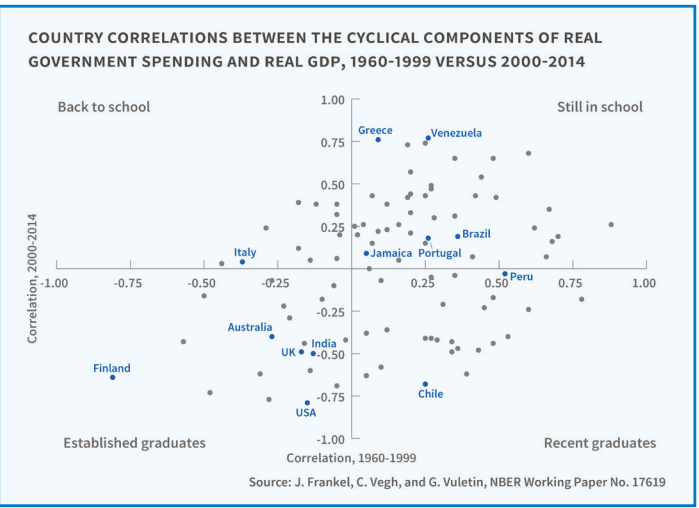


Figure 2

left): countries that have always been countercyclical. Not surprisingly, 74 percent of these countries are industrial, including the United States and the United Kingdom.

Still in school (top-right): countries that were originally procyclical and continue to be so. Not surprisingly, 95 percent of these countries are developing. A notable country in this group is Greece, which in fact has become much more procyclical since the year 2000, with the correlation increasing from 0.09 to 0.76.

Back to school (top-left): countries that were countercyclical but then turned procyclical.

Recent graduates (bottom-

right): countries that used to be procyclical but have become countercyclical over the last 15 years. Twenty one out of the 24 graduating countries (88 percent) are developing countries. The overall graduation rate for developing countries is 34 percent. As a result, the proportion of developing countries that are procyclical has fallen from 81 percent to 65 percent.

The poster-boy of the graduation movement has clearly been Chile. Between the two periods, Chile's correlation switched from 0.25 to -0.68. In fact, Chile's fiscal stimulus package of close to three percent of GDP in response to the global financial crisis of 2008–2009 was among the largest in the developing world.

The key to Chile's graduation was the adoption in the year 2001 of a fiscal rule that requires the government to run a structural balanced budget.⁷ The structural balance is computed by adjusting the actual balance for the effects on tax revenues of deviations of actual output from trend output and of deviations of copper prices from their long-run value. These trends are based on forecasts produced by an independent group of experts. By construction, a zero structural balance forces the fiscal authority to save in good times and allows it to spend in bad times.

Needless to say, fiscal rules are not a panacea and even Chile broke its own rule in 2009 when, as a result of the stimulus package in response to the global financial crisis, it ran a structural deficit of 1.2 percent. But clearly fiscal rules can be helpful as a guide to sound fiscal policy and, when based on the structural fiscal balance, in drawing the market's attention to the need to adjust for the business cycle when evaluating current fiscal policy.

Even more important perhaps is the overall improvement in the quality of fiscal institutions, including transparent budgetary procedures, fiscal accountability, and broad agreement on fiscal pri-

orities. A structural fiscal rule à la Chile should be viewed as an improvement in fiscal institutions. In fact, the empirical evidence clearly suggests that improvements in the quality of institutions lead to more countercyclical fiscal policy.⁸

How Effective is Countercyclical Fiscal Policy?

We have established that about a third of developing countries have graduated. This has brought the number of developing countries that have pursued

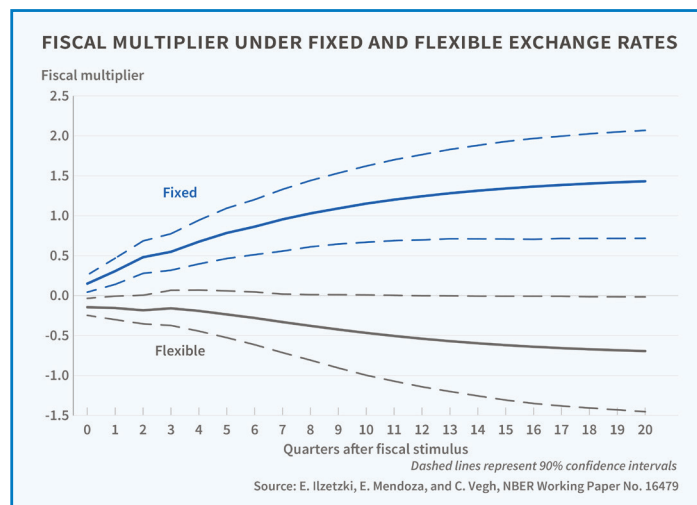


Figure 3

countercyclical fiscal policies over the last 15 years to 35 percent from just 19 percent in the period 1960–1999. The next question, then, is: How effective has countercyclical fiscal policy been?

The size of the fiscal multipliers has, of course, been a perennial question for the United States and, to a lesser extent, other industrial countries. Until quite recently, however, the evidence for emerging countries had, at best, been scant, due to lack of reliable quarterly data. Estimates based on annual data are dubious simply because the main identification mechanism—the Blanchard-Perotti assumption that government spending can react to GDP with only one period lag—strains credibility when applied to annual data.

Ethan Ilzetzki, Enrique Mendoza, and I put together a novel quarterly dataset for government spending for 44

countries (20 industrial and 24 developing) from the first quarter of 1960 to the fourth quarter of 2007. Often “quarterly data” is simply interpolated from annual data, so we went to great lengths to ensure that only data originally collected on a quarterly basis was included.⁹ Perhaps our most important finding is that the size of fiscal multipliers seems to depend critically on country characteristics such as exchange rate regime and level of debt. In particular—as illustrated in Figure 3—we find that the fiscal multiplier is relatively large in economies operating under fixed (or, more generally, predetermined) exchange rates, but is indistinguishable from zero under flexible exchange rates. We also show that, on impact, the fiscal multiplier is zero in economies with debt exceeding 60 percent of GDP, presumably reflecting the belief in global capital markets that any fiscal expansion is simply unsustainable.

As Alan Auerbach and Yuriy Gorodnichenko have shown for OECD countries, another critical determinant of the size of the fiscal multiplier is the stage of the business cycle, with the fiscal multiplier being larger in recessions than in booms.¹⁰ Moreover, in a study on OECD countries, Daniel Riera-Crichton, Vuletin, and I have shown that whether government spending is increasing or decreasing matters as well. We find that the linear (or single) multiplier after four six-month semesters is 0.40, rises to 1.25 if computed for recessions (in line with Auerbach and Gorodnichenko), and to 2.3 when computed for recessions and government spending going up. Intuitively, the bias arises because government spending has a larger effect on output when it increases than when it decreases and, even in OECD countries, there are many instances in which government spending falls in recessions, which biases downward the “true” multiplier.¹¹

Since emerging markets in particu-

lar face repeated crises, it is also important to look at fiscal policy responses during crises—as opposed to cyclical characteristics over the regular business cycle—and see how they have evolved. Vuletin and I have looked at fiscal policy in the midst of crises for seven Latin American countries accounting for more than 90 percent of the region's GDP over the last 40 years and concluded that countries such as Chile and Mexico have been able to switch from procyclical to countercyclical fiscal policy responses.¹² But the picture is uneven, as countries like Argentina, Uruguay, and Venezuela continue to show a pronounced tendency to contract government spending sharply in recessions.

Eurozone: The New Latin America?

Vuletin and I further show that the fiscal policy response in recent recessions in the eurozone (still ongoing, of course, for countries such as Greece) has been eerily reminiscent of the pervasive response in Latin America several decades ago. Figure 4 shows the correlation between the cyclical components of government spending and GDP from the beginning of the recession to the first quarter of 2013 for 10 eurozone countries. We see that four countries (Greece, Ireland, Italy, and Portugal) have been procyclical, with Greece, not surprisingly, the most procyclical of all.¹³ We further show that contractionary fiscal policy during bad times intensified the fall in GDP, and worsened social indicators.

Final Remarks

We should note, in closing, that monetary policy has not escaped the procyclical trap. In fact, over the period 1960–2009, about 40 percent of developing countries pursued pro-

cyclical monetary policy.¹⁴ When the sample is divided before and after the year 2000, about 35 percent of developing countries are found to have graduated to countercyclical monetary policy.

The source of procyclicality in monetary policy is the need, in the minds of many policymakers in emerging markets, to defend the domestic currency in bad times by raising interest rates. Policymakers often fear, with some justification, that sudden currency depreciation will increase inflation, exacerbate capital flight, and render dollar-denominated debt of both public and private agents more oner-

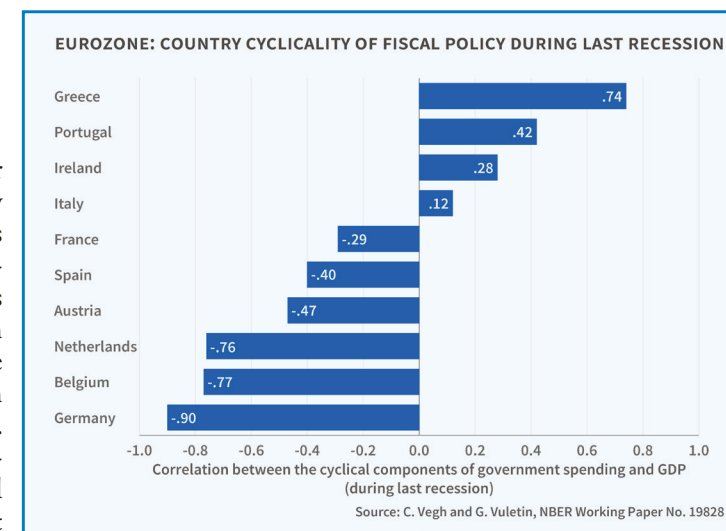


Figure 4

ous. But whatever the merits, defending the currency in bad times imparts an unavoidable procyclicality to monetary policy.

In sum, while progress has been made in the conduct of macroeconomic policies in emerging markets, many continue to pursue procyclical monetary and fiscal policies. By aggravating already volatile boom-bust cycles, such policies have negative effects on output and social indicators. From a macroeconomic point of view, this is arguably the main challenge faced by developing countries as another cycle of capital outflows and low commodity prices works its way through. Further research in this area may help in identifying factors that

may enable more developing countries to adopt countercyclical macroeconomic policies.

¹ I use the terms “emerging markets” and “developing countries” interchangeably, since the prototypical developing country that I have in mind has fairly standard fiscal institutions and is reasonably integrated into world capital markets.

² Return to text

³ Updated from C. Reinhart, G. Kaminsky, and C. Vegh, “When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies,”

NBER Working Paper No. 10780, September 2004, and in M. Gertler and K. Rogoff, eds., NBER Macroeconomics Annual 2004, Cambridge, Massachusetts: MIT Press, pp. 11–53.

⁴ Return to text

⁵ C. Vegh and G. Vuletin, “How Is Tax Policy Conducted over the Business Cycle?” NBER Working Paper No. 17753, January 2012, and American Economic Journal: Economic Policy, Vol. 7(3), pp. 327–70.

⁶ Return to text

⁷ On the former explanation, see A. Riascos and C. Vegh, “Procyclical Government Spending in Developing Countries: The Role of Capital Market Imperfections” mimeo, University of California, Los Angeles, 2003; G. Cuadra, J. Sanchez, and H. Sapriza, “Fiscal Policy and Default Risk in Emerging Markets,” Review of Economic Dynamics, 13(2), 2010, pp. 452–69, and S. Bauducco and F. Caprioli, “Optimal Fiscal Policy in a Small Open Economy with Limited Commitment,” Journal of International Economics, 93(2), 2014, pp. 302–15. On the latter explanation, see A. Tornell and P. Lane, “The Voracity Effect,” American Economic Review, 89(1),

1999, pp. 22–46, E. Talvi and C. Vegh, “Tax Base Variability and Procyclicality of Fiscal Policy,” NBER Working Paper No. 7499, January 2000, and Journal of Development Economics, 78(1), 2005, pp. 156–90, and A. Alesina and G. Tabellini, “Why is Fiscal Policy Often Procyclical?” NBER Working Paper No. 11600, September 2005, and Journal of the European Economic Association, 6(5), 2008, pp. 1006–36. [Return to text](#)

⁵ J. Frankel, C. Vegh, and G. Vuletin, “On Graduation from Fiscal Procyclicality,” NBER Working Paper No. 17619, November 2011, and Journal of Development Economics, 100(1), 2013, pp. 32–47. [Return to text](#)

⁶ While 2000 is certainly an arbitrary point to break the sample, minor variations do not make a difference. [Return to text](#)

⁷ For a detailed discussion of the Chilean case, see J. Frankel, “A Solution to Fiscal Procyclicality: The Structural Budget Institutions Pioneered by Chile,” NBER Working Paper No. 16945, April 2011, and Journal Economía Chilena, Central Bank of Chile, 14(2),

2011, pp. 39–78.

[Return to text](#)

⁸ J. Frankel, C. Vegh, and G. Vuletin, “On Graduation from Fiscal Procyclicality,” NBER Working Paper No. 17619, November 2011, and Journal of Development Economics, 100(1), 2013, pp. 32–47. [Return to text](#)

⁹ E. Ilzetzki, E. Mendoza, and C. Vegh, “How Big (Small?) Are Fiscal Multipliers?” NBER Working Paper No. 16479, October 2010, and Journal of Monetary Economics, 60(2), 2013, pp. 239–54. [Return to text](#)

¹⁰ A. Auerbach and Y. Gorodnichenko, “Fiscal Multipliers in Recession and Expansion,” NBER Working Paper No. 17447, September 2011, and in A. Alesina and F. Giavazzi, eds., Fiscal Policy after the Financial Crisis, Chicago, Illinois: University of Chicago Press, 2013, pp. 63–98, [Return to text](#)

¹¹ D. Riera-Crichton, C. Vegh, and G. Vuletin, “Procyclical and Countercyclical Fiscal Multipliers: Evidence from OECD Countries,” NBER Working Paper No. 20533,

September 2014, and Journal of International Money and Finance, Vol. 52(C), 2015, pp. 15–31. [Return to text](#)

[Return to text](#)

¹² C. Vegh and G. Vuletin, “The Road to Redemption: Policy Response to Crises in Latin America,” NBER Working Paper No. 20675, November 2014, and IMF Economic Review, Vol. 62(4), 2014, pp. 526–68. [Return to text](#)

¹³ Recall from Figure 1 that, historically, Greece and Portugal have been the only two industrial countries with procyclical government spending. Further, Figure 2 shows these two countries as “still in school.” [Return to text](#)

¹⁴ C. Vegh and G. Vuletin, “Overcoming the Fear of Free Falling: Monetary Policy Graduation in Emerging Markets,” NBER Working Paper no. 18175, June 2012, and in D. Evanoff, C. Holthausen, G. C. Kaufman, and M. Kremer, eds., The Role of Central Banks in Financial Stability: How Has It Changed? World Scientific Studies in International Economics, Book 30, Singapore: World Scientific Publishing, 2013). [Return to text](#)

Energy and Environmental Technology

David Popp

Developing new and improved clean-energy technologies is an important part of any strategy to combat global climate change. For example, generation of electricity and heat is the largest source of carbon emissions, accounting for 42 percent of carbon emissions worldwide in 2012.¹ Meeting the climate policy goals currently under consideration, such as European Union discussions to reduce emissions by 40 percent below 1990 levels by 2030 or the U.S. Clean Power Plan goal of reducing emissions from the electricity sector by 32 percent by 2030, will not be possible without replacing much of the current fossil fuels-based electric generating capacity with alternative, carbon-free energy sources.

My research focuses on the role of technology for both reducing energy consumption and providing clean energy. This work includes three main themes: empirical studies of the relationship between environmental policy and innovation, policy simulations and empirical work on ways environmental and science policies may promote energy innovation, and empirical studies of environmental technology transfer. Much of my research uses patent data to track energy innovation, thereby building on the pioneering efforts of NBER researchers such as Adam Jaffe and Bronwyn Hall, whose early forays into patent data made these data accessible to a new generation of researchers.²

Empirical Studies of Induced Innovation

My empirical work on policy-induced technological change seeks to understand how policy affects the development of new environmentally-friendly technologies. I use patent data to track changes in environmental technologies, such as pollution control devices, alternative

energy sources, and technologies designed to improve energy efficiency. With this research, I aim to better inform researchers who simulate the effects of long-term policies such as climate change policy and to contribute to the broader discussion of environmental policy design.

Early work on energy innovation focused on the link between energy prices and innovation. In a 2002 paper, I use patent data to identify innovation on 11 different alternative energy and energy efficiency technologies.³ In the long run, a 10 percent increase in energy prices leads to a 3.5 percent rise in the number of energy patents. Most of the response occurs quickly after a change in energy prices, with a mean lag response time between energy prices and patenting activity of 3.71 years. My estimates controlled for the quality of knowledge available to an inventor as well as other factors influencing R&D, such as government support for energy research and technology-specific demand shifters.

Subsequent work turned attention to the incentives offered by various policy instruments, showing that the types of incentives matter. In a 2003 paper, I combine plant-level data on flue gas desulfurization (FGD) units installed at U.S. coal-fired power plants with patents pertaining to FGD devices to assess the impact of innovation before and after the 1990 Clean Air Act (CAA),⁴ which instituted permit trading for sulfur dioxide (SO₂). Before this act, new plants were required to install flue gas desulfurization capacity capable of removing 90 percent of SO₂. As a result, the innovations that occurred before the 1990 CAA focused on reducing the cost of FGD units, rather than on improving their environmental performance. After passage of the act, the focus of innovation became improving the ability of FGD units to remove SO₂ from a plant’s emissions.

While economists often favor using



David Popp is a research associate in the NBER’s Programs on Environmental and Energy Economics and Productivity, Innovation, and Entrepreneurship. He is professor of public administration and international affairs at the Maxwell School of Syracuse University, where he is also a senior research associate in the Center for Policy Research.

Popp studies the links between environmental policy and innovation, with a particular focus on how environmental and energy policies shape the development of new technologies for combating climate change. His research often makes use of patent data to trace development of green technologies, exploring how policy and prices shape innovation. Other recent work considers the potential of technology for climate adaptation by studying how innovation responds to natural disasters.

Popp is a co-editor for two journals, the *Journal of the Association of Environmental and Resource Economists* and *Environmental and Resource Economics*. He currently serves on the advisory committee of the Green Growth Knowledge Platform. Popp received a B.A. in political economy from Williams College in 1992, and a Ph.D. in economics from Yale University in 1997. He lives in Manlius, NY with his wife, Deirdre, and two teenage children. He enjoys baseball, hiking, snowshoeing, and attending his children’s many musical and theater performances.

broad-based policies, such as a carbon tax or tradable permits, to address externalities, policy makers often use more narrowly focused options. In renewable energy, popular options include feed-in tariffs, in which governments guarantee a fixed price above prevailing market prices for energy from renewable sources, and renewable portfolio standards that require a minimum percentage of electricity be generated using renewable sources. While renewable portfolio standards leave it to market forces to decide which renewable sources are used to meet the target, feed-in tariffs may target specific energy sources. For example, at their peak, feed-in tariffs for solar energy in Germany were over seven times higher than the feed-in tariffs for wind energy.⁵

In a 2010 publication, Nick Johnstone, Ivan Haščić, and I collect data on renewable energy policies and patents across countries to assess the effect of various renewable energy policies on innovation.⁶ Figure 1 shows that patenting activity has increased rapidly over the past decade as these policies have become more prevalent.⁷ Moreover, different instruments end up promoting innovation on different types of renewable energy. Quantity-based policies, such as renewable portfolio standards, favor development of wind energy. Of the various alternative energy technologies, wind has the lowest cost and is closest to being competitive with traditional energy sources. As such, when faced with a mandate to provide alternative energy, firms focus their innovative efforts on the technology that is closest to market. In contrast, direct investment incentives are effective in supporting innovation in solar and waste-to-energy technologies, which are further from being competitive with traditional energy technologies and thus need the guaranteed revenue from a feed-in tariff to be competitive.

These results suggest particular challenges to policy makers who wish to encourage long-run innovation for technologies that have yet to near market competitiveness. Economists generally

recommend using broad-based environmental policies, such as emission fees, and letting the market “pick winners.” This leads to lower compliance costs in the short-run, as firms choose the most effective short-term strategy. But because firms will focus on those technologies closest to market, broad-based market policy incentives do not provide as much incentive

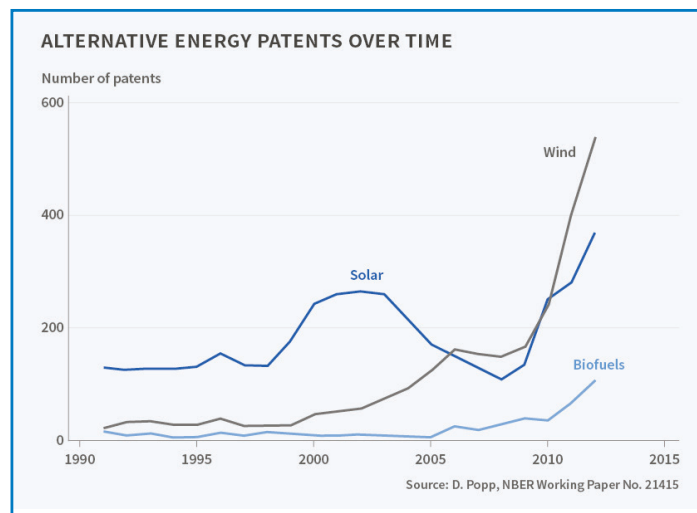


Figure 1

for research on longer-term needs. There may be a complementary role for policies such as direct R&D subsidies to promote development of clean technologies further from the market.

The Roles of Environmental and Science Policy

Understanding the role of environmental policy on technological change involves the study of two market failures. Because pollution is not priced by the market, firms and consumers have no incentive to reduce emissions without policy intervention. Thus, the market for technologies that reduce emissions will be limited without policy interventions that alter these incentives. At the same time, the public goods nature of knowledge leads to spillovers that benefit the public as a whole, but not the innovator. As a result, potentially innovative private firms and individuals may not have incentives to provide the socially optimal level of research activity.

The evidence suggests that science policy plays a supporting role, but that

environmental policies are most important for promoting new green technologies. Policies must be in place not only to encourage the development of cleaner technologies, but also to encourage the adoption of existing clean technologies. In a 2006 paper using ENTICE, a model of the global economy that links economic activity to carbon emissions and allows research in the energy sector to respond to policy changes,⁸ I compare long-run welfare gains from both an optimally-designed carbon tax (one equating the marginal benefits of carbon reductions with the marginal costs of such reductions) and optimally designed R&D subsidies.⁹ While combining both policies yields the largest welfare gain, a policy using only the carbon tax achieves 95 percent of the welfare gains of the combined policy. In contrast, a policy using only the optimal R&D subsidy attains just

11 percent of the welfare gains of the combined policy. This finding is confirmed by other researchers simulating U.S. and global energy policies, showing that policies directly targeting environmental damages from electricity generation better promote both emissions reductions and innovation.¹⁰ However, carbon prices and R&D subsidies can complement each other if clean technologies are less developed than existing dirty technologies. In such a case, initial R&D subsidies can close the gap between clean and dirty technologies, reducing the level of carbon taxes needed in future years to reduce greenhouse gas emissions.¹¹

To better understand the potential for future public energy R&D spending, in recent work, I use scientific publications to evaluate the effectiveness of public energy R&D expenditures.¹² Combining data on scientific publications for alternative energy technologies with data on government R&D support helps isolate the effect of public R&D and sheds light on the process through which public R&D helps develop scientific knowledge. Interestingly,

unlike work on private sector innovation, other factors such as energy prices and policy have little effect on alternative energy publications. Thus, current government energy R&D efforts appear to support novel research, rather than crowding out work that would otherwise be done. I find little evidence for diminishing returns to energy R&D at current funding levels. However, patience is important for evaluating public investment in energy R&D. The ultimate goal of government energy R&D funding is not a publication, but rather a new technology. Thus I use citations these articles receive from future patents to assess the impact of basic science on new technologies. Figure 2 traces the time path of the increased citation probability for publications generated from an additional \$1 million in R&D funding being cited by a patent. It may take up to a decade to realize the full effect of public energy R&D funding on publications, and even longer until these publications are cited in new energy patents. Because of the lags between initial funding and publication, there is little increase in the cumulative probability of a citation resulting from new R&D funding until approximately six years after the funding, with the effect not leveling out until almost 18 years afterwards. Allowing for a five year window for processing patents, this suggests that new patent applications citing these publications begin appearing about one year after funding and continue for 13 years.

International Technology Transfer

A third stream of my research focuses on the international dimensions of environmental technological change. This work began with a 2006 study of air pollution control equipment in the United States, Japan, and Germany.¹³ Whereas the United States was an early adopter of stringent sulfur dioxide (SO₂) standards, both Japan and Germany introduced stringent

nitrogen oxide (NO_x) standards much earlier than the U.S. Using patent data from all three countries, I find that innovation responds to policy even in countries that adopt regulations late, suggesting that these countries do not simply take advantage of technologies “off the shelf” that have been developed elsewhere. Instead, late adopters often undertake adaptive R&D to fit previously developed technology to local markets. As evidence, I show that these later patents are more likely to cite earlier foreign rather than domestic inventions.

My more recent work on international environmental technological change explores how technology can help developing countries address environmental issues. As emerging and developing countries con-

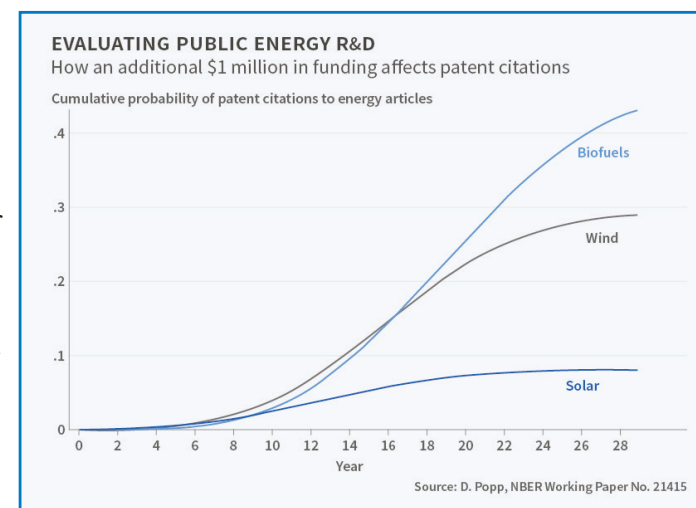


Figure 2

tinue to grow, the environmental impact of their economies increases. Access to clean technologies may mitigate this impact. Mary Lovely and I flip the usual question of policy’s effect on regulation around, asking instead how technology affects regulation.¹⁴ Because most pollution control technologies are first developed in industrialized countries, and because environmental regulations are needed to provide incentives to adopt these technologies, we focus on the adoption of environmental regulation as the first step in the international diffusion of environmental technologies. Using a hazard model, we study the adoption of environmental regulations for coal-fired power plants in a set of 39 devel-

oped and developing countries. While the adoption of pollution control technologies within a country responds quickly to environmental regulation, we find that adoption of the regulations themselves follows the typical S-shaped pattern noted in studies of technology diffusion. Access to technology is an important factor influencing regulatory adoption. As pollution control technologies improve, the costs of abatement, and thus the costs of adopting environmental regulation, fall. Thus, countries adopt environmental regulation at lower levels of per capita income over time. Moreover, countries that are more open to international trade have better access to these technologies, and are thus more likely to adopt regulation. While openness to world markets may also work against passage of environmental regulation by increasing competition and making it harder for local firms to pass along cost increases to consumers, we find that the access to technology effect dominates once the level of abatement technology reaches a critical level, which in our sample occurs during the early 1990s.

International climate agreements also foster access to technology. The Clean Development Mechanism (CDM) enables entities in developed countries to sponsor emission-reducing projects in developing countries. A secondary goal of the CDM is to help developing countries achieve sustainable development through the transfer of climate-friendly technologies from developed countries. If the technologies transferred via CDM projects lead to subsequent diffusions within the country, it will reduce the future abatement costs of carbon emissions and drive technological change in the energy sector of the recipient country.¹⁵ Tian Tang and I use data on wind turbine projects in China sponsored through the Clean Development Mechanism to ask whether these projects improve the technical capacity of wind projects in China.¹⁶ Using a learning curve model allowing for spatially correlated errors, we find that project costs

decrease and project efficiency (measured by the capacity factor, which compares a wind farm's actual annual electricity generation to its potential annual output if the wind farm operates at its full capacity) increases with the previous experience of the project developer. The greatest efficiency gains come from repeated interactions between local project developers and foreign wind turbine manufacturers. That these improvements occur for the capacity factor as well as for cost reductions suggest that technology transfer occurs, and that the results are more than reduced transaction costs and lower contract prices for repeat customers.

Conclusion

While the papers cited here highlight the important connections between environmental policy and technological change, much work remains to fully understand the potential for technology to aid in both the mitigation of and adaptation to climate change. In addition to the research questions addressed here, the role of technology in climate change adaptation¹⁷ and the behavioral influences of clean technology adoption,¹⁸ are important areas for future work.

¹ International Energy Agency (IEA) 2014, "CO₂ Emissions from Fuel Combustion: Highlights," Paris, France: OECD/IEA, 2014.

[Return to text](#)

² B. H. Hall, A. B. Jaffe, and M. Trajtenberg, "The NBER Patent Citation Data File: Lessons, Insights and Methodological Tools," NBER Working Paper No. 8498, October 2001.

[Return to text](#)

³ D. Popp, "Induced Innovation and Energy Prices," NBER Working Paper No. 8284, May 2001, and the American Economics Review, 92(1), 2002, pp. 160–80.

[Return to text](#)

⁴ D. Popp, "Pollution Control Innovations and the Clean Air Act of 1990," NBER Working Paper No. 8593, November 2001, and Journal of Policy Analysis and Management, 22(4), 2003, pp. 641–60.

[Return to text](#)

⁵ D. Popp, "Using Scientific Publications to Evaluate Government R&D Spending: The Case of Energy," NBER Working Paper No. 21415, July 2015.

[Return to text](#)

⁶ OECD-EPAU, Renewable Energy Policy Dataset, version February 2013. Compiled by the OECD Environment Directorate's Empirical Policy Analysis Unit (N. Johnstone, I. Haščič, M. Cárdenas Rodríguez, T. Duclert) in collaboration with an ad hoc research consortium (A. de la Tour, G. Shrimali, M. Hervé-Mignucci, T. Grau, E. Reiter, W. Dong, I. Azevedo, N. Horner, J. Noailly, R. Smeets, K. Sahdev, S. Witthöft, Y. Yang, T. Dubbeling.)

[Return to text](#)

⁷ N. Johnstone, I. Haščič, and D. Popp, "Renewable Energy Policies and Technological Innovation: Evidence Based on Patent Counts," NBER Working Paper No. 13760, January 2008, and Environmental and Resource Economics, 45(1), 2010, pp. 133–55.

[Return to text](#)

⁸ D. Popp, "ENTICE: Endogenous Technological Change in the DICE Model of Global Warming," NBER Working Paper No. 9762, June 2003, and Journal of Environmental Economics and Management, 48(1), 2004, pp. 742–68; W. D. Nordhaus, Managing the Global Commons: The Economics of the Greenhouse Effect, Cambridge, MA: MIT Press, Cambridge, MA, 1994.

[Return to text](#)

⁹ D. Popp, "R&D Subsidies and Climate Policy: Is there a 'Free Lunch'?" NBER Working Paper No. 10880, November 2004, and Climatic Change, 77(3–4), 2006, pp. 311–41.

[Return to text](#)

¹⁰ C. Fischer and R. G. Newell, "Environmental and Technology Policies for Climate Mitigation," Journal of Environmental Economics and Management, 55(2), 2008, pp. 142–62.

[Return to text](#)

¹¹ D. Acemoglu, U. Akcigit, D. Hanley, W. Kerr, "Transition to Clean Technology," NBER Working Paper No. 20743, December 2014, and forthcoming in the Journal of Political Economy.

[Return to text](#)

¹² D. Popp, "Using Scientific Publications to Evaluate Government R&D Spending: The Case of Energy," NBER Working Paper No. 21415, July 2015.

[Return to text](#)

¹³ D. Popp, "International Innovation and Diffusion of Air Pollution Control Technologies: The Effects of NO_x and SO₂ Regulation in the U.S., Japan, and Germany," NBER Working Paper No. 10643, July 2004 and the Journal of Environmental Economics and Management, 61(1), 2011, pp. 16–35.

[Return to text](#)

¹⁴ M. Lovely and D. Popp, "Trade, Technology, and the Environment: Does Access to Technology Promote Environmental Regulation," NBER Working Paper No. 14286, August 2008, and the Journal of Environmental Economics and Management, 51(1), 2006, pp. 46–71.

[Return to text](#)

¹⁵ D. Popp, "International Technology Transfer, Climate Change, and the Clean Development Mechanism," Review of Environmental Economics and Policy, 5(1), 2011, pp. 131–52.

[Return to text](#)

¹⁶ T. Tang and D. Popp, "The Learning Process and Technological Change in Wind Power: Evidence from China's CDM Wind Projects," NBER Working Paper No. 19921, February 2014, and forthcoming in the Journal of Policy Analysis and Management.

[Return to text](#)

¹⁷ Q. Miao and D. Popp, "Necessity as the Mother of Invention: Innovative Responses to Natural Disasters," NBER Working Paper No. 19223, July 2013, and the Journal of Environmental Economics and Management, 68(2), 2014, pp. 280–95.

[Return to text](#)

¹⁸ H. Allcott and M. Greenstone, "Is There an Energy Efficiency Gap?" NBER Working Paper No. 17766, January 2012, and Journal of Economic Perspectives, 26(1), 2012, pp. 3–28; T. D. Gerarden, R. G. Newell, and R. N. Stavins, "Assessing the Energy-Efficiency Gap," NBER Working Paper No. 20904, January 2015.

[Return to text](#)

Recessions and Retirement: How Stock Market and Labor Market Fluctuations Affect Older Workers

Courtney Coile and Phillip B. Levine

The sharp drop in equity values at the beginning of the recent financial crisis led to widespread concern about the effect of the crisis on retirement security. With defined contribution pension plans largely having replaced defined benefit plans for U.S. workers,¹ millions of individuals experienced deep declines in the value of their retirement savings. It was widely predicted that workers would delay retirement to make up for these losses, as newspaper headlines proclaimed "Economic Crisis Scrambles Retirement Math" and "Will You Retire? New Economic Realities Keep More Americans in the Workforce Longer."

The effect of the sharp rise in the unemployment rate on retirement was a less-publicized element of the crisis. Relative to earlier periods, workers who lost jobs experienced longer spells of unemployment and had a lower probability of finding new jobs.² Older workers who experienced job loss and difficulty finding work may have retired earlier than planned. Indeed, the Social Security Administration reported in 2009 that new retired worker benefit claims rose by 10 percent more than expected during 2008 and officials surmised that the weak economy was the cause.³

The potential effects of the crisis on retirement are more complex than suggested by the headlines. In a series of studies, we have investigated the effect of stock and labor market fluctuations on retirement decisions and retiree well-being in the United States. This summary reviews our exploration of whether retirement rates are higher when stock markets or labor markets are weak. We also describe our analyses of whether recessions have long-term impacts on retiree income and health.

Does the Stock Market Affect Retirement?

In order for stock market fluctuations to affect retirement decisions, several conditions must be met. First, since equity investors presumably expect a positive rate of return and understand that daily prices are volatile, there must be asset price movements representing larger- or smaller-than-expected returns. Second, workers must have enough stock assets that these price changes constitute meaningful wealth shocks. Third, retirement rates must be sensitive to fluctuations in wealth.

The stock market has experienced unusual equity returns over the past two decades, with two boom-bust cycles, culminating in the dot-com crash of 2000–2002 and the more recent financial crisis. Whether workers have substantial equity investments is a different matter. In one analysis, we report that 58 percent of U.S. households with a head aged 55 to 64 held stock assets in 2007, just before the recent crisis.⁴ The most common form of ownership is through retirement accounts (50 percent of households), though some households own stocks directly (21 percent) or in mutual funds outside of retirement accounts (14 percent). Median stock assets are \$78,000 among stockholders. Asset ownership and values are strongly correlated with education. Some 78 percent of households headed by a college graduate own stock, and the median holding is \$125,000, while just 21 percent of households headed by high school dropouts hold stock, with a median holding of \$10,000. Overall, nearly six in 10 of near-retirement-age households have less than \$25,000 in stock assets and only one in eight have assets over \$250,000.



Courtney Coile is a research associate in the NBER's Aging Program and editor of the NBER Bulletin on Aging and Health. She is a professor of economics at Wellesley College, where she directs the Knapp Social Science Center and has taught since 2000.

Much of Coile's research focuses on the economics of retirement. She is a long-time participant in the NBER's Social Security and Retirement Around the World project and is the co-author of *Reconsidering Retirement: How Losses and Layoffs Affect Older Workers*. She recently served on the National Academy of Sciences' Committee on the Long-Run Macro-Economic Effects of the Aging U.S. Population (Phase II) and is an editor for the *Journal of Pension Economics and Finance*.

Coile studied economics as an undergraduate at Harvard University and first worked at the NBER as a research assistant in those years. She earned her Ph.D. in economics from MIT in 1999.

Coile lives in the Boston suburbs with her husband and two school-age children. In her free time, she shares her love of baseball, music, and food with her family and is still working on getting her children to share her love of running and hiking.



Phil Levine is the Katharine Coman and A. Barton Hepburn professor of economics at Wellesley College, a research associate at the National Bureau of Economic Research, and a member of the National Academy of Social Insurance. He also has served as a senior economist at the White House Council of Economic Advisers.

Levine received a B.S. degree with honors from Cornell University in 1985 and a Ph.D. from Princeton University in 1990. He has been a member of the faculty at Wellesley College since 1991.

His research has largely been devoted to empirical examinations of the impact of social policy on individual behavior. Along with many publications in academic journals and edited volumes, he is the author of *Sex and Consequences: Abortion, Public Policy, and the Economics of Fertility*, coauthor of *Reconsidering Retirement: How Losses and Layoffs Affect Older Workers*, and co-editor of *Targeting Investments in Children: Fighting Poverty When Resources are Limited*.

Levine lives in Newton with his wife, Heidi. His two college-age children, Jake and Noah, currently attend Brown University and Middlebury College. Outside of work, he is a huge baseball fan and particularly enjoys watching both of his sons play.

If workers respond to financial wealth shocks, the stark differences in stock ownership by education suggest that the impact of stock market returns on retirement will vary by education. We asked whether college graduates between the ages of 55 and 70 are more sensitive to short-term (single year) stock market fluctuations when making retirement decisions than less educated individuals.⁵ When we analyzed data from the Current Population Survey, 1980–2002, and the Health and Retirement Study, 1992–2002, we found no evidence of this. This could be due to the small number of individuals who experienced large, unexpected wealth gains or losses during this period, or to the wealth effect being relatively small. We subsequently revisited this question with more years of data and were able to identify circumstances in which retirement behavior is responsive to stock market fluctuations.⁶ Specifically, we found that long-term market fluctuations, as measured by the percent change in the S&P 500 Index over a five- or 10-year period, affect the retirement decisions of college-educated workers aged 62 to 69. [See Figure 1] We found no statistically significant effect of short-term fluctuations on retirement behavior, nor any effect of market fluctuations on younger workers or workers with less education. The magnitude of the response is economically meaningful—a one-standard-deviation (77 percentage point) increase in the 10-year return increases the retirement rate of college graduates by 1.5 points, or 12 percent relative to the mean.

Overall, the empirical findings suggest that while there are workers whose retirements are slowed or accelerated when they experience unexpected changes in stock market returns, the

number of workers who experience substantial wealth shocks is relatively small and the magnitude of the aggregate retirement response is likely modest.

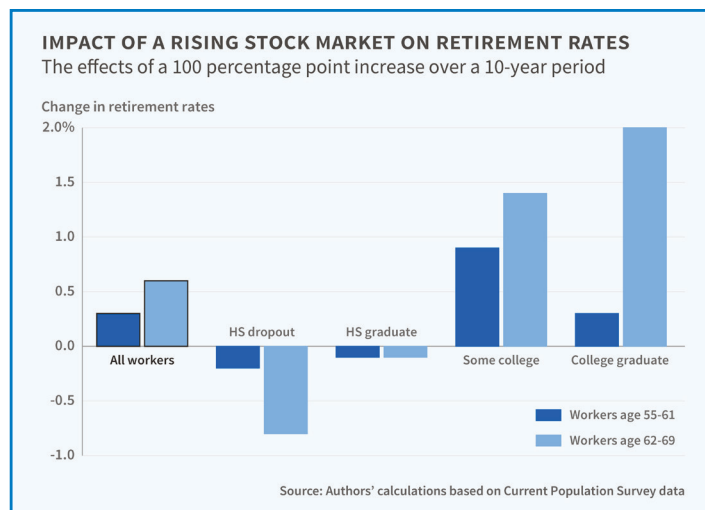


Figure 1

Therefore, it is unlikely that changes in labor force participation in the overall population that coincide with stock market upswings or downturns are retirement responses to the market.

Does the Labor Market Affect Retirement?

The Great Recession has equaled or surpassed recessions of the 1970s and 1980s in terms of the steep rise in unemployment and slow pace of recovery. While it seems logical that such an event could affect retirement behavior, the extensive retirement literature offers surprisingly little guidance on this point. We have explored whether retirement is cyclically sensitive, using 25 years of Current Population Survey data.⁷ Unlike an analysis of the stock market, a study of the labor market can take advantage of differences in market conditions across geographic locations as well as time. We use standard panel data methods to account for longstanding differences across states and national trends over time in retirement behavior, essentially asking whether workers retire earlier when the labor market is weaker in their geographic area after all other differences are taken into account.

Our central finding is that retirement is cyclically sensitive—a five-point increase in the unemployment rate raises the probability of retirement by about one percentage point, or eight percent relative to the mean annual retirement rate of 13 percent. Moreover, the labor supply response to unemployment emerges at age 61, as workers approach the Social Security early retirement age of 62; retirement is not cyclical for workers age 55 to 60.

In subsequent work, we explore how the cyclical sensitivity of retirement varies with education.⁸ We find that workers with a high school degree experience the largest effect—a five point increase in the unemployment rate raises their probability of retirement by 1.8 percentage points, or nearly 20 percent relative to the mean. [See Figure 2] The effects for other education groups are positive but not statistically significant. In explaining these results, we surmise that high school dropouts may be most likely to lose a job during a recession, but also are likely to retire at early ages regardless of market conditions due to poor health and the inability to continue working at physically demanding jobs, while more skilled workers may have a relatively low risk of unemployment during a recession. We think that “high school graduates may have the right combination of desire to continue working along with a higher risk of unemployment and difficulty in finding new work, so a recession may lead many of them to retire involuntarily.”⁹ In short, the results suggest that retirement is cyclically sensitive, particularly for less-educated workers over the age of 61.

Do Stock and Labor Markets Affect Retiree Well-Being?

Finally, we turn to the question of whether market fluctuations have long-term effects on retiree well-being. Here our focus is on labor market conditions, as the stock market has rebounded from its 2009 low to values near or above pre-crash levels, while the weakness in the labor market has been extensive and persistent. A spell of late-career unemployment can have long-term consequences for an individual even after the labor market rebounds. If an individual fails to find new employment, he or she may claim Social Security benefits when first available at age 62, poten-

encing a recession in the years leading up to retirement lowers retiree income. The finding is stronger for Social Security income, for less-educated workers, and for labor market conditions experienced at or after age 62.

Of course, income is not the only important measure of well-being. With coauthor Robin McKnight, we examined the impact of labor market conditions around the time of retirement on longevity.¹¹ Individuals who experience a late-career layoff may face years of reduced employment and earnings before retiring when they reach Social Security eligibility. They may also experience lost health insurance and reduced access to health care until reaching age 65, when Medicare becomes available. Using 30 years of data from the National Vital Statistics System, we find that experiencing a recession in one’s late 50s leads to a reduction in longevity. We also establish that reduced employment, insurance coverage, and health care access are plausible mechanisms for this effect.

Conclusion

Market fluctuations affect retirement, but the story is nuanced— weaker long-term stock returns lead more-skilled workers to delay retirement, while higher unemployment rates lead less-skilled workers to retire earlier. In one study, we estimated that if the unusual stock and labor market conditions experienced during the most recent downturn were to gradually return to normal over a five-year period, there would be a net increase in retirements of about 120,000, or 1.2 percent relative to the estimated 10 million workers retiring during this period.¹² In fact, the stock market has rebounded more quickly and the labor market more slowly, so the actual net increase in retirements is likely larger. Moreover, it is less-skilled workers who bear the brunt of the labor market effects of the crisis, and there appear to be negative long-term effects of late-career unemployment on income and health for

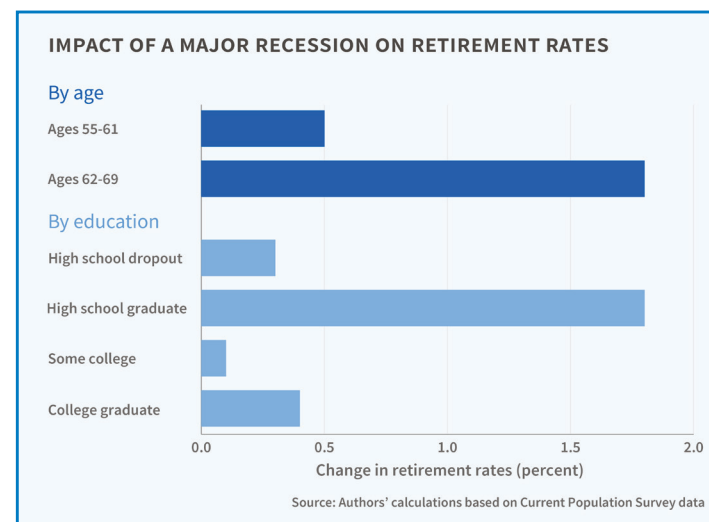


Figure 2

tially years earlier than planned. As benefits are subject to actuarial adjustment, earlier claiming results in permanently lower monthly income.

We use data from the American Community Survey to look at the relationship between the labor market conditions around the time of 62-year-olds’ retirements and those individuals’ income in their 70s.¹⁰ As in earlier work, we essentially treat labor market conditions at retirement as a random draw, asking whether individuals who approach retirement during a recession have lower retiree income than other individuals, after controlling for state, year, and age effects. We find that experi-

these individuals. While the recent crisis focused public attention on retirement security in an age of defined contribution pension plans, it seems clear that the difficulties facing individuals who approach retirement at a time when the labor market is weak merit greater public attention.

¹ J. Poterba, S. Venti, and D. Wise, “The Changing Landscape of Pensions in the United States,” NBER Working Paper No. 13381, October 2007.

[Return to text](#)

² H. Farber, “Job Loss in the Great Recession: Historical Perspective from the Displaced Worker Survey, 1984–2010,” NBER Working Paper No. 17040, May 2011.

[Return to text](#)

³ S. C. Goss, *Applications for Social Security Retirement Worker Benefits in Fiscal Year 2009*, Washington, D.C.: Social Security Administration, Office of the Chief Actuary, 2009.

[Return to text](#)

⁴ C. Coile and P. Levine, *Reconsidering Retirement: How Losses and Layoffs Affect Older Workers*, Washington D.C.: Brookings Institution Press, 2010.

[Return to text](#)

⁵ C. Coile and P. Levine, “Bulls, Bears, and Retirement Behavior,” NBER Working Paper No. 10779, September 2004, and *Industrial and Labor Relations Review*, 59(3), 2006, pp. 408–29.

[Return to text](#)

⁶ C. Coile and P. Levine, “The Market Crash and Mass Layoffs: How the Current Economic Crisis May Affect Retirement,” NBER Working Paper No. 15395, October 2009, and *The B.E. Press Journal of Economic Analysis and Policy*, 11(1), ISSN(Online) 1935–1682, 2011.

[Return to text](#)

⁷ C. Coile and P. Levine, “Labor Market Shocks and Retirement: Do Government Programs Matter?” NBER Working Paper No. 12559, October 2006, and *Journal of Public Economics*, 91(10), 2007, pp. 1902–19.

[Return to text](#)

⁸ C. Coile and P. Levine, “The Market Crash and Mass Layoffs: How the Current Economic Crisis May Affect Retirement,” NBER Working Paper No. 15395, October 2009, and *The B.E. Press Journal of Economic Analysis and Policy*, 11(1), ISSN (Online) Article 22, 2011.

[Return to text](#)

⁹ C. Coile and P. Levine, *Reconsidering Retirement: How Losses and Layoffs Affect Older Workers*, Washington, D.C.: Brookings Institution Press, 2010.

[Return to text](#)

¹⁰ C. Coile and P. Levine, “Recessions, Reeling Markets, and Retiree Well-Being,” NBER Working Paper No. 16066, June 2010, and *American Economic Review: Papers & Proceedings*, 101(3), 2011, pp. 23–28, (published as “Recessions, Retirement, and Social Security.”)

[Return to text](#)

¹¹ C. Coile, P. Levine, and R. McKnight, “Recessions, Older Workers, and Longevity: How Long Are Recessions Good for Your Health?” NBER Working Paper No. 18361, September 2012, and *American Economic Journal: Economic Policy*, 6(3), 2014, pp. 92–119.

[Return to text](#)

¹² C. Coile and P. Levine, “The Market Crash and Mass Layoffs: How the Current Economic Crisis May Affect Retirement,” NBER Working Paper No. 15395, October 2009, and *The B.E. Press Journal of Economic Analysis and Policy*, 11(1), ISSN (Online) Article 22, 2011.

[Return to text](#)

Menu Choices in Defined Contribution Pension Plans

Clemens Sialm

Significant changes in the structure of retirement saving programs have occurred in recent decades in the United States and across the world. Defined Contribution (DC) pension plans, such as 401(k) and 403(b) plans, have become an important source of retirement funding, while the relative significance of Social Security and Defined Benefit (DB) pension plans has declined. As a result, more savings and investment decisions need to be taken by individuals, who might not have the time and knowledge to take optimal investment decisions. In addition, there are potential conflicts of interest between providers of the newer plans and retirement savers. Investment choices that maximize the profits of plan providers are not necessarily the optimal choices for retirement savers. It is therefore crucial to scrutinize the impact of DC plan design on savings and investment decisions.

I discuss here some key findings of two recent research projects that analyze the mutual fund investment options offered in DC pension plans. The structure of the retirement savings system affects the investment strategies, the money flows, and the performance of retirement savers. DC plan design needs to take into account behavioral biases and bounded rationality by retirement savers as well as conflicts of interests by service providers.

Mutual Fund Menu Options

Mutual fund holdings in employer-sponsored DC plans are an important and growing segment of today’s financial markets. Figure 1 depicts the total value of mutual fund assets in the United States. Between 1992 and 2014, total mutual fund assets grew from \$1.6 trillion to \$15.9 trillion. Mutual funds can be held in DC pension plans, in Individual Retirement Accounts (IRAs), and in non-retirement environments. The growth of mutual fund assets has been particularly strong in DC plans. Currently, around 23.5 percent of mutual fund assets are held in DC plans, 22.4 percent in IRAs, and the remaining 54.1 percent in non-retirement accounts.¹ Thus, mutual funds have mixed clienteles that differ according to their distribution channels, their time horizons, and their tax implications.²

Whereas investors who own mutual funds in IRAs or in non-retirement accounts can choose from the universe of mutual funds, participants in employer-sponsored DC plans typically have limited choices. These choices arise through a two-stage process. In the first stage, the plan sponsor, typically the employer, together with the service providers, select the DC plan menu, which defines the set of investment options for participants. In the second stage, plan participants — the employees — allocate their individual DC account balances among the choices made available to them by the plan sponsor. Thus, final allocations in DC plans reflect decisions of the sponsor, the service providers, and the participants.

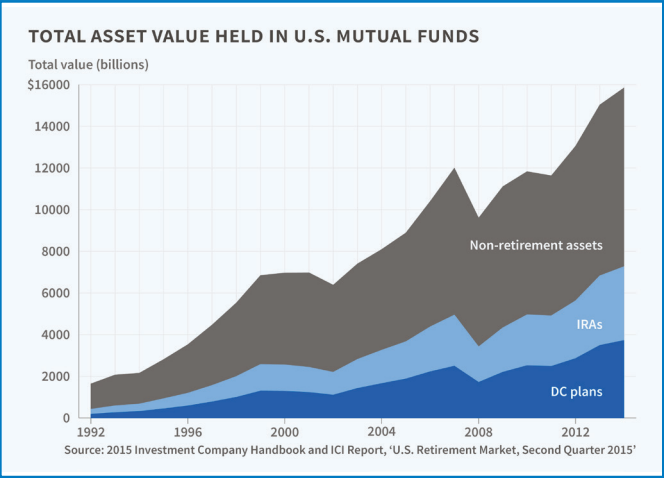


Figure 1



Clemens Sialm is a professor of finance and economics and director of the AIM Investment Center at the University of Texas at Austin. He is a research associate in the Asset Pricing and Public Economics programs of the NBER. He received an M.A. in economics from the University of St. Gallen in Switzerland and a Ph.D. in economics from Stanford University. Prior to joining the University of Texas, he taught at Stanford University and the University of Michigan in Ann Arbor. During the 2013–2014 academic year, he was the Mark and Sheila Wolfson Distinguished Visiting Associate Professor at the Stanford Institute for Economic Policy Research.

Sialm’s research interests are in the areas of investments, asset pricing, and taxation. He analyzes the investment strategies, performance, and behaviors of institutional and individual investors. He also investigates investment decisions of retirement savers. His research has been published in the *American Economic Review*, the *Journal of Finance*, the *Review of Financial Studies*, *Management Science*, and the *Journal of Public Economics*, among others. Sialm’s research frequently has been cited in *The Wall Street Journal*, *The New York Times*, and *The Economist*.

Sialm grew up in Disentis, a small Romansh town in the Swiss Alps. He lives with his wife, Wei, and their two sons, Daniel and Justin, in Austin.

Sticky vs. Discerning Money

Despite the importance of DC mutual fund holdings, little is known about the properties of money flows in DC pension plans. Conventional wisdom suggests that the DC plan assets in mutual funds are “sticky” and not discerning. Previous studies indicate that DC plan participants exhibit significant inertia, follow default options, and are reluctant to rebalance and readjust their portfolios.³ In addition, DC plan participants make periodic retirement account contributions or withdrawals, which lead to persistence in money flows.

To test whether DC money flows are sticky, Laura Starks, Hanjiang Zhang, and I compare the flows of DC and non-DC mutual fund investors from 1997 to 2010.⁴ In contrast to the conventional wisdom, we find that money flows into mutual funds by DC plan participants are more volatile and exhibit a lower serial correlation than the flows into mutual funds by other investors. Furthermore, we show that DC flows are more sensitive to prior fund performance than non-DC flows. In fact, the flow-performance sensitivity of DC flows is particularly pronounced for funds with extreme prior performance records.

Figure 2 depicts the sensitivity of money flows to prior performance for DC and non-DC assets. We group all U.S. domestic equity funds into percentiles according to the fund performance over the prior year. Funds in the lowest percentile correspond to the one percent of mutual funds that exhibit the worst performance over the previous year, whereas funds in the highest percentile correspond to the one percent of funds that exhibit the best performance. The dots in the figure show the average money flows for the performance percentiles after controlling for other fund characteristics. The blue diamonds cor-

respond to DC flows and the grey circles correspond to non-DC flows. The solid curves show the least-squares cubic relation for DC and non-DC flows.

On average, DC assets experience larger fund flows than non-DC assets due to the significant growth of tax-qualified retirement accounts over our sample period. Whereas the flow-performance relation is close to linear for non-DC assets, the relation is clearly nonlinear for DC assets. The flow-performance relation is particularly steep for DC assets corresponding to funds in the top and bottom performance groups. For example, funds in the bottom decile of performance experience an average outflow of 8.3 percent of their

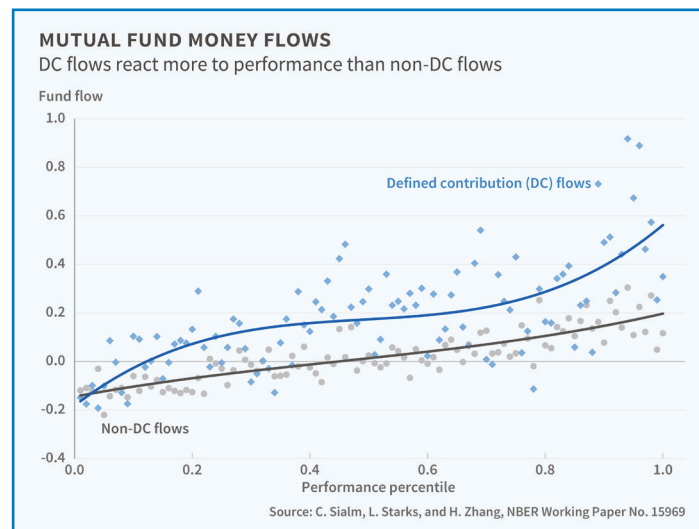


Figure 2

DC assets and funds in the top decile experience an average inflow of 53.6 percent of their DC assets. On the other hand, funds in the bottom decile experience an average outflow of 11.8 percent of their non-DC assets and funds in the top decile experience an average inflow of 17.9 percent of their non-DC assets.

This surprising result could be driven either by the actions of plan participants or by the actions of sponsors. Data from the U.S. Securities and Exchange Commission (SEC) allow us to decompose aggregate flows into flows resulting primarily from plan sponsor actions and flows resulting primarily from participant actions. This shows

that flows are predominantly driven by the actions of plan sponsors and that plan participants exhibit inertia and do not react sensitively to prior fund performance. Our results indicate that the actions of plan sponsors in changing their menus counteract the inertia of plan participants.

Favoritism in DC Plans

Whereas DC plans can provide valuable assistance to retirement savers by adjusting their menu options, DC plan service providers often face conflicting incentives concerning the plan's design. Veronika Pool, Irina Stefanescu, and I examine whether mutual fund families acting as service providers (i.e., trustees, record keepers) of 401(k) plans display favoritism toward their own funds.⁵

Fund families involved in plan design work with plan sponsors to create menus that serve the interests of plan participants, but they also have an incentive to promote their own proprietary funds when more suitable options may be available from other fund families. Focusing on menu changes, we hypothesize that service providers may influence 401(k) sponsors to include and subsequently keep their own affiliated funds on the investment menu.

Furthermore, due to this provider influence, fund addition and deletion decisions may be less sensitive to the prior performance of affiliated funds, as mutual fund families try to avoid the decline in inflows at poorly performing funds that might result if these funds were dropped from plan menus.

To investigate this favoritism hypothesis, we collect from annual filings of Form 11-K with the SEC information on the menus of mutual fund options offered in a large sample of DC pension plans for the period 1998 to 2009. Most 401(k) plans in our sample adopt an open architecture whereby investment options include not only funds from the family of the service provider but also funds from

other mutual fund families as well.

Figure 3 depicts the mean annual deletion frequencies by affiliation for funds grouped into deciles according to their prior percentile performance. The figure shows that affiliated funds are less likely to be deleted from a 401(k) plan than unaffiliated funds regardless of past performance. More importantly, the difference in deletion rates widens significantly for poorly-performing funds. For example, funds in the lowest performance decile have a probability of deletion of 25.5 percent for unaffiliated funds and a probability of deletion of only 13.7 percent for affiliated funds. Indeed the deletion rate of affiliated funds in the lowest performance decile is lower than the deletion rates of affiliated funds in deciles two through four. On the other hand, we find that in the top decile, affiliated funds are almost as likely to be deleted as unaffiliated funds.

Although the investment opportunity set of the plan is limited to the available menu choices, participants can freely allocate their contributions among these options. If participants are aware of provider biases or are simply sensitive to poor performance, they can—at least partially—undo provider favoritism by not allocating capital to poorly-performing affiliated funds. We show that participants are generally not sensitive to poor performance and do not undo the menu's bias toward affiliated families. This in turn indicates that plan participants are affected by the affiliation bias.

While our evidence on favoritism is consistent with conflicts of interest, 401(k) plan sponsors and service providers may also have superior information about their own proprietary funds. Therefore, it is possible that they show a preference for these funds not because they are necessarily biased toward them, but rather due to positive information they possess about these funds. To investigate this possibility, we examine future fund performance. For instance, if the decision to keep poorly performing affiliated funds on the menu is information-

driven, then these funds should perform better in the future. This is not the case. Affiliated funds that rank poorly based on past performance but are not delisted from the menu do not perform well in the subsequent year. On average, they underperform by approximately four percent annually on a risk-adjusted basis. Our results suggest that the favoritism we document could have important implications for the retirement income of employees.

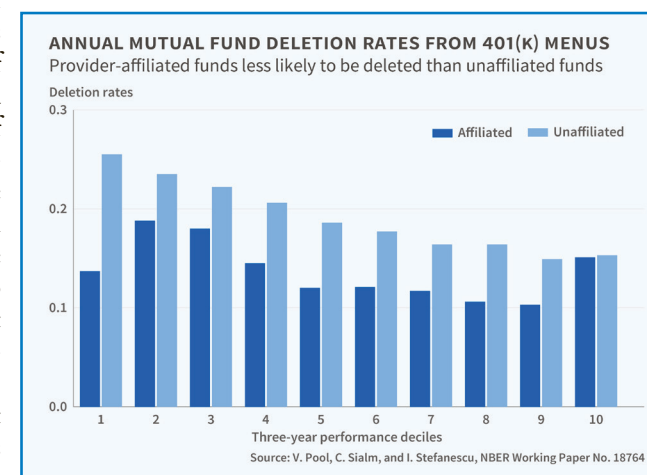


Figure 3

Conclusions

As individuals take more responsibility for managing their retirement savings, it becomes important to consider the two-stage process of asset allocation in retirement plans. This process, in which the sponsor selects the menu and the participants decide how much to invest in the separate options, has the advantage of mitigating the inertia of plan participants. Sponsors together with the service providers can monitor the available investment choices and decide whether to make adjustments to the lineup. On the other hand, the two-stage process also can create agency conflicts, as service providers have an incentive to attract and retain retirement contributions in their own proprietary funds. A systematic analysis of the advantages and disadvantages of different structures of retirement savings is crucial in an environment where retirement savers are subject to behavioral biases and bounded rationality and

where financial intermediaries are subject to agency conflicts.

¹ 2015 Investment Company Handbook and Investment Company Institute Report, “U.S. Retirement Market, Second Quarter 2015,” September 2015.

[Return to text](#)

² C. Sialm and L. Starks, “Mutual Fund Tax Clientele,” NBER Working Paper No. 15327, September 2009, and Journal of Finance, 67(4), 2012, pp. 1397–1422.

[Return to text](#)

³ See, for example, B. Madrian and D. Shea, “The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior,” NBER Working Paper No. 7682, May 2000, and Quarterly Journal of Economics, 116(4), 2001, pp. 1149–87; S. Benartzi and R. Thaler, “Naïve Diversification Strategies in Defined Contribution Savings Plans,” American Economic Review, 91(1), 2001, pp. 79–98; and J. Choi, D. Laibson, B. Madrian, and A. Metrick, “Defined Contribution

Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance,” NBER Working Paper No. 8655, December 2001, and in J. Poterba, Tax Policy and the Economy, Vol. 16, Cambridge, Massachusetts: MIT Press, 2002, pp. 67–113.

[Return to text](#)

⁴ C. Sialm, L. Starks, and H. Zhang, “Defined Contribution Pension Plans: Sticky or Discerning Money?” NBER Working Paper No. 19569, October 2013, and Journal of Finance, 70(2), 2015, pp. 805–38.

[Return to text](#)

⁵ V. Pool, C. Sialm, and I. Stefanescu, “It Pays to Set the Menu: Mutual Fund Investment Options in 401(k) Plans,” NBER Working Paper No. 18764, February 2013, and forthcoming in Journal of Finance. (This research was performed pursuant to a grant from the TIAA-CREF Institute through the Pension Research Council/Boettner Center (the PRC) of the Wharton School of the University of Pennsylvania (PRC).)

[Return to text](#)

Deaton Wins Nobel Prize in Economic Sciences

Princeton University Professor Angus Deaton, an NBER research associate for more than three decades, was awarded the 2015 Nobel Prize in Economic Sciences for his analysis of consumption, poverty, and welfare. “To design economic policy that promotes welfare and reduces poverty, we must first understand individual consumption choices,” the Royal Swedish Academy of Sciences said in a statement announcing the award. “More than anyone else, Angus Deaton has enhanced this understanding. By linking detailed individual choices and aggregate outcomes, his research has helped transform the fields of micro-economics, macroeconomics, and development economics.”

In his more recent research, the prize committee said, Deaton has highlighted “how reliable measures of individual household consumption levels can be used to discern mechanisms behind economic development. His research has uncovered important pitfalls when comparing the extent of poverty across time and place. It has also exemplified how the clever use of household data may shed light on such issues as the relationships between income and calorie intake, and the extent of gender discrimination within the family.” Deaton is the Dwight D. Eisenhower Professor of International Affairs and a professor of economics and international affairs at Princeton’s

Woodrow Wilson School of Public and International Affairs. A native of Scotland, he earned his bachelor’s degree and Ph.D. from the University of Cambridge, and holds both British and American citizenship. Deaton has authored or co-authored dozens of working papers. His recent papers include [Suicide, Age, and Wellbeing: an Empirical Investigation](#), with Anne Case, and [Creative Destruction and Subjective Wellbeing](#), with Philippe Aghion, Ufuk Akcigit, and Alexandra Roulet. He is affiliated with seven NBER research programs: Aging, Children, Development, Economic Fluctuations and Growth, Education, Health Care, and Public Economics.

New Board Members Elected

Pierre-André Chiappori and Jack Kleinhenz were elected to the NBER Board of Directors at the board’s September 2015 meeting. Chiappori is the E. Rowan and Barbara Steinschneider Professor of Economics at Columbia University. He received a Ph.D. in economics at the University Paris 1. Prior to joining the Columbia faculty in 2004, he taught in France and at the University of Chicago. His research focuses on household behavior, risk, insurance and contract theory, general equilibrium and

mathematical economics. Chiappori is a fellow of the European Economic Association, the Econometric Society, and the Society of Labor Economists. He is a distinguished fellow of the Becker Friedman Institute for Research in Economics at the University of Chicago, and a corresponding member of the French Académie des Sciences Morales et Politiques. Kleinhenz is chief economist for the National Retail Federation and the principal and chief economist of Kleinhenz & Associates, a regis-

tered investment advisory firm specializing in economic consulting and wealth management. He is an adjunct professor of economics at Case Western Reserve University’s Weatherhead School of Management, in Cleveland, Ohio. Formerly with the Federal Reserve Bank of Cleveland and the Federal Home Loan Bank of Pittsburgh, he is a current member of the Governor of Ohio’s Council of Economic Advisers and is the past president of the National Association for Business Economics.

Leadership Changes

Anna Aizer of Brown University, a research associate in the Children’s Program, has joined Janet Currie of Princeton as the program’s co-director. Aizer has investigated many issues that bear on the economic well-being of children, including the impact of maternal circumstances on child well-being, the link between public health insurance and health outcomes for children, and the determinants of youth violence and criminal activity. Nicholas Barberis of Yale University, a research associate in the Asset Pricing Program and the Stephen

and Camille Schramm Professor of Finance at Yale University’s School of Management, is the new director of the Behavioral Finance Working Group. He succeeds founding co-directors Robert Shiller of Yale and Richard Thaler of the University of Chicago. Barberis has used insights from psychology to study investor decision making in a wide range of contexts. His work has provided new insights on disparities between observed investor behavior and the predictions that derive from many standard models of financial decision-making.

Robert Moffitt of Johns Hopkins University, a research associate in the Children’s, Education, and Public Economics programs, has succeeded Jeffrey Brown of the University of Illinois as editor of the *Tax Policy and the Economy* annual. The papers in this volume are presented at a conference in Washington, D.C., each fall. Moffitt is the Krieger-Eisenhower Professor of Economics at Hopkins and a former editor of The American Economic Review. His research ranges broadly in the fields of tax policy, transfer program design, and labor economics.

Conferences

Tax Policy and the Economy

An NBER conference, “Tax Policy and the Economy,” took place in Washington, D.C., on September 24. Research Associate Jeffrey Brown of University of Illinois at Urbana-Champaign organized the meeting. These papers were discussed:

- **Gerald Carlino**, Federal Reserve Bank of Philadelphia, and **Robert P. Inman**, University of Pennsylvania and NBER, “Fiscal Stimulus in Economic Unions: What Role for States?” (NBER Working Paper No. [21680](#))
- **Nathaniel Hendren**, Harvard University and NBER, “The Policy Elasticity” (NBER Working Paper No. [19177](#))
- **Michael Cooper**, **John McClelland**, **James Pearce**, **Richard Prisinzano**, and **Joseph Sullivan**, Department of the Treasury; **Danny Yagan**, University of California, Berkeley, and NBER; and **Owen Zidar** and **Eric Zwick**, University of Chicago and NBER, “Business in the United States: Who Owns it and How Much Tax Do They Pay?” (NBER Working Paper No. [21651](#))
- **Michael Chirico**, **Charles Loeffler**, and **John MacDonald**, University of Pennsylvania, and **Robert P. Inman** and **Holger Sieg**, University of Pennsylvania and NBER, “An Experimental Evaluation of Notification Strategies to Increase Property Tax Compliance: Free-Riding in the City of Brotherly Love”
- **Jeffrey Clemens**, University of California, San Diego, and NBER, “Redistribution through Minimum Wage Regulation: An Analysis of Program Linkages and Budgetary Spillovers”
- **Severin Borenstein** and **Lucas W. Davis**, University of California, Berkeley, and NBER, “The Distributional Effects of U.S. Clean Energy Tax Credits” (NBER Working Paper No. [21437](#))

Summaries of these papers are at: <http://www.nber.org/confer/2015/TPE15/summary.html>

Education, Skills, and Technical Change: Implications for Future U.S. GDP Growth

The NBER hosted a Conference on Research in Income and Wealth (CRIW) meeting, “Education, Skills, and Technical Change: Implications for Future U.S. GDP Growth,” in Bethesda, MD, on October 16–17. Research Associates Charles Hulten of University of Maryland and Valerie Ramey of University of California, San Diego, organized the meeting. These papers were discussed:

- **Charles R. Hulten** and **Valerie Ramey**, “Skills, Education, and U.S. Economic Growth: Are U.S. Workers Being Adequately Prepared for the 21st Century World of Work?”
- **Canyon L. Bosler**, **Mary Daly**, and **John Fernald**, Federal Reserve Bank of San Francisco, and **Bart Hobijn**, Arizona State University, “The Outlook for U.S. Labor Quality Growth”
- **Dale Jorgenson**, Harvard University; **Mun Ho**, Resources for the Future; and **Jon Samuels**, Bureau of Economic Analysis, “Education, Participation, and the Revival of U.S. Economic Growth”
- **Jaïson Abel** and **Richard Deitz**, Federal Reserve Bank of New York, “Underemployment in the Early Careers of College Graduates Following the Great Recession”
- **Maury Gittleman**, **Kristen Monaco**, and **Nicole Nestoriak**, Bureau of Labor Statistics, “The Requirements of Jobs: Evidence from a Nationally Representative Survey”
- **Shelly Lundberg**, University of California, Santa Barbara, “Non-Cognitive Skills as Human Capital”
- **Stijn Broecke** and **Glenda Quintini**, Organisation for Economic Co-operation and Development, and **Marieke Vandeweyer**, University of Leuven, “Wage Inequality and Cognitive Skills: Re-Opening the Debate”
- **Robert G. Valletta**, Federal Reserve Bank of San Francisco, “Recent Flattening in the Higher Education Wage Premium: Polarization, Deskilling, or Both?”
- **Gordon Hanson**, University of California, San Diego, and NBER, and **Matthew J. Slaughter**, Dartmouth College and NBER, “High-Skilled Immigration and the Rise of STEM Occupations in U.S. Employment”
- **Caroline Hoxby**, Stanford University and NBER, “Online Education, Labor Productivity, and Technological Innovation”
- **Grey Gordon**, Indiana University, and **Aaron Hedlund**, University of Missouri, “Accounting for the Rise in College Tuition”
- **Edward Wolff**, New York University and NBER, “School Spending and Student Performance in OECD Countries, 1998–2011”

Summaries of these papers are at: <http://www.nber.org/confer/2015/CRIWf15/summary.html>

Firms and the Distribution of Income: The Roles of Productivity and Luck

An NBER conference, “How do Firms Affect the Distribution of Income? The Roles of Productivity and Luck,” took place in Palo Alto on November 13–14. Labor Studies Program Director David Card of University of California, Berkeley, and Research Associates Edward Lazear and Kathryn Shaw of Stanford University, organized the meeting. These papers were discussed:

- **Erling Barth**, Institute for Social Research and NBER; **James Davis**, Bureau of the Census; and **Richard B. Freeman**, Harvard University and NBER, “Augmenting the Human Capital Earnings Equation with Measures of Where People Work”
- **John Haltiwanger**, University of Maryland and NBER, and **Henry R. Hyatt** and **Erika McEntarfer**, Bureau of the Census, “Do Workers Move Up the Firm Productivity Job Ladder?”

- **Chinhui Juhn**, University of Houston and NBER; **Kristin McCue** and **Holly Monti**, Bureau of the Census; and **Brooks Pierce**, Bureau of Labor Statistics, “Firm Performance and the Volatility of Worker Earnings”
- **Edward Lazear** and **Kathryn Shaw**, Stanford University and NBER, and **Christopher Stanton**, Harvard University and NBER, “Who Gets Hired? The Importance of Finding an Open Slot”
- **David Card** and **Patrick Kline**, University of California, Berkeley, and NBER; **Ana Rute Cardoso**, Institute for Economic Analysis (Barcelona); and **Jörg Heining**, Institute for Employment Research (Nuremberg), “Firms and Labor Market Inequality: A Review”
- **John M. Abowd**, Cornell University and NBER; **Kevin L. McKinney**, Bureau of the Census; and **Nellie Zhao**, Cornell University, “Earnings Inequality Trends in the United States: Nationally Representative Estimates from Longitudinally Linked Employer-Employee Data”
- **Erik Brynjolfsson**, MIT and NBER, and **Heekyung Kim** and **Guillaume Saint-Jacques**, MIT, “CEO Pay and Information Technology”
- **Jae Song**, Social Security Administration; **David Price** and **Nicholas Bloom**, Stanford University and NBER; **Fatih Guvenen**, University of Minnesota and NBER; and **Till von Wachter**, University of California, Los Angeles, and NBER, “Firming Up Inequality” (NBER Working Paper No. 21199)
- **Stefan Bender**, Deutsche Bundesbank; **Nicholas Bloom**; **David Card**; **John Van Reenen**, London School of Economics and NBER; and **Stefanie Wolter**, Institute for Employment Research (Nuremberg), “Of Managers and Management: Evidence from Matched Employer-Employee Data”
- **David Deming**, Harvard University and NBER, and **Lisa Kahn**, Yale University and NBER, “Firm Heterogeneity in Skill Demands”

Summaries of these papers are at: <http://www.nber.org/confer/2015/PERf15/summary.html>

Lessons from the Crisis for Macroeconomics

An NBER conference, “Lessons from the Crisis for Macroeconomics,” took place in New York on December 4. Research Associates Virgiliu Midrigan and Thomas Philippon of New York University organized the meeting. These papers were discussed:

- **Julian Kozlowski**, New York University, and **Laura Veldkamp** and **Venky Venkateswaran**, New York University and NBER, “The Tail that Wags the Economy: Belief-Driven Business Cycles and Persistent Stagnation” (NBER Working Paper No. 21719)
- **David Berger** and **Guido Lorenzoni**, Northwestern University and NBER, and **Veronica Guerrieri** and **Joseph Vavra**, University of Chicago and NBER, “House Prices and Consumer Spending” (NBER Working Paper No. 21667)
- **Christopher House** and **Linda Tesar**, University of Michigan and NBER, and **Christian Pröbsting**, University of Michigan, “Austerity in the Aftermath of the Great Recession”
- **Atif Mian**, Princeton University and NBER; **Amir Sufi**, University of Chicago and NBER; and **Emil Verner**, Princeton University, “Household Debt and Business Cycles Worldwide” (NBER Working Paper No. 21581)
- **Òscar Jordà**, Federal Reserve Bank of San Francisco; **Moritz Schularick**, University of Bonn; and **Alan Taylor**, University of California, Davis, and NBER, “Leveraged Bubbles” (NBER Working Paper No. 21486)
- **Danny Yagan**, University of California, Berkeley, and NBER, “Moving to Opportunity? Migratory Insurance over the Great Recession”
- **Robert Hall**, Stanford University and NBER, “Macroeconomics of Persistent Slumps”

Summaries of these papers are at: <http://www.nber.org/confer/2015/LCMf15/summary.html>

Program and Working Group Meetings

Development Economics

The NBER’s Program on Development Economics and The Bureau for Research and Economic Analysis of Development held a joint meeting in Cambridge on September 25–26. Program Director Duncan Thomas of Duke University, Research Associates Abhijit Banerjee of MIT and Mushfiq Mobarak of Yale University, and Eliana La Ferrara of Bocconi University, organized the meeting. These papers were discussed:

- **Jing Cai**, University of Michigan, and **Adam Szeidl**, Central European University, “Interfirm Relationships and Business Performance”
- **Francesco Amodio**, McGill University, and **Miguel A. Martinez-Carrasco**, University of Piura, “Input Allocation, Workforce Management and Productivity Spillovers: Evidence from Personnel Data”
- **Koichiro Ito**, University of Chicago and NBER, and **Shuang Zhang**, University of Colorado, Boulder, “Willingness to Pay for Clean Air: Evidence from Air Purifier Markets in China”
- **Emily L. Breza**, Columbia University, and **Arun G. Chandrasekhar**, Stanford University and NBER, “Social Networks, Reputation and Commitment: Evidence from a Savings Monitors Experiment” (NBER Working Paper No. [21169](#))
- **Juan Carlos Suárez Serrato** and **Xiao Yu Wang**, Duke University and NBER, and **Shuang Zhang**, “The One Child Policy and Promotion of Mayors in China”
- **Joram Mayshar**, Hebrew University of Jerusalem; **Omer Moav**, University of Warwick; **Zvika Neeman**, Tel Aviv University; and **Luigi Pascali**, Pompeu Fabra University, “Cereals, Appropriability, and Hierarchy”
- **Christian Dippel**, University of California, Los Angeles, and NBER; **Avner Greif**, Stanford University; and **Daniel Treffer**, University of Toronto and NBER, “The Rents from Trade and Coercive Institutions: Removing the Sugar Coating” (NBER Working Paper No. [20958](#))

Summaries of these papers are at: <http://www.nber.org/confer/2015/DEVf15/summary.html>

Chinese Economy

The NBER’s Working Group on the Chinese Economy met in Cambridge on October 9–10. Working Group Director Hanming Fang of the University of Pennsylvania and Research Associate Shang-Jin Wei of Columbia University organized the conference. These papers were discussed:

- **Cynthia Kinnan**, Northwestern University and NBER; **Shing-Yi Wang**, University of Pennsylvania and NBER; and **Yongxiang Wang**, University of Southern California, “Relaxing Migration Constraints for Rural Households” (NBER Working Paper No. [21314](#))
- **Koichiro Ito**, University of Chicago and NBER, and **Shuang Zhang**, University of Colorado, Boulder, “Willingness to Pay for Clean Air: Evidence from Air Purifier Markets in China”
- **Wolfgang Keller** and **Carol Shiue**, University of Colorado, Boulder and NBER, and **Xin Wang**, University of Colorado, Boulder, “Capital Markets in China and Britain, 18th and 19th Century: Evidence from Grain Prices” (NBER Working Paper No. [21349](#))

- **Chen Lin** and **Xiaofeng Zhao**, Chinese University of Hong Kong; **Randall Morck**, University of Alberta and NBER; and **Bernard Yeung**, National University of Singapore, “Anti-Corruption Reforms and Shareholder Valuations: Evidence from China”
- **Bei Qin**, University of Hong Kong; **David Stromberg**, Stockholm University; and **Yanhui Wu**, University of Southern California, “The Political Economy of Social Media in China”
- **Yi Che**, Shanghai Jiao Tong University; **Yi Lu**, National University of Singapore; **Justin Pierce**, Federal Reserve Board; **Peter Schott**, Yale University and NBER; and **Zhigang Tao**, University of Hong Kong, “Do Chinese Imports Influence U.S. Elections?”
- **Andrew Ang**, Columbia University and NBER; **Jennie Bai**, Georgetown University; and **Hao Zhou**, Tsinghua University, “The Great Wall of Debt: Corruption, Real Estate, and Chinese Local Government Credit Spreads”
- **James Choi**, Yale University and NBER; **Li Jin**, Peking University; and **Hongjun Yan**, Yale University, “Informed Trading and the Cost of Capital”
- **Raül Santaaulàlia-Llopis**, Washington University in St. Louis, and **Yu Zheng**, City University of Hong Kong, “The Price of Growth: Consumption Insurance in China 1989–2009”
- **Tasso Adamopoulos**, York University; **Loren Brandt** and **Diego Restuccia**, University of Toronto; and **Jessica Leight**, Williams College, “Misallocation, Selection and Productivity: A Quantitative Analysis with Panel Data from China”

Summaries of these papers are at: <http://www.nber.org/confer/2015/CEf15/summary.html>

Political Economy

The NBER’s Political Economy Program, directed by Alberto Alesina of Harvard University, met in Cambridge on October 23. These papers were discussed:

- **Oded Galor**, Brown University and NBER, and **Marc Klemp**, Brown University, “Roots of Autocracy”
- **Filip Matějka**, Center for Economic Research and Graduate Education - Economics Institute, and **Guido Tabellini**, Bocconi University, “Electoral Competition with Rationally Inattentive Voters”
- **Marianne Bertrand**, University of Chicago and NBER; **Robin Burgess** and **Guo Xu**, London School of Economics; and **Arunish Chawla**, Indian Administrative Service, “Determinants and Consequences of Bureaucrat Effectiveness: Evidence from the Indian Administrative Service”
- **Alberto Bisin**, New York University and NBER, and **Thierry Verdier**, Paris School of Economics, “On the Joint Evolution of Culture and Institutions”
- **Gabriele Gratton**, University of New South Wales; **Luigi Guiso** and **Claudio Michelacci**, Einaudi Institute for Economics and Finance; and **Massimo Morelli**, Columbia University and NBER, “From Weber to Kafka: Political Activism and the Emergence of an Inefficient Bureaucracy”
- **Sharun Mukand**, University of Warwick, and **Dani Rodrik**, Harvard University and NBER, “The Political Economy of Liberal Democracy” (NBER Working Paper No. [21540](#))

Summaries of these papers are at: <http://www.nber.org/confer/2015/POLf15/summary.html>



Market Design

The NBER’s Working Group on Market Design, co-directed by Michael Ostrovsky of Stanford University and Parag Pathak of MIT, met in Cambridge on October 23–24. These papers were discussed:

- **Tayfun Sönmez** and **Utku Ünver**, Boston College, and **Özgür Yılmaz**, Koç University, “How (not) to Integrate Blood Subtyping Technology to Kidney Exchange”
- **Mehmet Ekmekci**, Boston College, and **M. Bumin Yenmez**, Carnegie Mellon University, “Integrating Schools for Centralized Admissions”
- **Atila Abdulkadiroğlu**, Duke University; **Joshua Angrist** and **Parag Pathak**, MIT and NBER; and **Yusuke Narita**, MIT, “Research Design Meets Market Design: Using Centralized Assignment for Impact Evaluation” (NBER Working Paper No. [21705](#))
- **Shuchi Chawla**, University of Wisconsin-Madison; **Jason Hartline**, Northwestern University; and **Denis Nekipelov**, University of Virginia, “Mechanism Design for Data Science”
- **John Hatfield**, University of Texas at Austin; **Scott Duke Kominers**, Harvard University; **Alexandru Nichifor**, University of St Andrews; **Michael Ostrovsky**; and **Alexander Westkamp**, Maastricht University, “Full Substitutability”
- **Thành Nguyen**, Purdue University, and **Rakesh Vohra**, University of Pennsylvania, “Near Feasible Stable Matchings with Complementarities”
- **Ali Hortaçsu**, University of Chicago and NBER; **Jakub Kastl**, Princeton University and NBER; and **Allen Zhang**, Department of the Treasury, “Bid Shading and Bidder Surplus in the U.S. Treasury Auction System”
- **Jonathan Levin**, Stanford University and NBER, and **Andrzej Skrzypacz**, Stanford University, “Are Dynamic Vickrey Auctions Practical? Properties of the Combinatorial Clock Auction” (NBER Working Paper No. [20487](#))
- **Nick Arnosti**, **Marissa Beck**, and **Paul Milgrom**, Stanford University, “Adverse Selection and Auction Design for Internet Display Advertising”
- **Daniela Saban**, Stanford University, and **Gabriel Weintraub**, Columbia University, “Procurement Mechanisms for Differentiated Products”
- **Steven Lalley**, University of Chicago, and **Glen Weyl**, Microsoft Corporation, “Quadratic Voting”
- **Canice Prendergast**, University of Chicago, “The Allocation of Food to Food Banks”

Summaries of these papers are at: <http://www.nber.org/confer/2015/MDf15/summary.html>



Economic Fluctuations and Growth

The NBER’s Program on Economic Fluctuations and Growth met in New York on October 30. Faculty Research Fellow Greg Kaplan of Princeton University and Research Associate Ricardo Reis of Columbia University organized the meeting. These papers were discussed:

- **Xavier Gabaix**, New York University and NBER; **Jean-Michel Lasry**, Paris Dauphine University; **Pierre-Louis Lions**, Collège de France; and **Benjamin Moll**, Princeton University and NBER, “The Dynamics of Inequality” (NBER Working Paper No. [21363](#))
- **Wouter den Haan**, London School of Economics; **Pontus Rendahl**, University of Cambridge; and **Markus Riegler**, University of Bonn, “Unemployment (Fears) and Deflationary Spirals”
- **Cosmin Ilut**, Duke University and NBER; **Rosen Valchev**, Boston College; and **Nicolas Vincent**, HEC Montréal, “Paralyzed by Fear: Rigid and Discrete Pricing under Demand Uncertainty”
- **Marco Del Negro** and **Marc Giannoni**, Federal Reserve Bank of New York, and **Christina Patterson**, MIT, “The Forward Guidance Puzzle”
- **Iván Werning**, MIT and NBER, “Incomplete Markets and Aggregate Demand” (NBER Working Paper No. [21448](#))
- **Mikhail Golosov**, Princeton University and NBER, and **Guido Menzio**, University of Pennsylvania and NBER, “Agency Business Cycles” (NBER Working Paper No. [21743](#))

Summaries of these papers are at: <http://www.nber.org/confer/2015/EFGf15/summary.html>

International Finance and Macroeconomics

The NBER’s Program on International Finance and Macroeconomics met in Cambridge on October 30. Research Associates Ariel Burstein of University of California, Los Angeles, and Charles Engel of University of Wisconsin-Madison organized the meeting. These papers were discussed:

- **Javier Cravino** and **Andrei Levchenko**, University of Michigan and NBER, “The Distributional Consequences of Large Devaluations”
- **Gita Gopinath**, Harvard University and NBER; **Sebnem Kalemli-Özcan**, University of Maryland and NBER; **Loukas Karabarbounis**, University of Chicago and NBER; and **Carolina Villegas-Sanchez**, ESADE, “Capital Allocation and Productivity in South Europe” (NBER Working Paper No. [21453](#))
- **Doireann Fitzgerald**, Federal Reserve Bank of Minneapolis and NBER; **Stefanie Haller**, University College Dublin; and **Yaniv Yedid-Levi**, University of British Columbia, “How Exporters Grow”
- **Philippe Bacchetta** and **Elena Perazzi**, University of Lausanne, and **Eric van Wincoop**, University of Virginia and NBER, “Self-Fulfilling Debt Crises: Can Monetary Policy Really Help?” (NBER Working Paper No. [21158](#))
- **George A. Alessandria**, University of Rochester and NBER, and **Horag Choi**, Monash University, “The Dynamics of the U.S. Trade Balance and the Real Exchange Rate: The J Curve and Trade Costs?”
- **Hanno Lustig**, Stanford University and NBER, and **Adrien Verdelhan**, MIT and NBER, “Does Incomplete Spanning in International Financial Markets Help to Explain Exchange Rates?”

Summaries of these papers are at: <http://www.nber.org/confer/2015/IFMf15/summary.html>



Public Economics

The NBER’s Program on Public Economics met in Palo Alto on November 5–6. Research Associates Raj Chetty and Mark Duggan of Stanford University organized the meeting. These papers were discussed:

- **Florian Scheuer**, Stanford University and NBER, and **Iván Werning**, MIT and NBER, “The Taxation of Superstars” (NBER Working Paper No. [21323](#))
- **Benjamin B. Lockwood**, Harvard University; **Charles G. Nathanson**, Northwestern University; and **Glen Weyl**, Microsoft Corporation, “Taxation and the Allocation of Talent”
- **Daniel K. Fetter**, Wellesley College and NBER, and **Lee Lockwood**, Northwestern University and NBER, “Government Old-Age Support and Labor Supply: Evidence from the Old Age Assistance Program”
- **Alexander M. Gelber**, University of California, Berkeley, and NBER; **Timothy J. Moore**, George Washington University and NBER; and **Alexander Strand**, Social Security Administration, “The Effect of Disability Insurance Payments on Beneficiaries’ Earnings”
- **Hugh Macartney**, Duke University and NBER; **Robert McMillan**, University of Toronto and NBER; and **Uros Petronijevic**, University of Toronto, “Education Production and Incentives”
- **Xavier Giroud**, MIT and NBER, and **Joshua Rauh**, Stanford University and NBER, “State Taxation and the Reallocation of Business Activity: Evidence from Establishment-Level Data” (NBER Working Paper No. [21534](#))
- **Ufuk Akcigit**, University of Chicago and NBER; **Salomé Baslandze**, Einaudi Institute for Economics and Finance; and **Stefanie Stantcheva**, Harvard University and NBER, “Taxation and the International Mobility of Inventors” (NBER Working Paper No. [21024](#))
- **Pablo Fajgelbaum**, University of California, Los Angeles, and NBER; **Eduardo Morales**, Princeton University and NBER; **Juan Carlos Suárez Serrato**, Duke University and NBER; and **Owen M. Zidar**, University of Chicago and NBER, “State Taxes and Spatial Misallocation” (NBER Working Paper No. [21760](#))
- **Lorenz Kueng**, Northwestern University and NBER, “Explaining Consumption Excess Sensitivity with Near-Rationality: Evidence from Large Predetermined Payments”
- **Marco Di Maggio**, Columbia University, and **Amir Kermani**, University of California, Berkeley, “The Importance of Unemployment Insurance as an Automatic Stabilizer”
- **Pascal Michaillat**, London School of Economics, and **Emmanuel Saez**, University of California, Berkeley, and NBER, “The Optimal Use of Government Purchases for Macroeconomic Stabilization” (NBER Working Paper No. [21322](#))

Summaries of these papers are at: <http://www.nber.org/confer/2015/PEf15/summary.html>



Monetary Economics

The NBER’s Program on Monetary Economics met in Cambridge on November 6. Research Associates Gauti Eggertsson of Brown University and James Stock of Harvard University organized the meeting. These papers were discussed:

- **Marco Del Negro** and **Marc Giannoni**, Federal Reserve Bank of New York, and **Christina H. Patterson**, MIT, “The Forward Guidance Puzzle”
- **Francesco D’Acunto**, University of Maryland; **Daniel Hoang**, Karlsruhe Institute of Technology; and **Michael Weber**, University of Chicago, “Inflation Expectations and Consumption Expenditure”
- **Mariana García-Schmidt**, Columbia University, and **Michael Woodford**, Columbia University and NBER, “Are Low Interest Rates Deflationary? A Paradox of Perfect-Foresight Analysis” (NBER Working Paper No. [21614](#))
- **Valerie Ramey**, University of California, San Diego, and NBER, “Macroeconomic Shocks and Their Propagation: Monetary Policy Shocks”
- **Diego Anzoategui** and **Joseba Martinez**, New York University; **Diego A. Comin**, Dartmouth College and NBER; and **Mark Gertler**, New York University and NBER, “Endogenous Technology Adoption and R&D as Sources of Business Cycle Persistence”
- **Atif R. Mian**, Princeton University and NBER; **Amir Sufi**, University of Chicago and NBER; and **Emil Verner**, Princeton University, “Household Debt and Business Cycles Worldwide” (NBER Working Paper No. [21581](#))

Summaries of these papers are at: <http://www.nber.org/confer/2015/MEf15/summary.html>

Asset Pricing

The NBER’s Program on Asset Pricing met in Palo Alto on November 6. Research Associates Kent D. Daniel and Robert Hodrick of Columbia University organized the meeting. These papers were discussed:

- **David Backus**, New York University and NBER; **Nina Boyarchenko**, Federal Reserve Bank of New York; and **Mikhail Chernov**, University of California, Los Angeles, “Term Structures of Asset Prices and Returns”
- **Michael Weber**, University of Chicago, “The Term Structure of Equity Returns: Risk or Mispricing?”
- **Dong Lou** and **Christopher Polk**, London School of Economics, and **Spyros Skouras**, Athens University of Economics and Business, “A Tug of War: Overnight Versus Intraday Expected Returns”
- **Zhiguo He** and **Bryan T. Kelly**, University of Chicago and NBER, and **Asaf Manela**, Washington University in St. Louis, “Intermediary Asset Pricing: New Evidence from Many Asset Classes”
- **Ian Dew-Becker**, Northwestern University; **Stefano Giglio**, University of Chicago and NBER; **Anh T. Le**, Pennsylvania State University; and **Marius Rodriguez**, Federal Reserve Board, “The Price of Variance Risk” (NBER Working Paper No. [21182](#))
- **Nicolae B. Gârleanu**, University of California, Berkeley, and NBER, and **Lasse H. Pedersen**, Copenhagen Business School, “Efficiently Inefficient Markets for Assets and Asset Management” (NBER Working Paper No. [21563](#))

Summaries of these papers are at: <http://www.nber.org/confer/2015/APf15/summary.html>



Corporate Finance

The NBER’s Program on Corporate Finance met in Palo Alto on November 6. Research Associates Peter Demarzo of Stanford University and Bruce Carlin of University of California, Los Angeles, organized the meeting. These papers were discussed:

- **Christophe Pérignon**, HEC Paris, and **Boris Vallée**, Harvard University, “The Political Economy of Financial Innovation: Evidence from Local Governments”
- **Christopher Hennessy**, London Business School, and **Ilya A. Strebulaev**, Stanford University and NBER, “Beyond Random Assignment: Credible Inference of Causal Effects in Dynamic Economies”
- **Andrew Hertzberg**, Columbia University; **Andres Liberman**, New York University; and **Daniel Paravisini**, London School of Economics, “Adverse Selection on Maturity: Evidence from On-line Consumer Credit”
- **Ulf Axelson** and **Igor Makarov**, London School of Economics, “Informational Black Holes in Financial Markets”
- **Brad Barber** and **Ayako Yasuda**, University of California, Davis, “Interim Fund Performance and Fundraising in Private Equity”
- **Shai Bernstein**, Stanford University and NBER; **Emanuele Colonnelli**, Stanford University; and **Benjamin Iverson**, Northwestern University, “Asset Reallocation in Bankruptcy”
- **Xavier Giroud**, MIT and NBER, and **Joshua Rauh**, Stanford University and NBER, “State Taxation and the Reallocation of Business Activity: Evidence from Establishment-Level Data” (NBER Working Paper No. [21534](#))
- **Casey Dougal**, Drexel University; **Pengjie Gao**, University of Notre Dame; **William J. Mayew**, Duke University; and **Christopher A. Parsons**, University of California, San Diego, “What’s in a (School) Name? Racial Discrimination in Higher Education Bond Markets”

Summaries of these papers are at: <http://www.nber.org/confer/2015/CFf15/summary.html>

Labor Studies

The NBER’s Program on Labor Studies met in Palo Alto on November 13. Program Director David Card of the University of California, Berkeley, organized the meeting. These papers were discussed:

- **Magnus Carlsson** and **Dan-Olof Rooth**, Linnaeus University, and **Gordon Dahl**, University of California, San Diego, and NBER, “Do Politicians Change Public Attitudes?” (NBER Working Paper No. [21062](#))
- **Thomas Lemieux**, University of British Columbia and NBER, and **W. Craig Riddell**, University of British Columbia, “Top Incomes in Canada: Evidence from the Census” (NBER Working Paper No. [21347](#))
- **Danny Yagan**, University of California, Berkeley, and NBER, “Why Are Arizonans Still Out of Work? Long-Term Employment Depression after the 2007–2009 Recession”

Summaries of these papers are at: <http://www.nber.org/confer/2015/LSf15/summary.html>



Economics of Education

The NBER’s Program on the Economics of Education met in Cambridge on November 19–20. Program Director Caroline M. Hoxby of Stanford University organized the meeting. These papers were discussed:

- **Scott E. Carrell**, University of California, Davis, and NBER; **Mark Hoekstra**, Texas A&M University and NBER; and **Elira Kuka**, Southern Methodist University, “The Long-Run Effects of Disruptive Peers”
- **Robert Garlick**, Duke University, and **Joshua M. Hyman**, University of Connecticut, “Data vs Methods: Quasi-Experimental Evaluation of Alternative Sample Selection Corrections for Missing College Entrance Exam Score Data”
- **Gregorio S. Caetano** and **Hao Teng**, University of Rochester, and **Joshua Kinsler**, University of Georgia, “Towards Consistent Estimates of Children’s Time Allocation on Skill Development”
- **Eric Nielsen**, Federal Reserve Board, “Achievement Gap Estimates and Deviations from Cardinal Comparability”
- **George Bulman**, University of California, Santa Cruz, and **Caroline M. Hoxby**, “The Returns to the Federal Tax Credits for Higher Education” (NBER Working Paper No. [20833](#))
- **Douglas N. Harris**, Tulane University, and **Matthew Larsen**, Lafayette College, “The Effects of the New Orleans Post-Katrina School Reforms on Student Academic Outcomes”
- **Michael Dinerstein**, University of Chicago, and **Troy D. Smith**, RAND Corporation, “Quantifying the Supply Response of Private Schools to Public Policies”
- **Esteban M. Aucejo**, London School of Economics, and **Jonathan James**, California Polytechnic State University, “The Path to College Education: Are Verbal Skills More Important than Math Skills?”
- **Andrew C. Barr**, Texas A&M University, and **Sarah Turner**, University of Virginia and NBER, “Aid and Encouragement: Does a Letter Increase Enrollment among UI Recipients?”
- **Michael D. Bates**, University of California, Riverside, “Public and Private Learning in the Market for Teachers: Evidence from the Adoption of Value-Added Measures”
- **Luc Behaghel** and **Marc Gurgand**, Paris School of Economics, and **Clément de Chaisemartin**, University of Warwick, “Ready for Boarding? The Effects of a Boarding School for Disadvantaged Students”
- **Massimo Anelli**, Bocconi University, “Returns to Elite College Education: a Quasi-Experimental Analysis”
- **Richard Murphy**, University of Texas at Austin, and **Gill Wyness**, University College London, “Testing Means-Tested Aid”
- **Rodney Andrews**, University of Texas at Dallas and NBER; **Scott A. Imberman**, Michigan State University and NBER; and **Michael Lovenheim**, Cornell University and NBER, “The Effects of Targeted Recruitment and Comprehensive Supports for Low-Income High Achievers at Elite Universities: Evidence from Texas Flagships”

Summaries of these papers are at: <http://www.nber.org/confer/2015/EDf15/summary.html>



Behavioral Finance

The NBER’s Working Group on Behavioral Finance met in Cambridge on November 20. Working Group Director Nicholas Barberis of Yale University organized the meeting. These papers were discussed:

- **Samuel Hartzmark**, University of Chicago, and **Kelly Shue**, University of Chicago and NBER, “A Tough Act to Follow: Contrast Effects in Financial Markets”
- **Sergey Chernenko**, Ohio State University, and **Samuel Hanson** and **Adi Sunderam**, Harvard University and NBER, “Who Neglects Risk? Investor Experience and the Credit Boom”
- **Nicholas Barberis**; **Robin Greenwood** and **Andrei Shleifer**, Harvard University and NBER; and **Lawrence Jin**, California Institute of Technology, “Extrapolation and Bubbles”
- **Ian Gow**, Harvard University; **Steven Kaplan**, University of Chicago and NBER; **David Larcker**, Stanford University; and **Anastasia Zakolyukina**, University of Chicago, “CEO Personality and Firm Policies”
- **Umit Gurun**, University of Texas at Dallas; **Noah Stoffman**, Indiana University; and **Scott Yonker**, Cornell University, “Trust Busting: The Effect of Fraud on Investor Behavior”
- **Sandra Black**, University of Texas at Austin; **Paul Devereux**, University College Dublin; and **Petter Lundborg** and **Kaveh Majlesi**, Lund University, “On the Origins of Risk-Taking in Financial Markets” (NBER Working Paper No. [21332](#))

Summaries of these papers are at: <http://www.nber.org/confer/2015/BFf15/summary.html>

Organizational Economics

The NBER’s Working Group on Organizational Economics met in Cambridge on December 4–5. Group Director Robert S. Gibbons of MIT organized the meeting. These papers were discussed:

- **Sylvain Chassang**, Princeton University, and **Juan M. Ortner**, Boston University, “Collusion in Auctions with Constrained Bids: Theory and Evidence from Public Procurement”
- **Daron Acemoglu**, MIT and NBER, and **Alex Wolitzky**, MIT, “Sustaining Cooperation: Community Enforcement vs. Specialized Enforcement” (NBER Working Paper No. [21457](#))
- **John Antonakis** and **Christian Zehnder**, University of Lausanne; **Giovanna d’Adda**, Polytechnic University of Milan; and **Roberto Weber**, University of Zurich, “Just Words? Just Speeches? On The Economic Value of Charismatic Leadership”
- **Alexander Schmitt** and **Johannes Van Biesebroeck**, University of Leuven, “Governing Supply Relationships: Evidence from the Automotive Sector”
- **Laura Alfaro** and **Pol Antràs**, Harvard University and NBER; **Davin Chor**, National University of Singapore; and **Paola Conconi**, Université libre de Bruxelles, “Internalizing Global Value Chains: A Firm-Level Analysis” (NBER Working Paper No. [21582](#))
- **Francine Lafontaine**, University of Michigan, “Organizations and Policy”



- **Alexandre Mas**, Princeton University and NBER, “Does Disclosure affect CEO Pay Setting? Evidence from the Passage of the 1934 Securities and Exchange Act”
- **Emily L. Breza** and **Yogita Shamdasani**, Columbia University, and **Supreet Kaur**, Columbia University and NBER, “The Morale Effects of Pay Inequality”
- **Orie Shelef**, Stanford University, and **Amy Nguyen-Chyung**, University of Michigan, “Competing for Labor through Contracts: Selection, Matching, Firm Organization and Investments”
- **Gadi Barlevy**, Federal Reserve Bank of Chicago, and **Derek Neal**, University of Chicago and NBER, “Allocating Effort and Talent in Professional Labor Markets”

Summaries of these papers are at: <http://www.nber.org/confer/2015/OEf15/summary.html>

International Trade and Investment

The NBER’s Program on International Trade and Investment met in Palo Alto on December 4–5. Program Director Robert Feenstra of the University of California, Davis, organized the meeting. These papers were discussed:

- **Ana Fernandes** and **Martha Pierola**, World Bank; **Peter Klenow**, Stanford University and NBER; **Sergii Meleshchuk**, University of California, Berkeley, and **Andrés Rodríguez-Clare**, University of California, Berkeley, and NBER, “The Intensive Margin in Trade: Moving Beyond Pareto”
- **Paolo Bertoletti**, University of Pavia; **Federico Etro**, Ca’ Foscari University of Venice; and **Ina Simonovska**, University of California, Davis, and NBER, “International Trade with Indirect Additivity”
- **Carsten Eckel**, University of Munich, and **Stephen Yeaple**, Pennsylvania State University and NBER, “Is Bigger Better? Multi-product Firms, Labor Market Imperfections, and International Trade”
- **Treb Allen**, Northwestern University and NBER, and **David Atkin**, MIT and NBER, “Volatility, Insurance, and the Gains from Trade”
- **Jose Asturias**, Georgetown University; **Manuel García-Santana**, Université Libre de Bruxelles; and **Roberto Ramos**, Bank of Spain, “Competition and the Welfare Gains from Transportation Infrastructure: Evidence from the Golden Quadrilateral of India”
- **Ralph Ossa**, University of Chicago and NBER, “A Quantitative Analysis of Subsidy Competition in the U.S.” (NBER Working Paper No. [20975](#))
- **James Harrigan**, University of Virginia and NBER; **Ariell Reshef**, University of Virginia; and **Farid Toubal**, Paris School of Economics, “The March of the Techies: Technology, Trade, and Job Polarization in France, 1994–2007”
- **Wolfgang Keller**, University of Colorado Boulder and NBER, and **Håle Utar**, Bielefeld University, “International Trade and Job Polarization: Evidence at the Worker Level”

Summaries of these papers are at: <http://www.nber.org/confer/2015/ITIf15/summary.html>

Entrepreneurship

The NBER's Working Group on Entrepreneurship met in Cambridge on December 4. Group Director Antoinette Schoar of MIT and Research Associate Josh Lerner of Harvard University organized the meeting. These papers were discussed:

- **Deborah Goldschmidt**, Boston University, and **Johannes F. Schmieder**, Boston University and NBER, “The Rise of Domestic Outsourcing and the Evolution of the German Wage Structure” (NBER Working Paper No. 21366)
- **Tania Babina** and **Paige Ouimet**, University of North Carolina at Chapel Hill, and **Rebecca Zarutskie**, Federal Reserve Board, “Going Entrepreneurial? IPOs and New Firm Creation”
- **Ulf Axelson** and **Igor Makarov**, London School of Economics, “Informational Black Holes in Financial Markets”
- **Thomas J. Chemmanur**, Boston College; **Gang Hu**, Hong Kong Polytechnic University; and **Chaopeng Wu**, Xia Men University, “High Differentiation and Low Standardization: The Role of Venture Capitalists in Transforming the Management and Governance of Private Family Firms”
- **Serguey Braguinsky**, Carnegie Mellon University and NBER, and **David A. Hounshell**, Carnegie Mellon University, “History and Nanoeconomics in Strategy and Industry Evolution Research: Lessons from the Meiji-Era Japanese Cotton Spinning Industry”
- **William R. Kerr**, Harvard University and NBER, and **Martin Mandorff**, Swedish Competition Authority, “Social Networks, Ethnicity, and Entrepreneurship” (NBER Working Paper No. 21597)

Summaries of these papers are at: <http://www.nber.org/confer/2015/ENTf15/summary.html>

NBER Books

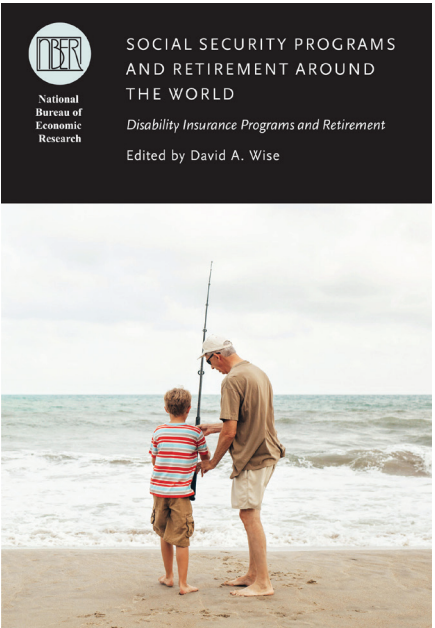
Social Security Programs and Retirement around the World: Disability Insurance Programs and Retirement

Edited by David A. Wise
National Bureau of Economic Research Conference Report
Cloth: \$130, e-book \$104

Even as life expectancy in many countries continues to increase, social security and similar government programs can prompt workers to leave the labor force when they reach the age of eligibility for benefits. Disability insurance programs can also play a significant role in the departure of older workers from the labor force, with many individuals in some countries relying on disability insurance until they are able to enter into full retirement.

The sixth stage of an ongoing research project studying the relationship between

social security programs and labor force participation, this volume draws on the work of an eminent group of international economists to consider the extent to which differences in labor force participation across countries are determined by the provisions of disability insurance programs. Presented in an easily comparable way, their research covers 12 countries, including Canada, Japan, and the United States, and considers the requirements of disability insurance programs, as well as other pathways to retirement.

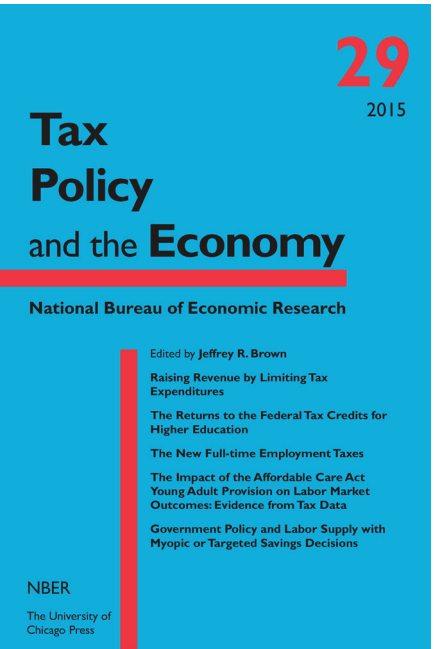


Tax Policy and the Economy, Volume 29

Edited by Jeffrey R. Brown
Cloth \$60, e-book \$48

The papers in Volume 29 of *Tax Policy and the Economy* illustrate the depth and breadth of taxation-related research by NBER research associates, both in terms of methodological approach and in terms of topics. In the first paper, former NBER President Martin Feldstein estimates how much revenue the federal government could raise by limiting tax expenditures in various ways, such as capping deductions and exclusions. The second paper, by George Bulman and Caroline Hoxby, makes use of a substantial expansion in the availability of education tax credits in 2009 to study whether tax credits have a significant causal effect on college atten-

dance and related outcomes. In the third paper, Casey Mulligan discusses how the Affordable Care Act (ACA) introduces or expands taxes on income and on full-time employment. In the fourth paper, Bradley Heim, Ithai Lurie, and Kosali Simon focus on the “young adult” provision of the ACA that allows young adults to be covered by their parents’ insurance policies. They find no meaningful effects of this provision on labor market outcomes. The fifth paper, by Louis Kaplow, identifies some of the key conceptual challenges to analyzing social insurance policies, such as Social Security, in a context in which shortsighted individuals fail to save adequately for retirement.



For information on ordering and electronic distribution, see <http://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 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

Nonprofit Org.
U.S. Postage
PAID
National Bureau of
Economic Research