

NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH

Reporter OnLine at: www.nber.org/reporter

2010 Number 4

Program Report

IN THIS ISSUE

Program Report	
Environmental and Energy Economics	1
Research Summaries	
Collegiate Attainment	7
The Economic Institutions of Water	10
... Managers and Managerial Biases	13
Empirical Analysis of Corruption	17
NBER Profiles	20
Conferences	22
NBER News	26
Program and Working Group Meetings	28
Bureau Books	38

Environmental and Energy Economics

Don Fullerton*

The NBER's Program on Environmental and Energy Economics (EEE) was initiated in 2007, but has grown to 80 members and 240 NBER Working Papers in less than three years. The Program's research is broad and diverse. Program members study topics as varied as pollution abatement technology, the role of "pollution havens," regulated electricity markets, pollution-tax incidence, and the effects of environmental policy on employment, morbidity, and mortality. Because this body of research is too broad and too diverse to summarize in one Program Report, I will touch on only a few topics here.

Gasoline Use and Vehicle Emissions

Numerous federal policies are directed at the reduction of gasoline consumption, with the aim being to improve environmental quality and to reduce oil imports. Recent research covers a range of such policies, including gasoline taxes, fuel-efficiency regulation, and alternative fuel subsidies. The current federal tax is 18.4 cents/gallon, with state taxes adding about 30 cents more. Changes to the tax at the state level are frequent, as are proposals to alter the federal tax. The sharp gasoline price increases experienced through 2008 offer a valuable source of variation for examining the influence of gasoline price on the vehicle fleet.

Meghan Busse, Christopher Knittel, and Florian Zettelmeyer use this price variation to examine changes in the price and composition of cars purchased.¹ They find that each \$1 increase in the gas price causes more than a 20 percent change in new car sales at the high and low end of fuel efficiency, and changes the resale price for used cars by as much as \$3000. Shanjun Li, Roger von Haefen, and Christopher Timmins investigate the effect on the

* Fullerton directs the NBER's Program on Environmental and Energy Economics and is Gutsell Professor in the Finance Department, Center for Business and Public Policy, and Institute of Government and Public Affairs at the University of Illinois.

NBER Reporter

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*

BOARD OF DIRECTORS

Chairman — *John S. Clarkeson*
Vice Chairman — *Kathleen B. Cooper*
Treasurer — *Robert Mednick*

DIRECTORS AT LARGE

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

DIRECTORS BY UNIVERSITY APPOINTMENT

George Akerlof, <i>California, Berkeley</i>	Mark Grinblatt, <i>California, Los Angeles</i>
Jagdish W. Bhagwati, <i>Columbia</i>	Marjorie B. McElroy, <i>Duke</i>
Glen G. Cain, <i>Wisconsin</i>	Joel Mokyr, <i>Northwestern</i>
Alan V. Deardorff, <i>Michigan</i>	Andrew Postlewaite, <i>Pennsylvania</i>
Ray C. Fair, <i>Yale</i>	Uwe E. Reinhardt, <i>Princeton</i>
Franklin Fisher, <i>MIT</i>	Craig Swan, <i>Minnesota</i>
John P. Gould, <i>Chicago</i>	David B. Yoffie, <i>Harvard</i>

DIRECTORS BY APPOINTMENT OF OTHER ORGANIZATIONS

Jean Paul Chavas, *Agricultural and Applied Economics Association*
Martin Gruber, *American Finance Association*
Ellen Hughes-Cromwick, *National Association for Business Economics*
Arthur B. Kennickell, *American Statistical Association*
Thea Lee, *American Federation of Labor and Congress of Industrial Organizations*
William W. Lewis, *Committee for Economic Development*
Robert Mednick, *American Institute of Certified Public Accountants*
Alan L. Olmstead, *Economic History Association*
John J. Siegfried, *American Economic Association*
Gregor W. Smith, *Canadian Economics Association*
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.

fleet as a whole, showing that each 10 percent increase from the \$2.34 per gallon price in 2005 generated improvements in fuel economy that were only 0.22 percent in the short run and 2 percent in the long run.²

Politically, direct mandates have proven more successful in achieving their goals than gasoline taxes. Still, recent increases in required fuel efficiency of about 30 percent by 2016 raise questions about technological feasibility. However, Knittel draws from a long time-series of vehicle characteristics, estimating shifts in the technological frontier of fuel economy, weight, and power,³ and finds that if technological progress since 1980 had been put toward fuel economy rather than weight and power, it could have reduced fuel use by 50 percent. Meeting the strict new rules may require little more than halting the observed increases in weight and horsepower, he concludes.

Lawrence Goulder, Mark Jacobsen, and Arthur van Benthem examine ambitious new state-level mandates on fuel economy.⁴ Fourteen states have agreed to improve fuel economy by about 45 percent for the 2020 model year, expecting large savings in gasoline use within their borders. Yet 65 to 75 percent of these savings may be offset in the rest of the country. Federal rules are applied nationwide, so more fuel economy in some states means that less is required elsewhere. This issue of overlapping jurisdictions also applies to low carbon fuel standards and to proposals for greenhouse gas reductions.

Some policies and proposals would encourage alternative fuels such as ethanol through subsidies, mandates, and standards. Stephen Holland, Knittel, and Jonathan Hughes examine the low carbon-fuel standard, a mandate on the average ethanol content of fuels in California.⁵ That standard implicitly taxes conventional fossil fuel and subsidizes ethanol; yet the impact of the subsidy component can outweigh the tax and result in more overall emissions of carbon dioxide. Other policies to encourage ethanol production avoid this effect.

Mandated increases in ethanol production from corn also create pressure on world food supplies. Michael Roberts and Wolfram Schlenker calculate that mandated ethanol production in the United States will consume 5 percent of world caloric production from corn, wheat, rice, and soybeans.⁶ They show that U.S. mandates alone could increase world food prices by 20 to 30 percent.

Each of these policies would alter miles driven and change the vehicle fleet, in turn influencing traffic congestion and trade patterns. Lucas Davis and Matthew Kahn study the trade in used vehicles to Mexico, showing that 2.5 million used vehicles were exported in the four years following the North American Free Trade Agreement.⁷ Policies that influence the future of the U.S. vehicle fleet therefore can be expected to affect the Mexican fleet, altering gasoline use in both countries.

Energy Markets

Heightened concerns about climate change have fuelled interest in making energy production and consumption more efficient and less carbon intensive. Leading climate policy proposals would price the externality, so that the cost of energy includes all social costs, but this approach presumes that current energy prices paid by consumers already reflect private supply costs. However, Lucas Davis and Eric Muehlegger document significant departures from marginal cost pricing in domestic natural gas markets.⁸ They estimate that residential and commercial gas customers face an average markup of more than 40 percent over the period 1991–2007.

A paper by Steven Davis, Cheryl Grim, John Haltiwanger, and Mary Streitwieser studies the electricity prices paid by U.S. manufacturing plants from 1963 to 2000.⁹ They document tremendous dispersion in electricity prices paid by manufacturers and they find that marginal supply costs exceed marginal prices for smaller manufacturing customers by 10 percent or more.

The energy sector also is affected by market failures associated with technology innovation and diffusion. Policies that aim to accelerate the development and adoption of clean energy technologies have become an important component of environmental policy more broadly. Gilbert Metcalf analyzes the impacts of incentives for energy investment offered under the Federal tax code.¹⁰ He concludes that the Federal production tax credit has played an important role in increasing investment in wind energy development over the past decade.

Asking a slightly different question, David Popp and Richard Newell posit that new investment in the development of climate change mitigation technologies comes at the expense of other investment.¹¹ Linking patent data and financial data by firm, they ask whether increases in alternative energy R and D are likely to represent new R and D spending, or how much of the additional climate change R and D comes at the expense of other types of patenting activity. Although they find evidence of crowding out for alternative energy firms, they also find that alternative energy patents are cited more frequently, and by a wider range of other technologies, than other patents by these firms, suggesting that their social value is higher.

In addition to environmental externalities and the imperfect appropriability of the returns to R and D, sub-optimal investment in energy efficiency and conservation may be the result of a series of market barriers, market failures, and cognitive failures. These distortions help to rationalize more prescriptive policy interventions, including appliance standards and building energy efficiency codes. EEE Program Members evaluate the impacts of these programs and test some of their underlying assumptions. Using detailed micro data from California, for example, Dora Costa and Matthew Kahn show that the phase-in of building codes in 1983 has effectively reduced residential electricity consumption.¹² Jacobsen and Kotchen analyze the impacts of a more recent building code change in Florida.¹³ Using household-level billing data from Gainesville, they conclude that the increased stringency of the energy code is associated with a statistically and economically significant reduction in both electricity and natural gas consumption.

Economic Effects of Environmental Policy

Environmental and energy policy can affect employment, productivity, and growth, as well as emissions and overall economic welfare. Alternative policies differ in terms of these effects, and therefore deserve study. These policies certainly

affect the price and availability of natural resources, including fisheries,¹⁴ land,¹⁵ water,¹⁶ and petroleum.¹⁷

Policies for environmental protection may affect the benefit or value of ecosystem services. Jared Carbone and Kerry Smith investigate how willingness to pay for such services depends on changes in demand for complementary market goods, where these demands can change with pollution regulations.¹⁸ As a result, partial equilibrium estimates differ from general equilibrium calculations. Arik Levinson matches survey happiness data with EPA air quality data to infer the dollar value of air quality.¹⁹ A major economic impact of environmental policies is their overall cost. Because air quality varies through the course of the year, Maureen Cropper and her co-authors demonstrate that costs can be reduced by limiting driving more on high-ozone days, for example by selling fewer permits to drive on those days.²⁰ Meredith Fowlie, Knittel, and Catherine Wolfram find higher marginal abatement costs for stationary sources than for mobile sources, indicating further cost reductions from reallocation of abatement between those sources.²¹

Environmental protection also has important effects on technology,²² trade,²³ and human health. Using random variations in annual temperature, Olivier Deschênes and Michael Greenstone find that climate change could raise the annual mortality rate from 0.5 percent to 1.7 percent by the end of the twenty-first century, a modest amount that is not statistically significant, except for infants.²⁴ Janet Currie and Reed Walker estimate health damages from congestion-related air pollution.²⁵ They exploit changes in congestion from the introduction of electronic toll collection. As a result of the improved traffic flow, they find that mothers living within two kilometers of toll stations experience more than a 10 percent reduction in the incidence of low birth weight.

The EEE group also studies the distribution of the costs of environmental policy. Some researchers use partial equilibrium or input-output models to calculate the effects of increased energy

costs on output prices, finding regressive effects.²⁶ Others use computable general equilibrium (CGE) models to find effects on factor prices as well as output prices.²⁷ Still others use analytical general equilibrium models with few sectors to solve for expressions that show how parameters affect output prices and factor prices²⁸ and other researchers investigate redistributions between generations,²⁹ between locations,³⁰ or between ethnic groups.³¹

Absent coordinated and harmonized global climate change policy, emissions regulation imposed in one jurisdiction may lead to increases in emissions in other jurisdictions that are less stringently regulated. Meredith Fowlie analyzes the potential for this emissions “leakage” from California’s electricity sector under a source-based cap-and-trade program. Regulation that exempts out-of-state producers achieves approximately one third of the emissions reductions achieved under complete regulation, at more than twice the cost per ton of emissions abated.

James Bushnell and Yihsu Chen develop a regional model of the power sector in the western United States.³² They examine the impacts of alternative cap-and-trade designs on operations, emissions, and electricity prices. Even when the scope of the cap-and-trade program is expanded to include seven western states, they find, emissions leakage in the electricity sector could still be significant. They provide evidence to suggest that emissions leakage could be mitigated significantly by making permit allocations contingent upon past electricity production choices.

Finally, environmental and energy policy may be able to reduce uncertainty. Martin Weitzman first noted the importance of a “fat-tail” probability distribution for damages, such that a climate catastrophe might have low probability but also very high damages that outweigh the effects of discounting.³³ The importance of the possible catastrophe then depends on risk aversion in utility. Constant relative risk aversion means that marginal utility is unbounded, and society would pay huge amounts to avoid a major catastrophe. Robert Pindyck finds that once marginal utility is bounded, extreme results

disappear, and a thin-tailed distribution can yield higher willingness to pay for abatement.³⁴

The Design and Implementation of U.S. Climate Policy

Although academic environmental economists like to discuss major conceptual issues in the choice between pollution taxes, permit systems, or command and control mandates,³⁵ the U.S. House of Representatives in June of 2009 passed actual climate policy legislation. The choices are no longer just conceptual, but involve many small aspects of policy design that collectively determine the effectiveness of the policy. For this reason, Catherine Wolfram and I organized an NBER conference in Washington D.C. in May 2010, which focused on the actual problem of policymakers trying to design climate legislation.

In their paper for the conference, Lawrence Goulder and Robert Stavins show how federal policy interacts with state and local policy to control greenhouse gas (GHG) emissions.³⁶ For cap-and-trade legislation, a regional policy reduces pressure on federal constraints and allows polluters in other regions to increase emissions.

With a carbon tax, however, a particular region can have a stricter policy without that leakage. Kahn points out that cities have policies affecting carbon emissions, too.³⁷ Zoning rules may encourage urban density, for example, which can reduce commuting, residential unit sizes, and thus energy use.

Lucas Davis points out that the House Bill also tightens energy efficiency standards for consumer appliances.³⁸ Such standards are not necessary if higher energy prices encourage energy-efficient appliances, but they may help if landlords buy cheap inefficient appliances because renters pay electric bills. Controlling for household income and characteristics using household-level data, Davis finds that renters are significantly less likely to have efficient appliances.

Kotchen studies the effects of voluntary programs on “green electricity” adop-

tion.³⁹ Knittel and Ryan Sandler analyze the effects of carbon pricing on GHG emissions from the transportation sector; they find large effects of gasoline prices on consumer choices both about vehicle miles travelled and about when to scrap older vehicles.⁴⁰ Other papers prepared for the conference analyze distributional effects,⁴¹ interactions of climate policy with other regulations,⁴² and issues of monitoring and enforcement.⁴³

Continuing with the details of cap-and-trade policy, Meredith Fowlie looks at whether eligibility for output-based allocation of permits might be based on energy intensity and import penetration in a way that would mitigate adverse impacts on international competitiveness.⁴⁴ Robertson Williams analyzes the time-profile of climate policies, finding efficiency reasons for phase-in of a permit policy but not for a carbon tax.⁴⁵ Erin Mansur looks at reasons to implement climate policy downstream (on emissions) rather than upstream (on the carbon content of coal, natural gas, and petroleum).⁴⁶

Climate policy is likely to have other effects as well. Stephen Holland shows how carbon emission restrictions might have output effects that reduce other pollutants, or substitution effects that increase other pollutants.⁴⁷ Olivier Deschênes notes that higher industrial energy costs may affect labor demand; he uses 30 years of data to estimate a cross-price elasticity of -0.15 to -0.08, implying that the proposed bill’s 3 percent increase in electricity prices might result in 0.3 percent less employment in the short run.⁴⁸ Charles Kolstad looks at incentives for R and D, showing that a permit system can allow the innovator to capture the gains from innovation, while a tax system might not.⁴⁹

The design of climate policy also must account for international considerations. Kala Krishna uses a general equilibrium model to draw analogies between emission permit restrictions and quotas or other trade restrictions, with effects on output prices, factor prices, and traded quantities.⁵⁰ Besides the effects on traded goods, climate policy might create trade in “offsets,” with problems that are ana-

lyzed by James Bushnell.⁵¹ More broadly looking at all natural-carbon cycles, Severin Borenstein notes that many types of human activities could have indirect as well as direct effects on climate, in ways that might be very difficult to regulate.⁵²

V. Kerry Smith suggests that besides introducing carbon pricing, climate policy might provide incentives for adaptation.⁵³ Changes in climate will affect the demand for substitutes, for example when variations between normal and dry periods change the residential demand for water.

Finally, Michael Roberts and Wolfram Schlenker look at the effects of climate change on agricultural output.⁵⁴ While average yields have risen over past decades, crop tolerance to extreme heat has not. Unfortunately, climate change may significantly reduce yields under current technologies.

¹ M. R. Busse, C. R. Knittel, and F. Zettelmeyer, "Pain at the Pump: The Differential Effect of Gasoline Prices on New and Used Automobile Markets," NBER Working Paper No. 15590, December 2009.

² S. Li, R. von Haefen, and C. Timmins, "How Do Gasoline Prices Affect Fleet Fuel Economy?" NBER Working Paper No. 14450, October 2008, and *American Economic Journal: Economic Policy*, 1(2), August 2009, pp. 113–37.

³ C. R. Knittel, "Automobiles on Steroids: Product Attribute Trade-Offs and Technological Progress in the Automobile Sector," NBER Working Paper No. 15162, July 2009, and forthcoming in the *American Economic Review*.

⁴ L. Goulder, M. Jacobsen, and A. van Benthem "Unintended Consequences from Nested State & Federal Regulations: The Case of the Pavley Greenhouse-Gas-per-Mile Limits," NBER Working Paper No. 15337, September 2009.

⁵ S. Holland, C. Knittel, and J. Hughes, "Greenhouse Gas Reductions under Low Carbon Fuel Standards?" NBER Working Paper No. 13266, July 2007, and *American Economic Journal: Economic Policy*, 1(1), February 2009, pp. 106–46.

⁶ M. Roberts and W. Schlenker,

"Identifying Supply and Demand Elasticities of Agricultural Commodities: Implications for the US Ethanol Mandate," NBER Working Paper No. 15921, April 2010.

⁷ L. Davis and M. Kahn, "International Trade in Used Durable Goods: The Environmental Consequences of NAFTA," NBER Working Paper No. 14565, December 2008, and forthcoming in the *American Economic Journal: Economic Policy*.

⁸ L. W. Davis and E. Muehlegger, "Do Americans Consume Too Little Natural Gas? An Empirical Test of Marginal Cost Pricing," NBER Working Paper No. 15885, April 2010, forthcoming in the *RAND Journal of Economics*.

⁹ S. J. Davis, C. Grim, J. Haltiwanger, and M. Streitwieser, "Electricity Pricing to U.S. Manufacturing Plants, 1963–2000," NBER Working Paper No. 13778, February 2008.

¹⁰ G. E. Metcalf, "Investment in Energy Infrastructure and the Tax Code," NBER Working Paper No. 15429, October 2009, and *Tax Policy and the Economy* 24, 2010, pp. 1–33.

¹¹ D. Popp and R. G. Newell, "Where Does Energy R&D Come From? Examining Crowding Out from Environmentally-Friendly R&D," NBER Working Paper No. 15423, October 2009.

¹² D. L. Costa and M. E. Kahn, "Why Has California's Residential Electricity Consumption Been So Flat since the 1980s? A Microeconomic Approach," NBER Working Paper No. 15978, May 2010.

¹³ G. D. Jacobsen and M. J. Kotchen, "Are Building Codes Effective at Saving Energy? Evidence from Residential Billing Data in Florida," NBER Working Paper No. 16194, July 2010.

¹⁴ R. T. Deacon, D. P. Parker, and C. Costello, "Overcoming the Common Pool Problem through Voluntary Cooperation: The Rise and Fall of a Fishery Cooperative," NBER Working Paper No. 16339, September 2010.

¹⁵ H. Sigman, "Environmental Liability and Redevelopment of Old Industrial Land," NBER Working Paper No. 15017, May 2009, and *Journal of Law and*

Economics, 53, May 2010, pp. 289–306.

¹⁶ S. Olmstead, W. M. Hanemann, and R. N. Stavins, "Water Demand under Alternative Price Structures," NBER Working Paper No. 13573, November 2007, and *Journal of Environmental Economics and Management*, 54, 2007, pp. 181–98.

¹⁷ J. D. Hamilton, "Causes and Consequences of the Oil Shock of 2007–8," NBER Working Paper No. 15002, May 2009, and "Understanding Crude Oil Prices," NBER Working Paper No. 14492, November 2008, and *The Energy Journal*, 30(2), 2009, pp. 179–06.

¹⁸ J. C. Carbon and V. K. Smith, "Valuing Ecosystem Services in General Equilibrium," NBER Working Paper No. 15844, March 2010.

¹⁹ A. Levinson, "Valuing Public Goods Using Happiness Data: The Case of Air Quality," NBER Working Paper No. 15156, July 2009.

²⁰ M. L. Cropper, Y. Jiang, A. Alberini, and P. Baur, "Getting Cars off the Road: The Cost-Effectiveness of an Episodic Pollution Control Program," NBER Working Paper No. 15904, April 2010.

²¹ M. Fowlie, C. R. Knittel, and C. Wolfram, "Sacred Cars? Optimal Regulation of Stationary and Non-stationary Pollution Sources," NBER Working Paper No. 14504, November 2008.

²² W. D. Nordhaus, "The Perils of the Learning Model For Modeling Endogenous Technological Change," NBER Working Paper No. 14638, January 2009.

²³ A. Levinson, "Technology, International Trade, and Pollution from U.S. Manufacturing," NBER Working Paper No. 13616, November 2007, and *American Economic Review*, 99(5), December 2009, pp. 2177–92.

²⁴ O. Deschênes and M. Greenstone, "Climate Change, Mortality, and Adaptation: Evidence from Annual Fluctuations in Weather in the US," NBER Working Paper No. 13178, June 2007.

²⁵ J. Currie and R. Walker, "Traffic Congestion and Infant Health: Evidence from E-ZPass," NBER Working Paper No. 15413, October 2009, and forthcoming in

the American Economic Journal: Applied Economics.

²⁶ Three examples include: S. Borenstein, "The Redistributive Impact of Non-linear Electricity Pricing", NBER Working Paper No. 15822, March 2010; K. A. Hassett, A. Mathur, and G. E. Metcalf, "The Incidence of a U.S. Carbon Tax: A Lifetime and Regional Analysis", NBER Working Paper No. 13554, October 2007, and The Energy Journal, 30(2), pp. 155–178; and C. A. Grainger and C. D. Kolstad, "Who Pays a Price on Carbon?", NBER Working Paper No. 15239, August 2009 and Environmental & Resource Economics, 46(3), July 2010, pp. 359–76.

²⁷ S. Rausch, G. E. Metcalf, J. M. Reilly, and S. Paltsev, "Distributional Implications of Alternative U.S. Greenhouse Gas Control Measures", NBER Working Paper No. 16053, June 2010, and The B.E. Journal of Economic Analysis & Policy, 10(2).

²⁸ D. Fullerton and G. Heutel, "Analytical General Equilibrium Effects of Energy Policy on Output and Factor Prices," NBER Working Paper No. 15788, February 2010, and The B.E. Journal of Economic Analysis & Policy, 10(2). See also D. Fullerton and H. Monti, "Can Pollution Tax Rebates Protect Low-Income Families? The Effects of Relative Wage Rates", NBER Working Paper No. 15935, April 2010.

²⁹ L. H. Summers and R. J. Zeckhauser, "Policymaking for Posterity," NBER Working Paper No. 14359, September 2008, and Journal of Risk and Uncertainty, 37(2), pp. 115–40.

³⁰ N. V. Kuminoff, V. K. Smith, and C. Timmins, "The New Economics of Equilibrium Sorting and its Transformational Role for Policy Evaluation," NBER Working Paper No. 16349, September 2010.

³¹ H. S. Banzhaf and R. P. Walsh, "Segregation and Tiebout Sorting: Investigating the Link between Investments in Public Goods and Neighborhood Tipping", NBER Working

Paper No. 16057, June 2010.

³² J. B. Bushnell and Y. Chen, "Regulation, Allocation, and Leakage in Cap-and-Trade Markets for CO₂", NBER Working Paper No. 15495, November 2009.

³³ M. L. Weitzman, "On Modeling and Interpreting the Economics of Catastrophic Climate Change," Review of Economics and Statistics, 91(1), February, 2009, pp. 1–19. Also see M. L. Weitzman, "GHG Targets as Insurance against Catastrophic Climate Damages", NBER Working Paper No. 16136, June 2010.

³⁴ R. S. Pindyck, "Fat Tails, Thin Tails, and Climate Change Policy", NBER Working Paper No. 16353, September 2010.

³⁵ See, for example, L. Kaplow, "Taxes, Permits, and Climate Change", NBER Working Paper No. 16268, August 2010.

³⁶ L. H. Goulder and R. Stavins, "Interactions of State and Federal Climate Change Policies", NBER Working Paper 16123, June 2010.

³⁷ M. E. Kahn, "Urban Policy Effects on Carbon Mitigation," NBER Working Paper No. 16131, June 2010.

³⁸ L. W. Davis, "Evaluating the Slow Adoption of Energy Efficient Investments: Are Renters Less Likely to Have Energy Efficient Appliances?" NBER Working Paper 16114, June 2010.

³⁹ M. J. Kotchen, "Climate Policy and Voluntary Initiatives: An Evaluation of the Connecticut Clean Energy Communities Program", NBER Working Paper No. 16117, June 2010.

⁴⁰ C. R. Knittel and R. Sandler, "Carbon Prices and Automobile Greenhouse Gas Emissions: The Extensive and Intensive Margins", NBER Working Paper No. 16482, October 2010.

⁴¹ G. E. Metcalf, A. Mathur, and K. A. Hassett, "Distributional Impacts in a Comprehensive Climate Policy Package", NBER Working Paper No. 16101, June 2010.

⁴² A. Levinson, "Belts and Suspenders: Interactions among Climate Policy Regulations", NBER Working Paper No.

16109, June 2010.

⁴³ H. Sigman, "Monitoring and Enforcement of Climate Policy", NBER Working Paper No. 16121, June 2010.

⁴⁴ M. Fowlie, "Updating the Allocation of Greenhouse Gas Emissions Permits in a Federal Cap-and-Trade Program", NBER Working Paper No. 16307, August 2010.

⁴⁵ R. C. Williams, "Setting the Initial Time-Profile of Climate Policy: The Economics of Environmental Policy Phase-Ins", NBER Working Paper No. 16120, June 2010.

⁴⁶ E. T. Mansur, "Upstream versus Downstream Implementation of Climate Policy", NBER Working Paper No. 16116, June 2010.

⁴⁷ S. P. Holland, "Spillovers from Climate Policy", NBER Working Paper No. 16158, July 2010.

⁴⁸ O. Deschênes, "Climate Policy and Labor Markets", NBER Working Paper No. 16111, June 2010. Employment effects are also studied by J. Graff-Zivin and M. J. Neidell, "Temperature and the Allocation of Time: Implications for Climate Change", NBER Working Paper No. 15717, February 2010.

⁴⁹ C. D. Kolstad, "Regulatory Choice with Pollution and Innovation", NBER Working Paper No. 16303, August 2010.

⁵⁰ K. Krishna, "Limiting Emissions and Trade: Some Basic Ideas", NBER Working Paper No. 16147, July 2010.

⁵¹ J. B. Bushnell, "The Economics of Carbon Offsets", NBER Working Paper No. 16305, August 2010.

⁵² S. Borenstein, "Markets for Anthropogenic Carbon within the Larger Carbon Cycle", NBER Working Paper No. 16104, June 2010.

⁵³ V. K. Smith, "How Can Policy Encourage Economically Sensible Climate Adaptation?" NBER Working Paper No. 16100, June 2010.

⁵⁴ M. J. Roberts and W. Schlenker, "Is Agricultural Production Becoming More or Less Sensitive to Extreme Heat? Evidence from U.S. Corn and Soybean Yields", NBER Working Paper No. 16308, August 2010.

Collegiate Attainment: Understanding Degree Completion

John Bound and Sarah Turner*

Collegiate attainment has not kept pace with increases in the demand for skilled workers in the United States. The widely-noted increase in the wage premium to college completion since the 1970s has led to a substantial expansion in the number of students attending college, although the number of students *completing* college has not increased commensurately.¹ In fact, among those aged 25–34, the share of high school graduates who had enrolled in college increased from just under 50 percent to over 68 percent between 1975 and 2009, while the percent of those enrolled who completed a four-year degree actually fell slightly, from 54.7 percent to 53.2 percent.² Moreover, students who do complete degrees now do so at a slower rate than those in earlier generations.³

While overall college completion rates have stagnated, gaps in collegiate attainment by parental circumstances actually have widened, with the persistently low college graduation rate among low-income students contributing to the stagnation in the growth of the supply of college-educated workers in recent decades.⁴ Moreover, changes in degree attainment have not been uniform across different types of colleges and universities. College completion rates have declined, and time to degree has increased most markedly, among students begin-

ning their studies at community colleges and public institutions outside the most selective flagship universities.

Broadly speaking, collegiate attainment is determined by the interaction of student attributes (the “demand side”) and institutional characteristics (the “supply side”). Our analyses consider how these different factors affect degree completion and time to degree receipt. *Both* student characteristics and institutional resources play a substantial role in the determination of these college outcomes.

Evidence on Determinants of Degree Attainment

On the demand-side, the pre-collegiate preparation of potential college students often is cited as one of the most significant barriers to degree completion. Given substantial increases in college going, one might hypothesize that if students with weaker preparation were induced to attend college, they would finish college at a lower rate and a slower pace, and it is probable that a lower proportion of students would finish college.

Using data from two longitudinal surveys—the National Longitudinal Survey of the High School Class of 1972 (NLS72) and the National Educational Longitudinal Study (NELS: 88)—to measure degree attainment, we find that students with relatively low academic achievement in both cohorts are unlikely to complete the BA degree.⁵ There is no question that the cross-cohort increase in the share of students with weak preparation affected the aggregate college completion rate; we estimate that about one third of the cross-cohort decline in completion rates can be explained by the change in student preparation.⁶

While models of educational attain-

ment typically consider a perfectly elastic supply side of the education market, evidence of substantial stratification in degree outcomes and resources has motivated us to consider the distribution of resources as a way of explaining changes in degree attainment. In the United States, there is considerable (and increasing) stratification in the level of resources provided by colleges and universities, and many of these resources come from public and private subsidies beyond tuition.⁷ Limited changes in enrollment in response to increased demand, particularly at the most selective and resource-intensive colleges and universities, demonstrate that the supply-side of the higher education market is not perfectly elastic.⁸

Substantial differences in institutional resources by broad type of institution—distinguishing institutions by selectivity, public control, and two-year versus four-year degree programs—are closely coupled with differences in college completion rates. Students from the 1992 high school cohort first attending selective private colleges and universities graduated at a rate over 90 percent; those attending open-access public four-year institutions completed at a rate less than 57 percent; while those starting at community colleges completed at a rate of only 17.6 percent. Still, for these students, median expenditures per student were 2.7 times greater at the private universities than at the open-access public universities, and 5.2 times greater than at community colleges. To be sure, these observed differences also incorporate differences in student attributes, although the differences in completion rates by institutional type and resources per student, adjusted for student achievement, remain quantitatively large. After adjusting for student achievement, we predict a completion rate advantage (relative to attend-

*Bound and Turner are Research Associates in the NBER's Program on Education. Bound also is Research Professor, Population Studies Center, and George E. Johnson Collegiate Professor of Economics, at the University of Michigan. Turner is University Professor of Economics & Education at the University of Virginia. Her profile appears later in this issue.

ing a less selective public) of 35 percentage points for attending a highly selective private school and a completion rate advantage of about 24 percentage points for attending a top-50 public university. The penalty in the likelihood of completion that is associated with attending a community college is about 32 percentage points.

Significant changes in the distribution of students among different types of institutions—with students attending college more recently concentrated among public universities outside the flagship universities and community colleges—and erosion in resources per student at these institutions are quantitatively important in explaining the decline in college completion rates.

While the median college entrant experienced a decline in resources between the high school class of 1972 and the high school class of 1992, students at private colleges and universities were likely to experience a notable *increase* in instructional expenditures per student. Also, while the college completion rate fell overall during these years, this aggregate result combines the rise in completion rates at relatively resource-intensive institutions (private colleges and top public universities) and the fall in completion rates for students starting at less selective public four-year colleges and community colleges. Finally, the distribution of students among institutions shifted dramatically over this interval with a relative increase in the share of students beginning at community colleges and a decline in the share of students beginning at the more selective four-year institutions.⁹ Our estimates suggest that these changes on the supply-side of the market can explain the majority of observed decline in completion rates.

It is important to emphasize that the demand-side and supply-side explanations just described are not mutually exclusive: less-prepared students sort into the most elastic sectors of higher education with the fewest resources. In essence, increased demand for college crowds more students (and more of the less prepared students) into community colleges and non-top 50 public universities. Therefore, demand increases not only lower the resources per student at these institutions, but also cause higher dispersion in resources across the sectors of higher

education. While those institutions with the greatest resources are unlikely to expand enrollment along with increases in student demand, the open-access public institutions and community colleges are relatively elastic in supply.

Understanding Increased Time to Degree Attainment

Among those students who do complete college degrees, the time needed for degree completion has increased markedly in recent decades. For those completing a bachelor's degree, time to degree has increased by about one third of a year, with the proportion of completers finishing in four years has fallen from 57.8 percent to 43.6 percent. While declining achievement of entering students accounts for some of the decline in completion rates, it accounts for little of the observed change in time to degree because the most poorly prepared students are unlikely to complete college at all.

Extended time to degree is most pronounced among students starting their studies at public colleges and universities, particularly outside the flagship universities. Erosion of resources per student in the public sector partly explains extended time to degree: for example, limited course offerings, particularly for “gateway” courses that are prerequisites for degree progress, leave some students with less than full loads or enrolling in courses that do not meet degree requirements.

Widely-noted increases in college costs, with real tuition costs at four-year universities rising by more than 250 percent over three decades, also may limit the progression through degree programs, especially if credit constraints lead students to increase employment at the cost of reductions in the rate of credit attainment. There is no question that the number of hours worked by college students has increased in recent decades. Between 1972 and 1992, average weekly hours worked (unconditional) among those enrolled in college increased by about 2.9 hours, from 9.5 to 12.4, as measured for 18–21 year old college students in the October Current Population Survey, with a further increase to 13.2 hours per week evident in 2005. Estimating the effect

of working while in school on collegiate attainment is difficult because the decision to work and the choice of hours of employment are endogenous, but the available evidence suggests that credit constraints and rising college costs are strongly linked to the extension of time to degree.

Research Opportunities and Unanswered Questions in the Economics of Higher Education

Looking forward, we know that college completion is a critical input for individual labor market success and economic growth. However, the question of whether reasoned investments at the post-secondary level can appreciably change the number of college graduates entering the labor force is more complicated. Substantial further investments to increase college enrollment are not likely to have an appreciable effect on the number of college graduates. While the numbers are not zero, we find little evidence of large numbers of students well-prepared to complete college who are not already enrolling. Where there are substantial potential opportunities to improve outcomes, they are at the margin of college choice and in the pathway to degree attainment. With aggregate completion rates a little above 50 percent, there appear to be ample opportunities to increase persistence to degree completion. Plainly there are large differences in degree completion associated with collegiate resources and, as the stratification in collegiate resources has increased in recent decades, so too has the difference among institutions in degree outcomes.

Our review of the evidence suggests a number of unexplored areas for economic research related to college choice, in-college attainment, and the supply-side determinants of stratification and resources per student. First, with respect to college choice, it is well-documented that many students—particularly those from the least advantaged circumstances—who appear well-prepared to benefit from resource-intensive college experiences, instead attend colleges and universities with low funding levels and

poor graduation prospects. While it is widely suggested that there is a “market failure” in the college choice process, the barriers to optimal choice are poorly understood. Second, how in-college experiences and the organization of the college “production function” affect attainment remain questions that are not well-addressed in the current research literature. Variation in completion rates is associated with institutional resources, but it is far from clear “how” and “why” resources affect collegiate attainment. There is also much to learn, both substantively and methodologically, from recent efforts concentrated on in-depth longitudinal experiences, such as the work of Stinebrickner and Stinebrickner.¹⁰

Finally, the unique mixed-market institutional structure of higher education in the United States—with a combination of non-profit, for-profit, and public providers and a mix of funding from student, philanthropic, state, and federal sources—presents many challenges for textbook models of organizational behavior and industrial organization. Both theoretical innovations and empirical evidence can be brought to explaining the nature of competition in the higher education market, the level of stratification among institutional offerings, and student outcomes. As we emphasized here and in other work, the stratification of resources in higher education has increased dramatically in the last three decades among U.S. institutions.¹¹ These substantial changes in the distribution of resources likely have important implications for degree receipt and future returns, especially given that a substantial share of enrollment expansion has occurred at community colleges and open-access public institutions.

Indeed, given the importance of market structure in determining the distribution of resources among students, there are rich opportunities for applied theoretical work that builds on the framework set forth in papers like Rothschild and White, which incorporates market imperfections such as limited access to credit markets and information barriers.¹² The questions of “who pays?” and “who benefits?” were first asked in higher edu-

cation nearly four decades ago, but the answers remain somewhat elusive. Better economic analysis and additional evidence on these questions holds the promise of increasing collegiate attainment and improving the allocation of resources.¹³ The current challenge is to identify innovative, evidence-based reform initiatives to increase the productivity and the rate of degree attainment in higher education, rather than meeting national targets of degree attainment by lowering standards, which would ultimately limit the capacity of these institutions to function effectively as engines of economic growth.

¹ D. Autor, *The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings*, Washington, D.C.: Center for American Progress and The Hamilton Project, 2010; C. Goldin and L. Katz, *The Race between Education and Technology*, Cambridge, MA: Harvard University Press, 2008.

² Figures are from CPS Historical Time Series Table A-1. *Years of School Completed by People 25 Years and Over, by Age and Sex: Selected Years 1940 to 2009*. At <http://www.census.gov/hhes/socdemo/education/data/cps/historical/index.html>.

³ J. Bound, M. Lovenheim, and S. Turner, “Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources,” NBER Working Paper No. 15566, December 2009, and *American Economic Journal: Applied Economics*, 2(3), (2010), pp. 129–57.

⁴ W. Bowen, M. Chingos, and M. McPherson, *Crossing the Finish Line: Completing College at America’s Public Universities*, Princeton: Princeton University Press, 2009; C. Goldin and L. Katz, *The Race between Education and Technology*, Cambridge, MA: Harvard University Press, 2008.

⁵ *In the bottom quartile of the test score distribution, the likelihood of attending college increases from 21.7 percent to 44.0 percent, which is consistent with a larger percentage of less-prepared students attending college in the later cohort in order to take advantage of the rising returns to education. However, among this group, only 5.6 percent in the initial period of observation receive a B.A., and this*

percent falls yet further to 5.0 percent for the later cohort. Focusing on college attendees, the likelihood of completing a B.A. declined from 25.8 percent to 11.4 percent across cohorts for those in the bottom quartile of math test scores, while the graduation rate for the best prepared students actually increased somewhat (from 66.8 percent to 73 percent).

⁶ J. Bound, M. Lovenheim, and S. Turner, “Increasing Time to Baccalaureate Degree in the United States,” NBER Working Paper No. 15892, April 2010.

⁷ G. Winston, “Subsidies, Hierarchy, and Peers: The Awkward Economics of Higher Education,” *Journal of Economic Perspectives* 13(1), (1999), pp. 13–36; J. Bound and S. Turner, “Cohort Crowding: How Resources Affect Collegiate Attainment,” NBER Working Paper No. 12424, August 2006, and *Journal of Public Economics*, 91(5–6), (2007), pp. 877–99.

⁸ J. Bound and S. Turner, “Cohort Crowding: How Resources Affect Collegiate Attainment.”

⁹ *Between college entrants from the high school class of 1972 and the high school class of 1992, the share starting at community colleges increased from 31.2 percent to 43.71, the share beginning at public four-year institutions declined from 46.7 percent to 37.6 percent, and the share beginning at private four-year institutions declined from 22.1 percent to 18.7 percent.* In J. Bound, M. Lovenheim, and S. Turner, “Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources,” *op cit*.

¹⁰ R. Stinebrickner and T. Stinebrickner, “Learning About Academic Ability and the College Drop-Out Decision,” NBER Working Paper No. 14810, August 2009; “The Effect of Credit Constraints on the College Drop-Out Decision: A Direct Approach Using a New Panel Study,” NBER Working Paper No. 13340, August 2007, and *American Economic Review* 98(5), (2008), pp. 2163–84; and “Working during School and Academic Performance,” *Journal of Labor Economics*, 21(2), (2003), pp. 449–72.

¹¹ C. Hoxby, “The Changing Selectivity of American Colleges and Universities: Its Implications for Students, Resources, and Tuition,” NBER Working Paper No. 15546, October 2009, and *Journal of Economic*

Perspectives, 23(4), (2009), pp. 95–118; J. Bound, B. Hershbein, and B. Long, “Playing the Admissions Game: Student Reactions to Increasing College Competition,” NBER Working Paper No. 15272, August 2009; C. Hoxby, “How the Changing Market Structure of U.S. Higher Education

Explains College Tuition,” NBER Working Paper No. 6323, December 1997.

¹² M. Rothschild and L. White, “The Analytics of the Pricing of Higher Education and Other Services in Which the Customers Are Inputs,” *Journal of Political Economy*, 103(3), (1995), pp. 573–86.

¹³ L. Hansen and B. Weisbrod, “The Distribution of Costs and Direct Benefits of Public Higher Education: The Case of California,” *Journal of Human Resources*, 4(2), (1969), pp. 176–91.

The Economic Institutions of Water

Gary Libecap*

There is increasing concern about the availability of fresh water worldwide as demand grows and as supplies become more uncertain because of climate change.¹ With rising per capita incomes and growing populations, human consumption of water is rising while the demands for water for agriculture, manufacturing, recreation, and the environment also are increasing.

More than other natural resources, water is allocated and used through an institutional framework that is important for analyzing “the economics of water.” In the United States and elsewhere, property rights to water generally are not well defined because of the high resource costs involved and the political costs associated with equity and the demands for public goods. Accordingly, markets are less active than one might expect for this critical and increasingly valuable asset.² Decisions about water often are made through judicial, legislative, and bureaucratic processes, without direct price and cost considerations, which results in waste and misallocation.

My research has examined water rights, exchange negotiations, markets, and regu-

lation in the semi-arid U.S. West in order to better understand the institutional constraints that influence water distribution, use, and investment. In many cases there are important historical legacies that affect how those institutions have developed and operate today.

Limited Markets

Although the western United States has some of the most active water markets in the world, large price differences between agricultural water, where as much as 80 percent of annual consumption takes place, and urban water illustrate the potential for further gains from trade. Additionally, as Grafton, Landry, O’Brien, and I show, water markets are much more active in the Murray-Darling River Basin of south eastern Australia than in the U.S. West.³ So, what impedes the development of water markets?

As I indicated in a recent paper, it is difficult to assemble price comparisons needed to gauge the potential for trade in water because of segmented local markets, limited comparable observations of transactions within and across sectors, high shipping or conveyance costs, diverse regulatory regimes, and variation in quality.⁴ Available price data thus must be viewed with caution. Even so, the differences often are striking. For instance, in the Reno/Truckee Basin of Nevada the median price for 1,025 agriculture-to-urban water rights sales between

2002 and 2009 (2008 prices) was \$17,685/AF as compared to \$1,500/AF for 13 agriculture-to-agriculture sales.⁵ In the South Platte Basin of Colorado the median price for agriculture-to-urban sales was \$6,519/AF as compared to \$5,309/AF for agriculture-to-agriculture sales.⁶

Aggregating transactions across markets and time can compensate for the limited number of similar transactions within local markets, further illustrating the potential gains from trade and revealing how activity varies across the states and across time. Until my work with Brewer, Glennon, and Ker, though, there had been no comprehensive examination of water rights, trading, and the type of contracts used in the U.S. West.⁷ We developed a dataset of 3,232 water transactions (short- and long-term leases and sales) across 12 western states from 1987–2005. This dataset subsequently has been updated through 2008 with 4,220 observations, of which 2,765 have price information.⁸ The data reveal that median prices between 1987 and 2008 were \$74/AF for agriculture-to-urban leases as compared to \$19/AF for agriculture-to-agriculture leases; median prices were \$295/AF for agriculture-to-urban sales as compared to \$144/AF for agriculture-to-agriculture sales.⁹

Every western state allows for water trading, but patterns vary sharply. Colorado dominates in terms of total market transactions, but California, Texas, Arizona, and Nevada also have active markets. Within California, the state’s institutional and regu-

* Libecap is a Research Associate in the NBER’s Programs on the Development of the American Economy and Environmental and Energy Economics. He is also a Professor of Corporate Environmental Management and Economics at the University of California, Santa Barbara. His profile appears later in this issue.

latory environment favors short-term leases. In all states, however, most trading involves informal exchanges among adjacent users within sectors (neighboring irrigators, for example), rather than trades across sectors, such as agriculture-to-urban, where price differences and associated efficiency gains from reallocation are the greatest. There is virtually no private water transacting across state boundaries. Still, despite apparent barriers, the total number of water transfers is increasing as demand is shifting. Between 1987 and 2008 agriculture-to-urban and environmental trades have been rising significantly, but agriculture-to-agriculture trades show no discernable trend. Analyzing the underlying institutions and transaction costs affecting these observed patterns is central to my research.

U.S. Water Rights

I have examined property rights to a variety of natural resources, including oil and gas, timber, agricultural and range land, fish, and water. Among these, water poses the greatest challenges in defining rights.¹⁰ Water cannot be bounded or partitioned easily across claimants and uses. Fluidity, and in the case of groundwater an inability to observe it, also raise the costs of measuring a water right. Parties often sequentially access the same water, and amenity, riparian, and aquatic habitat values may be provided simultaneously. For these reasons, private and public water uses are intertwined to an extent not found for other resources. In the eastern United States, where water traditionally has been less scarce than in the West, it typically is common property, with riparian rights held by land owners whose properties are appurtenant to water. Riparian rights holders have proportionate access for reasonable use, so long as their actions do not harm downstream claimants.

In the more arid western United States, access to water historically has determined the location and economic viability of communities. Prior appropriation rights emerged in the nineteenth century to support mining and agriculture often remote from water sources.¹¹

Appropriative rights are not tied to the land, and the ability to move water led to investment in dams, storage reservoirs, and canal systems by the Bureau of Reclamation and other organizations, largely in support of farming.¹² Hansen, Lowe, and I construct a county-wide dataset of water supply infrastructure, topography, and agricultural output for five western states from 1900–2002. Using these data, we show how critical this investment was for providing more constant water supplies in order to smooth agricultural production in the face of climatic variability.¹³

Appropriative water rights grant rights of diversion to a *fixed* quantity or flow of water from a highly variable stock, based on the date of the original claim. Those with the earliest claims or senior rights have the highest priority, and subsequent claimants have lower-priority or junior rights. Diversions are rationed progressively by priority of right, and during periods of drought, junior diversions may be halted. Appropriative rights can be sold or leased for use elsewhere, creating a basis for water markets.

As I argue, markets are limited by incomplete water rights.¹⁴ First, there is uncertainty as to the actual amount of water involved. In the past, when scarcity was less of an issue, rights were not measured accurately nor were diversions monitored. Limited information about capacities resulted in many streams and aquifers being over-allocated. Second, fluctuating seasonal precipitation affects stream flow, reservoir size, and groundwater recharge, and hence, the amount of water available for individual diversion. Seasonal fluctuations, however, are generally predictable. Long-term droughts are more difficult to forecast and may be even more prevalent with climate change. Third, and perhaps most important, under prior appropriation there is a critical interdependence among diverters from the same water source with different access priorities. This situation complicates the definition of a water right and use of water markets because of the potential for third-party impairment from trade.

Because as much as 50 percent of the

original diversion may flow back to the stream or percolate down to the aquifer, it is available for subsequent users. During times of drought when only senior appropriators may have their allotments fulfilled, junior appropriators are especially dependent upon these return flows. They bear most of the downside risk of shortfalls. Actions by senior rights holders that affect water consumption and hence influence the amount of water released downstream can directly impair junior parties. For example, sales by senior rights holders to urban areas may move water out of a basin so that it no longer is available for subsequent access by junior rights holders. Accordingly, they are more likely to protest, and often delay or block, otherwise economically-beneficial trades.¹⁵ Additionally, if the sale or lease of surface water results in groundwater substitution, then third parties also can be affected as aquifers are depleted. Groundwater rights are even less well defined and monitored than are surface rights, and classic common-pool conditions can exist.¹⁶

Accordingly, interconnected water uses under appropriative water rights are the basis for state regulation of potential third-party impairment. Regulatory patterns vary across the states with important implications for the transaction costs of exchange and extent of market activity.

Water Regulation

In all western states, appropriative water rights are usufruct rights, conditional upon placing water into beneficial use, no-injury to third parties, and adherence to the public interest. Failure to comply can result in the loss of the right. Although irrigation was the dominant initial basis for diversion, the set of beneficial uses is expanded or contracted based on changing public values, judicial interpretations, and constituent group politics.

As I describe, beneficial use is a vague concept that can shift, adding uncertainty to a water right. Historically, physical diversion and complete use of diverted water were deemed sufficient to maintain a water right—the so-called use-it-or-lose-it mandate. Not surprisingly, this

requirement motivates irrigators to place marginal water into low-valued applications, even though its use in urban settings has much higher values. This marginal water offers the greatest opportunity for gains from trade. It also suggests that any indirect effects of water exchange, such as a reduction in demand for farm labor and related declines in local commercial activity would be small.¹⁷

Nevertheless, concerns about the impact of agricultural-to-urban water trades on regional economies are major sources of opposition to expanded water markets. A common reference is the infamous Owens Valley-to-Los Angeles water transfer, largely negotiated during 1916–34 between farmers and the Los Angeles Department of Water and Power (LADWP). This additional water supply delivered via the Los Angeles Aqueduct made the rapid growth of Los Angeles possible. The common view is that the LADWP used its monopsony power to extract the rents and essentially “stole” the valley’s water, leaving it an economic wasteland. The episode was the basis for the 1974 movie *Chinatown*, and the anecdote is repeated often in contemporary water policy discussions.

Because of the notoriety of this event, I collected data on 869 farms purchased by the city, the prices paid for land and water rights, and the bargaining pools formed by farmers. My analysis reveals that contrary to the conventional wisdom, farmers did much better by selling than if they had remained in agriculture. Further, the more cohesive the pool, the higher the sale price received. Nevertheless, comparing the prices paid with what the LADWD might have been willing to pay (the cost of alternative water) reveals that the city captured most of the surplus. Although there were clear gains from trade for both parties, the imbalance in the outcome fuels equity concerns that loom large in rural areas today.¹⁸

The prospect of both direct and indirect third-party impairment has led states to implement judicial or administrative procedures that must be followed before water applications can be altered or water

rights transferred. The burden of proof of no-harm from a transfer rests with the applicant. The procedures vary by state, but those with a broad definition of both pecuniary and technological injury and a wide range of standing for objection have higher transaction costs for water trade.¹⁹

Other institutions also affect the transaction costs of water exchange. Irrigation districts are the most common type of agricultural water supply organization, and many use tremendous amounts of water. One of the country’s largest is the Imperial Irrigation District of Southern California (IID), which annually diverts 2.8 million AF of Colorado River water, nearly two-thirds of California’s legal share of the river. In some irrigation districts individual water rights are only vaguely defined and instead are held in trust by the district as common property. In those cases, the voting rule by which the district governing board is selected plays an important role in the costs of water transactions. Where the board is elected by community-wide votes, the many heterogeneous interests involved, including non-farmers, tenant farmers, and land owners, make water negotiations with urban areas more complex and contentious than in the case where the board is selected by only farm owners. As I argue, in light of the high prices offered for urban water, there is potential for opportunism as additional claimants attempt to secure a portion of the rents. These differential patterns of water regulation and governance affect water market activity.²⁰

Alternative Water Institutions

Although my research focus has been on the U.S. West, similar conditions exist in other semi-arid regions where increased fresh water scarcity is raising pressures for more efficient water use and distribution. In the July 2010 paper with Grafton and others, I compare water institutions and market activity in parts of Australia, Chile, China, South Africa, and the United States with respect to four components of integrated water resource management: institutional underpinnings, economic efficiency, equity, and

environmental sustainability. Australia has the earliest and most developed water market and administrative management structure. The United States is more fragmented, with considerable institutional diversity and innovation as well as an expanding water market. Chile has well defined water rights similar to those in Australia. South African water rights are short term and the country relies more on central planning and less on water markets. Hence, it has few formal trades. Chinese institutions are the least well developed, so that some river basins and reservoirs are effectively informal open access.

Overall, my research reveals the importance of water institutions. There are important path dependencies, and efficiency and equity objectives for water often conflict.

¹ T. P. Barnett, D. W. Pierce, H. G. Halliday, C. Bonfils, B. D. Santer, T. Das, G. Bala, A. W. Wood, T. Nozawa, A. A. Mirin, D. R. Caya, and M. D. Dettinger, “Human-Induced Changes in the Hydrology of the Western United States,” *Science* 319 (2008), pp. 1080–83; and *World Water Assessment Program 2009*, The United Nations World Water Development Report 3: Water in a Changing World, Paris: UNESCO.

² J. Brewer, R. Glennon, A. Ker, and G. D. Libecap, “Water Markets in the West: Prices, Trading, and Contractual Forms,” *NBER Working Paper No. 13002*, March 2007, and *Economic Inquiry*, 46(2): pp. 91–112; Q. R. Grafton, C. Landry, G. D. Libecap, S. McGlennon, and R. O’Brien, “An Integrated Assessment of Water Markets: Australia, Chile, China, South Africa, and the USA,” *NBER Working Paper No. 16203*, July 2010, forthcoming in *Review of Environmental Economics and Policy*; Q. R. Grafton, C. Landry, G. D. Libecap, and R. O’Brien, “Water Markets: Australia’s Murray-Darling Basin and the U.S. Southwest,” *NBER Working Paper No. 15797*, March 2010; and T. Anderson and R. Watson, *Tapping Water Markets*, manuscript, Bozeman, MT: Property and Environment Research Center, 2010.

³ Grafton et al, March 2010.

⁴ G. D. Libecap, “Institutional Path Dependence in Climate Adaptation: Coman’s ‘Some Unsettled Problems of Irrigation,’” *NBER Working Paper No. 16324*,

September 2010, forthcoming American Economic Review 101 (1) (2011), pp. 1–19.

⁵ *Transactions are in terms of acre feet (AF). An acre foot is 325,852 gallons, about enough to meet the needs of 4 people for a year.*

⁶ *As reported in G. D. Libecap, “Institutional Path Dependence in Climate Adaptation...”*

⁷ *Brewer et al, March 2007.*

⁸ *See G. D. Libecap, “Water Rights and Markets in the U.S. Semi-Arid West: Efficiency and Equity Issues, forthcoming in Evolution of Property Rights Related to Land and Natural Resources, D. H. Cole and E. Ostrom, eds., Cambridge: Lincoln Institute, 2010.*

⁹ *See Brewer et al 2007; G. D. Libecap, “Water Rights and Markets in the U.S. Semi-Arid West...”*

¹⁰ *G.D. Libecap and J.L. Smith, “The Self-Enforcing Provisions of Oil and Gas Unit Operating Agreements: Theory and Evidence,” NBER Working Paper No. 7142, May 1999, Journal of Law, Economics and Organization 15(2): pp. 526–48; G.D. Libecap, “The Assignment of Property Rights on the Western Frontier: Lessons for Contemporary Environmental and Resource Policy,” NBER Working Paper No. 12598,*

October 2006, in Journal of Economic History 67(2): pp. 257–9; T. L. Anderson, R. Arnason, and G.D. Libecap, “Efficiency Advantages of Grandfathering in Rights-Based Fisheries Management,” NBER Working Paper No. 16519, November 2010, forthcoming in Annual Review of Environment and Resource Economics.

¹¹ *M. T. Kanazawa, “Efficiency in Western Water Law: The Development of the California Doctrine, 1850–1911,” Journal of Legal Studies 27 (1) (1998), pp. 159–85; G. D. Libecap, “The Assignment of Property Rights...”*

¹² *See G. D. Libecap, “Institutional Path Dependence in Climate Adaptation...”*

¹³ *Z. K. Hansen, G. D. Libecap, and S. E. Lowe, “Climate Variability and Water Infrastructure: Historical Experience in the Western United States,” NBER Working Paper No. 15558, December 2009, forthcoming in The Economics of Climate Change: Adaptations Past and Present, G. D. Libecap and R. Steckel, eds., University of Chicago Press.*

¹⁴ *G.D. Libecap, “Institutional Path Dependence in Climate Adaptation...” and G. D. Libecap, “Water Rights and Markets in the U.S. Semi-Arid West...”*

¹⁵ *See G. D. Libecap, “Institutional Path*

Dependence in Climate Adaptation...”

¹⁶ *G. D. Libecap, “Water Rights and Markets in the U.S. Semi-Arid West...” and R. Hornbeck and P. Keskin, “Farming the Ogallala Aquifer: Short and Long-run Impacts of Groundwater Access, working paper, Economics Department, Harvard University, 2010.*

¹⁷ *G. D. Libecap, “Water Rights and Markets in the U.S. Semi-Arid West...”*

¹⁸ *G. D. Libecap, “Transaction Costs: Valuation Disputes, Bi-Lateral Monopoly Bargaining and Third-Party Effects in Water Rights Exchanges. The Owens Valley Transfer to Los Angeles,” NBER Working Paper No. 10801, September 2004, later published as, “Chinatown Revisited: Owens Valley and Los Angeles—Bargaining Costs and Fairness Perceptions of the First Major Water Rights Exchange,” Journal of Law, Economics and Organization 25 (2) (2008), pp. 311–38, and G. D. Libecap, Owens Valley Revisited: A Reassessment of the West’s First Great Water Transfer, Palo Alto: Stanford University Press, 2007.*

¹⁹ *G. D. Libecap, “Water Rights and Markets in the U.S. Semi-Arid West...”*

²⁰ *See G. D. Libecap, “Institutional Path Dependence in Climate Adaptation...”*

A “New” Paradigm in Corporate Finance: The Role of Managers and Managerial Biases

Ulrike Malmendier*

When Corporate Finance emerged as a field of academic research and instruction in the first half of the last century, it revolved to a large extent around the role of managers and their individual preferences and

**Malmendier is a Research Associate in the NBER’s Programs in Labor Studies and Corporate Finance and an Associate Professor of Economics and Finance at the University of California, Berkeley. Her profile appears later in this issue.*

beliefs. For example, in addressing the puzzling observation that corporations are very sensitive to the availability of internal funding and tend to shy away from debt, Gordon Donaldson devoted much of his classic work on corporate debt policies to “management attitudes.” In his story of Depression Babies, he claimed that managers who had experienced the Great Depression seemed to be particularly unwilling to use debt financing.¹

Modigliani and Miller’s famous irrel-

evance theorem, and the development of corporate finance theory, fundamentally changed the field. Myers and Majluf suggested that managers’ reluctance to raise external funds does not reflect irrational debt aversion, but rather is the rational response to asymmetric information. Soon, the field turned its focus away from management attitudes. Their perceived role was discussed only if it was of historical interest.²

The shift away from emphasis on man-

agers left an unresolved set of puzzles. Why do firms expend so much effort to select individual managers? Why do they spend so much money to keep them? Why are managers fired if the firm is not doing well? Over the last few years, researchers have returned to the premise that individual managers do matter. Recent research has examined the role of managerial traits, talent, and styles, as well as the role of managerial biases, such as CEO overconfidence. What triggered this change? And what have we learned so far? I use this summary of my own research, much of it joint with Geoffrey Tate, to explore these recent developments.

The Unintended Consequences of Compensation Data

Identifying the role of individual managerial traits is difficult, because it is hard to disentangle them from other determinants of corporate outcomes. A first step—and a necessary condition for the identification of managerial effects—is greater availability of manager-level panel data. A sufficient panel allows us, at least, to separate out time effects and time-invariant firm effects from managerial effects.

Starting in the 1990s, the systematic construction of datasets on executive compensation, such as ExecuComp, turned out to be crucial in providing precisely this information. Thanks to its panel structure and the identification of managers' names, age, gender, and career path, ExecuComp became the starting point for a broad body of research on managerial effects, not simply on compensation.

Superstar CEOs

One example of compensation data enabling much broader research is my research on “Superstar CEOs” with Tate.³ The title refers to the fact that, in terms of compensation, but also in terms of status and press coverage, managers in the United States follow a highly skewed distribution: a small number of superstars enjoy the bulk of the rewards. We explore the ramifications of a “CEO superstar culture” for managers and shareholders. Specifically, we ask whether the popular notion of prominent achiev-

ers subsequently underperforming, which is widely-held in many contexts (from “Sports Illustrated Jinx” to “Nobel Prize Disease”), applies to top executives. The empirical basis for this study is a unique, hand-collected dataset on CEOs who won high-profile awards from the business press or other prominent organizations between 1975 and 2002, merged with ExecuComp data. Our challenge is to identify the correct counterfactual—how would a superstar CEO have performed had he not won the award and attracted all the media attention? How do we avoid measuring mere mean reversion?

Using a two-stage matching procedure and nearest-neighbor matching estimators, we identify CEOs who, based on observables, were likely to win the award at a specific point in time but did not. We find that actual award winners significantly underperform the matched sample of not-award-winning CEOs, by 12–20 percent over three years. At the same time, the average compensation of award winners increases from about \$13m to over \$18m, far more than that of “hypothetical” winners. Moreover, winners spend significantly more time on outside activities (public speeches, writing memoirs, board meetings of other companies, on the golf course). The silver lining is that these findings are concentrated in badly governed firms, for example, firms with weak shareholder rights. Good governance can prevent the extractions and distractions of superstars, without lowering the firm's performance, as far as we can infer from the awards data.

The Rise of Behavioral Economics

Undoubtedly, the rise of behavioral economics was another important determinant of the changes in thinking about the role of individual managers. If individuals have “non-standard” preferences, if they form non-standard beliefs or make mistakes in their optimization process, then individual differences have the potential to help us to predict differences in investment and financing among fundamentally similar firms. Of course, even differences in “standard” preferences or beliefs could give rise to firm-level differences. But the mounting evidence on persistent biases and mistakes has helped us to clarify the need for proper identification

of individual traits and to distinguish clearly between managers who do and who do not display biased behavior.

Overconfident CEOs

One such bias, long suspected as an explanation of misguided investment and mergers, is managerial overconfidence. If managers are overconfident about their ability to create value, then they are likely to perceive too many investment projects and mergers as being worth undertaking. Tate and I analyze the existence and importance of CEO overconfidence in a series of papers. The first⁴ begins by pointing out that the implications of overconfidence are more subtle than simply “more and worse investment.” Once we account for financial market interaction, we realize that rational financiers curb overconfident managers' desire to over-invest: they refuse to provide the necessary financing, at least not at the price the overconfident CEO expects. Hence, the investment decisions of overconfident CEOs become sensitive to internal cash flow, in particular in firms with few internal resources.

The empirical challenge here is to provide a plausible measure of overconfidence. Since biased beliefs naturally defy direct and precise measurement, we use “revealed beliefs”—again exploiting executive compensation data. We identify CEOs who personally over-invest in their companies by buying excessive amounts of company stock, or holding executive options until they expire, even if these options are highly in the money and a calibrated model of option exercise suggests that the owners should diversify. In our data, such CEOs do not outperform the market by holding on to their options, ruling out insider trading or rational empire building as explanations. Holding on to options is also hard to explain with signaling, given that the stock of overconfident CEOs' firms performs worse than the market and the industry. After addressing a number of additional interpretations (taxes, risk tolerance, board pressure, procrastination), we conclude that excessive stock purchases and option holding likely indicate overestimation of future returns.

We then show that there is a robust

relationship between the CEOs' personal overinvestment in their firms and their corporate investment: overconfident CEOs are excessively sensitive to the availability of internal funds. As predicted by the theory, the relationship between overconfidence and investment-cash flow sensitivity is strongest in financially constrained firms. Overconfidence emerges as a novel explanation for the long-standing investment-cash flow puzzle.

The Market Interaction of Overconfident CEOs

Our findings implicitly rely on the market interaction of rational investors and biased managers: investors who do not share the CEO's optimistic view demand higher interest rates or lower stock issuance prices than the CEOs deem appropriate. Another paper, with Tate and Jun Yan⁵ tests this channel directly. Here, we ask whether overconfident CEOs are more reluctant to tap external capital markets. Combining our overconfidence data on managers' personal portfolios with data on security issuances, we find a significant relationship between overconfidence and two long-standing capital-structure puzzles: the "pecking order of financing" (preference for cash over debt and debt over equity) and firms' reluctance to access external capital markets, including the "debt conservatism puzzle."

In the same paper, we also consider managerial traits other than overconfidence that are likely to generate differences in managers' financial decision-making. Specifically, we exploit variation in managers' personal histories. Existing evidence in the psychology literature suggests that seismic events early in life can have long lasting effects on individuals' personalities. We identify two such formative experiences that affect a significant portion of our sample CEOs: growing up during the Great Depression and serving in the military. Depression CEOs are considered to have less faith in external capital markets and, therefore, to lean excessively on internal financing. Military service during early adulthood, and particularly combat exposure, induces aggressiveness and risk-taking, possibly including more aggressive capital-structure choices.

Both sets of predictions are confirmed in the data. Depression CEOs are more prone to under-utilize debt relative to its tax benefits than the average CEO. And, they do not substitute equity issuance for debt, confirming that they have an aversion to risky capital markets. CEOs with prior military service, particularly in World War II, choose more aggressive capital structures. Under their leadership, market leverage ratios are significantly higher than under their predecessors' or successors' leadership. The results on World War II veterans are particularly important, because the draft alleviates concerns about self-selection into service.

Overall, this paper provides three strong cases for measurable managerial characteristics having significant explanatory power beyond traditional capital-structure determinants. As such, our results help us to answer a crucial question in capital-structure research: why do firms with seemingly similar fundamentals have significantly different capital structures? Modern dynamic theories of optimal capital structure allow room for similar firms to operate away from a common target capital structure, but the factors which predict the direction of such deviations remain unclear. Our results show that managerial traits help to explain the remaining variation.

In a third paper, Tate and I⁶ provide the strongest and clearest evidence on the empirical importance of managerial overconfidence. We relate overconfidence to mergers and acquisitions. As pointed out earlier, overconfidence does not necessarily predict excessive mergers when embedded into a market setting with rational financiers. It does so only when the (overestimated) benefits of a merger exceed the (also overestimated) costs of raising external financing. Hence, overconfidence induces more mergers only in cash-rich firms. However, if we do observe that overconfident CEOs undertake more mergers on net, then we can derive the additional prediction that those mergers, on average, have lower returns than mergers undertaken by non-overconfident CEOs.

In our empirical analysis, we find that overconfident CEOs do, in fact, undertake significantly more and significantly worse mergers than other CEOs, in particular in cash-rich firm years. The average announce-

ment effect is significantly more negative for mergers of overconfident CEOs (-90 basis points) than for those of their non-overconfident peers (-12 basis points). We also introduce a second, media-based proxy for overconfidence, which captures how the business press characterizes a CEO—either as "confident" and "optimistic" or as "reliable," "cautious," "conservative," "practical," "frugal," and "steady." All of our main results are replicated using this press-based measure of overconfidence.

Overall, managerial overconfidence appears to provide a unifying framework for some of the major empirical puzzles in Corporate Finance. Our findings do not imply that traditional explanations, such as misaligned incentives or asymmetric information, are not valid. Overconfidence is an additional explanation, applicable to the subset of overconfident CEOs. But its broad explanatory power and its large estimated effects on investment, financing, and mergers indicate that it has significant empirical relevance. Moreover, the overconfidence explanation has important governance implications: overconfidence cannot be curbed by providing incentives in the form of stock and option grants.

Individual Characteristics of Other Corporate Actors

The importance of individual characteristics and biases for corporate outcomes is likely to extend beyond the CEO and to shape the way organizations function, as Colin Camerer and I discuss in our survey on Behavioral Economics of Organizations.⁷ In a related paper,⁸ Burak Güner, Tate, and I focus on a different set of corporate actors, board members. We illustrate the individual impact of corporate directors, especially the role of one individual trait: their financial expertise. Following the recent wave of accounting scandals, regulators have urged placing more "financial experts" on boards to ensure more accurate disclosure and better audit committee performance. However, we neither know whether individual board members make a difference nor whether they affect outcomes in the way the regulator intends, preventing financial missteps. In particular, "financial experts" typically are

bankers, who may pursue the interests of their financial institutions rather than maximizing shareholder value.

How can we identify individual effects when board composition is endogenous and, hence, the influence of board members is hard to disentangle from firm-specific effects? We construct a novel panel data set on the board composition of 282 companies over 14 years. The data provide sufficient variation to identify commercial banker effects, after controlling for company fixed effects. Thus, the results do not reflect time-invariant firm characteristics. Moreover, we are able to instrument for the presence on the board of commercial bankers, using pre-sample shocks to the supply of banker directors attributable to the banking crisis in the late 1970s and early 1980s.

We find that financial experts significantly affect corporate decisions, although not necessarily in the interest of shareholders. When commercial bankers join boards, firm lending increases, but mostly for firms with good credit and poor investment opportunities—that is, firms that are able to repay loans but do not have value-creating investment projects. Also, investment bankers on the board are associated with larger security issuance but also worse acquisitions. Both activities generate fees for the investment banks but appear to decrease (or at least not to increase) shareholder value. Third, whenever the interests of the financial institutions are unrelated to a corporate decision (for example, in the case of compensation decisions), or the financial expert is unaffiliated (for example, finance professors), we find little evidence of any influence at all. This research illustrates that the ongoing debate on optimal corporate governance is likely to benefit from accounting for individuals in our prediction of corporate outcomes.

Marketwide Implications

Given the evidence on influences—both rational and biased—that individual managers have on corporate outcomes, the next obvious question is: What are the broader, market-level implications? How do biases affect prices and market interaction outside the firm? For example, returning to the old story of Depression Babies in a non-corporate setting, Stefan Nagel and I⁹ show that individual investors who lived through

times of macroeconomic downturn, such as the Great Depression of the 1930s, tend to shy away from the stock market and other risky financial investments, as measured by stock-market investment and reported willingness to take financial risk. These results have market-wide implications: time variation in the earlier experiences of the current set of investors will influence risk taking in the aggregate.

This insight, in turn, helps to explain the puzzling phenomenon that periods of high risky asset prices—as measured by the price/earning ratio—often are followed by low subsequent returns. Indeed, we are able to show that periods of high average experienced returns of the current set of investors (and hence high risk taking) coincide with periods of high price/earnings ratios. For example, the 1960s and 1990s, periods of high equity-market valuations and low subsequent returns, coincide with periods when then-present investors had high experienced stock-market returns. And the 1940s and early 1980s, which were periods of low valuation and high subsequent returns, coincide with investors having low experienced stock-market returns. While this does not prove that variations in P/E ratios and expected returns are driven by experience effects, a theory of experience-induced variation in risk taking is a plausible explanation.

In another set of papers with Devin Shanthikumar,¹⁰ I explore the market response to a different bias affecting financial decisions: naiveté about misaligned incentives. In the context of investment advice, we document that individual investors fail to account for upward distortions in analyst recommendations. In response, analysts profitably can offer investment advice even when standard rational frameworks predict that they should not be able to do so in the presence of asymmetric information.

How does the discussion of a “market response” to investor biases relate back to the corporate setting and to managerial biases? Since investors cannot (short-)sell specific pieces of a firm—or short-sell the CEO, for that matter—the stock market is unlikely to allow identifying a “market reaction” to managerial biases, with the exception of the rare occasion when we can study announcement effects (as in the case of mergers by overconfident CEOs discussed above). A more

promising route to identifying a response to managerial biases is internal firm data. Firms appear to install “corporate repairs”—that is, procedures and institutional design intended to counteract managerial biases. Obtaining and exploring such data seems the natural next step in the development of the new paradigm in Corporate Finance research.

¹ G. Donaldson, “Corporate Debt Capacity: A Study of Corporate Debt Policy and the Determination of Corporate Debt Capacity,” Boston, Harvard Graduate School of Business Administration, (1961) p. 89.

² F. Modigliani and M. Miller, “The Cost of Capital, Corporation Finance, and the Theory of Investment,” *American Economic Review*, vol. 48, (1958), pp. 261–97; S. Myers and N. Majluf, “Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not Have,” *Journal of Financial Economics*, vol. 13, (1984), pp. 187–222; S. Myers, “The Capital Structure Puzzle,” *Journal of Finance*, vol. 39(3), *Papers & Proceedings*, (1984), pp. 575–92.

³ U. Malmendier and G. Tate, “Superstar CEOs,” *NBER Working Paper No. 14140*, June 2008, and *Quarterly Journal of Economics*, vol. 124(4), pp. 1593–638.

⁴ U. Malmendier and G. Tate, “CEO Overconfidence and Corporate Investment,” *NBER Working Paper No. 10807*, October 2004, and *Journal of Finance*, vol. 60(6), pp. 2661–700.

⁵ U. Malmendier, G. Tate, and J. Yan, “Overconfidence and Early-life Experiences: The Impact of Managerial Traits on Corporate Financial Policies,” *NBER Working Paper No. 15659*, January 2010.

⁶ U. Malmendier and G. Tate, “Who Makes Acquisitions? CEO Overconfidence and the Market’s Reaction,” *NBER Working Paper No. 10813*, October 2004, and *Journal of Financial Economics*, vol. 89 (1), pp. 20–43.

⁷ U. Malmendier and C. Camerer, “Behavioral Economics of Organizations,” in P. Diamond and H. Vartiainen (eds.), *Behavioral Economics and Its Applications*, Princeton University Press, (2009).

⁸ B. Güner, U. Malmendier, and G. Tate, “Financial Expertise of Directors,” *Journal of Financial Economics*, vol. 88(2), pp. 323–54, (2008).

⁹ U. Malmendier and S. Nagel, “Depression Babies: Do Macroeconomic Experiences Affect Risk-Taking?” NBER Working Paper No. 14813, March 2009, forthcoming in Quarterly Journal of Economics.

¹⁰ U. Malmendier and D. Shanthikumar, “Are Small Investors Naïve about Incentives?” NBER Working Paper No. 10812, October 2004, and Journal of Financial Economics, vol. 85(2), pp. 457-89, (2007), and “Do

Security Analysts Speak in Two Tongues?” NBER Working Paper No. 13124, May 2007.

Empirical Analysis of Corruption

Benjamin A. Olken*

Although corruption is considered a significant problem in much of the developing world, for many years there was virtually no hard economic data on it. Instead, economic studies for the most part relied on cross-country datasets consisting of businessmen’s general perceptions of the relative corruption levels of different countries.¹ The lack of data meant that it was difficult to estimate the true costs of corruption, to test which theories of corruption were borne out in the data, and to understand what approaches might be most effective in reducing corruption.

In recent years, a variety of approaches have been taken to ferret out more accurate indicators of corrupt activity. My recent empirical work on corruption examines how this improved data can be used to answer three questions: what are the costs of corruption; how can corruption be ameliorated; and, what theories of corruption best match the data?

The Costs of Corruption

Corruption may matter for economic efficiency if theft of government resources increases the cost of government activity. Then, otherwise worthwhile government projects — such as redistribution schemes or public works projects — will no longer

**Olken is a Research Associate in the NBER’s Programs on Political Economy, Economic Fluctuations and Growth, and Children. He is also an Associate Professor of Economics at MIT. His Profile appears later in this issue.*

be cost effective. I examine this possibility² in my study of a large Indonesian anti-poverty program that distributed subsidized rice to poor households. I estimate the extent of corruption in the program by comparing administrative data on the amount of subsidized rice distributed in a given region with survey data on the amount of the subsidized rice actually received by households in that region. The central estimates suggest that, on average, at least 18 percent of the rice appears to have disappeared. I show statistically that the “missing rice” was much more concentrated in particular regions than would be predicted by random chance. Therefore, it looks as though in some regions much of the rice was not distributed at all, rather than there simply being misreporting in the survey data.

In the same paper, I construct a welfare calculation of the benefits of the program, both as it was implemented and using a counterfactual with the same targeting of beneficiaries but without corruption. I estimate that the welfare losses from this “missing rice” may have been large enough to offset the potential welfare gains from the program’s redistribution. In other words, the program without corruption might have been cost-effective but, in the presence of corruption, it likely was not. These estimates suggest that corruption can be costly enough to substantially impede redistribution.

Corruption also may lead to inefficiency if it undoes the government’s ability to correct an externality. For example, if someone can bribe a police officer or

judge instead of paying an official fine, then the marginal cost of breaking the law is reduced from the official fine to the amount of the bribe. Even worse, if the police officer extracts the same bribe regardless of whether the person has broken the law, then the marginal cost of breaking the law falls to zero and the law ceases to have a disincentive effect altogether.

Patrick Barron and I examine this possibility in a paper on trucking in Indonesia.³ We had surveyors travel with truck drivers on 304 trips to and from the Indonesian province of Aceh, recording data on more than 6,000 illegal payments made at police and military checkpoints and at weigh stations. We believe that this represents the first large-scale survey that has ever directly observed actual bribes in the field.

Using these data, we examine what happens when these trucks stop at weigh stations. Driving an overweight truck is a classic example of an activity that generates an externality. While there can be benefits to a trucker from loading on additional weight, the damage the truck does to the road rises very rapidly with the truck’s weight. For this reason, governments around the world weigh trucks and impose fines on trucks that are overweight.

In our data, we find that virtually all of the trucks in our sample were substantially over the weight limits — and, in fact, 42 percent of trucks were more than 50 percent over the legal weight limit. The data also suggest that corrup-

tion at weigh stations is a likely culprit. According to the law, all trucks more than 5 percent over the legal weight limit are supposed to be ticketed, to immediately unload their excess cargo, and to have their drivers appear in court to face a fine. In fact, virtually none of the truckers received an official ticket. Instead, virtually all of them paid a bribe. While more overweight trucks did pay higher bribes, the bribe did not change substantially with the truck's weight. Even those trucks that were not overweight at all still had to pay a bribe. Corruption thus dramatically reduced the marginal cost of driving overweight trucks, leading to more of them and ultimately to a more rapidly degraded road.

Approaches to Reducing Corruption

Given that corruption may involve efficiency costs, a natural question is how it can be ameliorated. To investigate this, I designed and conducted a randomized field experiment that took place in over 600 Indonesian villages, each of which was building a small road.⁴ The experiment evaluated several theories about how to improve monitoring and reduce corruption. One approach, dating back at least to Becker and Stigler,⁵ suggests that the right combination of monitoring and punishments can control corruption. In practice, however, the very individuals tasked with monitoring and enforcing punishments themselves may be corruptible, which suggests that alternative approaches, such as community-based monitoring, may be more effective. Given these competing views, I randomly allocated each village into one of three experimental treatments: one treatment increased traditional top-down audits by the central government audit agency; two treatments increased community-based monitoring, one by increasing participation at community-based project monitoring meetings and one by providing anonymous comment forms to villagers, allowing them to participate with a reduced fear of retaliation by powerful village elites.

To measure corruption, engineers dug

core samples in each road to estimate the quantity of the materials used; they surveyed local suppliers to estimate prices paid; and they interviewed villagers to determine the wages paid on the project. From these data, I was able to estimate what each project actually cost to build, and then to compare this to what the village reported it spent on the project on a line-item by line-item basis.

Using this data, I find that government audits reduce corruption by 8 percentage points or about 30 percent from the baseline level. By contrast, increasing grass-roots participation in monitoring has little impact on average, reducing missing expenditures only in situations with limited free-rider problems and limited elite capture.⁶ Interestingly, the audits revealed that there was substitution among alternative forms of corruption: although audits reduced missing expenditures, they led to increases in nepotism (that is, the hiring of family members of the project leader or village officials to work on the project). On balance, the results demonstrate that the traditional economic approach to fighting crime – increasing the expected cost of crime by increasing the probability of being caught – can play an important role in reducing corruption, even in a highly corrupt environment where those doing the monitoring are themselves potentially corruptible.

One potential explanation for why the increase in grass-roots participation did not reduce corruption is that villagers may have limited information about corruption. In another paper, I compare Indonesian villagers' stated beliefs about corruption in the road-building project with the engineer's estimates of corruption in the roads.⁷ I find that villagers' beliefs contain real information about corruption, and that villagers are sophisticated enough to distinguish between corruption in a particular road project and general corruption in the village. However, villagers only appear to be able to detect corruption in the form of marked-up unit prices, not in overstated quantities. Naturally, in response to this corrupt officials hide almost all of their corruption by inflating quantities, which are hard to

detect, rather than by marking up unit prices, which are easier to detect. This is one reason why professional auditors, who are more adept at detecting sophisticated corruption schemes, may be more effective than ordinary villagers at monitoring corruption.

In another paper, I examine how changing levels of grass-roots participation in village activities affect governance outcomes. I focus on changes in such participation that is associated with variation in access to television and radio. Specifically, I consider the hypothesis first suggested by Robert Putnam in *Bowling Alone* (2000) that television leads to a reduction in participation in a broad range of social and governmental activities, which in turn leads to worse governance.⁸ In this research, I exploit the fact that volcanoes in East and Central Java block television and radio signals in some areas, but not in others. I find that better signal reception, which is associated with more time watching television and listening to the radio, is associated with substantially lower levels of participation in a wide range of social and village government activities, including lower levels of participation in the meetings in which villages monitor corruption in the road projects. However, despite this impact on participation, improved television and radio reception does not appear to affect the quality of village governance, at least as measured by corruption in the road projects. These findings echo my experimental results and suggest that additional grass-roots participation, whether induced experimentally or driven by changes in media access, does not appear to be related to improvements in village governance.

The Theory of Corruption

The work just described focuses on strategic interaction between the group that can benefit from a government program, in this case the villagers and the auditors, and one or more village officials who are charged with implementing the program. It does not consider potential strategic interactions between village officials. In other settings, how-

ever, strategic interactions between corrupt agents themselves become important. In this view, first articulated by Shleifer and Vishny,⁹ corrupt agents behave like profit maximizing firms, and the level of corruption is determined not just by external monitoring, but also by the structure of the “market” for bribes, the elasticity of demand for the officials’ services, and the degree to which corrupt officials can coordinate with one another in setting “prices” for bribes.

Barron and I use the data we collected on the bribes that truck drivers pay to empirically test the idea that market forces in part determine the level of corruption. We exploit the fact that, during the period we studied, the number of checkpoints along one of the roads was reduced, in accordance with a peace agreement signed earlier in the year. We use this change in market structure to estimate the elasticity of the average bribe paid with respect to the expected number of checkpoints. We show that the average price paid at checkpoints increases when the number of checkpoints declines. The results provide evidence for the Shleifer-Vishny view that market structure has an impact on the total amount of bribes charged, and more specifically, that price setting in this particular context is decentralized rather than centralized. These findings highlight the need to consider strategic interactions between corrupt agents in designing effective anti-corruption policy.

My very recent work continues to apply economic theory to the problems of corruption. My paper co-written by Robin Burgess, Matthew Hansen, Peter Potapov, and Stefanie Sieber explores the notion that a larger number of competing officials reduces the return to each corrupt official and increases the quantity of the activity that bribes might otherwise impede.¹⁰ We explore this idea in the context of illegal logging in Indonesia, using satellite data on deforestation combined with official production statistics. We show that as the number of political jurisdictions increase, so that there are more bureaucracies with the potential to facilitate illegal logging in a province, logging rates increase and prices fall.

Next Steps

Despite recent advances, empirical research on corruption is still a nascent field. The number of rigorous, careful estimates of the social costs of corruption is still quite small, and there are reasons to believe there may be substantial heterogeneity across contexts. For example, econometric estimates of the magnitude of corruption vary from about 2 percent in the case of the U.N. Oil for Food Program¹¹ to as much as 87 percent in the case of funding for public schools in Uganda.¹² Moreover, a wide range of commonly used anti-corruption policies, from the efficiency wage idea proposed by Becker and Stigler to crackdowns by anti-corruption commissions, are still remarkably under-studied. The recent advances in corruption measurement suggest that understanding these questions will be a fruitful area for future research.

¹ P. Mauro, “Corruption and Growth,” *Quarterly Journal of Economics* 110 (3), (1995), pp. 681–712.

² B.A. Olken, “Corruption and the Costs of Redistribution: Micro Evidence from Indonesia,” *Journal of Public Economics*, 90 (4-5), (2006), pp. 853–70.

³ B.A. Olken and P. Barron, “The Simple Economics of Extortion: Evidence from Trucking in Aceh,” *NBER Working Paper No. 13145*, June 2007, and *Journal of Political Economy*, 117 (3), (2009), pp. 417–52.

⁴ A related study that examines the efficiency costs of corruption in the drivers’ license department in India suggests that corruption allows people who do not know how to drive to obtain licenses. See M. Bertrand et al., “Does Corruption Produce Unsafe Drivers? *NBER Working Paper No. 12274*, June 2006, and “Obtaining a Driving License in India: An Experimental Approach to Studying Corruption?,” *Quarterly Journal of Economics*, 122 (4), (2007), pp. 1639–76.

⁵ B.A. Olken, “Monitoring Corruption: Evidence from a Field Experiment in Indonesia,” *NBER Working Paper No. 11753*, November 2005, and *Journal of*

Political Economy 115 (2), (2007), pp. 200–49.

⁶ G.S. Becker, and G.J. Stigler, “Law Enforcement, Malfeasance, and Compensation of Enforcers,” *Journal of Legal Studies*, 3(1), (1974), pp. 1–18.

⁷ In particular, the increased grass-roots monitoring was only effective in reducing theft of wages, which occurs when villagers are asked to work on a project on a volunteer basis but project officials falsely claim that they paid them wages. Monica Singhal and I explore this concept of “volunteer” work on public infrastructure projects more systematically in our paper on “Informal Taxation,” where we show that type of labor is a non-trivial component of local public finance in developing countries. Niehaus and Sukhtankar have also done related research on the incentives to steal wage payments in India. See B.A. Olken and M. Singhal, “Informal Taxation,” *NBER Working Paper No. 15221*, August 2009, and P. Niehaus and S. Sukhtankar, “Corruption Dynamics: the Golden Goose Effect,” *U.C.S.D. Working Paper*, 2010.

⁸ B.A. Olken, “Corruption Perceptions vs. Corruption Reality,” *NBER Working Paper No. 12428*, August 2006, and *Journal of Public Economics*, 93 (7-8), (2009), pp. 950–64.

⁹ B.A. Olken, “Do Television and Radio Destroy Social Capital? Evidence from Indonesian Villages,” *NBER Working Paper No. 12561*, October 2006, and *American Economic Journal: Applied Economics*, (14), (2009), pp. 1–33.

¹⁰ R. Burgess, M. Hansen, B.A. Olken, P. Potapov, and S. Sieber, “The Political Economy of Deforestation in the Tropics,” mimeo, MIT.

¹¹ C.-T. Hsieh and E. Moretti, “Did Iraq Cheat the United Nations? Underpricing, Bribes, and the Oil for Food Program,” *NBER Working Paper No. 11202*, March 2005, and *Quarterly Journal of Economics*, 121 (4), (2006), pp. 1211–48.

¹² R. Reinikka, and J. Svensson, “Local Capture: Evidence from A Central Government Transfer Program In Uganda,” *Quarterly Journal of Economics*, 119(2), (2004), pp. 679–705.

NBER Profile: *Malcolm Baker*



Malcolm Baker has been an NBER Research Associate since 2007, and will direct the NBER's Corporate Finance Program beginning in January 2011. He is the Dwight P. Robinson, Jr. Professor of Business Administration at the Harvard Business School, where he has taught since 2001.

Baker received a Ph.D. in business economics from Harvard University in 2000, an M.Phil. in finance from Cambridge University, and a B.A. in applied mathematics-economics from Brown University. Before beginning his doctoral studies, he

was a senior associate at Charles River Associates and a member of the U.S. Olympic Rowing Team.

Baker's research is in the areas of behavioral finance, corporate finance, and asset pricing, with a primary focus on the interaction between corporate financing decisions and inefficiency in capital markets. He has been an associate editor of the *Journal of Finance* since 2007.

Baker lives in Newton, MA, with his wife, Christina, and his children, Ellie (10) and Colin (7).

NBER Profile: *Gary D. Libecap*

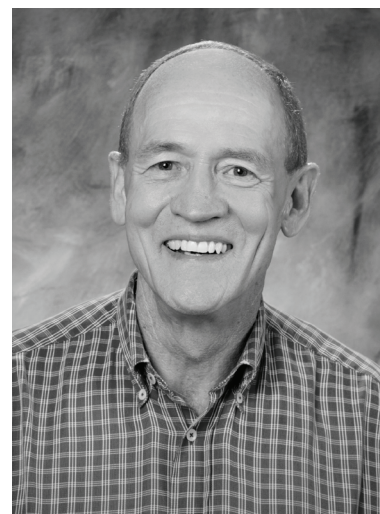
Gary D. Libecap is a Research Associate in the NBER's Programs in the Development of the American Economy and Environmental and Energy Economics. He is also a Professor of Corporate Environmental Management at the Donald Bren School of Environmental Science & Management and Economics Department, University of California, Santa Barbara.

Libecap holds an M.A. and Ph.D. in Economics from the University of Pennsylvania and B.A. in Economics from the University of Montana. He joined the Bren School faculty in 2006. Prior to that time, he was the Anheuser Busch Professor, and Professor of Economics and Law, at the University of Arizona, Tucson, where he taught for more than twenty years.

In addition to teaching business strategy, law, economics, and economic history often in a natural resource context, Libecap

was instrumental in developing the Eco-Entrepreneurship focus, a joint venture between the Bren School and the School of Engineering. He has also served as president of the Economic History Association, the Western Economics Association International, and the International Society for the New Institutional Economics. He currently (2010–11) is the Pitt Professor of American History and Institutions in the Economics Department at Cambridge University.

Normally, Gary and his wife Ann live in Santa Barbara. Their daughter, Sarah, is finishing a residency in Pediatrics at UCSF and their son, Christopher, is a Smokejumper with the Forest Service. Whenever possible, Gary and Ann are at their log cabin in northwestern Montana where they like to hike and fly fish.



NBER Profile: Ulrike Malmendier



Ulrike Malmendier is a Research Associate in the NBER's Programs on Corporate Finance and Labor Economics. She is also an Associate Professor of Economics (with tenure) in the Economics Department, and an Associate Professor of Finance, at the Haas School of Business at the University of California, Berkeley.

Malmendier joined the Berkeley faculty in 2006, after having been an Assistant Professor of Finance at Stanford University since 2002. She also has been a Visiting Scholar at the Max-Planck Institute in Bonn, a Visiting Fellow at Princeton University, and a Visiting Assistant Professor of Finance at the Graduate School of Business at the University of Chicago over the past five years.

Malmendier received her Ph.D. in Business Economics from Harvard University in 2002, and her Ph.D. in Law

from the University of Bonn in 2000. In 2010 she received the Alfred P. Sloan Prize fellowship, and she currently serves as associate editor for the *Journal of Financial Intermediation*, the *Economic Journal*, and the *Journal of the European Economic Association*. She is also the co-founder and organizer of the Behavioral Annual Economics Meetings (BEAM).

Malmendier lives in North Berkeley, CA with her husband Stefano DellaVigna and her two sons, Thomas (2 years) and Lucas (6 months). When she is not sitting in *the* original Peet's Coffee shop (pretending to work) or juggling her academic life between her two campus affiliations, she enjoys jogging and biking in the Berkeley hills, the food in Berkeley's Gourmet Ghetto, and watching the sun setting behind the Golden Gate Bridge.

NBER Profile: Benjamin A. Olken

Benjamin A. Olken is a Research Associate in the NBER's Programs on Political Economy, Economic Fluctuations and Growth, and Children. He is also a tenured Associate Professor of Economics at MIT. His research focuses on political economy issues in developing countries, with a particular interest in corruption.

Olken received his B.A. as a double-major in Mathematics and Ethics, Politics, and Economics from Yale University in 1997 and his Ph.D. in Economics from Harvard University in 2004. He joined the MIT faculty in 2008, after a three-year term as a Junior Fellow of the Harvard Society of Fellows and

a one-year post-doctoral fellowship at the NBER.

This academic year, Olken is a Visiting Associate Professor of Economics at the University of Chicago's Booth School of Business. He has been working in Indonesia since 1997, when he was a Henry Luce Scholar in Economic Policy based in Jakarta during the last days of the Soeharto regime.

Olken and his wife, Amy Finkelstein, also a professor of economics at MIT, live in Brookline, MA. They have two children, Sam age 3, and Sarah age 10 months.





Sarah E. Turner is a Research Associate in the NBER's Program on Education and the University Professor of Economics and Education at the University of Virginia. She received a B.A. in Economics from Princeton University in 1989 and a Ph.D. in Economics from the University of Michigan in December 1997.

Turner joined the University of Virginia faculty as an Assistant Professor

in 1997, was promoted to Associate Professor in 2003, and to full professor in 2008. She is also a Research Affiliate of the Population Studies Center of the University of Michigan.

Turner resides in Charlottesville, Virginia with her dog, Amos, and her horse, Scooter.

Conferences

Economic Research on African Development Successes

The second of three NBER conferences on "Economic Research on African Development Successes" took place in Accra, Ghana on July 18–20, 2010. The conference organizers, all NBER Research Associates, were Sebastian Edwards of the University of California, Los Angeles, Simon Johnson of MIT, and David N. Weil of Brown University.

Fifteen research projects were discussed at the meeting. They are:

- "New Cellular Networks in Malawi: Correlates of Service Rollout and Network Performance"
Dmitrios Batzilis, University of Chicago; **Taryn Dinkelman**, Princeton University; **Emily Oster**, University of Chicago and NBER; **Rebecca Thornton**, University of Michigan; and **Deric Zanera**, National Statistical Office, Malawi
- "The Returns to the Brain Drain and Brain Circulation in Sub-Saharan Africa: Some Computations Using Data from Ghana"
Yaw Nyarko, New York University
- "Healing the Wounds: Learning from Sierra Leone's Post-war Institutional Reforms"
Katherine Casey, Brown University; **Rachel Glennerster**, MIT; and **Edward Miguel**, University of California, Berkeley, and NBER
- "Fifteen Years On: Household Incomes in South Africa"
Murray Leibbrandt, University of Cape Town, and **James Levinsohn**, Yale University and NBER
- "The Determinants of Food Aid Provisions to Africa and the Developing World"
Nathan Nunn, Harvard University and NBER, and **Nancy Qian**, Yale University and NBER
- "The Financial System in Burundi: An Investigation of its Efficiency in Resource Mobilization and Allocation"
Léonce Ndikumana, African Development Bank; **Janvier Nkurunziza**, United Nations Conference on Trade and Development (UNCTAD); and **Prime Nyamoya**, OGI Consulting Group, Burundi

- “AGOA Rules: The Intended and Unintended Development Consequences of Special Fabric Provisions”
Lawrence Edwards, University of Cape Town, and **Robert Z. Lawrence**, Harvard University and NBER
- “Mobile Banking: The Impact of M-Pesa in Kenya”
Isaac Mbiti, Southern Methodist University, and **David N. Weil**, Brown University and NBER
- “Mauritius: African Success Story” (NBER Working Paper No. 16569)
Jeffrey Frankel, Harvard University and NBER
- “Discussion Sessions Coupled with Microfinancing May Enhance the Role of Women in Household Decision-Making in Burundi”
Radha Iyengar, London School of Economics and NBER, and **Giulia Ferrari**, London School of Economics
- “The Unofficial Economy in Africa”
Rafael La Porta, Dartmouth College and NBER, and **Andrei Shleifer**, Harvard University and NBER
- “Girl Power: Cash Transfers and Female Empowerment (Malawi)”
Sarah Baird, George Washington University; **Ephraim Chirwa**, University of Malawi Chancellor College; **Jacobus de Hoop**, Tinbergen Institute and VU University Amsterdam; and **Berk Özler**, The World Bank
- “Were the Nigerian Banking Reforms of 2005 a Success? And for the Poor?”
Lisa Cook, Michigan State University
- “The Decline and Rise of Agricultural Productivity in Sub-Saharan Africa Since 1961” (NBER Working Paper No. 16481)
Steven Block, Tufts University
- “African Export Successes: Surprises, Stylized Facts and Explanations”
William Easterly, New York University and NBER, and **Ariell Reshef**, University of Virginia

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/ADSs10/summary.html>

NBER’s 25th Tax Policy and the Economy Conference Held in Washington

The NBER’s 25th Conference on Tax Policy and the Economy took place at the National Press Club in Washington on September 23, 2010. NBER Research Associate Jeffrey R. Brown of the University of Illinois at Urbana-Champaign organized this year’s meeting. The following papers were discussed:

- **James M. Sallee**, University of Chicago and NBER, “The Taxation of Fuel Economy”
- **Katherine Baicker**, Harvard University and NBER, and **Jonathan Skinner**, Dartmouth College and NBER, “Health Care Spending Growth and the Future of U.S. Tax Rates”
- **Gopi Shah Goda**, Stanford University and NBER; **John B. Shoven**, Stanford University and NBER; and **Sita Slavov**, Occidental College, “Implicit Taxes on Work from Social Security and Medicare”
- **Ray C. Fair**, Yale University, “Possible Macroeconomic Consequences of Large Future Federal Government Deficits”
- **Martin S. Feldstein**, Harvard University and NBER, “Preventing a National Debt Explosion”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/TPE10/summary.html>

Universities-Research Conference on Economic Development

The NBER and the Bureau for Research and Economic Analysis of Development held a conference on economic development in Cambridge on September 24 and 25, 2010. This was part of the NBER's University Research Conference series. The following papers were discussed:

- **Nicholas Bloom**, Stanford University and NBER; **Benn Eifert**, University of California, Berkeley; **Aprajit Mahajan** and **John Roberts**, Stanford University; and **David McKenzie**, The World Bank, "Does Management Matter? Evidence from India"
- **Todd Schoellman**, Arizona State University, "Education Quality and Development Accounting"
- **Abhijit Banerjee** and **Esther Duflo**, MIT and NBER; and **Rachel Glennerster** and **Cynthia G. Kinnan**, MIT, "The Miracle of Microfinance? Evidence from a Randomized Evaluation"
- **Hongbin Cai**, **Yuyu Chen**, and **Li-An Zhou**, Peking University, and **Hanming Fang**, University of Pennsylvania and NBER, "Microinsurance, Trust and Economic Development: Evidence from a Randomized Natural Field Experiment"
- **Marco Gonzalez**, University of California, Berkeley, and **Climent Quintana-Domeque**, Universidad de Alicante, "Roads to Development: Experimental Evidence from Urban Road Pavement"
- **Matthias Doepke**, Northwestern University and NBER, and **Michèle Tertilt**, Stanford University and NBER, "Does Female Empowerment Promote Economic Development?"
- **Nava Ashraf** and **Erica M. Field**, Harvard University and NBER, and **Jean Lee**, The World Bank, "Household Bargaining and Excess Fertility: An Experimental Study in Zambia"

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/BREAD/summary.html>

Rate and Direction of Inventive Activity

Members of the NBER's Working Group on Innovation Policy and the Economy organized a conference in honor of the fiftieth anniversary of the publication of *The Rate and Direction of Inventive Activity*, a 1962 NBER volume containing several landmark papers in the economics of technological change. NBER Research Associates Josh Lerner of Harvard Business School and Scott Stern of the Sloan School of Management organized the program, which took place at the Aerie Conference Center in Virginia on September 30–October 2, 2010. These papers were discussed:

- **Timothy F. Bresnahan**, Stanford University and NBER; **Shane Greenstein**, Northwestern University and NBER; and **Rebecca Henderson**, Harvard University and NBER, "Schumpeterian Competition and Diseconomies of Scope; Illustrations from the Histories of Microsoft and IBM"
- **Carl Shapiro**, University of California at Berkeley, "Competition and Innovation: Did Arrow Hit the Bull's Eye?"
- **Josh Lerner** and **Peter Tufano**, Harvard Business School and NBER, "The Consequences of Financial Innovation: A Counterfactual Research Agenda"
- **Alexander J. Field**, Santa Clara University, "The Adversity/Hysteresis Effect: Depression Era Productivity Growth in the U.S. Railroad Sector"
- **Timothy F. Bresnahan**, "Generality, Recombination, and Re-Use"

- **Joshua Gans**, University of Melbourne; and **Fiona E. Murray**, MIT, “Funding Conditions, the Public-Private Portfolio, and the Disclosure of Scientific Knowledge”
- **Ralf R. Meisenzahl**, Federal Reserve Board of Governors, and **Joel Mokyr**, Northwestern University, “The Rate and Direction of Invention in the British Industrial Revolution: Incentives and Institutions”
- **Petra Moser**, Stanford University and NBER, and **Paul Rhode**, University of Michigan and NBER, “Plant Patents and the American Rose”
- **Kevin J. Boudreau**, London Business School, and **Karim R. Lakhani**, Harvard University, “The Confederacy of Software Production: Field Experimental Evidence on Heterogeneous Developers, Tastes for Institutions, and Effort”
- **Pierre Azoulay**, MIT and NBER; **Joshua S. Graff Zivin**, University of California, San Diego and NBER; and **Bhaven Sampat**, Columbia University, “The Diffusion of Scientific Knowledge Across Time and Space: Evidence from Professional Transitions for the Superstars of Medicine”
- **Daron Acemoglu**, MIT and NBER, “Diversity and Technological Progress”
- **Daniel Spulber**, Northwestern University, “How Entrepreneurs Affect the Rate and Direction of Inventive Activity”
- **Shulamit Kahn**, Boston University, and **Megan MacGarvie**, Boston University and NBER, “The Effects of the Foreign Fulbright Program on Knowledge Creation in Science and Engineering”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/RDIA10/summary.html>

Economics of Culture and Institutions

An NBER Conference on the Economics of Culture and Institutions, organized by Alberto Bisin of NBER and New York University and Paola Giuliano of NBER and the University of California, Los Angeles, took place in Cambridge on November 20, 2010. These papers were discussed:

- **Lawrence Blume**, Cornell University; **William Brock**, University of Wisconsin; **Steven N. Durlauf**, University of Wisconsin and NBER; and **Yannis M. Ioannides**, Tufts University, “Identification of Social Interactions”
- **Quamrul Ashraf** and **Oded Galor**, Brown University, “Cultural Assimilation, Cultural Diffusion, and the Origin of the Wealth of Nations”
- **Stelios Michalopoulos**, Tufts University, and **Elias Papaioannou**, Dartmouth College, “Divide and Rule or the Rule of the Divided? Evidence from Africa”
- **Yann Algan**, Sciences Po; **Pierre Cahuc**, Ecole Polytechnique; and **Andrei Shleifer**, Harvard University and NBER, “Teaching Practices and Social Capital”
- **Luigi Guiso**, European University Institute; **Paola Sapienza**, Northwestern University and NBER; and **Luigi Zingales**, University of Chicago and NBER, “Long Term Persistence”
- **Benjamin Feigenberg**, MIT, and **Erica M. Field** and **Rohini Pande**, Harvard University and NBER, “Building Social Capital through Microfinance” (NBER Working Paper No. 16018)
- **Nicholas Bloom**, Stanford University and NBER; **Raffaella Sadun**, Harvard University and NBER; and **John Van Reenen**, London School of Economics and NBER, “The Organization of Firms across Countries”

Summaries of the papers can be found at <http://www.nber.org/confer/2010/CIF10/summary.html>

NBER Researchers Win Nobel Prize in Economics

NBER Research Associates Peter A. Diamond of MIT and Dale T. Mortensen of Northwestern University shared the 2010 Nobel Prize in Economics with Christopher Pissarides of the London School of Economics. Both Diamond and Mortensen are members of the NBER's Program on Economic Fluctuations and Growth; Diamond is also a member of the Public Economics Program.

The award citation prepared by the Prize Committee of the Royal Swedish Academy of Sciences highlighted the three researchers' analysis of "markets with search

frictions." Their research has found broad application in the study of markets for labor, housing, and many other commodities. A particularly current application is to an understanding of how unemployment can remain high in the United States and other developed countries despite the presence of a substantial number of job vacancies.

Diamond and Mortensen join a long list of current and past NBER affiliates who have received the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, which is better known as the Nobel

Prize in Economics. Past NBER-affiliated winners include: Paul R. Krugman, 2008; Edward C. Prescott and Finn Kydland, 2004; Robert F. Engle, 2003; George Akerlof and Joseph E. Stiglitz (shared with Michael Spence), 2001; James J. Heckman and Daniel L. McFadden, 2000; Robert C. Merton and Myron S. Scholes, 1997; Robert E. Lucas, Jr., 1995; Robert W. Fogel, 1993; Gary S. Becker, 1992; and the late George J. Stigler, 1982, Theodore W. Schultz, 1979, Milton Friedman, 1976, and Simon Kuznets, 1971.

NBER Director Robert Mednick Is Honored

Robert Mednick, a member of the NBER's Board of Directors since 1998 and the organization's Treasurer, was recently honored by the International Federation of Accountants (IFAC) with its prestigious Sempier Award. This award, which is pre-

sented every four years, recognizes outstanding contributions to the accounting profession over a period of many years. The IFAC award citation recognized Mednick's contributions to the development of the accountancy profession internationally,

including his two terms as the chair of the IFAC Compliance Advisory Panel and his role in IFAC's Accountants' Legal Liability Task Force, as particularly noteworthy.

Former NBER President Eli Shapiro Dead at Age 94

Eli Shapiro, who served as NBER President between 1982 and 1984, passed away in early December at the age of 94. He was the Alfred P. Sloan Professor of Management, Emeritus, at MIT. In the course of his academic career, he taught at the University of Chicago, the Harvard Business School, and the MIT Sloan School of Management.

A graduate of Brooklyn College,

Shapiro received his Ph.D. from Columbia in 1939. He joined the NBER in 1938 as a research economist and, with some interruptions, was a member of the Bureau's research staff until the early 1960s. His research focused on corporate finance and the links between financial and real activity -- topics that are as relevant today as they were when he began studying them more than seventy years ago.

Shapiro was elected to NBER's Board of Directors in 1974, and became Chairman of the Board in 1980. He relinquished that position when he became NBER President in 1982, but returned to the Board when he stepped down as President in 1984. In 1993, he became a director emeritus.

New Directors Elected to NBER Board

The NBER's Board of Directors has elected seven new members:

Alan V. Deardorff, who is the John W. Sweetland Professor of International Economics and Professor of Economics and Policy at the University of Michigan, is the representative of the University of Michigan. He succeeds Saul H. Hymans in this role. Deardorff received his Ph.D. in economics from Cornell University in 1971 and has been on the faculty at the University of Michigan since 1970.

John P. Gould was elected as the representative of the University of Chicago. He succeeds the late Arnold Zellner. Gould is the Steven G. Rothmeier Professor and Distinguished Service Professor at the University of Chicago's Booth School of Business. From 1983 to 1993, Gould served as dean of Chicago's Graduate School of Business. He received his M.B.A. in 1963 and Ph.D. in 1966 from the University of Chicago.

Peter Blair Henry was elected as an NBER Director-at-Large. Henry is the Dean of New York University's Leonard N. Stern School of Business, where he also holds the Dean Richard West Professorship of Business and the William Berkely Professorship of Economics and Business.

He received his Ph.D. from MIT, and was the Konosuke Matsushita Professor of International Economics at Stanford University's Graduate School of Business prior to moving to NYU.

Ellen Hughes-Cromwick, the Chief Economist of Ford Motor Company, will represent the National Association for Business Economics on the NBER Board, succeeding Harvey Rosenblum. She has just completed a six-year term on the NABE Board, including one-year as President, and is a member of the Board of Directors of the NABE Foundation. Hughes-Cromwick received her Bachelor's degree from the University of Notre Dame and a Master's degree in International Development and Ph.D. in Economics from Clark University in Worcester, MA.

Alan L. Olmstead, who is Director of the Institute of Governmental Affairs and Distinguished Professor of Economics at the University of California, Davis, was elected as the representative of the Economic History Association. He succeeds Timothy W. Guinane in representing this organization. Olmstead received his Ph.D. from the University of Wisconsin in 1970 and has been on the faculty at UC-Davis since 1969.

Gregor W. Smith, the Douglas D.

Purvis Professor of Economics and Associate Head of the Department of Economics at Queen's University, is the newly-elected representative of the Canadian Economics Association. He received his D.Phil. from Oxford University, and is a past president of the Canadian Economics Association. He succeeds Angelo Melino as the CEA's representative.

Finally, Bart van Ark, Senior Vice President and Chief Economist of The Conference Board, was elected as the representative of that organization. He succeeds Gail Fosler, who stepped down from the NBER Board of Directors in December 2009. Van Ark received his Ph.D. from, and is currently a Professor of Economic Development, Technological Change, and Growth at, the University of Groningen in the Netherlands.

Three former directors have been elected to Director Emeritus status: Saul H. Hymans, formerly the representative of the University of Michigan; Rudolph A. Oswald, a former Director-at-Large; and Nathan Rosenberg, who represented Stanford University. All are long-serving members of the NBER Board of Directors.

New Directors of NBER Working Groups and Programs

The NBER's Working Group on Household Finance has a new co-director: Brigitte Madrian of Harvard's Kennedy School of Government has joined Nicholas S. Souleles of the Wharton School and Peter Tufano of the Harvard Business School to co-direct that group. Madrian's profile appeared in the last issue of the *NBER Reporter* (see <http://www.nber.org/reporter/2010number3/profiles.html>)

Christina D. Romer, who resigned from the NBER when she became chair of the President's Council of Economic Advisers in early 2009, has now returned to the economics faculty at the University

of California, Berkeley. She was re-elected an NBER Research Associate by NBER's Board of Directors at their September 2010 meeting, and she re-joins David H. Romer, also of Berkeley, as co-director of the NBER's Monetary Economics Program.

In January, 2011, Raghuram Rajan of the Booth School of Business at the University of Chicago, who has led the NBER's Program on Corporate Finance since 1998, will be succeeded by Malcolm Baker of Harvard Business School. At the same time, Ernst R. Berndt of the MIT Sloan School of Management, who has led the NBER's Productivity

& Technological Change Program since 2000, will be succeeded by co-directors Nicholas Bloom of Stanford University and Josh Lerner of the Harvard Business School. When Lerner becomes co-director of the Productivity Program, he will step down from his roles as co-director of the Entrepreneurship and Innovation Policy Working Groups. Current co-directors Antoinette Schoar and Scott Stern, both of MIT's Sloan School of Management, will become the sole directors of the NBER's Entrepreneurship and Innovation Policy Working Groups, respectively.

Program and Working Group Meetings

Economic Fluctuations and Growth Research Meeting

The NBER's Program on Economic Fluctuations and Growth met at the Federal Reserve Bank of Chicago on October 1, 2010. NBER Research Associates John Haltiwanger, University of Maryland, and Sergio Rebelo, Northwestern University, organized the meeting. These papers were discussed:

- **Jonathan Parker**, Northwestern University and NBER; **Nicholas S. Souleles**, University of Pennsylvania and NBER; **David Johnson**, Bureau of the Census; and **Robert McClelland**, Bureau of Labor Statistics, "Consumer Spending and the Economic Stimulus Payments of 2008"
- **Lubos Pastor** and **Pietro Veronesi**, University of Chicago and NBER, "Uncertainty about Government Policy and Stock Prices"
- **Lutz Kilian** and **Dan Murphy**, University of Michigan, "The Role of Inventories and Speculative Trading in the Global Market for Crude Oil"
- **Gadi Barlevy** and **Jonas Fisher**, Federal Reserve Bank of Chicago, "Mortgage Choices and Housing Speculation"
- **Zhiguo He**, University of Chicago, and **Arvind Krishnamurthy**, Northwestern University and NBER, "Intermediary Asset Pricing"
- **Francois Gourio**, Boston University and NBER, and **Leena Rudanko**, Boston University, "Customer Capital"

Summaries of these papers may be found at <http://www.nber.org/confer/2010/EFGf10/summary.html>

Chinese Economy Working Group Meets

The NBER's Working Group on the Chinese Economy, directed by Shang-Jin Wei of Columbia University, met in Cambridge on October 1 and 2, 2010. Hanming Fang, University of Pennsylvania and NBER, organized the meeting with Wei. These papers were discussed:

- **Jun Qian**, Boston College; **Philip Strahan**, Boston College and NBER; and **Zhishu Yang**, Tsinghua University, "The Impact of Organizational and Incentive Structures on Soft Information: Evidence from Bank Lending"
- **Hongbin Cai**, **Li-An Zhou**, and **Yuyu Chen**, Beijing University; and **Hanming Fang**, "Microinsurance, Trust, and Economic Development: Evidence from a Randomized Natural Field Experiment"
- **Abhijit Banerjee**, MIT and NBER; **Xin Meng**, ANU; and **Nancy Qian**, Yale University and NBER, "The Life Cycle Model and Household Savings: Micro Evidence from Urban China"
- **Loren Brandt**, **Trevor V. E. Tombe**, and **Xiaodong Zhu**, University of Toronto, "Factor Market Distortion across Time, Space and Sectors in China"
- **Qingyuan Du**, Columbia University, and **Shang-Jin Wei**, "A Sexually Unbalanced Model of Current Account Imbalances" (NBER Working Paper No. 16000)
- **Ravi Jagannathan**, Kellogg Graduate School of Management and NBER; **Mudit Kapoor**, Indian School of Business; and **Ernst Schaumburg**, Federal Reserve Bank of New York, "Why are we in a Recession? The Financial Crisis is the Symptom not the Disease!"

- **Gabriella Conti**, University of Chicago; **James J. Heckman**, University of Chicago and NBER; and **Yi Jun Jian** and **Junsen Zhang**, Chinese University of Hong Kong, “Early Health Shocks, Parental Responses, and Child Outcomes”
- **Douglas Almond**, Columbia University and NBER; **Yuyu Chen**, Peking University; **Avraham Ebenstein**, Hebrew University of Jerusalem; **Michael Greenstone**, MIT and NBER; and **Hongbin Li**, Tsinghua University, “The Long-Run Impact of Air Pollution on Life Expectancy: Evidence from China’s Huai River Policy”
- **Galina Hale**, Federal Reserve Bank of San Francisco, and **Cheryl Long**, Colgate University, “If You Try, You’ll Get By”
- **Peter Zeitz**, University of California, Los Angeles, “Short-Run Incentives and Myopic Behavior: Evidence from State-Owned Enterprises in China”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/CWGF10/summary.html>

Household Finance Group Meeting

NBER Research Associates and Working Group co-directors Brigitte Madrian of Harvard University’s Kennedy School of Government, Nicholas Souleles of the University of Pennsylvania’s Wharton School, and Peter Tufano of the Harvard Business School, organized a meeting of the Household Finance Group in Cambridge on October 8, 2010. These papers were discussed:

- **Santosh Anagol**, University of Pennsylvania, and **Shawn A. Cole** and **Shayak Sarkar**, Harvard University, “Bad Advice: Explaining the Persistence of Whole Life Insurance”
- **Sumit Agarwal** and **Gene Amromin**, Federal Reserve Bank of Chicago; **Itzhak Ben-David**, Ohio State University; **Douglas Evanoff**, Federal Reserve Bank of Chicago; and **Souphala Chomsisengphet**, Office of the Comptroller of the Currency, “Market-Based Loss Mitigation Practices for Troubled Mortgages Following the Financial Crisis”
- **Daniel Cooper**, Federal Reserve Bank of Boston, “Home Equity Borrowing and Household Behavior in the 2000s”
- **Michael Lovenheim**, Cornell University, and **C. Lockwood Reynolds**, Kent State University, “The Effect of Housing Wealth on College Choice: Evidence from the Housing Boom”
- **Santosh Anagol** and **Hoikwang Kim**, University of Pennsylvania, “The Impact of Shrouded Fees: Evidence from a Natural Experiment in the Indian Mutual Funds Market”

These summaries may be found at: <http://www.nber.org/2010/HFf10/summary.html>

Market Design Working Group

The NBER’s Working Group on Market Design, directed by Susan Athey and Parag A. Pathak of NBER and MIT, met in Cambridge on October 8 and 9, 2010. These papers were discussed:

- **Dirk Bergemann** and **Johannes Horner**, Yale University, “Should Auctions Be Transparent?”
- **Simon Board**, University of California, Los Angeles, and **Andrzej Skrzypacz**, Stanford University, “Optimal Dynamic Auctions for Durable Goods: Posted Prices and Fire Sales”
- **Malles M. Pai**, University of Pennsylvania, and **Rakesh Vohra**, Northwestern University, “Optimal Auctions with Financially Constrained Bidders”
- **Lawrence M. Ausubel** and **Oleg V. Baranov**, University of Maryland, “Core-Selecting Auctions with Incomplete Information”

- **Sven Seuken** and **David C. Parkes**, Harvard University, and **Denis Charles, Max Chickering, Mary Czerwinski, Kamal Jain, Sidd Puri, and Desney Tan**, Microsoft Research, “Hidden Market Design: A Peer-to-Peer Backup Market”
- **Gary E. Bolton**, Penn State University; **Ben Greiner**, University of New South Wales; and **Axel Ockenfels**, University of Cologne, “Engineering Trust: Reciprocity in the Production of Reputation Information”
- **Soohyung Lee**, University of Maryland; **Muriel Niederle**, Stanford University and NBER, and **Hye-Rim Kim** and **Woo-Keum Kim**, Korea Marriage Culture Institute, “Propose with a Rose? Signaling in Internet Dating Markets”
- **Yinghua He**, Toulouse School of Economics, “Gaming School Choice Mechanisms”
- **Federico Echenique, SangMok Lee, and Matthew Shum**, California Institute of Technology, “Aggregate Matchings”
- **Fuhito Kojima**, Stanford University; **Parag A. Pathak**; and **Alvin E. Roth**, Harvard University and NBER, “Matching with Couples: Incentives and Stability in Large Markets”
- **Itai Ashlagi**, MIT, and **Alvin Roth**, “Participation (versus Free Riding) in Large Scale, Multi-Hospital Kidney Exchange”
- **Michael Ostrovsky**, Stanford University, and **Michael Schwarz**, Yahoo! Labs, “Reserve Prices in Internet Advertising Auctions: A Field Experiment”
- **Susan Athey; Dominic Coey**, Stanford University; and **Jonathan D. Levin**, Stanford University and NBER, “Subsidies and Set-Asides in Auctions”
- **Marek Pycia**, University of California, Los Angeles, and **Utku Unver**, Boston College, “Incentive Compatible Allocation and Exchange of Discrete Resources”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/MDf10/summary.html>

IFM Program Meeting

The NBER's Program on International Finance and Macroeconomics met in Cambridge on October 22, 2010. NBER Research Associates Charles Engel, University of Wisconsin, and Linda Tesar, University of Michigan, organized the meeting. These papers were discussed:

- **Laura Alfaro**, Harvard University and NBER; **Sebnem Kalemli-Ozcan**, University of Houston and NBER; and **Vadym Volosovych**, Erasmus University Rotterdam, “International Capital Allocation, Sovereign Borrowing, and Growth”
- **Jonathan Eaton**, Pennsylvania State University and NBER; and **Samuel S. Kortum, Brent Neiman, and John Romalis**, University of Chicago and NBER, “Trade and the Global Recession”
- **Andrei Levchenko**, University of Michigan and NBER, and **Jing Zhang**, University of Michigan, “The Evolution of Comparative Advantage: Measurement and Welfare Implications”
- **Nicola Gennaioli** and **Alberto Martin**, CREI, and **Stefano Rossi**, Imperial College Business School, “Sovereign Default, Domestic Banks, and Financial Institutions”
- **Christopher Erceg** and **Jesper Linde**, Federal Reserve Board, “Asymmetric Shocks in a Currency Union with Monetary and Fiscal Handcuffs”

- **Nicola Borri**, LUISS, and **Adrien Verdelhan**, MIT and NBER, “Sovereign Risk Premia”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/IFMf10/summary.html>

Corporate Finance

The NBER’s Program on Corporate Finance met in Cambridge on October 29. Program Director Raghuram Rajan of the University of Chicago organized the meeting. These papers were discussed:

- **Ran Duchin** and **Denis Sosyura**, University of Michigan, “TARP Investments: Financials and Politics”
- **Bernadette Minton**, Ohio State University; **Jerome P. Taillard**, Boston College; and **Rohan Williamson**, Georgetown University, “Do Independence and Financial Expertise of the Board Matter for Risk Taking and Performance?”
- **Kathleen Kahle**, University of Arizona, and **Rene M. Stulz**, Ohio State University and NBER, “Financial Policies and the Financial Crisis: Impaired Credit Channel or Diminished Demand for Capital?”
- **Robin Greenwood** and **Jeremy C. Stein**, Harvard University and NBER, and **Samuel Hanson**, Harvard University, “A Comparative-Advantage Approach to Government Debt Maturity”
- **Bruce I. Carlin**, University of California, Los Angeles and NBER, and **David T. Robinson**, Duke University and NBER, “What Does Financial Literacy Training Teach Us?”
- **Ji-Woong Chung**, **Berk Sensoy**, and **Lea H. Stern**, Ohio State University, and **Michael Weisbach**, Ohio State University and NBER, “Pay for Performance from Future Fund Flows: The Case of Private Equity”
- **Ashwini Agrawal**, New York University, and **David Matsa**, Northwestern University, “Labor Unemployment Risk and Corporate Financing Decisions”
- **Mark Garmaise**, University of California, Los Angeles, and **Gabriel Natividad**, New York University, “Cheap Credit for Financial Institutions: The Case of Global Microfinance”

Summaries of these papers may be found at <http://www.nber.org/confer/2010/CFf10/summary.html>

Labor Studies Program Meeting

The NBER’s Program on Labor Studies, directed by David Card of the University of California, Berkeley, met in Cambridge on October 29, 2010. These papers were discussed:

- **Hilary W. Hoynes**, University of California, Davis and NBER, and **Erzo F.P. Luttmer**, Dartmouth College and NBER, “The Insurance Value of State Tax-and-Transfer Programs” (NBER Working Paper No. 16280)
- **Joshua Kinsler** and **Ronni Pavan**, University of Rochester, “College Quality, Educational Attainment, and Family Income”
- **Erling Barth**, University of Oslo and NBER; **Alex Bryson**, London School of Economics; **James C. Davis**, U.S. Census Bureau and NBER; and **Richard Freeman**, Harvard University and NBER, “The Contribution of Dispersion across Plants to the Increase in U.S. Earning Dispersion”
- **Daron Acemoglu** and **David Autor**, MIT and NBER, “Skills, Task and Technologies: Implications for Employment and Earnings” (NBER Working Paper No. 16082)

- **Brigham Frandsen**, MIT, “Union Wage Setting and the Distribution of Employees’ Earnings: Evidence from Certification Elections”
- **Victor Lavy**, Hebrew University and NBER, “Does Increasing Mother’s Schooling Reduce Fertility and Increase Children’s Education: Evidence from a Natural Experiment on Arabs in Israel”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/LSf10/summary.html>

Behavioral Finance Meeting

The Behavioral Economics Working Group held a meeting on Behavioral Finance in Cambridge on October 30, 2010. Organizers Kent D. Daniel, Columbia Business School, and Tano Santos, Columbia Business School and NBER, chose these papers to discuss:

- **Kenneth R. Ahern**, University of Michigan; **Daniele Daminelli**, Politecnico di Milano; and **Cesare Fracassi**, University of Texas at Austin, “Lost in Translation? The Effect of Cultural Values on Mergers around the World”
- **Cary Frydman**, **Peter Bossaerts**, and **Colin Camerer**, California Institute of Technology; **Nicholas C. Barberis**, Yale University and NBER; and **Antonio Rangel**, California Institute of Technology and NBER, “Realization Utility and Regret Signals in the Brain are Associated with Suboptimal Stock Market Transactions”
- **Camelia M. Kuhnen**, Northwestern University, and **Brian Knutson** and **Gregory R. Samanez-Larkin**, Stanford University, “Different Affective Learning Systems Contribute to the Accumulation of Assets and Debt”
- **Henrik Cronqvist**, Claremont McKenna College, and **Stephan Siegel**, Columbia University, “The Origins of Savings Behavior”
- **Andrea Frazzini**, AQR Capital Management, and **Lasse H. Pedersen**, New York University and NBER, “Betting Against Beta”
- **Xavier Gabaix**, New York University and NBER, “A Sparsity-Based Model of Bounded Rationality”

These summaries may be found at: <http://www.nber.org/2010/BEf10/summary.html>

Asset Pricing Program Meeting

The NBER’s Program on Asset Pricing met at the Federal Reserve Bank of San Francisco on November 5, 2010. Organizers Sydney Ludvigson and Lasse H. Pedersen, both of New York University and NBER, chose these papers to discuss:

- **Snehal Banerjee**, Northwestern University, and **Jeremy Graveline**, University of Minnesota, “The Cost of Short-Selling Liquid Securities”
- **Ke Tang**, Renmin University of China, and **Wei Xiong**, Princeton University and NBER, “Index Investment and Financialization of Commodities” (NBER Working Paper No. 16385)
- **Robert Novy-Marx**, University of Rochester and NBER, “The Other Side of Value: Good Growth and the Gross Profitability Premium” (NBER Working Paper No.15940)
- **Tim Bollerslev**, Duke University and NBER, and **Viktor Todorov**, Northwestern University, “Tails, Fears and Risk Premia”
- **Lubos Pastor** and **Pietro Veronesi**, University of Chicago and NBER, “Uncertainty about Government Policy and Stock Prices” (NBER Working Paper No. 16128)

- **Alexander Dyck**, University of Toronto, and **Adair Morse**, University of Chicago, “Sovereign Wealth Fund Portfolios”

Summaries of these papers may be found at <http://www.nber.org/confer/2010/APf10/summary.html>

Public Economics Program Meeting

The NBER’s Program on Public Economics (PE) met in Cambridge on November 4 and 5, 2010. The first part of the meeting focused on “Behavioral Responses to Taxation” and was organized by Research Associates Raj Chetty of Harvard University, who co-directs the PE Program, and Emmanuel Saez of the University of California, Berkeley. The PE Program’s Co-Director Amy Finkelstein of MIT, and NBER Research Associate Erzo F.P. Luttmer of Dartmouth College, also organized this meeting. These papers were discussed:

- **Jon M. Bakija**, Williams College; **Adam J. Cole**, U.S. Department of the Treasury; and **Bradley Heim**, Indiana University, “Jobs and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from U.S. Tax Return Data”
- **Lisa Schreiber Rosenmerkel**, Internal Revenue Service, and **Jenny Wahl**, Carleton College, “Crossing the Bar: Predicting Wealth from Income and Estate Tax Records”
- **Brian Raub**, **Barry Johnson**, and **Joseph Newcomb**, Internal Revenue Service, “Rich or Richer? Comparing Estimates for the Forbes 400 to IRS Data”
- **Atif R. Mian**, University of California, Berkeley and NBER, and **Amir Sufi**, University of Chicago and NBER, “The Effects of Fiscal Stimulus: Evidence from the 2009 ‘Cash for Clunkers’ Program” (NBER Working Paper No. 16351)
- **Emmanuel Farhi**, Harvard University and NBER, and **Ivan Werning**, MIT and NBER, “Insurance and Taxation over the Life Cycle”
- **Jesse Cunha**, Stanford University, and **Giacomo DeGiorgi** and **Seema Jayachandran**, Stanford University and NBER, “The Price Effects of Cash versus In-Kind Transfers”
- **Jeffrey B. Liebman**, Harvard University and NBER, and **Neale Mahoney**, Stanford University, “Do Expiring Budgets Lead to Wasteful Year-End Spending? Evidence from Federal Procurement”
- **Damon Jones**, University of Chicago and NBER, “Inertia and Overwithholding: Explaining the Prevalence of Income Tax Refunds” (NBER Working Paper No. 15963)
- **Syngjoo Choi**, University College London; **Shachar Kariv**, University of California, Berkeley; **Wieldand Muller**, Tilburg University; and **Dan Silverman**, University of Michigan and NBER, “Who Is (More) Rational”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/PEf10/summary.html>

Monetary Economics Program Meeting

The NBER’s Monetary Economics Program met in Cambridge on November 5, 2010. NBER Research Associates Christopher House and Matthew D. Shapiro, University of Michigan, organized this program:

- **Alessandro Barattieri** and **Peter Gottschalk**, Boston College, and **Susanto Basu**, Boston College and NBER, “Some Evidence on the Importance of Sticky Wages” (NBER Working Paper No. 16130)
- **Virgiliu Midrigan**, New York University and NBER, and **Oleksiy Kryvtsov**, Bank of Canada, “Inventories, Markups and Real Rigidities in Menu Cost Models” (NBER Working Paper No. 14651)

- **Atif R. Mian**, University of California, Berkeley and NBER, and **Amir Sufi**, University of Chicago and NBER, “The Effects of Fiscal Stimulus: Evidence from the 2009 ‘Cash for Clunkers’ Program” (NBER Working Paper No. 16351)
- **Jaime Guajardo**, **Daniel Leigh**, and **Andrea Pescatori**, International Monetary Fund, “Will It Hurt? Macroeconomics Effects of Fiscal Consolidation”
- **Nicola Gennaioli**, CREI; **Andrei Shleifer**, Harvard University and NBER; and **Robert W. Vishny**, University of Chicago and NBER, “Neglected Risks, Financial Innovation, and Financial Fragility” (NBER Working Paper No. 16068)
- **Robert E. Hall**, Stanford University and NBER, “Macroeconomics of the Prolonged Slump”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/MEf10/summary.html>

Education Program Meets

The NBER’s Program on Education, directed by Caroline M. Hoxby of Stanford University, met at the Federal Reserve Bank of Chicago on November 11 and 12. The following papers were discussed:

- **Patrick Wolf** and **Brian Kisida**, University of Arkansas; **Babette Gutmann** and **Lou Rizzo**, Westat; **Michael Puma**, Chesapeake Research Associates; and **Nada Eissa**, Georgetown University and NBER, “Evaluation of the DC Opportunity Scholarship Program: Experimental Impacts after at Least Four Years”
- **Karthik Muralidharan**, University of California, San Diego and NBER; **Jishnu Das** and **Venkatesh Sundararaman**, The World Bank; **Stefan Dercon**, Oxford University; **James Habyarimana**, Georgetown University; and **Pramila Krishnan**, University of Cambridge, “When Can School Inputs Improve Test Scores”
- **Steven F. Lehrer**, Queen’s University and NBER, and **Weili Ding**, Queen’s University, “Estimating Context-Independent Treatment Effects in Education Experiments”
- **Jane Cooley** and **Jeffrey Traczynski**, University of Wisconsin, “Spare the Rod? The Effect of Sanctions on Schools”
- **Stephanie Riegg Cellini**, George Washington University, and **Latika Chaudhary**, Scripps College, “The Labor Market Returns to a Private Two-Year College Education”
- **Eric S. Taylor**, Stanford University, and **John H. Tyler**, Brown University and NBER, “The Effect of Evaluation on Teacher Performance: Evidence from Longitudinal Student Achievement Data of Mid-career Teachers”
- **Cristian Pop-Eleches** and **Miguel Urquiola**, Columbia University and NBER, “Going to a Better School: Effects and Behavioral Responses”
- **C. Kirabo Jackson**, Northwestern University and NBER, “Peer Quality or Input Quality? Evidence from Trinidad and Tobago”
- **Jeffrey Groen**, Bureau of Labor Statistics, “Time to the Doctorate and the Labor Market for New PhD Recipients”
- **Pablo Pena**, University of Chicago, “Randomness and the Measurement of Intergenerational Mobility”
- **Pamela Jakiela**, Washington University; **Edward Miguel**, University of California, Berkeley and NBER; and **Vera L. te Velde**, University of California, Berkeley, “You’ve Earned It: Combining Field and Lab Experiments to Estimate the Impact of Human Capital on Social Preferences”

- **Sheetal Sekhri**, University of Virginia, “Affirmative Action and Peer Effects: Evidence from Caste-Based Reservation in General Education Colleges in India”

Summaries of these papers may be found at: <http://www.nber.org/confer/2009/EDf010/summary.html>

Political Economy Meeting

The NBER’s Program on Political Economy met in Cambridge on November 19, 2010. Matthew Gentzkow, NBER and University of Chicago, and Francesco Trebbi, NBER and University of British Columbia, organized the meeting. These papers were discussed:

- **Sandeep Baliga** and **Jeffrey Ely**, Northwestern University, “Torture”
- **Abhijit Banerjee**, MIT and NBER; **Selvan C. Kumar**, Yale University; **Rohini Pande**, Harvard University and NBER; and **Felix Su**, Harvard University Department of Economics, “Do Informed Voters Make Better Choices? Experimental Evidence from Urban India”
- **Yosh Halberstam**, University of Toronto, and **Montagnes Pablo**, “Information Contagion in Co-election Environments: Theory and Evidence from Entry and Exit of Senators”
- **Alessandra Casella**, Columbia University and NBER; **Aniol Llorente-Saguer**, Max Planck Institute; and **Thomas Palfrey**, California Institute of Technology, “Competitive Equilibrium in Markets for Votes”
- **Efraim Benmelech**, Harvard University and NBER; and **Claude Berrebi** and **Esteban Klor**, Hebrew University, “Counter-Suicide-Terrorism: Evidence from House Demolitions” (NBER Working Paper No. 16493)
- **David Jaeger**, City University of New York; **Esteban Klor**, Hebrew University; **Sami H. Miaari**, University of Haifa; and **Daniele Paserman**, Boston University and NBER, “The Struggle for Palestinian Hearts and Minds: Violence and Public Opinion in the Second Intifada” (NBER Working Paper No. 13956)

Summaries of these papers can be found at: <http://www.nber.org/confer/2010/POLf10/summary.html>

Entrepreneurship Working Group Meeting

The NBER’s Entrepreneurship Working Group, co-directed by Josh Lerner of Harvard Business School and Antoinette Schoar of MIT, met in Cambridge on December 3, 2010. These papers were discussed:

- **Geraldo Cerqueiro**, Universidade Catolica Portuguesa, and **Maria Fabiana Penas**, Tilburg University, “How Does Personal Bankruptcy Law Affect Start-ups?”
- **Lee G. Branstetter**, Carnegie Mellon University and NBER; **Francisco Lima** and **Ana Venancio**, Technical University of Lisbon; and **Lowell Taylor**, Carnegie Mellon University, “Do Entry Regulations Deter Entrepreneurship and Job Creation? Evidence from Recent Reforms in Portugal” (NBER Working Paper No. 16473)
- **John Asker**, New York University and NBER, and **Joan Farre-Mensa** and **Alexander Ljungqvist**, New York University, “Does the Stock Market Harm Investment Incentives?”
- **Marc-Andreas Muendler** and **James E. Rauch**, University of California, San Diego and NBER, “Mobilizing Social Capital through Employee Spinoffs: Evidence from Brazil”

- **Annamaria Conti** and **Frank Rothaermel**, Georgia Institute of Technology, and **Marie C. Thursby**, Georgia Institute of Technology and NBER, “Show Me the Right Stuff: Signals for High-Tech Startups”

Summaries of these papers can be found at: <http://www.nber.org/confer/2010/ENTf10/summary.html>

International Trade and Investment

The NBER's Program on International Trade and Investment met at the Federal Reserve Bank of San Francisco on December 3 and 4, 2010. Program Director Robert C. Feenstra of the University of California, Davis organized the meeting. These papers were discussed:

- **Kalina Manova**, Stanford University and NBER, and **Davin Chor**, Singapore Management University, “Off the Cliff and Back? Credit Conditions and International Trade During the Global Financial Crisis” (NBER Working Paper No. 16174)
- **Robert C. Feenstra**; **Zhiyuan Li**, Shanghai University of Finance & Economics; and **Miaojie Yu**, Peking University, “Exports and Credit Constraints Under Incomplete Information: Theory and Evidence from China”
- **Jessie H. Handbury**, Columbia University, and **David E. Weinstein**, Columbia University and NBER, “Is New Economic Geography Right? Evidence from Price Data”
- **James R. Markusen**, University of Colorado and NBER, “Putting Per-Capita Income back into Trade Theory”
- **A. Kerem Coşar**, University of Chicago, Booth School of Business; **Nezih Guner**, Universitat Autònoma de Barcelona; and **James R. Tybout**, Pennsylvania State University and NBER, “Firm Dynamics, Job Turnover, and Wage Distributions in an Open Economy” (NBER Working Paper No. 16326)
- **Ina Simonovska**, University of California, Davis and NBER, and **Michael Waugh**, New York University, “The Elasticity of Trade: Estimates and Evidence”
- **James Harrigan**, University of Virginia and NBER, and **Victor Shlychkov**, Columbia University, “Export Prices of U.S. Firms”

Summaries of these papers may be found at: www.nber.org/confer/2010/ITIf10/summary.html

Productivity Program Meeting

The NBER's Program on Technological Progress & Productivity Measurement, directed by Ernst R. Berndt of MIT, met in Cambridge on December 10, 2010. These papers were discussed:

- **David M. Cutler**, Harvard University and NBER, “Where Are the Health Care Entrepreneurs? The Failure of Organizational Innovation in Health Care”(NBER Working Paper No. 16030)
- **David Meltzer**, University of Chicago and NBER, and **Jeanette Chung**, University of Chicago, “Coordination, Switching Costs, and the Division of Labor in General Medicine: An Economic Explanation for the Emergence of Hospitalists in the United States” (NBER Working Paper No. 16040)
- **Nicholas Bloom**, Stanford University and NBER; **Carol Propper**, University of Bristol; **Stephan Seiler**, London School of Economics; and **John Van Reenen**, London School of Economics and NBER, “The Impact of Competition on Management Practices in Public Hospitals” (NBER Working Paper No. 16032)

- **Diego A. Comin**, Harvard University and NBER, and **Bart Hobijn**, Federal Reserve Bank of San Francisco, “Technology Diffusion and Postwar Growth” (NBER Working Paper No. 16378)
- **Timothy F. Bresnahan**, Stanford University and NBER; **Shane Greenstein**, Northwestern University and NBER; and **Rebecca Henderson**, Harvard University and NBER, “Schumpeterian Competition and Diseconomies of Scope; Illustrations from the Histories of Microsoft and IBM”
- **Alberto Cavallo**, MIT, and **Roberto Rigobon**, MIT and NBER, “The Distribution of the Size of Price Changes”

Summaries of these papers may be found at: <http://www.nber.org/confer/2010/PRf10/summary.html>

Organizational Economics Meeting

The NBER’s Organizational Economics Working Group met in Cambridge on December 10 and 11, 2010. Robert Gibbons, MIT and NBER, organized the meeting, with the assistance of Elizabeth Martinez of Massachusetts General Hospital. These papers were discussed:

- **Jonathan S. Skinner** and **Douglas O. Staiger**, Dartmouth College and NBER, “Technology Diffusion and Productivity Growth in Health Care” (NBER Working Paper No. 14865)
- **Gadi Barlevy**, Federal Reserve Bank of Chicago, and **Derek Neal**, University of Chicago and NBER, “Pay for Percentile”
- **Rocco Macchiavello**, Harvard University, and **Ameet Morjaria**, Harvard Kennedy School, “The Value of Relationships: Evidence from a Supply Shock to Kenya Flower Exporters”
- **Philippe Jehiel**, PSE, and **Andrew F. Newman**, Boston University, “Loopholes: Social Learning and the Evolution of Contract Form”
- **C. Kirabo Jackson**, Northwestern University and NBER, and **Henry S. Schneider**, Cornell University, “Do Social Connections Reduce Moral Hazard? Evidence from the New York City Taxi Industry”
- **Kenneth Ayotte**, Northwestern University Law School, and **Henry Hansmann**, Yale University, “A Nexus of Contracts Theory of Legal Entities”

Summaries of the papers can be found at: <http://www.nber.org/confer/2010/OEf10/summary.html>

Market Microstructure Group Meets

Members of the NBER’s Working Group on Market Microstructure met in Cambridge on December 17, 2010. Organizers Charles M. Jones of Columbia University, Bruce Lehmann of NBER and the University of California, San Diego, and Avaniidhar Subrahmanyam, University of California, Los Angeles, chose the following papers to discuss:

- **Doyne Farmer**, **Austin Gerig**, and **Fabrizio Lillo**, Santa Fe Institute, and **Henri Waelbroeck**, Pipeline Financial Group, “How Efficiency Shapes Market Impact”
- **Jonathan A. Brogaard**, Northwestern University, “High Frequency Trading and Its Impact on Market Quality”
- **Joel Hasbrouck**, New York University, and **Gideon Saar**, Cornell University, “Low-Latency Trading”
- **Andrei Kirilenko** and **Mehrdad Samadi**, Commodity Futures Trading Commission, and **Albert S. Kyle** and **Tugkan Tuzun**, University of Maryland, “The Flash Crash: The Impact of High Frequency Trading on an Electronic Market”

- **Amber Anand**, Syracuse University; **Paul Irvine**, University of Georgia; **Andy Puckett**, University of Tennessee; and **Kumar Venkataraman**, Southern Methodist University, “Market Crashes and Institutional Trading”
- **Cristina Cella**, Stockholm School of Economics; **Andrew Ellul**, Indiana University; and **Mariassunta Giannetti**, Stockholm School of Economics, “Investors’ Horizons and the Amplification of Market Shocks”

Summaries of these papers can be found at: <http://www.nber.org/confer/2010/MMf10/summary.html>

Bureau Books

These volumes may be ordered directly from the University of Chicago Press Distribution Center, at
 Telephone: 1-800-621-2736
 Email: custserv@press.uchicago.edu

For more information on ordering and electronic distribution, see
<http://www.press.uchicago.edu/Misc/Chicago/infopage.html>

Labor in the New Economy

Labor in the New Economy, edited by Katharine G. Abraham, James R. Spletzer, and Michael Harper, is available from the University of Chicago Press for \$110.00. This volume, Number 71 in the NBER’s Studies in Income and Wealth, addresses the accurate measurement of labor market activity. As the structure of the economy has changed over the past few decades, research-

ers and policymakers have been increasingly concerned with how these changes may affect workers. In this book, leading economists examine a variety of important trends in the new economy, including inequality of earnings and other forms of compensation, job security, employer reliance on temporary and contract workers, hours of work, and workplace safety and health.

Abraham is a Research Associate in the NBER’s Program in Labor Studies and a Professor of Survey Methodology and Adjunct Professor of Economics at the University of Maryland. Spletzer and Harper are affiliated with the Bureau of Labor Statistics in Washington, DC.

Demography and the Economy

Demography and the Economy, edited by John B. Shoven, is available from the University of Chicago Press for \$110.00. Demographics is a field that is vital to our understanding of social and economic change, and it has become increasingly important in recent years as concerns have grown over the aging populations of developed nations. Demographic studies can offer insight into trends in fertility, mortality, immigration, and labor force participa-

tion, as well as age, gender, and race-specific trends in health and disability.

This NBER Conference Report explores the connections between demography and economics, and in particular what demographic trends can reveal about the sustainability of traditional social security programs and the larger implications for economic growth. Contributors analyze a variety of issues, including the impact of greater wealth on choices about mar-

riage and childbearing and the effects of aging populations on housing prices, Social Security, and Medicare.

Shoven is a Research Associate in the NBER’s Programs in Public Economics, Aging, and Economic Fluctuations and Growth. He is also the Charles R. Schwab Professor of Economics at Stanford University.

Founding Choices: American Economic Policy in the 1790s

Founding Choices: American Economic Policy in the 1790s, edited by Douglas A. Irwin and Richard Sylla, is available from the University of Chicago Press for \$110.00 in the clothbound edition and \$35.00 in paperback.

The political decisions made by the founding fathers were crucial to the suc-

cess of the early republic, but their economic decisions were just as pivotal. This NBER Conference Report explores these economic choices and their profound influence on American life, westward expansion, and influence abroad. Among the topics covered are finance, trade, and monetary and banking policy. This book will be essential

reading for historians and economists alike.

Irwin and Sylla are Research Associates in the NBER's Program on the Development of the American Economy. Irwin is also the Robert E. Maxwell '23 Professor of Arts and Sciences at Dartmouth College. Sylla is a Professor of Economics at New York University's Stern School of Business.

Regulation versus Litigation: Perspectives from Economics and Law

Regulation versus Litigation: Perspectives from Economics and Law, edited by Daniel P. Kessler, is available from the University of Chicago Press for \$110.00.

Proponents of broad legislation enforced through litigation versus those who prefer regulation by administrative agencies vigorously debate the efficacy of

each approach. This NBER Conference Report explores the trade-offs between litigation and regulation, how one approach may outperform the other at a particular time, and how to choose between the two in addressing particular economic activities. The analyses here are both theoretical and empirical and involve a range of

industries, including public health, financial markets, medical care, and workplace safety.

Kessler is a Research Associate in the NBER's Program in Law and Economics and a Professor at Stanford University's Hoover Institution.

The following volume may be ordered directly from the University of Chicago Press Journals Division.

To order by telephone, call Monday through Friday, 8 am to 5 pm Central Time, (773) 753-3347; or toll-free in the U.S. and Canada, (877) 705-1878. To order by mail, the address is: University of Chicago Distribution Center, 11030 South Langley Avenue, Chicago, IL 60628, (773)702-7000

Innovation Policy and the Economy, Volume 11

Innovation Policy and the Economy, Volume 11, edited by Josh Lerner and Scott Stern, is available from the University of Chicago Press Journals Division for \$58.00 clothbound or \$35.00 in electronic format.

The NBER's annual conferences on Innovation Policy and the Economy provide a forum for discussing how certain policies can affect the ability of an economy to

achieve scientific and technological progress, and what impact science and technology can have on economic growth. This volume includes papers on: failure of organizational innovation in health care; the interaction among and-trade, emissions taxes, and innovation; and how science policy may evolve along with science itself.

Lerner and Stern are Research Associates

in the NBER's Program on Productivity and co-direct NBER's Working Group on Innovation Policy. Lerner is the Jacob H. Schiff Professor of Investment Banking at the Harvard Business School. Stern is a of Technological Innovation, Entrepreneurship, and Strategic Management at MIT's Sloan School of Management.

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