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WINTER 2006/7

Program Report

Productivity

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It is now seven years since Zvi Griliches, the NBER's Productivity Program Director for its first twenty years, passed away in October 1999. Due in large part to Zvi's enormous intellectual legacy and the extraordinary efforts he expended in nurturing and mentoring young scholars, I am pleased to report that the NBER's Productivity Program today is vibrant and robust, and that its researchers are carrying on the tradition of examining sources and consequences of innovation and productivity growth, and in the process developing and empirically exploiting new datasets.

Efficiency and productivity are essential concepts in almost every economist's tool kit, and thus it is not surprising that many of the NBER's Productivity Program members are affiliated with other NBER Programs where these concepts are important as well, including Labor Studies, Industrial Organization, Corporate Finance, Economic Fluctuations and Growth, International Trade and Investment, Law and Economics, and Health Care. What distinguishes the Productivity Program's research focus from these other Programs at the NBER is its strong emphasis on the roles of research and development, patents, incentive systems, regulations, knowledge spillovers, technological progress, organizational form, and market structure in influencing the extent and nature of productivity growth and innovation. In addition, a disproportionate share of Productivity Program researchers have traditionally focused considerable attention on issues involving economic measurement, such as measures of inputs, outputs, prices, quality change, and multifactor productivity, a focus that reflects Zvi Griliches's enduring bequest.

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Rather than attempting to summarize the full scope of program activity, much of which overlaps with other NBER programs, I will highlight in this report research in six broad areas, domains particularly prominent in Productivity Program research over the last four to five years. The sequence I follow will begin with research on individual inventors, followed by research on knowledge flows within and across firms and other institutions, on patents and intellectual property protection, on market structure, international trade and investment, and recent research on macroeconomics and productivity growth, particularly on the role of information and communications technology investments.

Innovation at the Level of the Individual Inventor

Does technological progress, by expanding knowledge, place an increased educational burden on successive generations of innovators? Do today's innovators spend longer time in learning, and/or do they become more narrowly expert? Benjamin Jones (11359) shows that the age at which Nobel Prize winners and other great inventors produce great ideas has increased substantially over the twentieth century, specifically because of a large drop in productivity at young ages, and is closely related to an increasing age at completion of formal education. Focusing on more ordinary inventors, Jones (11360) shows that the age at first patent, teamwork, and specialization are all increasing over time. These papers suggest dramatic changes in the nature of innovation, with a decline in output by the very young and a ubiquitous move towards greater teamwork in the implementation of ideas. Related research by David Galenson (12185, 12058) on artistic innovation finds that artists who innovate early in their lives do so suddenly, while those who innovate late do so more gradually.

In a series of papers (9017, 10923, 11654) Kenneth Sokoloff and collaborators have used new micro data sets on patents, inventors, and patent assignment contracts in the United States beginning in the nineteenth century, and examined the changing division of labor between those who invented new technologies and those who exploited them commercially. Soon after the major patent reform of 1836, intermediaries — such as patent lawyers, agents, and agencies — emerged, facilitating transactions between buyers and sellers of patents. However, the move-

ment of inventors into firms — at least as employees — did not proceed very far before the 1920s, at which time inventive activity shifted to R and D laboratories housed in large corporations. In between, inventors developed long-term attachments with a firm in which the inventor was a principal, often by bringing investors with them. In related research comparing inventors in the United States and Britain between 1790 and 1930 (10966), Sokoloff and collaborators report that the relatively low patent application fee in the United States (about 2.5 percent of that in Britain until late in the nineteenth century), combined with the U.S. administrative examination rather than the British registration and prize procedures, resulted in U.S. patentees typically having relatively humbler origins than their British counterparts.[1]

Another research stream, more theoretical, focuses on incentives faced by academic researchers. It examines whether returns to university licensing divert faculty from basic to applied research and to less leisure as they age. Marie Thursby and co-authors (11197, 10758) also introduce complications from tenure and from the fact that academic researchers may earn license income and enhanced prestige both inside and outside the university. These authors conclude that it is far from obvious that licensing damages basic research and education.

While patent data has long been used in empirical research, information on the identity (name and location) of the inventor has seldom been employed, because of what Manuel Trajtenberg (12479) calls the "who is who" problem: the name of a given inventor may be spelled differently across his/her patents, and the same name may correspond to different inventors (the "John Smith" problem). To address this problem involving over four million patent records and 1.6 million inventors from across the world, Trajtenberg developed an elaborate computerized data mining methodology, resulting in detailed data on individuals' patenting history, their employers, and co-inventors. He finds that 40 percent of patentees have more than one patent, and 70,000 have more than ten patents.

Managing R and D and innovation raises a number of issues regarding incentives. Beginning in the late 1980s, U.S. corporations increasingly linked compensation of central research personnel to the economic incentives of the corporation. Joshua Lerner and Julie Wulf (11944) examine the impact of the shifting compensation of the heads of corporate R and D. They report that among firms with centralized R and D operations, more long-term incentives (for example, stock options and restricted stock) are associated with more heavily cited patents, with more patent filings, and with patents of greater generality. While they cannot distinguish between the roles of better project selection or better people selection, they interpret these findings as being consistent with the view that performance pay of corporate R and D heads is associated with more innovative firms.

Knowledge Flows and Innovation Across Organizations

R and D

Geographic proximity between academia and industry R and D laboratories has long been hypothesized to facilitate knowledge spillovers. Using program-level data on pharmaceutical drug discovery expenditures during the 1980s and 1990s and location-program-level data on relevant academic science, Jeffrey Furman, Margaret Kyle, Iain Cockburn, and Rebecca Henderson (12509) study how proximity of pharmaceutical research laboratories to universities and the laboratories of competing pharmaceutical companies influenced the number of patents generated by the laboratories. They find that "public" science — generated by universities, academic medical centers, and government laboratories — generated positive spillovers to geographically proximate private pharmaceutical research laboratories, but that no such spillovers occurred among private laboratories.[2] Focusing on an earlier phenomenon — the growth of U.S. industrial pharmaceutical laboratories between 1927 and 1946, Megan MacGarvie and Jeffrey Furman (11470) find that while the pres-

ence of nearby industrial facilities helped shape the direction of university research programs, there was a significant, positive and causal effect running from university research to the growth of pharmaceutical research laboratories in the first half of the twentieth century.

An obvious way in which knowledge flows can occur between academia and industry is via collaborative publications. Does the success of these collaborations depend on the research status of the faculty involved? Focusing initially on biotechnology, Lynne Zucker, Michael Darby, and Jeff Armstrong (8499) report that counts of collaborative publications by top research university faculty and firm employees are an empirically useful indicator of knowledge transfer leading to firm success, but that collaborative articles of the very top star academic scientists with firm employees predicted significantly more firm success than collaborations with other faculty. Based on a census of biotechnology firms that did and did not go public, Darby and Zucker (8954) find that among other factors, the strength of the firm's science base (use of recombinant DNA technology, number of articles by star academic scientists as — or with — firm employees, number of biotech patents) reduced the time to initial public offering (IPO) and increased the expected proceeds raised from the IPO.

Zucker and Darby (9825, 11181) have extended this line of research to study nanoscale science and technology developments. An almost completed output of this research is NanoBank.org, a public digital library matching and linking individuals and organizations within and across the nanotechnology subsets of the Institute for Scientific Information (ISI) Web of Science, U.S. patent data, and firm financial records; the NBER will host a conference in 2007 where presented papers will use data drawn from the beta version of NanoBank. The concept of star scientist in numerous other areas of science and technology is examined empirically in Zucker and Darby (12172), in which they follow the 1981–2004 careers of 5,401 star scientists, as measured by ISIHighlyCited.com. They find that the number of stars in a U.S.

geographical region, or in one of the top-25 science and technology countries, generally has a significant and quantitatively large positive impact on the probability of firm entry in the same area of science and technology and that other measures of academic knowledge stocks have weaker and less consistent effects. Hence it is the stars themselves, more than their discoveries, which play a key role in the formation or transformation of high-tech industries. In terms of migration, Zucker and Darby report that in the United States stars become more concentrated over time, moving from areas with relatively few peers to those with many in their discipline. On the other hand, these authors also document the tendency of foreign-born American stars to return to their homeland when it develops sufficient strength in their area of science and technology.

Based on co-authorship counts among condensed matter physicists in the French "Centre National de la Recherche Scientifique", Jacques Mairesse and Laure Turner (11172) report that co-authorship intensity is about 40 times higher within a given laboratory than across laboratories within the same city and about 100 times greater than in laboratories in other cities. Immediate proximity is therefore critical.

Jeffrey Furman and Scott Stern (12523) examine the impact of a different institution — biological resource centers (BRCs) — on the growth of the cumulative "knowledge stock" in molecular biology. BRCs authenticate, preserve, and offer independent access to biological research materials such as cells, cultures, and specimens, thereby reducing the marginal costs to researchers of building on prior research efforts. Employing a difference-in-differences estimator linking specific material deposits to journal articles, these researchers report not only a selection effect (disproportionately important materials are deposited and preserved in BRCs), but also that materials being deposited in BRCs result in a significant marginal "boost" in the diffusion of knowledge, as measured by journal article citations. The latter effect increases with time and varies with the economic and institutional conditions in which deposits occur.

Bibliometric research has long quantified knowledge flows and influence by measuring citations in published articles and patents. The Institute for Scientific Information collects data from the top 110 U.S. research universities in twelve main fields that cover nearly all of science. Based on 1981–99 data on 2.4 million papers and 18.8 million citations, James Adams, J. Roger Clemmons, and Paula E. Stephan (10875) compute citation probabilities as actual citations divided by potential citations. The mean citation probability within fields is on the order of 10^{-5}, whereas cross-field citations are one tenth to one-hundredth as large, or 10^{-6} to 10^{-7}. Scientific influence is asymmetric within fields, and occurs primarily from top institutions to those less highly ranked. Using the same database, Adams (10640) reports that team size (as measured by the number of authors on an article) has increased by about 50 percent between 1981 and 1999, holding a number of other factors constant. Team size data are supplemented by measures of domestic and foreign institutional collaborations, capturing the geographic dispersion of team workers. The time-series evidence suggests that the trend toward larger and more dispersed teams accelerates at the start of the 1990s, which Adams conjectures may reflect sudden declines in the cost of collaboration attributable to improvements in telecommunications. Private universities and departments whose scientists have earned prestigious awards participate in larger teams, as do departments that have larger amounts of federal funding. Placement of former graduate students is a key determinant of institutional collaborations, especially collaborations with firms and foreign scientific institutions. Adams finds that scientific influence increases with team size and institutional collaborations. He interprets increased team size as reflecting an increase in the division of labor, and concludes that scientific productivity increases with the scientific division of labor.

Since relatively little academic research is patented, and only a fraction of the patents are ever licensed, Lee Branstetter and Yoshiaki Ogura (11561) examine the universe of industry patent citations from a set of California-based research universities, and assess changes over time in the propensity of U.S. industry patents to cite these papers, controlling for a variety of other factors. Branstetter and Ogura find patterns in their data consistent with the notion that there has been an increase in knowledge spillovers from academic science to commercial invention, but that this increase is highly concentrated in a small number of technical fields.

Diffusion of Superior Management Practices within Multinational Firms

While patent and professional journal citations are channels through which knowledge flows can be observed and quantified, there are many other ways in which knowledge transfer can occur, particularly within firms. NBER researchers are beginning to search for evidence of knowledge transfer within multinational firms. Productivity growth in sectors intensively using information technologies (IT) has been greater in the United States than in Europe since 1995. Using U.K. panel data on U.S. and non-U.S. multinational-owned establishments, Nick Bloom, Raffaella Sadun, and John VanReenen find that U.S. owned establishments have a stronger relationship between IT and productivity capital than either non-U.S. multinationals or domestic establishments.[3] This finding is robust to inclusion of fixed effects and holds when a sample of establishments taken over by U.S. multinationals is examined. Moreover, this U.S. multinational effect of IT is particularly strong in sectors such as retail and wholesale that use IT intensively; notably, as discussed below, it is these very same industries that account for much of the U.S.-European productivity growth differential since the mid-1990s. In related research, Lee Branstetter (8015) finds that Japanese multinational firms' network of affiliates in the United States are a significant channel of knowledge spillovers from Japan to the United States and vice-versa. These results are consistent with those of Wolfgang Keller and Stephen Yeaple (9504) who, using firm-level Compustat data and detailed unpublished data from the U.S. Bureau

of Economic Analysis on the industry classification of foreign-owned affiliates, find evidence for major FDI spillovers from affiliates of foreign-owned firms in the United States to U.S.-owned firms between 1987 and 1996; such spillovers explain about 11 percent of the U.S. manufacturing multifactor productivity growth during this time period.

Patents, R&D, Innovation and Firms' Valuations

While the existence of intellectual property (IP) protection through patents has long been thought to provide positive incentives for R and D and innovation, a growing "anti-commons" perspective highlights the negative role of patents in facilitating knowledge accumulation relative to publication in professional journals. Fiona Murray and Scott Stern (11465) note that a given discovery may contribute both to scientific research (journal publication) and to useful commercial applications (patents); they examine patent-paper pairs in biotechnology, exploiting the fact that patents are granted with a substantial lag, often years after the knowledge is initially disclosed through journal publication. Diffusion of citations occurs in both the pre-grant period and after formal IP rights are granted. Relative to the expected citation pattern for publications with a given quality level, the "anti-commons" hypothesis predicts that the citation rate to a scientific publication should fall after formal IP rights associated with that publication are granted.

Using a difference-in-differences estimator for 169 patent-paper pairs (and including a control group of other publications from the same prestigious *Nature* journal for which no patent was granted), Murray and Stern find evidence for a modest anti-commons effect, with the post-patent grant decline in citations of about 10–20 percent. This decline becomes more pronounced with the number of years elapsed since the date of patent grant, and is particularly salient for articles written by researchers with public sector affiliations. Hence, while this evidence suggests that formal IP rights do not seem to have a devastating impact on subsequent sci-

entific research, the increased use of formal IP appears to be significantly shaping the structure, conduct, and performance of both university and industry researchers. Additional implications of IP protection for the generation and accumulation of scientific and commercial knowledge are considered by Murray and Stern in another NBER publication.[4] Related research by Bronwyn Hall (7643) and Hall and Alfonso Gambardella (11120) has centered on IP issues arising from university-industry interactions, and documents the tensions that have arisen.

Patents on software and business methods have become highly controversial, with critics claiming that patents stifle innovation by holding up the development of technology that builds on patented prior art and by swamping inventors with patent-infringement suits; see, for example, Josh Lerner and Feng Zhu (11168). Iain Cockburn and Megan MacGarvie (12563) examine the effects of software patents on entry and exit in narrowly defined classes of software products, using a dataset with comprehensive coverage of both mature public firms and small privately held firms between 1994 and 2004; they find both stifling and stimulating effects of patents on entry. All else equal, greater numbers of patents held by incumbents have a negative impact on entry rates into narrowly defined software product markets, while greater numbers of patents held by entrants increase the rate of entry and decrease the rate of exit, all else equal. Related research by Lerner (7918, 10223) examines the impact of a notable judicial decision involving State Street Bank on financial patenting behavior.

In Hall and MacGarvie (12195), the authors examine valuation effects of software patenting. Major changes in software patentability occurred in the U.S. Patent and Trademark Office in 1995. After 1995, software patents became more valuable than ordinary patents, but Hall and MacGarvie find that if the patents are held by hardware firms, then it does not matter whether these patents are cited. That is, the "importance" of software patents held by non-software firms has no impact on firms' valuations, although

their existence does. The authors also report that the extension of patentability to software was initially negative for software firms, especially for those producing application software or services.

The worldwide expansion of patenting activity by firms in many sectors has led to an increase in the uncertainty and costs associated with enforcing one's own patents and defending against the patents of others. Building on earlier work by Hall and Rosemarie Ziedonis (7062) that found that increases in patenting in the semiconductor industry were driven largely by a need to amass large defensive patent portfolios because of technological complexity and threat of holdup, Hall (10605) reports that patent growth in the United States since 1984 has taken place in all technologies, but not in all industries, being concentrated in the electrical, electronics, computing, and scientific instruments industries. Although the 5–8 percent annual growth may reflect in part accelerated innovation, this growth has seriously affected patent offices worldwide and has led to increasing concern over patent quality and timeliness of issuance. Research by Cockburn, Sam Kortum, and Scott Stern (8980) on the relationship between poor examination and subsequent costly patent litigation, however, was unable to uncover any relationship. Hall, Stuart Graham, Dietmar Harhoff, and David Mowery (8807, 9731) investigate the workings and outcomes of the patent opposition system, a procedure not available in the United States, but used in Europe, and assess how such a system might function in the United States. In related research, Lerner (7477, 7478 and 8977) examines patent office practice, patent protection, and innovation over a 150-year time period, for a number of countries.[5]

David Popp, Ted Juhl, and Daniel Johnson (9518) examine grant lags for U.S. patent applications and find considerable differences across technology. Patents in biotechnology and and software experience the longest delays, but for different reasons: biotechnology patents are most likely to go through several revisions during the examination process, reflecting their complexity, whereas

software patents do not undergo revisions more frequently, but rather sit in the queue longer. Adding more software examiners therefore might reduce grant lags, but lags in biotechnology approvals are unlikely to be greatly affected by increasing the number of biotechnology examiners.

The energy sector has been the focus of R and D by both government and industry. Around 1981, according to Popp (11415), U.S. government R and D shifted its focus from applied (for example, synthetic fuels) to more basic in nature. Using patent citations as a measure of energy R and D quality, Popp finds that the likelihood of a patent receiving a citation from a future patent in the same field has fallen over time, which he interprets as evidence of diminishing returns to R and D over time. Distinguishing government patents from before and after the 1981 change in focus, Popp reports that government patents filed after 1981 are more likely to be cited, and moreover, that descendants of these patents — private patents that cite these government patents — are 30 percent more likely to be cited by subsequent patents. Popp concludes that government and industry R and D have distinct roles to play in the innovation process.

A lengthy NBER collaboration among Bronwyn Hall, Adam Jaffe, and Manuel Trajtenberg has put into the public domain a database that has been used subsequently by many researchers (the NBER's Patent Citation Data File). An early contribution by these authors (7741) investigated whether the citations received by U.S. firm's patents conveyed information about their private stock market valuation; they found that patent citations were more informative about value than the patents themselves, with interesting variation across sectors.

Hall has also pursued the closely related area of the market value of R and D spending, both for U.S. firms (with Jaffe and Trajtenberg in 7741) and for firms in a number of major European countries (with Raffaele Oriani in 10408). While R and D undertaken in France, the United States, and Germany is valued similarly, the value of R and D performed in the United Kingdom and Italy is substan-

tially higher, which the authors interpret as suggesting that there may be underinvestment in innovative activities in these two countries.

Conventional accounting practices traditionally exclude from gross domestic product investments in intangible capital, such as R and D, patents, brand equity and advertising, and human competency. Carol Corrado, Charles Hulten, and Daniel Sichel estimate that this practice implicitly ignores approximately $1 trillion of the output of the non-farm business sector in the United States by the late 1990s, an amount approximately equal to the amount of investment spending on tangible capital goods, and about 10 percent of gross domestic product.[6] The same authors (11948) extend the time dimension and carry out a formal sources-of-growth analysis. Among the more important findings, the authors report that intangible inputs have grown more rapidly than other inputs over the last four decades, that most of this expansion is not attributable to the growth in scientific R and D, but instead reflects growth in non-traditional intangibles such as non-scientific R and D, and management and human competencies. When intangibles are included in the analysis, capital deepening replaces multifactor productivity as the principal source of economic growth after 1995; notably, including intangibles has little effect on the acceleration of multifactor productivity in the mid-1990s. These, and a number of related issues involving the construction of R and D satellite accounts as a supplement to the National Income and Product Accounts, are considered by Barbara Fraumeni and Sumiye Okubo.[7]

Innovation, Organizational Form, and Market Structure

Causality between innovation and market structure generally has been viewed as being bidirectional, reflecting both Schumpeterian and network externality influences. In (9269), Philippe Aghion, Nick Bloom, Richard Blundell, Rachel Griffith, and Peter Howitt develop a theoretical framework and then demonstrate empirically with U.K. firm data

that the relationship between innovation and competition appears to be an inverted U-shape. At low levels of competition, increases in competition spur on more innovation, but at higher levels of innovation, additional competition appears eventually to reduce any further innovation. In their U.K. dataset, most industries were on the increasing part of the slope, consistent with earlier findings that the net impact of competition is to increase innovation. They conclude that more competition is, on average, likely to boost competition, but that at extremely high levels of competition there may be a trade-off between the positive efficiency and pricing effects of additional competition with the potentially negative innovation impacts. In contrast, arguing that growth in any country at any time is typically uneven and instead concentrated in a few firms in a few industries achieving metamorphic technological progress as a result of highly uncertain but breakthrough innovations, Darby and Zucker (12094) argue (a la Schumpeter) that despite lagged diffusion, consumers' welfare is greater with dominant firms in concentrated industries because of enhanced innovation.

Bee Yan Aw, Sukkyun Chung, and Mark Roberts (8629) compare linkages among firm-level productivity, R and D investment, and survival for firms in the same industry in Korea and in Taiwan, They find that Taiwanese industries are characterized by less concentrated market structure, more producer turnover, a smaller percentage of plants operating at low productivity levels, and smaller productivity differentials between surviving and failing producers. They interpret these results as reflecting strong competitive pressures in Taiwan that lead to market selection based on productivity differences, and the presence of impediments to entry or exit that insulate low productivity producers in Korea.

In a different line of research, Chad Syverson (10501, 12231) examines how demand-side product substitutability affects industry structure and performance in the U.S. ready-mixed concrete industry, an industry where product substitutability is determined largely by the density of

concrete producers in the market. With high density, consumers' ability to substitute implies that relatively inefficient producers are unable to be profitable, resulting in higher minimum and average productivity levels, less productivity dispersion, and lower prices because of spatial competition. Transport costs play a very critical role in the ready-made concrete industry, so in additional work (10049) Syverson explores the substitutability-productivity link across a number of different industries. He finds that product substitutability measured in several ways — transport costs, physical product differentiation, and advertising-driven brand differentiation — is negatively related to within-industry productivity dispersion and positively related to industries' median productivity levels. In related work using plant-specific physical output and unit price measures, Lucia Foster, John Haltiwanger, and Syverson (11555) also report that physical productivity is inversely correlated with plant-level prices.

In yet another strand of literature, as an alternative framework to "racing" models that assume R and D competition between a potential entrant and an incumbent, Joshua Gans, David Hsu, and Scott Stern (7851) endogenize the choice of product market competition versus cooperation with established firms (via licensing, alliances, or acquisition). They hypothesize that the relative returns to cooperation increase with control over IP rights, low transaction costs, and greater sunk costs associated with product market entry. They find empirical support for all three factors in determining commercialization strategies, and conclude that the pro-competitive impact of start-up innovation — the "gale of creative destruction" — depends on imperfections in the market for ideas. More generally, this research strand establishes that the industrial organization consequences of start-ups are endogenous to the commercialization environment, including factors such as the strength of IP rights, the availability of venture capita, and sunk costs. Josh Lerner and various co-authors consider related research on issues involving R and D and marketing-performance impacts from various forms of alliances and financing for a variety of prod-

uct technologies (8251, 9175, 9680, 9816, 10165, 10956, 11136, and 11292).

Interest in factors affecting an organization's ability to innovate has evolved to the development of a new form of survey, called innovation surveys, in a number of European countries. Based on a common core questionnaire, the country surveys assemble information on innovators and non-innovators, where "innovators" are defined as firms that have introduced a new product or process over the last three years, "new" is defined as substantially improved or completely new, and a distinction is made between products new to the firm but not necessarily new to the market and products new to the firm and the market. Jacques Mairesse, along with co-authors Pierre Mohnen, Elizabeth Kremp, and others (8644, 10237, 10897, 12280, and 12320), has developed a three-tier framework that examines firms' R and D investment function, a knowledge function with R and D as an input, and an innovation output function. They use this framework to account for differences across firms, industries, and countries in the propensity for "innovativity", analogous to multifactor productivity in traditional growth accounting analyses. They interpret innovativity as reflecting the ability to transform R and D and other innovation factors into innovation output, along with other unobserved and unmeasured factors.

NBER researchers also have examined the relationship between market structure and diffusion. Envisaging takeovers as playing roles similar to the entry and exit of firms, Boyan Jovanovic and Peter Rousseau (9279) argue that from 1890–1930, when electricity and the internal combustion engine spread through the U.S. economy, and more recently from 1971–2001 (the "Information Age"), takeovers played a major role in accelerating the diffusion of new technologies.

Productivity and International Trade

NBER Productivity researchers have contributed extensively to literatures explaining bilateral patterns of trade between countries, and quantifying gains

from trade. An early contribution was by Jonathan Eaton and Sam Kortum (6253), for which they were awarded the Frisch Medal in 2004. In this paper, Eaton and Kortum modeled observed aggregate trade volumes as a tug of war between technology differences that led to more trade and trade costs leading to less trade. In subsequent research with Andrew Bernard and J. Bradford Jensen, Eaton and Kortum (7688) examined U.S. plant-level export data, and empirically examined facts about how few firms export, how small a fraction of exporters are, and how much greater is their productivity. In Eaton, Kortum, and Francis Kramarz (10344), this framework is extended to study the detailed export behavior of French firms, while in Johannes Van Biesebroeck (10020) related research focuses on the effects of exports on the productivity performance of sub-Saharan manufacturing plants. Eaton and Kortum (12385) summarize this line of research linking innovation, diffusion, and international trade.

A most interesting case analysis of the productivity and price impacts of entry by a large retailer is the study by Beata Javorcik, Wolfgang Keller, and James Tybout (12457), based on interviews of Mexican firms, on the response of the Mexican soaps, detergents, and surfactant (SDS) producers to entry by Wal-Mart. The authors argue that the most fundamental effect of the North American Free Trade Agreement and the General Agreements on Tariff and Trade on Mexico's SDS industry was to induce Wal-Mart to enter Mexico. Once there, Wal-Mex fundamentally changed the retail sector, forcing SDS firms to cut their prices and/or innovate. Those unable to respond to this new environment tended to lose market share and, in some cases, to disappear altogether. As a result, many Mexican producers achieved impressive efficiency gains, both from labor shedding and innovation, which in turn was fueled by innovative input suppliers and by multinationals bringing new products and processes into Mexico.

Advocates of stronger IP protection in developing countries have suggested that stronger IP rights would induce mul-

tinationals to transfer more and better technology to IPR-reforming countries, and to do so at a more rapid rate than would obtain in a weak IPR environment, thereby benefiting the IPR-reforming countries. Using Bureau of Economic Analysis data on foreign direct investment, Lee Branstetter, Raymond Fisman, and Fritz Foley (11516) report that recent IPR reforms have in fact resulted in a quantitatively significant increase in technology transfer by U.S.-based multinational parents to their affiliates in IPR-reforming countries. Bee Yan Aw, Mark Roberts, and Tor Winston (11174) focus on the complementary role of export market participation and R and D investment as a source of knowledge acquisition and productivity growth for Taiwanese electronics producers, based on "learning by exporting". They find that firms that export but do not invest in R and D have significantly higher future productivity than firms that do not engage in either activity, but that firms that both export and perform their own R and D have the highest average future productivity levels among all groups. This pattern is consistent with the hypothesis that R and D and exports are complementary activities contributing to firm-level productivity growth.

More generally, the very substantial literature appearing between 1993 and 2003 on international technology diffusion via the mechanisms of international trade and foreign direct investment, as well as the geographical localization and productivity growth impacts of this diffusion, is identified and summarized in Wolfgang Keller (8573).

Aggregate Productivity Growth and the Role of Information Technology Investments

Two questions that have motivated macroeconomic productivity over the last decade have been what caused the revival in U.S. productivity growth after 1995 and its further jump in 2001–4, and why did productivity growth in Europe slow down just as that in the United States was accelerating? NBER researcher Robert J.

Gordon has addressed both of these issues in three papers. Separating actual productivity growth from its underlying trend, Gordon calculates trend acceleration from around 1.5 percent annually in the early 1990s to over 3 percent per year in 2002–3.[8] Actual growth was even faster in 2002–3, reflecting a standard cyclical phenomenon he calls the "early recovery bubble", in which during the early stage of an economic recovery, firms persist in cutting costs and shedding labor, reacting to the previous recession even as output begins to recover. Gordon attributes the labor productivity "explosion" in the early part of this decade primarily to unusually deep corporate cost cutting resulting from the sharp drop in profits and stock prices in 2000–2, from the aftermath of the accounting scandals, and the increasing reliance of executive pay on stock options. An alternative hypothesis, offered by Susanto Basu, John Fernald, Nicholas Oulton, and Sylaja Srinivasan (10010) is that much of the productivity payoff of the heavy IT investments of the late 1990s were delayed because of lags in adopting software and business practices to the rapid improvements in IT hardware capability of the previous decade.

Gordon and Ian Dew-Becker (11842) examine the consequences of this labor productivity growth on nominal wage growth and inflation. While increased productivity growth since 1995 has moderated inflation, Gordon and Dew-Becker obtain the provocative finding that over the entire 1966–2001 time period, only the top 10 percent of the income distribution achieved gains in wage and salary income equal to the growth rate of labor productivity, while the bottom 90 percent fell behind. The authors attribute this increased skewness of the income distribution to disproportionate income gains at the top — primarily of entertainment and sports "superstars" and to chief executive officers of large corporations — along with downward pressure for most workers coming from shrinking unionization, rising imports, and job competition from immigration.

Turning to U.S.-European comparisons, Gordon (10661) documents that after 1995 the growth rate of productivity

in western Europe (the EU-15 countries) slowed down about as much as it accelerated in the United States, implying that half of the divergence was attributable to better American performance and half to worse European performance. He then argues that since Europe uses much of the same IT software and hardware as does the United States, it is implausible to cite IT investment as playing an important role on either side of the Atlantic (recall my earlier discussion of different productivity in U.S.- and European-owned multinational plants in Europe, by Bloom and co-authors). Rather, he attributes the difference to variations in specific industries, most notably wholesale and retail trade, and in finance. Regarding retailing, the key development that Gordon cites is the development of the "big box" format, led by Wal-Mart, Home Depot, Best Buy, and others. In turn, the success of this formula relies on largely deregulated use of land in the United States, where it is relatively easy to build a Wal-Mart at expressway interchanges. Gordon notes that much of European retailing still takes place in small stores in central cities with little physical space to take advantage of modern technology.

A related but different set of issues are examined by William Nordhaus (11354), who focuses on the productivity rebound in the last decade in U.S. manufacturing industries, where manufacturing employed has declined sharply. He finds that the productivity rebound since 1995 has been widespread, with approximately 40 percent of it occurring in "New Economy" industries. Interestingly, Nordhaus finds that the relevant productivity-employment elasticities indicate that more rapid productivity growth leads to increased, rather than decreased, employment in manufacturing. This leads him to conclude that productivity growth is not to be feared, at least not in U.S. manufacturing, where the largest recent employment declines have occurred.

Focusing on an earlier era, and using pooled cross-section, time series data for 44 industries over the decades of the 1960s, 1970s, and 1980s in the United States, Edward Wolff (8743) finds no econometric evidence that computer

investment is positively linked to multifactor (not labor) productivity growth. However, computerization is positively associated with occupational restructuring and changes in the composition of intermediate inputs and capital coefficients. He also finds very modest evidence that the growth of worker skills is positively related to industry productivity growth. In other research in which he incorporates the age structure of capital into the measurement of productivity, Wolff (9768) finds that once variations in the vintage composition of capital are taken into account and capital stock is measured in efficiency units, multifactor productivity growth is smoothed considerably, particularly during the 1970s slowdown, relative to ignoring the effects of changing vintage capital composition.

Concluding Remarks

This summary of recent contributions by NBER Productivity Program researchers documents that the program continues to be wide-ranging, vibrant, and robust. It is also worth noting that while lengthy, this summary is incomplete in that I have omitted detailed discussion of much Productivity Program research that focuses on measurement issues, such as that involving price measurement incorporating quality changes, standard errors for price indexes, alternative measures of innovation, measuring output in diffi-

cult sectors such as finance and banking, and computing consumers' valuations of new goods. I also have omitted discussion of research on the productivity impacts of various federal and state regulatory policies, including environmental regulations in the context of climate change. Discussion of these issues is deferred to a subsequent issue of the *NBER Reporter.*

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[2] *A less technical summary of this research is given in M. Kyle, "Does Locale Affect R&D Activity? The Case of Pharmaceuticals", Federal Reserve Bank of San Francisco Economic Letter, Nov. 13, 2004.*

[3] *N. Bloom, R. Sadun, and J. VanReenen, "It Ain't What You Do but the Way That You Do I.T.: Investigating the Productivity Miracle Using Multinationals", presented at 2005 NBER Summer Institute Productivity Program. Available from nbloom@stanford.edu.*

[4] *F. Murray and S. Stern, "When Ideas are Not Free: The Impact of Patents on Scientific Research," in A. Jaffe, J. Lerner, and S. Stern, eds.,* Innovation Policy and the Economy, *Vol. 7, MIT Press for the National Bureau of Economic Research,*

forthcoming.

[5] *An overview of patent policy developments and their consequences in the last two decades in the United States is found in A. Jaffe and J. Lerner,* Innovation and its Discontents: How Our Broken Patent System is Endangering Innovation and Progress, and What To Do About It, *Princeton: Princeton University Press, 2005.*

[6] *C. Corrado, C. Hulten, and D. Sichel, "Measuring Capital and Technology: An Expanded Framework", in C. Corrado, J. Haltiwanger, and D. Sichel, eds.,* Measuring Capital in the New Economy, *University of Chicago Press for the National Bureau of Economic Research, Conference on Research in Income and Wealth, 2005, pp. 11–41.*

[7] *B. M. Fraumeni and S. Okubo, "R&D in the National Income and Product Accounts: A First Look at Its Effect on GDP", in C. Corrado, J. Haltiwanger, and D. Sichel, eds.,* Measuring Capital in the New Economy, *University of Chicago Press for the National Bureau of Economic Research, Conference on Research in Income and Wealth, 2005, pp. 275–316.*

[8] *R. J. Gordon, "Exploding Productivity Growth: Context, Causes, and Implications",* Brookings Papers on Economic Activity, *Vol. 34 (2003, No. 2), pp. 207–98. Available as NBER Reprint No. 2300.*

Research Summaries

Exchange Rate Regimes, Globalization, Financial Crises, and Monetary Policy

Michael D. Bordo*

My research in the past decade has concentrated largely on four related themes that I discuss in this article: Exchange Rate Regimes, Globalization, Financial Crises, and Monetary Policy.

Exchange Rate Regimes

As discussed in the Fall 1999 *NBER Reporter*, much of my earlier work focused on the gold standard and related monetary regimes. A series of papers with Finn Kydland, Ronald MacDonald, and Hugh Rockoff emphasized the importance of credible commitment mechanisms in the design of monetary regimes, focusing on the gold standard.[1] My recent work extends this approach.

The choice of exchange rate regimes, between fixed and floating exchange rates, evolved considerably in the past hundred years.[2] Before 1914, advanced countries adhered to gold while periphery countries either emulated the advanced countries or floated. Some peripheral countries were especially vulnerable to financial crises and debt default, in large part because of their extensive external debt obligations denominated in core country currencies. This left them with the difficult choice of floating but restricting external borrowing or devoting considerable resources to maintaining an extra hard peg.

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Today while advanced countries can successfully float, emergers who are less financially mature and must borrow abroad in advanced country currencies are afraid to float, for the same reason as their nineteenth century forbearers were. To obtain access to foreign capital, they may need a hard peg to the core country currencies. In my paper with Marc Flandreau the key distinction between core and periphery countries, both then and now, is financial maturity, evidenced in the ability to issue international securities denominated in domestic currency[3] (or the absence of "original sin", a phrase coined by Eichengreen and Haussman (1999)[4]).

However, a case study by Chris Meissner, Angela Redish, and myself of the debt history of several former colonies of Great Britain (the United States, Canada, Australia, New Zealand, and South Africa), who had largely overcome the problem of original sin by the third quarter of the twentieth century, finds that sound fiscal institutions, high credibility of the monetary regimes, and good financial development are not sufficient to completely break free from original sin. Conversely, poor performance in these policy realms is not, for the most part, a necessary condition for Original Sin. The factor we emphasize for the common progress toward borrowing in domestic currencies across the five countries is the presence of shocks, such as wars, massive economic disruption, and the emergence of global markets. The differences in evolution between the United States and the Dominions we attribute to differences in size, the role of a key currency, which characterized the United States and not the others, and to membership in the British Empire. The importance of major shocks suggests that the establishment of a domestic bond market that mitigated these effects involved significant start-up costs, while the importance of scale suggests that network externalities and liquidity were pivotal in the emergence of overseas markets in domestic currency debt.[5]

The limiting case of a fixed exchange rate regime is a monetary union. My study of the history of monetary unions (MUs) with Lars Jonung[6]—based on the examples of the United States, Germany, and Italy—suggests that the success of MUs of the past has been intimately linked with both fiscal and political unification. The implementation of EMU was largely driven by the political will of elites and its ultimate success may also depend upon the political will of the citizenship.

Globalization

Globalization—the integration of goods, labor, and capital markets—has been one of the dominant issues in the past several decades. The present era of globalization was preceded by an earlier era in the late nineteenth century—from 1870 to World War I. Globalization in historical perspective was the subject of a recent NBER conference volume, edited with Alan Taylor and Jeffrey Williamson. The articles in the book covered many aspects of the globalization experience, including the integration of markets, growth convergence, inequality, financial development, the transmission of shocks, and the political economy of the backlash in the interwar period that ended the first era of globalization.

My research with Barry Eichengreen and Douglas Irwin[7] focused on a comparison of the record of financial and commer-

cial globalization in the two eras of globalization.[8] The empirical evidence we survey suggests that, while in some respects the financial integration of the pre-1914 era remains unsurpassed, in other respects today's financial markets are even more closely integrated than those in the past. The difference today is that new information-generating-and-processing technologies have reduced the market-segmenting effects of asymmetric information. In consequence, the range of financial claims that are traded internationally has broadened. While in the past entities (governments, railroads, and mining companies) with tangible and therefore relatively transparent assets were predominant, now international investors transact freely in a much broader range of securities.

We also find that the commercial integration before World War I was more limited. Given that integration today is even more pervasive than a hundred years ago, it is surprising that trade tensions and financial instability have not been worse in recent years. Institutional innovations that have taken place in the past century, such as the evolution of sound monetary and fiscal policies, the establishment of the Bretton Woods Institutions, GATT and the WTO, may be part of the explanation.

Financial Crises and Financial Instability

The recent era of globalization has been characterized by a large number of financial crises, both currency and banking crises, especially in the emerging markets.[9] My research with Barry Eichengreen and others considers whether this is a new phenomenon. Using a database for 21 countries from 1880–1997, we compiled evidence on the incidence, duration, and costs of various types of crises across four exchange rate regimes.[10] Like the evidence on financial integration, ours came with a strong feeling of déjà vu. The incidence and duration of currency crises have increased since earlier eras of globalization, while those of banking crises are similar. The output losses of crises are quite similar across eras of globalization except for twin crises, which have been worse. Moreover, we find that crises seem to reflect both economic structure and bad

policies. One possible determinant of crises in emerging countries is the presence of original sin.

My work with Chris Meissner finds, in both eras of globalization, an increased probability that emerging countries with original sin experienced debt, currency, and banking crises. Furthermore, crises were more likely to be a problem for middle-income emerging countries that were less financially developed. In the first era of globalization, countries like Italy, Portugal, Argentina and Brazil were more crisis-prone than Australia, Canada, Denmark, and Sweden.

Another part of this research program focuses on the transmission of financial crises.[11] Antu P. Murshid and I (2000)[12] present evidence from weekly data on sovereign bond prices and interest rates for episodes of financial turbulence from 1880 to 1997. We find little evidence for contagion, defined as an incidence in bilateral cross-market correlations, adjusted for heteroscedasticity. However, we do find evidence suggestive of transmission via fundamentals-based trade channels. A related paper (Bordo and Murshid, 2002)[13], using principal components analysis on monthly spreads on long-term bond yields, finds that financial market shocks were more globalized before 1914 than they are now.[14]

Financial crises represent an extreme form of financial instability. Michael Dueker, David C. Wheelock, and I (2000, 2002)[15] construct indexes of financial stability for the United States and the United Kingdom for 1790–1997. We find that aggregate price level and inflation shocks contributed to financial instability in the 1790-1933 and 1986-97 periods.

Finally, my research has examined the role of policy in preventing, managing, and resolving crises. Anna J. Schwartz and I (1998) examine the historical record over the past two centuries on international rescues. We contrast the experiences before 1973 of rescues of monetary authorities of advanced countries that were temporarily short of liquidity with the experience in the 1990s of bailouts of insolvent emerging countries. In a later paper, we assess the impact of IMF loans on the macro performance of the recipients.[16] A simple with-without comparison of countries receiving IMF assistance during crises in the period

1973–98, with countries in the same region not receiving assistance, suggests that the real performance of the former group was possibly worse than the latter. Similar results are obtained after adjusting for self-selection bias and counterfactual policies[17].

Monetary Policy

Economic history has long provided a useful laboratory for the practitioners of monetary policy. My research in the area has focused on deflation and monetary policy and asset prices.

Deflation in historical perspective

The return in the 1990s to an environment of low inflation has raised the specter in the United States of deflation and the collapse of prices such as occurred in the 1930s. My work with Angela Redish focuses on the deflationary experience of 1870–96 during the pre-1914 classical gold standard period. That episode has resonance for today because the gold standard regime, anchored by a credible commitment to maintaining long-run price stability, conveys similarities to today's central bank commitment to low inflation, and in both eras globalization was present with major technology shocks. We use a structural VAR methodology to distinguish between good deflation, reflecting productivity-driven increases in aggregate supply, and bad deflation, driven by collapses in aggregate demand. Our findings for the United Kingdom and Germany are that deflation was primarily of the good variety; for the United States, these results generally prevail with the exception of a banking-panic-induced demand-driven deflation episode in the mid-1890s.[18] Andrew Filardo and I (2004)[19] generalized this finding to a panel of over twenty countries for the past two centuries. With the exception of the interwar period we find that deflation was generally benign.

Monetary Policy and Asset Prices

The link between monetary policy and asset price movements has been of perennial interest to policymakers. Should the monetary authorities intervene to offset an asset boom before it turns into a bubble that bursts, with severe consequences for the real economy? Olivier Jeanne and I (2002)[20]

present some stylized facts on boom-bust dynamics in stock and property prices in twenty OECD countries in the past thirty years, as well as for the United States for the past 150 years. We find that asset booms turning into busts are infrequent events, but when they happen they are sometimes associated with considerable economic distress. We develop a theoretical framework that outlines the circumstances under which a central bank may consider following a pre-emptive policy to prevent the consequences of a bust.

Wheelock and I (2004)[21] examine the economic environment in which past U.S. stock market booms occurred as a first step toward understanding how these booms come about and whether monetary policy should be used to defuse them. In general, we find that booms in the past century and a half occurred in periods of rapid real growth and productivity advance, suggesting that booms are driven at least partly by fundamentals. We find no consistent relationship between inflation and stock market booms, though; booms have typically occurred when money and credit growth were above average.

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2   J. A. Frankel, "Experience of and Lessons from Exchange Rate Regime in Emerging Economies", NBER Working Paper No. 10032, October 2003. Also M. D. Bordo and H. James, "One World Money, Then and Now", NBER Working Paper No. 12189, May 2006, posits that in today's world of globalization and large shifts in relative prices, the Einsteinian or relative conception of money implicit in floating exchange rates is more suitable than the Newtonian view that underlies the case for fixed exchange rates.
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4   B. Eichengreen and R. Haussman, "Exchange Rates and Financial Fragility", NBER Working Paper No. 7418, November 1999.
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8   Also see M. Obstfeld and A. Taylor, Global Capital Markets: Integration, Crisis, and Growth, Cambridge University Press, (2004).
9   In "Why Clashes Between Internal and External Stability Goals End in Currency Crises, 1797–1994", NBER Working Paper No. 5710, June 1997, Michael D. Bordo and Anna J. Schwartz present a narrative of the history of currency crises from 1797–1994, which reflects a clash between internal and external stability goals. In "Some Historical Evidence 1870-1933 on the Impact and International Transmission of Financial Crises", NBER Working Paper No. 1606, September 1986, Bordo examines some his-
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11   Earlier evidence on the transmission of banking crises is in M. D. Bordo, "Some Historical Evidence 1870–1933 on the Impact and Transmission of Financial Crises", NBER Working Paper No. 1606, September 1986; and M. D. Bordo, B. Mizrach, and A. J. Schwartz, "Real Versus Pseudo International Systemic Risk: Some Lessons From History", Review of Pacific Basin Financial Markets and Policies, (1998).
12   M. D. Bordo and A. P. Murshid, "Are Financial Crises Becoming Increasingly More Contagious? What is the Historical Evidence on Contagion?", NBER Working Paper No. 7900, September 2000.
13   M. D. Bordo and A. P. Murshid, "Globalization and Changing Patterns in the International Transmission of Shocks in Financial Markets", NBER Working Paper No. 9019, June 2002.
14   This differs from Paulo Mauro, Nathan Sussman, and Yishay Yafeh, "Emerging Market Spreads: Then Versus Now", Quarterly Journal of Economics 117, (2002), pp.695–733, which may be attributed to the use of different country samples. Our sample contains both advanced and emerging countries while theirs was based solely on emerging countries. In "Have National Business Cycles Become More Synchronized?", NBER Working Paper No. 10130, December 2003, Bordo and Thomas Helbling also find evidence that global shocks are the key determinant of the synchronization of business cycle movements observed across exchange rate regimes from 1880 to the present.
15   M. D. Bordo, M. Dueker, and D. C. Wheelock, "Aggregate Price Shocks and Financial Instability: An Historical Analysis", NBER Working Paper No. 7652, April

2000, and "Aggregate Price Shocks and Financial Stability: The United Kingdom 1796–1999", NBER Working Paper No. 8583, November 2001.

[16]   In "The International Monetary Fund: Its Present Role in Historical Perspective", NBER Working Paper No. 7724, June 2000, Michael D. Bordo and Harold James describe the evolution of the IMF from its origins as the guardian of the Bretton Woods adjustable peg exchange rate system and financier of temporary current account deficits for advanced countries to its present primary roles as development financier and crisis manager for the emerging world.

[17]   In "Keeping Capital Flowing: The Role of the IMF", NBER Working Paper No. 10834,

October 2004, Michael D. Bordo, Ashoka Mody, and Nienke Oomes find evidence that following the adoption of an IMF program, both macroeconomic aggregates and capital flows improve, although they may initially deteriorate somewhat. Consistent with theoretical predictions and earlier empirical findings, they also find that IMF programs are most successful in improving capital flows to countries with bad, but not very bad, fundamentals. In such countries, IMF programs are also associated with improvements in the fundamental themselves.

[18]   M. D. Bordo and A. Redish, "Is Deflation Depressing? Evidence from the Classical Gold Standard", NBER Working Paper No. 9520, March 2003; and M. D. Bordo, J. L. Lane,

and A. Redish, "Good versus Bad Deflation: Lessons from the Gold Standard Era", NBER Working Paper No. 10329, February 2004.

[19]   M. D. Bordo and A. Filardo, "Deflation and Monetary Policy in a Historical Perspective: Remembering the Past or Being Condemned to Repeat It?", NBER Working Paper No. 10833, October 2004.

[20]   M. D. Bordo and O. Jeanne, "Boom-Busts in Asset Prices, Economic Instability, and Monetary Policy", NBER Working Paper No. 8966, May 2002.

[21]   M. D. Bordo and D. C. Wheelock, "Monetary Policy and Asset Prices: A Look Back at Past U.S. Stock Market Booms", NBER Working Paper No. 10704, August 2004.

The Microeconomic Evidence on Contagion, Capital Controls, and Capital Flows

Kristin J. Forbes*

On December 19, 2006, Thailand implemented restrictive capital controls on foreign investment and the Thai stock index fell by over 15 percent before trading was halted. Investors quickly began to draw comparisons to the summer of 1997, asking if events in Thailand would spark contagion and be the first in a series of crises around the globe. My research over the past few years has attempted to provide the framework and analysis to understand these types of events — covering topics from financial contagion and global linkages to capital controls and capital flows.

Many researchers — including other NBER affiliates — have made important contributions to these topics. Much of my own research has tried to take a different approach by using firm-level data to understand the macroeconomic movements in

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exchange rates, stock indices, investment, and growth. This "microeconomic approach" to answering questions in international finance has the benefit of using the wealth of information incorporated in firm behavior — information that is lost in the aggregation process used to create macroeconomic statistics. Heterogeneity across firms can be an important tool in identifying the impact of various macroeconomic events. This strategy of using disaggregated and firm-level data in international economics recently has become popular in the international trade literature[1] as well as in international finance.[2]

Contagion, Currency Crises, and the Cross-Country Transmission of Shocks

A series of financial crises — Mexico, Asia, Russia, Argentina — motivated an academic literature on "contagion" and the international transmission of crises.[3] The term contagion is generally used to refer to the spread of negative shocks — although

the definition has evolved over time.[4] The last decade has clearly shown that crises that originate in relatively small economies (such as Thailand) can quickly affect markets of very different sizes and structures located around the world, including markets that appear unrelated to the country where the crisis originated.

Early analyses of contagion tested for increased comovement between countries after a crisis (in variables such as their stock returns, bond spreads, exchange rates, or capital inflows). One complication with this approach, however, is that the correlation coefficients underlying this analysis depend on market volatility and can be biased. My work with Roberto Rigobon shows how this bias can significantly affect estimates of contagion.[5] We develop a correction for this bias and show that most recent crises were transmitted to other countries through linkages that exist in all states of the world — and not through special transmission channels that only occur during crises. Other authors have since used different identifying assumptions

in order to adjust for this bias in tests for contagion.[6]

This approach of testing how crises affect cross-country co-movements, however, has a major shortcoming: it cannot explain why these macroeconomic variables co-move or exactly how shocks are transmitted internationally. For investors interested in how a crisis spreads, and especially for governments and policymakers that would like to contain and prevent crises, understanding exactly how shocks spread is of critical importance. Do crises spread mainly through "real" linkages, such as trade and banking flows? Or, do they spread through investor behavior, driven by portfolio balancing or informational asymmetries or herding or irrationality? Sorting out these various explanations is further complicated by the fact that many cross-country linkages are highly correlated, so it is difficult to identify these various mechanisms in empirical work.

In order to differentiate between these various mechanisms, my research moved from the macroeconomic to the microeconomic level. Within each country there is a large variation in how different companies are affected by shocks. By using this firm heterogeneity it is possible to identify the mechanisms by which crises spread. To put this approach into practice, I created a dataset with financial statistics, product information, geographic data, and stock returns for over 10,000 companies in 46 countries.[7] My results suggest that direct trade flows and trade competition in third markets were important determinants of country vulnerability to crises.[8] I also find some evidence of a "portfolio recomposition" effect, in which investors were forced to sell assets in liquid markets in response to a crisis elsewhere. Finally, I find little evidence of a generalized "credit crunch" driving contagion.

Most of the empirical research on the transmission of crises—whether at the macroeconomic or microeconomic level—has focused on how crises affect financial variables (such as their impact on stock prices). This approach is not only timely, since the financial information is immediately available, but also has the benefit that stock returns should incorporate all known information about the future impact of the crisis. However, stock returns may be influenced by factors other than expected future prof-

its, especially in the less developed financial markets common in emerging markets. Moreover, even if stock returns accurately capture expected future profitability, the actual impact of a crisis could significantly diverge from the expected impact. Therefore, in my next set of papers I shifted from focusing on the financial market impact of crises to their broader impact on other firm-level variables, such as sales, profits, and investment.

In one of these papers, I develop a simple model to clarify exactly how exchange rate movements affect firms' profitability, focusing on the impact on the relative costs of labor and capital for firms that produce undifferentiated products.[9] The empirical analysis shows that in the longer term, which firms gain and lose from devaluations is determined by the relative intensity of capital and labor in production, as well as by how the devaluations affect interest rates. In a closely related paper, I expand the analysis to include firms that produce differentiated as well as undifferentiated products.[10] The results show that firms with greater foreign sales exposure have significantly better performance (according to a range of indicators) after depreciations, and firms with higher debt ratios tend to have lower net income growth. The results in these papers can help to explain why devaluations boost economic growth in some cases, but cause economic contractions in others.

In a final series of papers on the cross-country transmission of shocks, I broaden my focus to non-crisis as well as crisis periods.[11] Work with Menzie Chinn tests whether cross-country linkages through direct trade, trade competition in third markets, bank lending, or FDI can explain why movements in the world's largest financial markets often have such large, yet diverse, effects on other financial markets and how these cross-market linkages have changed over time.[12] The paper uses a factor model and shows that movements in the U.S. market, as well as sectoral factors, were important determinants of market returns in the later half of the 1990s. Other work with Tilak Abeysinghe looks at how spillover effects across markets are amplified by having "multiplier effects" on other countries, which in turn have their own spillover effects.[13] To track these multiplier effects, we develop a structural VAR model using a new specification strategy

linking output growth for all countries in the world. Estimates and impulse-response matrices show that these multiplier effects can transmit shocks in very different patterns than predicted by standard bilateral-linkage models.

Capital Controls

Governments and policymakers have struggled continually with how to protect their economies from contagion and the negative effects of global linkages. One prescription for emerging markets and developing countries that has recently gained support is capital controls—and especially controls on capital inflows. Several emerging markets—from Colombia to Russia to Thailand—recently have implemented new controls on capital inflows. Although capital controls may yield benefits in certain situations, my research suggests that capital controls come at a substantial cost and are not the panacea that many believe.

The most cited "success" story of capital controls is the market-based tax on capital inflows enacted by Chile from 1991–8 (the *encaje*). Several papers have analyzed the macroeconomic impact of the *encaje*. The general conclusions in this literature are that the Chilean capital controls generated some small economic benefits (such as shifting the composition of capital inflows to a longer maturity), but no significant economic costs. In an attempt to better assess the impact of these controls, my research shifted to the microeconomic effects of the *encaje* by studying its effect on Chilean firms. I document that the capital controls distorted firm's financing decisions and significantly increased financial constraints for smaller, publicly traded firms.[14] The Chilean capital controls appear to have led to a misallocation of resources away from smaller firms. Since smaller firms are valuable sources of job creation and economic growth in many emerging markets, these results suggest that capital controls could have more widespread negative effects on investment and growth than previously believed.

This work on Chilean firms is part of a new literature on the microeconomic effects of capital controls.[15] Most of the earlier literature on capital controls focused on cross-country, macroeconomic analysis and found

mixed evidence of the costs of controls and the benefits of capital account liberalization.[16] More recent papers in very different fields have used microeconomic data and documented several ways in which capital controls reduce the efficiency of financial markets and significantly distort decision making by firms, individuals and governments. Although this literature is only in its infancy, the initial results present a compelling case that capital controls yield widespread and often unexpected costs. Countries that have recently become enamored with capital controls as a means of reducing the appreciations of their currencies and insulating their economies from negative shocks should carefully weigh these costs against the perceived benefits of the controls.

Determinants of Global Capital Flows

Closely related to this work on capital controls — a means of stopping the movement of capital across borders — is my more recent work on capital flows. In this research, I continue to take a microeconomic approach to understanding macroeconomic trends, attempting to explain what drives individual firms, investors and governments to send capital abroad.

Research with Mihir A. Desai and Fritz Foley focuses on one specific type of capital flow: how multinational firms adjust capital flows to their foreign affiliates during crises.[17] More specifically, we examine how local firms and multinational affiliates respond to large currency movements. Although economic theory suggests that depreciations can reduce relative production costs and therefore give firms a competitive advantage, many firms claim that a "credit crunch" during depreciations makes it difficult to obtain the financing necessary to increase production. Our research shows that multinational affiliates increase sales, assets, and investment significantly more than local firms during, and subsequent to, depreciations. Multinational affiliates outperform local firms because they receive credit from their parent companies and therefore avoid the "credit crunch" affecting local firms. While much of the previous literature focused on how foreign investors tend to withdraw capital from emerging markets during cri-

ses, these results suggest that multinationals often send capital in the opposite direction, allowing their affiliates to expand economic activity during currency crises when local firms are financially constrained.

Capital flows to U.S. multinational affiliates, however, are only a small proportion of global capital flows. A much bigger portion of global capital moves in the reverse direction — into the United States. Why were foreigners willing to invest over $1.2 trillion in the United States in 2006 — capital inflows necessary to fund the U.S. current account deficit? Even more surprising, why are private sector firms and investors willing to invest hundreds of billions of dollars in the United States each year, even though they have recently earned substantially lower returns than if they had invested in similar assets in their own countries?

My recent work attempts to understand the microeconomic factors driving the decisions by firms and individuals to invest in the United States.[18] Certain characteristics of U.S. financial markets (such as their liquidity, strong corporate governance, and reserve status of the dollar) may make the United States a major source of investment in an optimal, portfolio maximization model. Foreigners, however, may also consistently underestimate the returns from holding U.S. assets. Resolving exactly what drives the individual decisions behind capital flows into the United States is critically important to understanding if the current system of global imbalances can be expected to continue, and if not, how quickly it could unwind.

Looking Forward

Although there have not been any major financial market crises over the past few years, there will inevitably be more crises in the future. Moreover, as global capital flows continue to increase, and especially as more complicated financial instruments gain importance, new risks and vulnerabilities will emerge. Understanding the factors driving these capital flows and the impact of different policies to reduce vulnerabilities will be an important research topic. Using microeconomic data to explain exactly what drives the related decisions by firms and individuals and how they are affected by different policies will be a powerful tool of analysis.

Although this literature using microeconomic data to investigate these questions in international finance is only in its infancy, it already has yielded important insights and will continue to be a valuable approach in the future.

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[1]   See A. Bernard, "Firms in International Trade", NBER Reporter, Fall 2006, for a summary of recent work using this approach in international trade.

[2]   Due to space constraints, this research summary is not able to describe all of the work in the new literature using microeconomic data in international finance. Key contributions include NBER working papers by Mark Aguiar, Anusha Chari, Kathryn Dominguez, Gita Gopinath, Peter Henry, Sergio Schmukler, Linda Tesar, Frank Warnock, and Shang-Jin Wei.

[3]   S. Claessens and K. J. Forbes, eds., International Financial Contagion, Boston, MA: Kluwer Academic Publishers, 2001.

[4]   See K. J. Forbes and R. Rigobon, "Contagion in Latin America: Definitions, Measurement and Policy Implications", NBER Working Paper No. 7885, September 2000, and Economia, 2001, 1(2), pp.1–46.

[5]   K. J. Forbes and R. Rigobon, "No Contagion, Only Interdependence: Measuring Stock Market Co-movements", NBER Working Paper No. 7267, July 1999, and Journal of Finance, 2002, 57(5), pp. 2223–61.

[6]   For example, see B. Boyer, M. Gibson, and M. Loretan, "Pitfalls in Tests for Changes in Correlations," Federal Reserve Board International Finance Division, Working Paper 597R, 1999; G.Corsetti, M. Pericoli, and M. Sbracia, "Some Contagion, Some Interdependence: More Pitfalls in Tests of Financial Contagion," Journal of International Money and Finance, 2005, 8, pp. 1177–99; and R. Rigobon, "Contagion: How to Measure It?", NBER Working Paper No. 8118, February 2001.

[7]   K. J. Forbes, "The Asian Flu and Russian Virus: Firm-level Evidence on How Crises are Transmitted Internationally", NBER Working Paper No. 7807, July 2000, and Journal of International Economics, 2004, 63(1), pp. 59–92.

[8]   This role of trade linkages (and especially competition in third markets) in the transmission of crises is also supported

by sectoral analysis. See K. J. Forbes, "Are Trade Linkages Important Determinants of Country Vulnerability to Crises?", NBER Working Paper No. 8194, March 2001, and S. Edwards and J.A. Frankel, eds. Preventing Currency Crises in Emerging Markets, (2002), pp. 77–124.

9 K. J. Forbes, "Cheap Labor Meets Costly Capital: The Impact of Devaluations on Commodity Firms", NBER Working Paper No. 9053, July 2002, and Journal of Development Economics (2002), 69(2), pp. 335–65.

10 K. J. Forbes, "How Do Large Depreciations Affect Firm Performance?", NBER Working Paper No. 9095, August 2002, and IMF Staff Papers (2002), 49, pp. 214–38.

11 See the symposium on Global Linkages published in the Review of Economics and Statistics, 2004, 86(3).

12 K. J. Forbes and M. Chinn, "A Decomposition of Global Linkages in Financial Markets Over Time", NBER Working Paper No. 9555, March 2003, and Review of Economics and Statistics, (2004), 86(3), pp.705–22.

13 T. Abeysinghe and K. J. Forbes, "Trade Linkages and Output-Multiplier Effects: A Structural VAR Approach with a Focus on Asia", NBER Working Paper No. 8600, November 2001, and Review of International Economics, 2005, 13(2), pp. 356–75.

14 K. J. Forbes, "One Cost of the Chilean Capital Controls: Increased Financial Constraints for Smaller Traded Firms", NBER Working Paper No. 9777, June 2003, and Journal of International Economics, 2007, forthcoming.

15 K. J. Forbes, "The Microeconomic Evidence on Capital Controls: No Free Lunch", NBER Working Paper No. 11372, May 2005, and S. Edwards, ed., International Capital Flows, 2007, forthcoming. Also see K. J. Forbes, "Capital Controls: Mud in the Wheels of Market Discipline", NBER Working Paper No. 10284, February 2004, and The Cato Journal, 2005, 1, pp. 153–66.

16 For excellent surveys of the literature on capital account liberalization, see P. Henry, "Capital Account Liberalization: Theory, Evidence, and Speculation", NBER Working Paper No. 12698, November 2006, and M. A. Kose, E. Prasad, K. Rogoff, and S. J. Wei, "Financial Globalization: A Reappraisal", NBER Working Paper No. 12484, August 2006.

17 M. Desai, C. F. Foley, and K. J. Forbes, "Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Crises," NBER Working Paper No. 10545, June 2004, and Review of Financial Studies, 2007, forthcoming.

18 K. J. Forbes, "Why Do Foreigners Really Invest in the United States?", forthcoming as an NBER Working Paper.

Tax Policy Towards Energy and the Environment

Gilbert E. Metcalf [*]

My research over the past several years has focused on the role of taxes and other instruments in environmental and energy policy. I have focused mainly on instrument design issues in a general equilibrium framework, as well as on the distributional implications of energy and environmental taxation.

Environmental Policy

An influential paper by Bovenberg and deMooij touched off a large research agenda on the optimal design of environmental taxes in a second-best world with pre-existing taxes.[1] It had long been understood that taxes on pollution could help to internalize pollution externalities. Beginning in the 1980s, analysts began to argue that the revenue from pollution taxes could be used to reduce other distortionary taxes, thereby generating a second "dividend" with a pollution tax. Some analysts concluded that the existence of this second dividend argued for a higher tax on pollution than the first-best Pigouvian prescription, where the tax is set equal to the social marginal damages of pollution.

Bovenberg and deMooij showed that for reasonable consumer preferences the optimal tax would, in fact, be lower than social marginal damages. Their insight was that while an environmental tax would enhance efficiency by discouraging pollution, it was still a distortionary tax and could interact with other distortionary taxes with first-best efficiency losses. Building on this initial result, researchers began to identify the gains from raising revenue via environmental policy instruments (pollution taxes or auction revenues from cap and trade systems). With Don Fullerton, I showed that the popularly held view that revenue-raising instruments were preferred to non-revenue-raising instruments focused on the wrong point.[2] What mattered was whether policies created scarcity rents and whether the government received the rents and used them to lower other distortionary taxes.

The result — that the second-best tax on pollution was below social marginal damages — was troubling to many environmentalists who were concerned that it implied that in a world with distortionary taxation more pollution should be allowed. Such a con-

clusion confuses price and quantity effects. That a first-best price rule ("set pollution taxes equal to social marginal damages") is modified in the presence of tax distortions ("set pollution taxes below social marginal damages") does not imply anything about changes in the optimal level of pollution. Using a simple analytic general equilibrium model, I provide a counter-example to show that having a tax below social marginal damages could be consistent with a higher level of environmental quality.[3]

The analytic general equilibrium framework constructed for the research just described was easily extended to a consideration of monopoly behavior among polluting firms and instrument design when policymakers cannot target pollution directly but rather must target some proxy for pollution.[4] The interest in second-best environmental policy design was widespread at this point and the NBER co-sponsored a conference on environmental policy with FEEM in Italy that Carlo Carraro and I co-organized.[5] One of the hotly debated topics during this period was whether tradable permits for pollution (like those for SO_2 trading under the Clean Air Act Amendments of 1990) should be given away or sold. One paper from that conference made the important point that this was not an either-or situation; rather, some of the permits could be traded and some sold.[6] The paper showed that only a small portion of permits need be given away in order to preserve the equity value of the energy industries because most of the burden of the permit price is passed forward to consumers in the form of higher prices.

I also have applied insights from the literature on second-best environmental taxation in my research on climate modeling. In particular, an empirical analysis of European energy and climate policy suggested that the benefits from auctioning permits from a European carbon cap and trade system vary substantially across countries, suggesting the need for country-specific policy guidance.[7] That research also showed that when environmental revenues (either from a carbon

tax or from selling tradable permits) were recycled by reducing existing taxes, certain European countries might do worse by lowering particular taxes than by giving the money back in a lump sum. While this is a standard theoretical result from the theory of the second-best, the CGE modeling results confirm that it is more than an intellectual curiosity.

In addition to considering the efficiency effects of environmental taxation, I have studied the distributional issues that arise with environmental taxation. Many environmental taxes are regressive. For example, a carbon tax would raise the price of energy products, products that are necessities in household budgets. I carried out an incidence analysis of a mix of environmental taxes and showed that the taxes, while regressive on an annual income basis, are less regressive when analyzed on a lifetime income basis.[8] This is a common finding for consumption taxes.[9] In addition, I noted that while an environmental tax might be regressive, an environmental tax reform could have any desired degree of progressivity. In particular, I constructed a tax reform where the revenue from a mix of environmental taxes is used to lower other taxes in a distributionally neutral fashion. More recently, I've broadened the discussion of how one might use the proceeds from a carbon tax to fund corporate tax integration. In particular, I measure the industry impacts from such a reform.[10]

Energy Policy

In addition to work on environmental policy, I have long focused on energy policy with a particular emphasis on energy conservation. Early work with Kevin Hassett identified the impact of energy tax credits for home conservation improvements.[11] That research identified an interesting asymmetry between price policies and investment policies. Consider a conservation investment that will reduce energy by a known amount over some future period. A government policy to double energy prices henceforth should have the same impact on the propensity to make this conservation investment as an alternative policy to subsidize half the cost of the investment. However, we found that the investment subsidy was substantially more effective than the price pol-

icy. It may be that consumers do not believe that future energy tax increases are credible. Or, it may be that the publicity effects from investment credits influence consumers' purchasing behavior.

Energy conservation will be an important component of any policy to reduce energy consumption and to enhance energy security in the United States. The United States already has made impressive gains in how efficiently it uses energy. Energy intensity (energy use per dollar of GDP) has steadily fallen from a 1917 peak of thirty-five thousand BTUs per dollar of GDP (year 2000 dollars) to a current level of 9.3 thousand BTUs. In recent research, I document that roughly two-thirds of this decline can be attributed to improvements in energy efficiency and one-third to changes in the composition of economic activity in the United States.[12] I also investigate the mechanism through which increases in energy prices affect energy intensity. I find that the dominant effect is through energy efficiency rather than through an inducement to shift from energy-intensive to non-energy-intensive activities. In other words, whatever forces have contributed to a shift towards a service economy in the United States, higher energy prices are not among them.

Energy policy was at the forefront of Congressional attention in 2005 when Congress passed the first major energy legislation since 1992. This legislation contained tax incentives worth $14 billion over a ten-year period. Some of these incentives were extensions of existing initiatives while others were new. I recently reviewed the new legislation and federal energy tax policy more generally.[13] In considering tax policy initiatives towards energy, it is worth noting the four major reasons for government intervention in energy markets: externalities from energy production and consumption, national security, market failures in energy conservation, and Hotelling rent expropriation on imported oil. Federal energy policy is not well targeted towards those four concerns. I also show in that research that current energy tax policies make clean coal increasingly competitive with pulverized coal electricity generating plants. The initiatives also make wind and biomass competitive with natural gas electricity generation. Finally, despite the United States being the

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third largest producer of petroleum products in the world, the federal tax initiatives towards energy supply have a negligible impact on world supply or prices.

Taxation and Public Pricing

A third strand of research focuses on taxation and public pricing issues more generally. One aspect of that research considers the interplay between market structure and the appropriate form of commodity taxation when firms produce differentiated products and thus can exert some degree of market power. It has long been known that tax policy can substitute for direct regulation to achieve the socially optimal market structure.[14] Research with George Norman suggests that the role of tax policy is more nuanced once one allows for more general market structures and technologies.[15] Whereas the previous literature found that positive ad valorem taxes could help effect optimal market structure, we find that taxes may be required under some circumstances and subsidies in other circumstances. The degree of spatial contestability plays a key role in determining the sign of the optimal tax rate. Once one allows for flexible manufacturing technologies, the story changes considerably. Flexible manufacturing allows firms to switch product specifications easily with the result that firms can easily customize products for consumers. Flexible manufacturing can occur in traditional industries (for example, textiles) as well as in the Internet based economy. Internet shopping provides us the opportunity to get our own personalized web pages at sites like Amazon. It may well be, with some sites, that we also get our own personalized prices. We show that with flexible manufacturing, commodity taxes are now ineffective at helping to achieve optimal market structure.

Another example of this research agenda concerns the optimal pricing of an excludable public good in the presence of distortionary taxation. With Jongsang Park, I posited a model of excludable public goods where consumers obtain utility based on the amount of the public good provided and the number of times the public good is consumed. One example would be an uncongested national park.[16] The government chooses the size of the park and consumers choose how often to visit the park. The government also uses a non-linear income tax to effect redistribution from high-ability to low-ability types (where ability is unobservable). The tax structure relies on a self-selection mechanism to achieve a separating equilibrium. We show that if the public good is a complement to leisure, then it is optimal to set a positive price on the public good. The higher price on the public good induces more labor supply, which discourages high-ability workers from choosing the consumption-labor bundle designed for low-ability workers. In effect, the public good price helps us to discriminate the high from low-ability workers.

Summary

Much of my current research is directly or indirectly focused on the economics of climate change. Climate change is a topic at the intersection between environmental and energy economics and is one of the most difficult issues facing policymakers today. Any effort to reduce greenhouse gas emissions will require a shift in the forms of energy we currently use as well as a reduction in overall energy consumption. My current research focuses on how governments can best evaluate and design policies to address this critically important problem.

1   A. L. Bovenberg and R. de Mooij, *"Environmental Levies and Distortionary Taxation,"* American Economic Review *94*, 1994: pp. 1085–9

2   D. Fullerton and G. E. Metcalf, *"Environmental Controls, Scarcity Rents, and Pre-Existing Distortions,"* NBER Working Paper No. 6091, July 1997, *and* Journal of Public Economics *80*, (2), 2001: pp. 249–67. We document the history of the double-dividend literature in D. Fullerton and G. E. Metcalf, *"Environmental Taxes and the Double Dividend Hypothesis: Did You Really Expect Something For Nothing?",* NBER Working Paper No. 6199, September 1997, *and* Chicago-Kent Law Review *73(1)*, 1998: pp. 221–56.

3   G. E. Metcalf, *"Environmental Levies and Distortionary Taxation: Pigou, Taxation, and Pollution,"* NBER Working Paper No. 7917, September 2000, *and* Journal of Public Economics *87*, 2003: pp. 313–22.

4   D. Fullerton, I. Hong, and G. E. Metcalf, *"A Tax on Output of the Polluting Industry is not a Tax on Pollution: The Importance of Hitting the Target",* NBER Working Paper No. 7259, July 1999, *and in* Behavioral and Distributional Effects of Environmental Policy, *C. Carraro and G. E. Metcalf, eds., Chicago, University of Chicago Press, 2001*: pp. 13–38; D. Fullerton and G. E. Metcalf, *"Cap and Trade Policies in the Presence of Monopoly and Distortionary Taxation",* NBER Working Paper No. 8901, April 2002, *and* Resource and Energy Economics *24*, 2002: pp. 327–47.

5   Behavioral and Distributional Effects of Environmental Policy, *op.cit.*

6   A. L. Bovenberg and L. Goulder, *"Neutralizing the Adverse Industry Impacts of CO_2 Abatement Policies: What Does It Cost?" in* Behavioral and Distributional Effects of Environmental Policy, *pp. 45–85.*

7   M. Babiker, G. E. Metcalf, and J. Reilly, *"Tax Distortions and Global Climate Policy",* NBER Working Paper No. 9136, August 2002, *and* Journal of Environmental Economics and Management *46*, 2003: pp.269–87.

8   G. E. Metcalf, *"A Distributional Analysis of Green Tax Reforms",* NBER Working Paper No. 6546, May 1998, *and* National Tax Journal *52(4)*, 1999: pp. 655–81.

9   See, for example, J. M. Poterba, *"Lifetime Incidence and the Distributional Burden of Excise Taxes",* American Economic Review *79(2)*, 1989: pp.325–30, and E. Caspersen and G. E. Metcalf, *"Is a Value Added Tax Regressive? Annual versus Lifetime Incidence Measures",* National Tax Journal *47(4)*, 1994: pp. 731–46.

10   G. E. Metcalf, *"Corporate Tax Reform: Paying the Bills with a Carbon Tax",* NBER Working Paper No. 11665, October 2005, forthcoming in* Public Finance Review.

11   K. Hassett and G. E. Metcalf, *"Energy Tax Credits and Residential Conservation Investment: Evidence from Panel Data",* NBER Working Paper No. 4020, August 1995, *and* Journal of Public Economics *57*, 1995: pp.201–17.

[12] G. E. Metcalf, "Energy Conservation in the United States: Understanding its Role in Climate Policy", NBER Working Paper No. 12272, June 2006.

[13] G. E. Metcalf, "Federal Tax Policy Towards Energy", NBER Working Paper No. 12568, October 2006. This paper was written for the NBER's 2006 Conference on Tax Policy and the Economy.

[14] J. A. Kay and M. J. Keen, "How Should Commodities Be Taxed?" European Economic Review 23(3), 1983: pp. 339–58.

[15] G. E. Metcalf and G. Norman, "Oligopoly Deregulation and the Taxation of Commodities", NBER Working Paper No. 9415, January 2003, and in Contributions to Economic Analysis and Policy 2(1), 2003.

[16] G. E. Metcalf and J. S. Park, "A Comment on the Role of Prices for Excludable Public Goods", NBER Working Paper No. 12535, September 2006, forthcoming in International Tax and Public Finance.

NBER Profile: *Charles H. Dallara*

Charles H. Dallara was elected to the NBER's Board of Directors at its Fall 2006 meeting. Dallara, who is a Managing Director of the Institute of International Finance (IIF), will serve as a Director-at-Large.

Prior to joining the IIF, Dallara was a Managing Director at J.P. Morgan & Co. from 1991 to 1993. During the 1980s, he served in a variety of senior financial positions in the U.S. government. He was appointed by former President Bush to the position of Assistant Secretary of the U.S. Treasury for International Affairs in May 1989 and served in that position until June 1991.

A native of Spartanburg, South Carolina, Dallara earned a B.S. in economics from the University of South Carolina in 1970 and an honorary doctorate from the university in 1991. He did graduate work at the Fletcher School of Law and Diplomacy, Tufts University, receiving his M.A. in 1975, an M.A. in Law and Diplomacy in 1976, and a Ph.D. in 1986.

Dallara is a member of the Council on Foreign Relations and serves on the International Advisory Board of the Instituto de Empresa. He is also a member of the Board of Overseers of the Fletcher School of Law and Diplomacy of Tufts University. He resides in Oak Hill, Virginia with his wife, Peixin, and has three children, Stephen, Emily, and Bryan.

NBER Profile: *Roger W. Ferguson, Jr.*

Roger W. Ferguson, Jr. was elected a Director-at-Large by NBER's Board of Directors at its Fall 2006 meeting. Ferguson is the Chairman of Swiss Re America Holding Corporation and Head of Financial Services and member of the Executive Committee for Swiss Re, a global reinsurance company. He joined Swiss Re in June 2006, after serving as vice chairman of the Board of Governors of the Federal Reserve System. Ferguson initially was appointed to the Fed Board in November 1997 to fill an unexpired term ending on January 31, 2000. In July 2001 he was sworn in for a full term, but he resigned in 2006 to return to the private sector.

From 1984 to 1997, before becoming a member of the Federal Reserve Board, Ferguson was a Partner at McKinsey & Company, an international management consulting firm. From 1981 to 1984, he was an attorney at the New York City office of Davis Polk & Wardwell.

Ferguson received his B.A. in economics in 1973, a J.D. in 1979, and a Ph.D. in economics in 1981, all from Harvard University. He is a member of Harvard's Board of Overseers.

Ferguson is married to Annette Nazareth and they have two children.

NBER Profile: *Kristin J. Forbes*

Kristin Forbes is an NBER Research Associate in the Program on International Finance and an Associate Professor of Economics at MIT's Sloan School of Management. She received her B.A., summa cum laude with highest honors, from Williams College and her Ph.D. in Economics from MIT. Her research focuses on policy-related questions in international finance and development, with recent work on international capital flows, capital controls, financial market contagion, and currency crises.

Over the last few years, Forbes has rotated between academia and economic policy positions in the U.S. government. She served a term as a Member of the White House's Council of Economic Advisers (where she was the youngest person to ever hold this position). She also worked in the U.S. Treasury Department as the Deputy Assistant Secretary of Quantitative Policy Analysis, Latin American and Caribbean Nations. Forbes was recently honored as a "Young Global Leader" as part of the World Economic Forum at Davos and has won several MIT teaching awards.

Forbes grew up hiking and skiing in New Hampshire and continues to enjoy trekking and scaling peaks around the world. She also plays tennis and squash. Currently she lives in Boston with her husband, Steven Calhoun, and their new son, Leighton. Leighton already has taken to hiking, although it may simply reflect an appreciation of his excellent vantage point from his parents' pack.
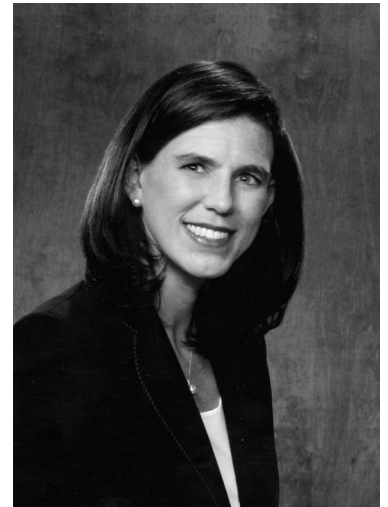
Conferences

Conference on Retirement Research

The NBER's Program on Aging held a Conference on Retirement Research on October 20 and 21. The conference organizers were NBER Research Associates Jeffrey R. Brown of University of Illinois, Urbana-Champaign, and Jeffrey Liebman of Harvard University, and David A.Wise of Harvard University, who directs the NBER's Aging Program.

The NBER has an ongoing grant from the Social Security Administration, as part of the Retirement Research Consortium. The grant has funded analysis of a wide range of issues related to Social Security. Selected papers written under the grant were presented at the conference, which was also funded through the grant. The papers were:

Jeffrey Liebman, and **Emmanuel Saez**, University of California, Berkeley and NBER, "Earnings Responses to Increases in Payroll Taxes"
Discussant: Bruce Meyer, University of Chicago and NBER

James M. Poterba, MIT and NBER; **Joshua Rauh**, University of Chicago and NBER; **Steven Venti**, Dartmouth College and NBER; and **David A. Wise**, "Reducing Social Security PRA Risk at the Individual Level— Lifecycle Funds and No-loss Strategies"
Discussant: Douglas Elmendorf, Federal Reserve Board

Gopi Shah Goda, Stanford University; **John Shoven**, Stanford University and NBER; and **Sita Slavov**, Occidental College, "Social Security and Medicare: Removing the Disincentives for Long Careers"

Discussant: Erzo Luttmer, Harvard University and NBER

Jeffrey R. Brown and **Scott J. Weisbenner**, University of Illinois, Urbana-Champaign and NBER, "Who Chooses Defined Contribution Plans?"
Discussant: Brigitte C. Madrian, Harvard University and NBER

Alan J. Auerbach and **Ronald Lee**, University of California, Berkeley and NBER, "Notional Defined Contribution Pension Systems in a Stochastic Context: Design and Stability"
Discussant: Jeffrey Liebman

Andrew Biggs and **Clark A. Burdick**, Social Security Administration, and **Kent Smetters**, University of Pennsylvania and NBER, "Pricing Personal Account Benefit Guarantees: A Simplified Approach"
Discussant: George Pennacchi, University of Illinois at Urbana-Champaign

John Geanakoplos, Yale University, and **Stephen P. Zeldes**, Columbia University and NBER, "Facilitating Comparisons between DB and DC Systems: Can a PRA System Have the Same Features as the Current Social Security System"
Discussant: Jason Furman, New York University

James M. Poterba, **Steven Venti**, and **David A.Wise**, "The Decline of Defined Benefit Retirement Plans and Asset Flows"
Discussant: Jonathan Skinner, Dartmouth College and NBER

Alexander Ludwig, University of Mannheim; **Axel Boersch-Supan**, University of Mannheim and NBER; and **Dirk Krueger**, Goethe University, Frankfurt, "Demographic Change, Relative Factor Prices, International Capital Flows, and Welfare"
Discussant: James M. Poterba

Andrew Samwick, Dartmouth College and NBER, "Changing Progressivity as a Means of Risk Protection in Investment-Based Social Security"
Discussant: Michael Hurd, RAND Corporation and NBER

Martin S. Feldstein, Harvard University and NBER, "Reducing the Risk of Investment Based Social Security"(NBER Working Paper No. 11084)
Discussant: David Wilcox, Federal Reserve Board

John Beshears, Harvard University**; James J. Choi**, Yale University and NBER; **David Laibson**, Harvard University and NBER; and **Brigitte C. Madrian**, "The Importance of Default Options for Retirement Saving Outcomes: Evidence from the United States"
Discussant: Jeffrey R. Brown

David M. Cutler and **Edward L.Glaeser**, Harvard University and NBER, and **Allison B. Rosen**, University of Michigan, "Trends in Risk Factors in the United States, 1971–5 versus 1999–2002"
Discussant: Jim Smith, RAND Corporation

Liebman and **Saez** use SIPP data matched to longitudinal uncapped earnings records from the Social Security Administration for 1981 to 1999 to analyze earnings responses to increases in tax rates and to inform discussions about the likely effects of raising the Social Security taxable maximum. The earnings distribution of workers around the current taxable maximum is inconsistent with an annual model in which people are highly responsive to the payroll tax rate, even

in the subset of self-employed individuals. Panel data on married men with high earnings display a tremendous increase in earnings over the 1980s and 1990s relative to other groups, with no clear breaks around the key tax reforms. This suggests that other income groups cannot serve as a control group for the high earners. This analysis does not support the finding of a large behavioral response to taxation by wives of high earners. The authors actually find a decrease in the labor supply of wives of high earners around both the 1986 and the 1993 tax reforms, which they attribute to an income effect caused by the surge in primary earnings at the top. Policy simulations suggest that with an earnings elasticity of 0.5, lost income tax revenue and increased deadweight loss would swamp any benefits from the increase in payroll tax revenue. In contrast, with an elasticity of 0.2, the ratio of the gain in OASDI revenue to lost income tax revenue and deadweight loss would be much greater.

Poterba, **Rauh**, **Venti**, and **Wise** examine how different personal retirement account (PRA) asset allocation strategies over the course of a worker's career would affect the distribution of retirement wealth and the expected utility of wealth at retirement. They consider rules that allocate a constant portfolio fraction to various assets at all ages, as well as "lifecycle" rules that vary the mix of portfolio assets as the worker ages. Their analysis simulates retirement wealth using asset returns that are drawn from the historical return distribution. The expected utility associated with different PRA asset allocation strategies, and the ranking of these strategies, is sensitive to four parameters: the expected return on corporate stock; the worker's relative risk aversion; the amount of non-PRA wealth that the worker will have available at retirement; and the expense ratios charged for the investment. At modest levels of risk aversion, or in the presence of substantial non-PRA wealth at retirement, the historical pattern of stock and bond returns implies that the expected utility of investing completely in diversified stocks is greater than that from any of the more conservative strategies.

Higher risk aversion or lower expected returns on stocks raises the expected utility of portfolios that include less risky assets. There often exists a fixed-proportions portfolio of stocks and inflation-indexed government bonds that yields expected utility at retirement that is at least as high as that from typical lifecycle investment strategies. When asset allocation is near the allocation that generates the highest expected utility, variation in expense ratios is more important than variation in asset allocation for affecting retirement utility.

Implicit taxes in Social Security — which measure Social Security contributions, net of benefits accrued, as a percentage of earnings — tend to increase over the life cycle. **Goda**, **Shoven**, and **Slavov** examine the effects of three potential policy changes on implicit Social Security tax rates: extending the number of years used in the Social Security formula from 35 to 40; allowing individuals who have worked more than 40 years to be exempt from payroll taxes; and distinguishing between lifetime low-income earners and high-income earners who work short careers. These three changes can be achieved in a benefit- and revenue-neutral manner, and create a pattern of implicit tax rates that are much less distortionary over the life cycle, eliminating the high implicit tax rates faced by many elderly workers. The effects of these policies on progressivity and women are also examined.

Brown and **Weisbenner** provide new evidence on what types of individuals are most likely to choose a defined contribution (DC) plan over a defined benefit (DB) plan. Making use of administrative data from the State Universities Retirement System (SURS) of Illinois, they study the decisions of nearly 50,000 new employees who make a one-time, irrevocable choice between a traditional DB plan, a portable DB plan, and an entirely self-managed DC plan. Because the SURS-covered earnings of these employees are not covered under the Social Security system, this choice provides insight into the DB versus DC preferences of individuals with regard to a primary source of their retirement

income. The authors find that a majority of participants fail to make an active decision and are thus defaulted into the traditional DB plan after 6 months. They also find that those individuals who are most likely to be financially sophisticated are most likely to choose the self-managed DC plan, despite the fact that, given current plan parameters, the DC plan is inferior to the portable DB plan under reasonable assumptions about future financial market returns. They discuss both rational and behavioral reasons that might explain this finding.

Around the world, Pay-As-You-Go (PAYGO) public pension programs face serious long-term fiscal problems primarily because of actual and projected population aging, and most appear unsustainable as currently structured. Some have proposed the replacement of such plans with systems of fully funded private or personal Defined Contribution (DC) accounts, but the difficulties of transition to funded systems have limited their implementation. Recently, a new variety of public pension program known as "Notional Defined Contribution" or "Non-financial Defined Contribution" (NDC) has been created, with the objectives of addressing the fiscal instability of traditional plans and mimicking the characteristics of funded DC plans while retaining PAYGO finance. Using different versions of the system recently adopted in Sweden, calibrated to U.S. demographic and economic parameters, **Auerbach** and **Lee** evaluate the success of the NDC approach in achieving fiscal stability in a stochastic context. (In a companion paper, these authors will consider other aspects of the performance of NDC plans in comparison to traditional PAYGO pensions.) They find that, despite its built-in self-correction mechanisms, the basic NDC scheme is still subject to fiscal instability: there is a high probability that the system's debt-payroll ratio will explode over time. With adjustments, however, the NDC approach can be made considerably more stable.

A number of proposals to introduce personal accounts to the Social Security program contain provisions that would

"guarantee" account holders against relatively poor investment performance that would make their total benefits fall below the level scheduled under current law. Presently, most of the focus is on the expected cost of such guarantees, as few estimates evaluate the potential market cost of insuring against the associated risk. **Biggs, Burdick**, and **Smetters** demonstrate how a simple modification of parameter inputs used to calculate the expected cost of guarantees would allow analysts to estimate the market cost of the underlying risk.

During most of 2005, the United States was engaged in a heated debate about whether to replace part of the current, defined-benefit Social Security system with a system of defined contribution personal accounts. A political stalemate has emerged. Democrats who advocate retaining the current system will not budge from three core goals, related to regarding Social Security as social *insurance*: 1) Social Security should redistribute wealth from those who have earned more over their working lives to those who have earned less; 2) different generations should share the risks of aggregate shocks; and 3) security should be achieved via inflation-indexed payments received for life. Republicans, on the other hand, will not give up on what they regard as their core goals, namely 1) individual ownership within Social Security accounts of tangible assets that cannot be revoked by a future government, 2) market valuation of account assets, 3) transparency regarding accrual of assets, 4) equity-like returns, and 5) individual choice of asset allocation. **Geanakoplos** and **Zeldes** seek a common ground between these two approaches that preserves the core goals of each. They show that it is possible to convert Social Security into a system of personal accounts, with irrevocable ownership of assets that have market prices and market rates of return, while at the same time redistributing benefits based on lifetime income, sharing risks across generations, and providing retirees an inflation-indexed life annuity. They call this system *progressive personal accounts*. Implementing these accounts

requires the creation of a new kind of derivative security (which they call a PAAW for Personal Annuitized Average Wage security) — it pays its owner one inflation-corrected dollar during every year of life after the fixed retirement date, multiplied by the economy wide average wage at the retirement date. Redistribution occurs via a variable government match of private contributions. The authors show that by choosing a particular variable match and restricting accounts to hold only PAAWs, it is possible to create a system of progressive personal accounts that exactly mimics the promised taxes and payouts of the current system. They describe how to create pools of PAAWs that could be traded in financial markets (yielding market prices), and then consider allowing individuals some (limited) flexibility to sell PAAWs in exchange for other marketable securities. Finally, they discuss ways to modify the system to make it self-balancing — reducing or avoiding the need for politicians to alter the tax and benefit rules affecting participants. They argue that this would lead to enhanced property rights and reduced political risk relative to the current system.

Demographic change has an important effect on the stock of assets held in defined benefit pension plans. **Poterba**, **Venti**, and **Wise** project the impact of changes in the age structure of the U.S. population between 2005 and 2040 on the stock of assets held by these plans. They project the net contributions to, and withdrawals from, these plans. These projections are combined with estimates of the future evolution of the stock of assets in defined contribution plans to describe the prospective impact of demographic change on the stock of retirement saving assets. Information on demography-linked changes in asset demand is a critical input to evaluating the potential impact of population aging on asset returns.

Boersch-Supan, Krueger, and **Ludwig** present the main findings of recent research on the impact of the demographic transition towards an older population in industrialized countries on world-wide rates of return to capi-

tal, international capital flows, and the distribution of welfare in the OECD. To quantify these effects, they develop a multi-country large scale Overlapping Generations model with uninsurable labor productivity and mortality risk. Because of the predicted relative abundance of the factor capital, the rate of return falls between 2005 and 2080 by roughly 90 basis points. The simulations indicate that capital flows from rapidly aging regions to the rest of the world will initially be substantial, but that trends are reversed when households decumulate savings. Capital flows from the important European countries — France, Germany and Italy are initially positive at 2 percent and then decrease to about about -2 percent by 2040. In contrast, the U.S.current account deficit is predicted to increase by 2 percentage points until 2030. In terms of welfare, the model suggests that young agents with few assets and currently low labor productivity gain up to 1 percent in consumption from higher wages associated with population aging. Older, asset-rich households tend to lose because of the predicted decline in real returns to capital.

Samwick analyzes the progressivity of the Social Security benefit formula as a means of lessening the risk inherent in investment-based Social Security reform. Focusing on a single cohort of workers who will reach their normal retirement age as the Social Security trust fund is projected to be exhausted, he simulates the distribution of benefits subject to both earnings and financial risk. The simulations show that the maximally progressive traditional benefit allows over two thirds of the equity risk to be eliminated. Similarly, using progressive benefit reductions in which replacement rates for lower earnings are reduced by less than those for higher earnings, about half of the equity risk can be eliminated. Sensitivity tests show that these patterns hold over a wide range of assumptions about risk aversion, the equity premium, and the size of the personal retirement accounts established by the reform.

Feldstein describes the risks implied by a mixed system of Social Security

pension benefits with different combinations of pay-as-you-go taxes and personal retirement account (PRA) saving. The analysis shows how these risks can be reduced by using alternative private market guarantee strategies. The first such strategy uses a blend of equities and TIPS to guarantee at least a positive real rate of return on each year's PRA saving. The second is an explicit zero-cost collar that guarantees an annual rate of return by giving up all returns above a certain level. One variant of these guarantees uses a two-stage procedure: a guaranteed return to age 66 and then a separate guarantee on the implicit return in the annuity phase. An alternative strategy provides a combined guarantee on the return during both the accumulation and the annuity phase. Simulations are presented of the probability distributions of retirement incomes relative to the "benchmark" benefits specified in current law. Calculations of expected utility show that these risk reduction tech-

niques can raise expected utility relative to the plans with no guarantees. The ability to do so depends on the individual's risk aversion level. This underlines the idea that different individuals would rationally prefer different investment strategies and risk reduction options.

Beshears, Choi, Laibson, and **Madrian** summarize the empirical evidence on how defaults affect retirement savings outcomes. After outlining the salient features of the various sources of retirement income in the United States, they present the empirical evidence on how defaults affect retirement savings outcomes at all stages of the savings lifecycle, including savings plan participation, savings rates, asset allocation, and post-retirement savings distributions. They then discusses why defaults have such a tremendous impact on savings outcomes. The paper concludes with a discussion of the role of public policy towards retirement saving when defaults matter.

Cutler, Glaeser, and **Rosen** compare the risk factor profile of the population in the early 1970s with that of the population in the early 2000s. They find that for the population aged 25–74, the 10-year probability of death fell from 9.8 percent in 1971–5 to 8.4 percent in 1999–2002. Among those aged 55–74, the same measure fell from 25.7 percent to 21.7 percent. The largest contributors to these changes were the reduction in smoking and better control of blood pressure. Despite substantial increases in obesity in the past three decades, the overall population risk profile is healthier now than it was.

These papers will be published by the University of Chicago Press in an NBER Conference volume. Its availability will be announced in a future issue of the *NBER Reporter*.

Macroeconomics and Individual Decision Making

The NBER's Working Group on Macroeconomics and Individual Decision Making held a conference in Boston on November 4. Working Group Directors George Akerlof, University of California at Berkeley, and Robert Shiller, NBER and Yale University, organized the meeting. These topics were discussed:

"Utility and Happiness" — **Miles Kimball**, University of Michigan and NBER, and **Robert Willis**, University of Michigan
Discussant: Christopher Hsee, University of Chicago

"Leadership in Groups: A Monetary Policy Experiment" — **Alan S. Blinder**,

Princeton University and NBER, and **John Morgan**, University of California at Berkeley
Discussant: Petra Geraats, University of Cambridge

"Why Has CEO Pay Increased So Much?" — **Xavier Gabaix**, MIT and NBER, and **Augustin Landier**, New York University
Discussant: George Baker, Harvard University and NBER

"Coarse Thinking and Persuasion" — **Sendhil Mullainathan** and **Andrei Shleifer**, Harvard University and NBER, and **Joshua Schwartzstein**, Harvard University

Discussant: Eric Zitzewitz, Stanford University

"The Rising-Tide Tax System: Indexing (at Least Partially) for Changes in Inequality" — **Leonard Burman** and **Jeffrey Rohaly**, Tax Policy Center, and **Robert Shiller**
Discussant: Christopher Foote, Federal Reserve Bank of Boston and NBER

"A Cognitive Theory of Identity, Dignity, and Taboos" — **Roland Benabou**, Princeton University and NBER, and **Jean Tirole**, IDEI and GREMAQ, Toulouse
Discussant: Robert Oxoby, University of Calgary

Psychologists have developed effective survey methods of measuring how happy people feel at a given time. The

relationship between how happy a person feels and utility is an unresolved question. Existing work in econom-

ics either ignores happiness data or assumes that felt happiness is more or less the same thing as flow utility. The

approach **Kimball** and **Willis** propose steers a middle course between the two polar views that "happiness is irrelevant to economics" and the view that "happiness is a sufficient statistic for utility." They argue that felt happiness is not the same thing as flow utility, but that it does have a systematic relationship to utility. In particular, they propose that happiness is the sum of two components: 1) elation — or short-run happiness — which depends on recent news about lifetime utility; and 2) baseline mood — or long-run happiness — which is the output of a household production function like the household production functions for health, entertainment, and nutrition. Because happiness is itself one of the arguments of the utility function, the determinants of happiness affect behavior. Moreover, because happiness depends on recent news about lifetime utility, short-run movements in happiness data provide important information about preferences. This theory of the relationship between utility and happiness provides a new explanation for the Easterlin paradox of secularly non-increasing happiness as the consequence of the Baumol cost disease for happiness and an explanation for loss-aversion based on the dependence of happiness on recent news.

In an earlier paper, **Blinder** and **Morgan** created an experimental apparatus in which Princeton University students acted as ersatz central bankers, making monetary policy decisions both as individuals and in groups. In this study, they manipulate the size and leadership structure of monetary policy decisionmaking. They find no evidence of superior performance by groups that have designated leaders. Groups without such leaders do as well as or better than groups with well-defined leaders. Furthermore, they find rather little difference between the performance of four-person and eight-person groups; the larger groups outperform the

smaller groups by a very small margin. Finally, they successfully replicate their Princeton results, at least qualitatively: Groups perform better than individuals and they do not require more "time" to do so.

Gabaix and **Landier** develop a simple equilibrium model of CEO pay. CEOs have different talents and are matched to firms in a competitive assignment model. In market equilibrium, a CEO's pay changes one-for-one with aggregate firm size, while changing much less with the size of his own firm. The model determines the level of CEO pay across firms and over time, offering a benchmark for calibratable corporate finance. The six-fold increase in CEO pay between 1980 and 2003 can be fully attributed to the six-fold increase in market capitalization of large U.S. companies during that period. The authors find a very small dispersion in CEO talent, which nonetheless justifies large pay differences. The data broadly support the model. The size of large firms explains many of the patterns in CEO pay, across firms, over time, and between countries.

Mullainathan, **Schwartzstein**, and **Shleifer** present a model of coarse thinking, in which individuals group situations into categories, and transfer information from situations in a category where it is useful to situations where it is not. The model explains how uninformative messages can be persuasive, particularly in low involvement situations, and how objectively informative messages can be dropped by the persuader without the audience assuming the worst. The model sheds light on several aspects of mutual fund advertising.

Based on experience over the past three decades, growing inequality appears to be a serious risk. A change in the tax system to index against changes in inequality is motivated both by financial theory and by classical welfare economics. Inequality

indexation would insure, at least partially, against future increases in after-tax inequality. Tax rates would endogenously adjust to changes in inequality. **Burman**, **Rohaly,** and **Shiller** develop a method of implementing the system using U.S. tax returns data and the Tax Policy Microsimulation Model. They study the outcomes if inequality indexation had begun in 1979, or 1994, and describe the distributive and incentive effects.

Benabou and **Tirole** analyze social and economic phenomena involving beliefs that people value and invest in. Uncertain about their "deep values", agents infer them from their own choices, which then come to define "who they are". Identity investments increase in unfamiliar settings or when a greater endowment (wealth, career, family, culture) raises the stakes on viewing an asset as valuable (escalating commitments). Taboos against certain transactions or their mere contemplation arise to protect beliefs about the "pricelessness" of certain assets (life, freedom, love, faith) or things one "would never do". Whether such behaviors are welfare-enhancing or reducing depends on whether beliefs are sought for a functional value (self-disciplines, sense of direction) or as affective consumptions (self-esteem, anticipatory feelings). Thus, a "hedonic treadmill" may arise, or competing identities may cause dysfunctional failures to assimilate, acquire new skills, or adapt to globalization. In social interactions, norm violations trigger forceful reaffirmation, exclusion, or harassment when threatening a strongly held identity, but further erode an initially weak morale. Dignity, pride, or wishful thinking lead to inefficient breakdowns of bargaining even under symmetric information, as partners seek to self-enhance and shift blame by rejecting "insultingly low" offers.

Inter-American Seminar on Economics: Informality, Corruption, and Institutions

The NBER and FEDESARROLLO co-sponsored this year's Inter-American Seminar on Economics (IASE) on "Informality, Corruption, and Institutions." The conference, which was held in Bogota, Colombia, on December 1 and 2, was organized by NBER Research Associate Sebastian Edwards of University of California, Los Angeles, and Mauricio Cardenas, FEDESARROLLO, Colombia. The following papers were discussed:

Alberto Alesina, Harvard University and NBER, and **Guido Tabellini**, IGIER, Bocconi, "Why is Fiscal Policy often Procyclical?
Comments: Leonardo Villar, Banco de la Republica, Colombia

Norman V. Loayza and **Jamele Rigolini**, World Bank, "Informality Trends and Cycles"
Comments: Marcela Melendez, InterAmerican Development Bank

Sebastian Edwards, "Capital Controls, Contagion, and Capital Flows"
Comments: Roberto Junguito,

Fasecolda, Colombia

William F. Maloney and **Edwin Goni**, World Bank, and **Mariano Bosch**, London School of Economics, "The Determinants of Rising Informality in Brazil: Evidence from Gross Worker Flows"
Comments: Maria Laura Alzua, IERAL de Fundacion Mediterranea, Argentina

Hugo Maul, Universidad Francisco Marroquin, Guatemala, "From Penny Capitalism to Global Markets: The Case of the Guatemalan Informal Sector"
Comments: Pablo Acosta, CAF, Venezuela

Pablo Fajnzylber and **William F. Maloney**, World Bank, and **Gabriel V. Montes**, University of Illinois, Champaign-Urbana, " Does Formality Improve Micro-Firm Performance? Quasi-Experimental Evidence from the Brazilian SIMPLES Program"
Comments: Maurice Kugler, Harvard University

Raquel Bernal, Universidad de los

Andes, Colombia, and **Mauricio Cardenas,** "Informality in Colombia: The Case of Child Labor"
Comments: Stefania Scandizzo, CAF, Venezuela

Ernesto Schargrodsky, Universidad Torcuato Di Tella, and **Sebastian Galiani**, Washington University, St. Louis, "Property Rights of the Poor: Effects of Land Titling"
Comments: Daniel Mejia, Banco de la Republica, Colombia

Jennifer Hunt, McGill University and NBER, " Bribery in Health Care in Peru and Uganda"
Comments: Mauricio Olivera, FEDESARROLLO, Colombia

Eric V. Edmonds, Dartmouth College and NBER, and **Salil Sharma,** Dartmouth College, "Institutional Influences on Human Capital Accumulation: Micro Evidence from Children Vulnerable to Bondage"
Comments: Alejandro Gaviria, Universidad de los Andes, Colombia

Many countries, especially developing ones, follow procyclical fiscal polices; that is, spending goes up (taxes go down) in booms and spending goes down (taxes go up) in recessions. **Alesina** and **Tabellini** provide an explanation for this suboptimal fiscal policy based upon political distortions and incentives for a less-than-benevolent government to appropriate rents. Voters have incentives similar to the "starving the Leviathan" classic argument, and demand more public goods or fewer taxes to prevent governments from appropriating rents when the economy is doing well. They test this argument against more traditional explanations based purely on borrowing constraints, with a reasonable amount of success.

Loayza and Rigolini study the trends and cycles of informal employ-

ment. They first present a theoretical model in which the size of informal employment is determined by the relative costs and benefits of informality and the distribution of workers' skills. In the long run, informal employment varies with the trends in these variables, and in the short run it reacts to accommodate transient shocks and to close the gap that separates it from its trend level. They then use an error-correction framework to examine empirically informality's long-and short-run relationships. For this purpose, they use country-level data at annual frequency for a sample of developed and developing countries, with the share of self-employment in the labor force as the proxy for informal employment. They find that, in the long run, informality is larger in countries that have lower GDP per capita and impose more costs

to formal firms, in the form of more rigid business regulations, less valuable police and judicial services, and weaker monitoring of informality. In the short run, informal employment is found to be countercyclical for the majority of countries, with the degree of counter cyclicality being lower in countries with larger informal employment and better police and judicial services. Moreover, informal employment follows a stable, trend reverting process. These results are robust to changes in the sample and to the influence of outliers, even when only developing countries are considered in the analysis.

Edwards investigates whether restrictions to capital mobility reduce countries' vulnerability to major external shocks. More specifically, he asks if countries that restrict the free flow of international capital have a lower prob-

ability of experiencing a sudden stop and being subject to contagion than countries with a freer degree of capital mobility. Edwards uses three new indexes on the degree of international financial integration and a large multi-country dataset for 1970–2004 to estimate a series of random-effect *probit* equations. The results from these *probit* equations are used to compute marginal effects of different indicators on the likelihood of a country facing a major external crisis. Edwards also analyzes the role played by other variables in determining the probability of experiencing a sudden stop, including large current account deficits; the exchange rate regime — fixed or flexible; holdings of international reserves; fiscal imbalances; world interest rates; and the degree of dollarization, among others. The most important finding is that countries with greater capital mobility are somewhat more subject to contagion than countries that restrict the free mobility of capital.

Maloney, **Goni**, and **Bosch** study gross worker flows to explain the rising informality in Brazilian metropolitan labor markets from 1983–2002. This period covers two economic cycles, several stabilization plans, a far-reaching trade liberalization, and changes in labor legislation through the Constitutional reform of 1988. Focusing first on cyclical patterns, they confirm Bosch and Maloney's (2006) findings for Mexico that the patterns of worker transitions between formality and informality correspond primarily to the job-to-job dynamics observed in the United States and not to the traditional idea of informality constituting the inferior sector of a segmented market. However, they also confirm distinct cyclical patterns of job finding and separation rates that lead to the informal sector absorbing more labor during downturns. Second, focusing on secular movements in gross flows and the volatility of flows, they find the rise in formality to be driven primarily by a reduction in job finding rates in the formal sector. A small fraction of this is driven by trade liberalization, and the

remainder seems driven by the rising labor costs and reduced flexibility arising from Constitutional reform.

Maul deals with the processes of integrating into the global markets an economy with a large informal sector. He argues that Guatemala's XXI century informal economy can be described as a "Penny Capitalism" system, a term coined by Sol Tax, and later used by T. Schultz, to describe Guatemalan's indigenous communities in the 1930s. This capitalist system works on a "microscopic scale," and is characterized by limited access to larger markets, technology, and credit, but highly efficient on very small scale. Most of the literature reduces informality to a single dimension (labor market, property rights, or Micro and Small Enterprises phenomenon). In contrast, in this paper Maul defines economic informality as a process of individual adaptation to a spectrum of regulatory contracts that the political authorities impose on workers and business firms. In this context, and given the ubiquitous nature of the informal economy, if globalization means the integration of formal firms to international trade, then for poor underdeveloped economies, such as Guatemala, there is a big challenge coming. Reducing informality in such an institutional environment implies much more than just reducing the costs and increasing the benefits of becoming formal. In such a context, limiting the access to national, regional, and global markets to "Doing Business" type of firms will seriously curtail the options for the country, as whole, and for the great majority of the labor force that operates in the informal economy, especially women, young people and indigenous communities.

Fajnzylber, Maloney, and **Montes** use Regression Discontinuity methods to identify the impact of the reduction of registration costs and taxes on newly born Brazilian micro firms. The introduction of the SIMPLES program in 1996 provides a quasi-natural experiment that permits them to eliminate many of the endogeneity issues surrounding the impact of registration

on firm performance. They find that newly created firms that opt for operating formally use more paid workers, are more capital intensive, and exhibit higher levels of total factor productivity. Increased access to credit and government provided technical assistance is not responsible for more than a small fraction of those formality effects. Rather, the observed greater willingness of formal firms to operate out of a fixed locale appears to be responsible for a large share of the formality-firm performance link. Further, the impact seems largest on poorly performing firms.

Bernal and **Cardenas** study the magnitude and nature of child labor in Colombia. In particular, they evaluate the factors that determine joint child labor and school attendance decisions within the household. In addition, they investigate the characteristics of children, parents, and households that are associated with certain types of child labor, for example, work with relative versus work with non-relatives, and work in certain economic sectors. The authors use various sources of data including the Child Labor Survey (2001), Child Labor Module Follow-up included in the National Household Survey (2003), the Living Standards Survey (2003) and the *Familias en Accion* database (2002-3). Total child labor participation, which includes all working children from 5 to 17 years of age, was approximately 14.5 percent in 2001. Approximately two-thirds of this group also attended school. Child labor participation rates in rural areas were twice as large as those in urban areas. Around two-thirds of working children worked for their parents or other relatives. The majority of children work in the agriculture sector (approximately 38 percent) followed by retail, manufacturing, and services. Bernal and Cardenas estimate a model in which child labor and school attendance are simultaneous decisions. Higher educational attainment of the head of the household, older head of household, and higher adult employment rates within the household are

all positively and significantly associated with higher probabilities of child labor. In addition, the probability that a child works increases for those in the lowest income quintile, for children living in larger households and living with extended family. The most vulnerable children (for example, ethnic minorities, with low-educated parents, living in very poor households, and the like) are more likely to work in agriculture, whereas less disadvantaged children (that is, those with highly educated parents, higher adult employment rates within the household, male head of household, and so on) are more likely to work in retail and in particular, in family-owned businesses. Finally, the authors find robust evidence that a conditional cash transfer program, *Familias en Accion,* has had significant effects on child labor, especially in the case of boys.

Secure property rights are considered a key determinant of economic development. However, the evaluation of the causal effects of property rights is a difficult task, as their allocation is typically endogenous. **Schargrodsky** and **Galiani** exploit a natural experiment in the allocation of land titles to overcome this identification problem. More than twenty years ago, a group of squatters occupied a piece of land in a poor suburban area of Buenos Aires. When the Congress passed a law expropriating the land from the former owners with the purpose of entitling it to the occupants, some of the original owners accepted the government compensation, while others are still disputing the compensation payment in the slow Argentine courts. These different decisions by the former owners generated an allocation of property rights that is exogenous in equations describing the behavior of the squatters. The authors find that entitled families increased housing investment, reduced household size, and improved the education of their children relative to the control group. However, effects on credit access are modest and there are no effects on labor income.

Hunt examines the role of household income in determining who bribes and how much they bribe in health care in Peru and Uganda. She finds that rich patients are more likely than other patients to bribe in public health care: doubling household consumption increases the bribery probability by 0.2–0.4 percentage points in Peru, compared to a bribery rate of 0.8 percent; doubling household expenditure in Uganda increases the bribery probability by 1.2 percentage points compared to a bribery rate of 17 percent. The income elasticity of the bribe amount cannot be precisely estimated in Peru, but is about 0.37 in Uganda. Bribes in the Ugandan public sector appear to be extorted from the richer patients amongst those exempted by government policy from paying the official fees, and reflect the same combination of fee for service and price discrimination as official fees. Bribes in the private sector are flat-rate fees paid by patients who do not pay official fees.

Hunt does not find evidence that the public health care sector in either Peru or Uganda is able to price-discriminate less effectively than public institutions with less competition from the private sector.

How do weak private property institutions influence human capital investment decisions? Empirical challenges have limited research on this potentially important facet of how institutions influence prosperity. **Edmonds** and **Sharma** argue that a debt-bondage institution prevalent in the western plains of Nepal is an unusually good setting in which it is possible to explore how institutions affect investments in education. They observe substantially more child labor, lower schooling attendance and attainment, and significantly elevated fertility in families vulnerable to debt-bondage. The data are most consistent with diminished returns to education in the vulnerable population as an explanation for the findings. They argue that this diminished return to education owes to a substantive expropriation threat. That is, the absence of secure property rights over human capital's output is a significant deterrent to educational investments.

It is anticipated that these proceedings will be published in an NBER conference volume. Its availability will be announced in a future issue of the *NBER Reporter*.

Financial Reporting and Taxation

The NBER held a conference on "Financial Reporting and Taxation" in Cambridge on December 7. Douglas Shackelford, NBER and University of North Carolina, Chapel Hill, organized this program:

Michelle Hanlon, University of Michigan, and **Edward Maydew**, University of North Carolina, "Book-Tax Conformity: Implications for Multinational Firms"
Discussants: Mihir A. Desai, Harvard University and NBER, and Peter Merrill, PricewaterhouseCoopers

Douglas Shackelford; **Joel B. Slemrod**, University of Michigan and NBER; and **James Sallee**, University of Michigan, "A Unifying Model of How Taxes Affect the Real and Accounting Decisions of Corporations"
Discussants: Alan J. Auerbach, University of California, Berkeley and NBER, and Terry Shevlin, University of Washington

John R. Graham, Duke University and NBER, and **Lillian F. Mills**, University of Texas, "Using Tax Return Data to Simulate Corporate Marginal Tax Rates
Discussants: Oliver Li, University of Notre Dame, and Clemens Sialm, University of Michigan and NBER

George A. Plesko, University of Connecticut, "Estimates of the Magnitude of Financial and Tax Reporting Conflicts"
Discussants: Raj Chetty, University of California, Berkeley and NBER, and David Weisbach, University of Chicago

Michelle Hanlon, University of Michigan, and **Joel B. Slemrod**, "What Does Tax Aggressiveness Signal? Evidence from Stock Price Reactions to News About Tax Aggressiveness"
Discussants: Joseph Bankman, Stanford University, and Dhammika Dharmapala, University of Connecticut

James M. Poterba, MIT and NBER, and **Nirupama Rao** and **Jeri Seidman**, MIT, "New Evidence on the Importance of Deferred Tax Assets and Liabilities and on Managerial Manipulation of Tax Expense"
Discussants: James R. Hines, University of Michigan and NBER, and Andrew Schmidt, Columbia University

Leslie A. Robinson and **Richard Sansing**, Dartmouth College, "Tax Incentives versus Financial Reporting Costs: The Case of Internally Developed Intangible Assets"
Discussants: Christian Leuz, University of Chicago, and Emmanuel Saez, University of California, Berkeley and NBER

Jennifer L. Blouin and **Irem Tuna**, University of Pennsylvania, "Tax Contingencies: Cushioning the Blow to Earnings?"
Discussants: Mary Margaret Frank, University of Virginia, and Thomas Neubig, Ernst & Young

Hanlon and **Maydew** examine the implications for multinational firms of recent proposals to conform tax and financial reporting (that is, book-tax conformity). Proponents of book-tax conformity argue that the current dual system in the United States allows firms to simultaneously manage their taxable income down while managing their book income upward. By requiring book-tax conformity, they contend that firms will be forced to trade-off reporting high earnings numbers to shareholders and reporting low earnings to the taxing authority, resulting in improved financial reporting and less tax avoidance. Reduced compliance costs and easier auditing also have been cited as potential benefits of book-tax conformity. Aspects of book-tax conformity that have not been examined, however, include its international implications, particularly regarding the foreign operations of U.S. multination-als. The authors describe several possible approaches to implementing book-tax conformity for firms that have both domestic and foreign operations. They discuss issues likely to arise with each approach and conjecture at the behavioral responses to each. Using firm-level financial data from Compustat, they simulate the effects of book-tax conformity on publicly traded U.S. firms. Specifically, they simulate the effects of book-tax conformity on the level and variability of book earnings and tax payments/collections.

Shackelford, Slemrod, and **Sallee** model the impact of taxes on both the real decisions and the accounting choices of firms. Their goal is to enhance understanding of the behavioral effects of taxation by merging the approach to the study of corporate taxation taken by economists and accountants. Economists typically study the effects of taxes on real decisions, ignoring the role of financial reporting. Accountants usually focus on the coordination of tax and accounting choices, with little attention to real economic effects. Both approaches yield important insights, but neither is complete because real and accounting decisions interact in important ways. As a result, studies of real (accounting) choices that ignore the incentives and constraints that affect accounting (real) decisions may misinterpret behavioral responses to taxation. Therefore, a unifying framework that incorporates both real and accounting choices is needed for comprehensive treatment of the behavioral responses to taxation. The authors propose that corporations make real and accounting decisions to maximize a function whose arguments include the present value of the after-tax cash flows and also after-tax book income in each of two periods. Corporations have limited discretion to shift across periods pre-tax book income,

taxable income, and the book tax provision. Some real decisions are more attractive than others because they provide managers with discretion over the timing of taxable income and book income; this is especially true for companies for which this discretion has relatively high value. The authors show how the presence of discretion modifies the optimal decisions of firms, in theory, and provide examples that illustrate this behavior in the real world. The source of this discretion may be either the accounting rules or the tax law. It is critical to know whether the book and tax accounting either must by law be conformed, or will be conformed by choice because of the private costs of maintaining separate accounting systems. When they are not conformed, divergence between the two may be costly to the extent that it alerts the IRS to possibly aggressive tax planning or the capital markets to poor earnings quality.

Graham and **Mills** simulate marginal tax rates (MTRs) from 1998 to 2000 using U.S. tax return data for public corporations. They compare the tax-return tax rates to tax rates calculated from public financial statement data (Compustat) and find that Graham's (1996a) simulated tax rate is the book variable most highly correlated with the tax-return variable. They also find that the correlation between book and tax MTRs improves substantially for firms with similar consolidated groups. They identify ways to improve upon Compustat MTRs in terms of more closely approximating tax-return based tax rates. Finally, they find that tax return MTRs are significantly correlated with financial statement corporate debt ratios, although less so than the correlation between book MTRs and debt ratios.

Plesko examines the tax reporting consequences of financial reporting discretion. Using a matched sample of financial statements with tax returns, he estimates the accuracy of tax return information inferred from financial statements. To examine the trade-offs between financial and tax reporting, he models the relation that discretionary financial accounting accruals have to discretionary federal tax accruals. The methodology

takes advantage of the contemporaneous nature of reporting to mitigate the econometric problems identified in earnings management studies. He finds that the extent that tax reporting reflects discretionary financial reporting varies dramatically by industry, profitability, and the sign of discretionary accruals measured under the tax system. Further, focusing on tax reporting, he finds that managers are able to undertake tax reducing activities with less of an effect on financial reporting than tax increasing accruals, consistent with recent evidence on the differential growth of book and tax income, and with tax avoidance activities.

Hanlon and **Slemrod** study the stock price reaction to news about tax aggressiveness. They find that, on average, a company's stock price declines when there is news about its involvement in tax shelters, but the reaction is small relative to reactions to other corporate misdeeds. They find some limited evidence for cross-sectional variation in the reaction. For example, the stock price decline is smaller for companies with relatively high effective tax rates, possibly because news about tax aggressiveness is more favorably viewed for those firms where public information would suggest otherwise. The stock price decline is also smaller for firms that have good governance, which is consistent with the idea that, for these firms, the news is less likely to trigger concern about insiders' aggressiveness toward the investors themselves. Indeed, these results suggest that for well-governed firms with especially high effective tax rates, news that they have been involved in a tax shelter is received favorably by the market. The reaction is more negative for firms in the retail sector, suggesting that part of the reaction may be a consumer/taxpayer backlash. Hanlon and Slemrod also explore the stock price reaction to reports of effective tax rate calculations released by Citizens for Tax Justice. They hypothesize that these reports signal tax aggressiveness without the implications for tax penalties or illegal behavior that tax shelter news carries, and therefore any market reaction represents a pure reputation effect. They find no statistically significant stock price reaction to the reports,

suggesting that the negative reaction to tax shelter news is not predominantly a reputation effect. All in all, their analysis suggests that tax shelter news is viewed as a negative event by the market, although the stock price reaction is much smaller than the reaction to major accounting mishaps.

Poterba, **Rao**, and **Seidman** collect data from the tax footnotes of a sample of large U.S. corporations between 1994 and 2004 and use it to investigate two issues concerning financial accounting for taxes. They document the importance of deferred tax assets and liabilities for their sample firms and demonstrate the substantial heterogeneity in firm tax positions. In 2004, 47 firms in the sample of 71 reported net deferred tax assets and 24 reported net deferred tax liabilities. In this sample, total deferred tax assets for firms with such assets in 2004 were $57.6 billion, while total deferred tax liabilities for firms with such liabilities were $212.8 billion. This implies that a 5 percentage point decline in the federal statutory corporate tax rate would reduce net income by roughly $8.2 billion at sample firms with net deferred tax assets, because these assets would decline in value and this in turn would reduce net income. Firms differ substantially in the composition of deferred tax assets and liabilities. The authors demonstrate this by disaggregating deferred tax accounts for their sample firms. They also explore the role of managerial discretion in reporting tax expense. They find evidence of tax management when firms will otherwise miss earnings targets, and extend prior research by analyzing which components of tax expense are most likely to be used for earnings management.

Robinson and **Sansing** develop and analyze a model in which tax considerations and financial reporting considerations have countervailing effects on a firm's investments in internally developed intangible assets. They also propose and estimate a new measure of tax preferences, the economic effective tax rate. This measure reflects both investments in intangible assets and the use of debt financing, neither of which generates book-tax differences. Their measure indicates that the

economic effective tax rate was about 16 percent between 1988 and 2005, when the statutory tax rate was either 34 or 35 percent. On average, about two-thirds of the difference between their measure and the statutory tax rate is attributable to intangible assets and about one-third is attributable to the use of debt financing. Both the effect of intangible assets and the use of debt financing on their measure vary across industries.

Blouin and **Tuna** study firms' tax contingencies (aka tax cushion). A recent call for corporate tax reform has highlighted the disparity between financial and income tax reporting. In this paper, the authors create a broad-based measure of a cushion that appears to capture cross-sectional variation in tax aggressiveness. After controlling for tax aggressiveness, they find some evidence that firms appear to be using cushions to smooth earnings. Specifically, a tax cushion is used to smooth earnings by firms with larger option incentive pay as a proportion of total compensation and larger implicit claims. Finally, these findings are consistent with firms asymmetrically reporting good news, providing additional evidence that firms strategically report non-recurring income components (Schrand and Walther 2000). Overall, the findings support the need for FIN48, which attempts to improve conformity in the reporting of tax contingencies.

Behavioral Responses to Taxation and Social Insurance Programs

An NBER-Universities Research Conference on "Behavioral Responses to Taxation and Social Insurance Programs" took place in Cambridge on December 8–9. Organizers Raj Chetty and Emmanuel Saez, both of NBER and University of California, Berkeley, chose these papers for discussion:

Anton Korinek, Columbia University, and **Joseph E. Stiglitz**, Columbia University and NBER, "Dividend Taxation and Intertemporal Tax Arbitrage"
Discussant: James M. Poterba, MIT and NBER

John D. Wilson, Michigan State University, and **Joel B. Slemrod**, University of Michigan and NBER, "Tax Competition with Parasitic Tax Havens"
Discussant: James R. Hines, University of Michigan and NBER

Jennifer Huang, University of Texas at Austin; **Gene Amromin,** Federal Reserve Bank of Chicago; and **Clemens Sialm**, University of Michigan and NBER, "The Tradeoff between Mortgage Prepayments and Tax-Deferred Retirement Savings"
Discussant: Brigitte Madrian, Harvard University and NBER

Nicole Maestas, RAND Corporation, and **Dana Goldman**, NBER and RAND Corporation, "Medical Expenditure Risk and Household Portfolio Choice"
Discussant: Amy Finkelstein, MIT and NBER

James P. Ziliak, University of Kentucky, "Taxes, Transfers, and the Labor Supply of Single Mothers"
Discussant: Bradley Heim, Department of the Treasury

Anil Kumar, Federal Reserve Bank of Dallas, and **Gary V. Engelhardt**, Syracuse University, "Employer Matching and 401(k) Saving: Evidence from the Health and Retirement Study"
Discussant: John Karl Scholz, University of Wisconsin, Madison and NBER

Adam Looney, Federal Reserve Board, "Trading Tax Benefits for Child Support"
Discussant: Melissa Kearney, The Brookings Institution and NBER

Dean Karlan, Yale University, and **John A. List**, NBER and University of Chicago, "Does Price Matter in Charitable Giving? Evidence from a Large-Scale Natural Field Experiment"
Discussant: Lise Vesterlund, University of Pittsburgh

Korinek and **Stiglitz** develop a life-cycle model of the firm to analyze the effects of dividend tax policy on aggregate investment. They find that new firms raise less equity and invest less the higher the level of dividend taxes, in accordance with the traditional view of dividend taxation. However, the dividend tax rate is irrelevant for the investment decisions of internally growing and mature firms, as postulated by the new view of dividend taxation. Since aggregate investment is dominated by these latter two categories, the level of dividend taxation, as well as unanticipated changes in dividend tax rates, have only a minor impact on aggregate investment and output. Anticipated dividend tax changes, on the other hand, allow firms to engage in inter-temporal tax arbitrage so as to reduce investors' tax burden. This can significantly distort aggregate investment. Anticipated tax cuts (increases) delay (accelerate) firms' dividend payments, which leads them to hold higher (lower) cash balances and, for capital constrained firms, can significantly increase (decrease) aggregate invest-

ment for periods after the tax change. Furthermore, the authors show that the analysis of dividend taxation in a contestable democracy has to take into account expectations about future regime changes and the ensuing dividend tax changes. This can significantly change the evaluation of a given dividend tax policy.

Slemrod and **Wilson** develop a tax competition framework in which some jurisdictions, called tax havens, are parasitic on the revenues of other countries. The havens use real resources to help companies camouflage their home-country tax avoidance, and countries use resources in an attempt to limit the transfer of tax revenues to the havens. The equilibrium price for this service depends on the demand and supply for such protection. Recognizing that taxes on wage income are also evaded, the authors solve for the equilibrium tax rates on mobile capital and immobile labor, and demonstrate that the full or partial elimination of tax havens would improve welfare in non-haven countries, in part because countries would be induced to increase their tax rates, which they have set at inefficiently low levels in an attempt to attract mobile capital. They also demonstrate that the smaller countries choose to become tax havens, and show that the abolishment of a sufficiently small number of the relatively large havens leaves all countries better off, including the remaining havens.

Amromin, **Huang**, and **Sialm** show that a signicant number of households can perform a tax arbitrage by cutting back on their additional mortgage payments and increasing their contributions to tax-deferred accounts (TDA). Using data from the Survey of Consumer Finances, the authors show that at least 38 percent of U.S. households that are accelerating their mortgage payments instead of saving in tax-deferred accounts are making the wrong choice. For these households, reallocating their savings can yield a mean benefit of 11 to 17 cents per dollar, depending on the choice of investment assets in the TDA. In the aggregate, these mis-allocated savings are costing U.S. households about 1.5 billion dollars per year. Finally, the authors show empirically that this inefficient behavior is unlikely to

be driven by liquidity considerations and that self-reported debt aversion and risk aversion variables explain, to some extent, the preference for paying off debt obligations early and hence the propensity to forgo the proposed tax arbitrage.

As health care costs continue to rise, medical expenses have become an increasingly important contributor to financial risk. Economic theory suggests that when background risk rises, individuals will reduce their exposure to other risks. **Maestas** and **Goldman** present a test of this theory by examining the effect of medical expenditure risk on the willingness of elderly Medicare beneficiaries to hold risky assets. They measure exposure to medical expenditure risk by whether an individual is covered by supplemental insurance through Medigap, an employer, or a Medicare HMO. They account for the endogeneity of insurance choice by using county variation in Medigap prices and non-Medicare HMO market penetration. They find that having Medigap or an employer policy increases risky asset holding by 6 percentage points relative to those enrolled in only Medicare Parts A and B. HMO participation increases risky asset holding by 12 percentage points. Given that just half of their sample holds risky assets, these are economically sizable effects. It also suggests an important link between the availability and pricing of health insurance and the financial behavior of the elderly.

How wages and non-labor income affect both the decision to work and hours of work among single mothers is critical to understanding the work disincentive effects of tax and welfare policies, and the attendant design of optimal income tax and transfer schemes. **Ziliak** uses data from the Current Population Survey and variation induced by fundamental reforms to the U.S. tax and welfare systems over the 1979–2001 period to estimate the labor-supply response of single mothers to changes in their after-tax and transfer wage rate and nonlabor income, conditional on whether or not they also participate in AFDC/TANF, food stamps, or SSI. He finds that wage changes have a large effect on the decision to work (the average elasticity of employ-

ment is 1.3), but a small effect on hours of work (average compensated wage elasticity of 0.16) unless the wage change also alters the mother's decision to participate in AFDC/TANF, food stamps, or SSI. These estimates are consistent with a recent theoretical model by Saez (2002) that suggests that the optimal transfer policy is one that involves a modest income guarantee for non-workers coupled with subsidies for low-income workers much like the current EITC program.

Employer matching of employee 401(k) contributions can provide a powerful incentive to save for retirement and is a key component in pension-plan design in the United States. Using detailed administrative contribution, earnings, and pension-plan data from the Health and Retirement Study, **Englehardt** and **Kumar** formulate a life-cycle-consistent econometric specification of 401(k) saving and estimate the determinants of saving, accounting for non-linearities in the household budget set induced by matching. The participation estimates indicate that an increase in the match rate by 25 cents per dollar of employee contribution raises 401(k) participation by 3.75 to 6 percentage points, and the estimated elasticity of participation with respect to matching ranges from 0.02–0.07. The parametric and semi-parametric estimates for saving indicate that an increase in the match rate by 25 cents per dollar of employee contribution raises 401(k) saving by $400–$700 (in 1991 dollars). The estimated elasticity of 401(k) saving to matching is also small and ranges from 0.09–0.12 overall, with just under half of this effect on the intensive margin. Overall, the analysis reveals that matching is a rather poor policy instrument with which to raise retirement saving.

Looney examines the economic incidence of non-refundable child-related tax benefits in low-income single parent families. Because non-refundable tax benefits only reduce taxes due, many argue that they cannot help low-income families without tax liability. Single parents may be an exception because tax law permits separated or divorced parents to exchange the tax benefits tied to their children. If parents exchange child-related tax ben-

efits and custodial parents are compensated for the trade, then the incidence of such benefits is more progressive than a naive estimate would suggest. Using data from the Survey of Income and Program Participation (SIPP) and exploiting variation in the value of child-related tax benefits due to differences in state tax systems and changes in federal tax law, Looney finds that parents exploit these arbitrage opportunities and that custodial mothers receive increased child support as a result.

Karlan and **List** conducted a natural field experiment to further their understanding of the economics of charity. Using direct mail solicitations to over 50,000 prior donors of a non-profit organization, they tested the effectiveness of a matching grant on charitable giving. They find that the match offer increases both the revenue per solicitation and the response rate. However, larger match ratios (that is, $3:$1 and $2:$1) relative to a smaller match ratio ($1:$1) had no additional impact. The results provide avenues for future empirical and theoretical work on charitable giving, cost-benefit analysis, and the private provision of public goods.

20th Annual TRIO Conference

The Twentieth Annual TRIO Conference, so-named because it is jointly sponsored by the NBER, the Centre for Economic Policy Research (CEPR), and the Tokyo Center for Economic Research (TCER), took place on December 15 and 16 in Tokyo. This year's conference focused on "Organizational Innovation and Firm Performance." It was organized by George P. Baker, NBER and Harvard University; Takeo Hoshi, NBER and University of California, San Diego; and Hideshi Itoh and Sadao Nagaoka, Hitotsubashi University and TCER. The program was:

George P. Baker; **Robert Gibbons**, NBER and MIT; and **Kevin J. Murphy**, University of Southern California, "Strategic Alliances: Bridges Between Islands of Conscious Power" Discussants: Hideshi Itoh, and Hodaka Morita, University of New South Wales

Ola Kvaloy, University of Stavanger, and **Trond E. Olsen**, Norwegian School of Economics and Business Administration, "Peer-Dependent Incentives and Ownership Rights" Discussants: Makoto Hanazono, Nagoya University, and Paul Oyer, Stanford University and NBER

Hideshi Itoh; **Osamu Hayashida**, Osaka Keizai University; and **Tatsuya Kikutani**, Kyoto University, "Complementarities among Authority, Responsibility, and Monitoring: Evidence from Japanese Business Groups" Discussants: Steven Tadelis, UC, Berkeley, and Wako Watanabe, Tohoku University

Steven Tadelis, and **Jonathan D. Levin**, Stanford University, "A Costly Contracting Approach to the Organization of Production" Discussants: Ola Kvaloy and Sadao Nagaoka

Akira Takeishi and **Sadao Nagaoka**, Hitotsubashi University; and **Yoshihisa Noro**, Mitsubishi Research Institute, "Determinants of Firm Boundaries: Empirical Analysis of the Japanese Auto Industry from 1984 to 2002" Discussants: George P. Baker, and Tatsuya Kikutani, Kyoto University

Hirofumi Uchida, Wakayama University; **Gregory F. Udell**, Indiana University, and **Wako Watanabe**, Tohoku University, "Bank Size and Lending Relationships in Japan" Discussants: Takeo Hoshi, and Ayako Yasuda, University of Pennsylvania

Paul Oyer, "Ability and Employer Learning: Evidence from the Economist Labor Market" Discussants: Daiji Kawaguchi, Hitotsubashi University and TCER, and Hideo Owan, Aoyama Gakuin University

Arghya Ghosh and **Hodaka Morita**, University of New South Wales, "An Economic Analysis of Platform Sharing" Discussants: Reiko Aoki, Hitotsubashi University and TCER, and Hans Gottinger, Hitotsubashi University

Strategic alliances range from short-term cooperative projects, through long-term partnerships and joint ventures, to transactions that permanently restructure firm boundaries and asset ownership. **Baker**, **Gibbons**, and **Murphy** draw on detailed discussions with practitioners to present a rich model of feasible governance structures. Their model focuses on two issues emphasized by practitioners: spillover effects (as opposed to hold-ups motivated by specific investments), and contracting problems ex post (as opposed to only ex ante). They use this model to generate a large number of strategic alliance possibilities, including simple cooperative arrangements (coopetition), strategic divestitures, total divestitures, licensing agreements, and royalty agreements. They show that any of these possible strategic alliances could be optimal.

In an earlier paper, **Kvaloy** and **Olsen** analyzed the conditions for implementing peer-dependent incentive regimes when

agents have ownership rights. They showed that compensation tied to peer-performance can induce employee-hold-up and obstruct the implementation of relational incentive contracts. In this paper, they present some extensions: they argue that the costs of transferring ownership rights to agents may depend on whether there exist conditions that call for peer-dependent incentives. In particular, they show that if there exists common noise that makes relative performance evaluation optimal, or peer pressure that makes joint performance evaluation optimal, then the firm will be more reluctant to give up ownership rights.

Itoh, **Hayashida**, and **Kikutani** offer an empirical test of complementarities among delegated authority, responsibility, and monitoring, using unique survey data collected from group-affiliated companies in Japan. The survey provides information about how various decisions are made within business groups, each of which consists of a large core parent firm and its network of affiliated firms, such as subsidiaries and related companies. The authors find some evidence that delegated authority and responsibility are complementary, implying that increasing assigned responsibility raises the marginal return from increasing delegated authority. They also obtain a stronger result, that performance is likely to be higher under the combination of low authority and low responsibility, or that of high authority and high responsibility, than under the "mix and match" combinations where one of them is low and the other high. They then study the effects of monitoring intensity on the authority-responsibility pair and find that performance of the firm with the combination of high authority and high responsibility is increasing in monitoring intensity, while the combination of low authority and low responsibility is not. The result is consistent with the theoretical hypothesis that increasing monitoring intensity raises the marginal return from increasing delegated authority and responsibility.

What determines the boundaries of organizations and the cost-based incentives within and between contracting entities? These questions have received much attention, and many approaches have been developed. Building on ideas from trans-action cost economics, agency theory and property rights theory, **Levin** and **Tadelis** develop a general procurement model that highlights the trade-off between productive efficiency and the costs of administrating performance contracts. They recast the question of firm boundaries as one of contracting over inputs or outputs, resulting in empirically testable predictions that are consistent with several previous studies. Their results demonstrate why control and cost incentives will shift in complementary ways, laying some foundations to the definition of hierarchy and market transactions within transaction cost economics.

Since Coase's (1937) seminal work, the boundaries of the firm have long been one of the most important issues for researchers, and the auto industry has been one of the most investigated industries. One example is Monteberde and Teece (1982), which demonstrated that transaction cost — measured by engineering efforts and firm-specificity to design component — indeed did matter for the vertical integration decision by OEMs (GM and Ford). **Takeishi**, **Nagaoka**, and **Noro** extend their analysis in three directions. First, for the dependent variable, in addition to the two choices (make internally or buy from the market), they put forward the third choice, "buy from affiliated ('keiretsu') suppliers." Second, for independent variables, they examine a set of new variables to measure multiple dimensions of contractibility. Third, they use a set of panel data of the Japanese auto industry, which they have built up to cover the make-or-buy decisions of 7 OEMs on 54 types of components for almost two decades from 1984 to 2002.

Current theoretical and empirical research suggests that small banks have a comparative advantage in processing soft information and delivering relationship lending. The most comprehensive analysis of this view found using U.S. data is by Berger, Miller, Petersen, Rajan, and Stein, 2005 (BMPRS). **Uchida**, **Udell**, and **Watanabe** use essentially the same methodology as BMPRS on a unique Japanese dataset. Like BMPRS, they find that larger firms tend to borrow from larger banks. However, unlike BMPRS, they do not find that this is because larger firms are more transparent. Their results imply that large banks do not necessarily have a comparative advantage in extending transactions-based lending. They also find, like BMPRS, that smaller banks have strong relationships with their borrowers. However, the banking relationships in the United States and Japan are strong in somewhat different dimensions. This paper clarifies these and other interesting similarities and differences between the United States and Japan.

Oyer studies the human capital development and firm-worker matching processes for Ph.D. economists. This group is useful for this purpose because the types of jobs they hold can be easily categorized and they have an observable productivity measure (that is, publications.) He derives a two-period model to motivate an empirical analysis of economist job matching upon graduation, matching ten years later, and productivity in the first ten years. He shows that matching to a higher ranked institution affects productivity. He presents evidence that employers improve their estimates of economists' ability early in their career in a way that determines longer-term job placement. He also finds that the initial placement of economists to institutions does not show much evidence of systematic misallocation along observable characteristics.

Ghosh and **Morita** explore the managerial implications and economic consequences of platform sharing under models of horizontal and vertical product differentiation. By using a common platform across different products, firms can save on fixed costs for platform development. At the same time, platform sharing imposes restrictions on firms' ability to differentiate their products, and this reduces their profitability. It might appear that platform sharing across firms makes consumers worse off because firms cooperate in their product development processes to maximize their joint profit. The authors find, however, that platform sharing benefits consumers in their framework because it intensifies competition in their horizontal differentiation model, and because it increases the quality of the lower-end product in our vertical differentiation model. They also show new channels through which a merger makes consumers worse off in the presence of platform sharing.

2006 Awards and Honors

A number of NBER researchers received honors, prizes, awards, and professional kudos during 2006. In alphabetical order, those so honored (excluding honors by the individual's own university) are:

Daron Acemoglu received the 2005 John Bates Clark Medal in economics and the Turkish Academy of Sciences Distinguished Science Award; he also was named a Fellow of the Society of Labor Economics and a Fellow of the American Academy of Arts and Sciences.

Alberto Alesina, winner of the 2006 Distinguished CES (Center for Economic Studies) Fellow Prize in Economics, granted at the University of Munich. He was also made a Fellow of the American Academy of Arts & Sciences.

Heitor Almeida and **Daniel Wolfenzon** won the Jensen Prize (second prize) for the "Best Paper Published in 2005 in the *Journal of Financial Economics* in the Areas of Corporate Finance and Organizations" for their paper, "The Effect of External Finance on the Equilibrium Allocation of Capital."

Lee J. Alston was elected President of the International Society for New Institutional Economics.

Joseph Altonji was elected a Fellow of the Society of Labor Economists.

Torben G. Andersen was awarded a Certificate of Appreciation from the *American Statistical Association* for editorship of the *Journal of Business & Economic Statistics* 2004–6.

Joshua Angrist was elected a Fellow of the Society of Labor Economists and a Fellow of the American Academy of Arts & Sciences.

Abhijit Banerjee received the first Michael Wallerstein Award from the American Political Science Association in September 2006.

Lucian Bebchuk is President-Elect of the American Association of Law and Economics.

Roland Benabou became a Fellow of the Canadian Institute for Advanced Research.

Jonathan Berk shared the TIAA-CREF Paul Samuelson Award that was presented in January 2006. He was also cited for publishing one of the two best papers ever published in *The Review of Financial Studies*, 2006: "A Critique of Size Related Anomalies." Finally, he received the Bernstein-Fabozzi/Jacobs Levy Award (Outstanding Article) from the *Journal of Portfolio Management*, 2006.

Marianne Bertrand won the 2006 John T. Dunlop Award of the Labor and Employment Relations Association for contributions to research that address industrial relations/employment problems of national significance.

Rebecca Blank became a Fellow of the Society of Labor Economists and a Vice President of the American Economic Association.

Francine D. Blau is President, Society of Labor Economists.

Alan Blinder delivered the Presidential Address to the Eastern Economic Association in Philadelphia in February.

Richard Blundell was elected a Fellow of the Society of Labor Economists.

Jacob Boudoukh, Matthew Richardson, and **Robert Whitelaw** won "The Goldman Sachs Asset Management Award for the Best Paper in Investments" at the 2006 WFA Meetings in Colorado.

John F P Bridges was awarded the International Society of Pharmacoeconomics and Outcomes Research (ISPOR) Bernie O'Brien New Investigator Award for 2006.

Charles Brown was named a Fellow of the Society of Labor Economists.

Jeffrey R. Brown was appointed to the Social Security Advisory Board.

Markus K. Brunnermeier received the BGI-Michael Brennan best paper award (runner up) for his paper "Information Leakage and Market Efficiency" published in the *Review of Financial Studies*.

Erik Brynjolfsson won the Best Paper Award, International Conference on Information Systems, for "Information Worker Productivity: Task-level Evidence", co-authored with Sinan Aral and Marshall van Alstyne. He also won the award for Best Paper in Valuing IT Track at the 2006 International Conference on Information Systems for "Which Came First, IT or Productivity? The Virtuous Cycle of Investment and Use in Enterprise Systems" with Sinan Aral and D.J. Wu.

Laurent Calvet received the "Best finance researcher under the age of 40" prize for 2006 from *Le Monde* (newspaper) and the Europlace Institute of Finance (EIF).

Jeff Campbell received the *Journal of Industrial Economics* 2nd Annual "Best Article of the Year" Prize for his paper with **Hugo Hopenhayn**, "Market Size Matters."

David Card and **Alan Krueger** won the IZA Prize in Labor Economics.

Alessandra Casella was awarded a Guggenheim Fellowship for 2006-7 for her work on Storable Votes.

Raj Chetty was recipient of a Smith Richardson Public Policy Fellowship, one of three given annually to young economists working in public economics and public policy in the United States. He also received an NSF CAREER grant, the NSF's major award in support of early-career scientists.

Judith Chevalier was elected a Fellow of the American Academy of Arts and Sciences.

John H. Cochrane won the Fama/DFA second prize from the *Journal of Financial Economics* for "The Risk and Return of Venture Capital."

Janet Currie was elected a Fellow of the Society of Labor Economists in 2006.

David M. Cutler and **Jonathan Gruber** were joint recipients of the first ASHE medal (American Society of Health Economists), given to the outstanding

health economist aged 40 and younger.

Peter M. DeMarzo won Barclays Global Investors/Michael Brennan Prize for the Best Paper published in Volume 18 of *The Review of Financial Studies*: "The Pooling and Tranching of Securities: A Model of Informed Intermediation."

Barry Eichengreen received a doctor honoris causa from the American University in Paris.

Stanley L. Engerman (and **Kenneth L. Sokoloff**) won the Arthur H. Cole Prize for the outstanding article published in the *Journal of Economic History* from September 2005-6 for "The Evolution of Suffrage Institutions in the New World." **Engerman** was also named a Distinguished Fellow of the American Economic Association.

Isaac Ehrlich was named Founding Editor-in-Chief of the *Journal of Human Capital.* He was also named NYSTAR Distinguished Professor of 2005 by the New York state office of Science, Technology, and Academic Research (NYSTAR) Faculty Development Program for his work on human capital and economic growth and development.

Robert Feenstra received the Bernhard Harms Prize for 2006, from the Kiel Institute for World Economics.

Martin Feldstein was appointed to the President's Foreign Intelligence Advisory Board.

Raquel Fernandez presented the Marshall Lecture at the European Economic Association meetings in Vienna in August 2006.

Jesus Fernandez-Villaverde and Juan Rubio-Ramirez won the Richard Stone prize in applied econometrics.

Amy Finkelstein received CES-Ifo's Distinguished Research Affiliate Award, for "best paper in Public Economics by a young scholar" for "The Interaction of Public and Private Insurance: Medicaid and the Long-Term Care Insurance Market"(co-authored by **Jeffrey R. Brown**). She also was given Research America's Eugene Garfield Economic Impact of Medical and Health Research Award for "outstanding research on how medical or health research impacts the economy" for "Static and Dynamic Effects of Health Policy: Evidence from the Vaccine Industry."

Roderick Floud was awarded the honorary degree of Doctor of Letters by the University of Westminster in November 2006.

Robert W. Fogel was named *Indispensable Person of the Year* for 2006 by the Alliance for Aging Research for contributions to the study of health and aging.

Richard Freeman and **Edward Lazear** shared the 2006 Society of Labor Economists' Jacob Mincer prize honoring lifetime achievements in the field of labor.

Barbara Fraumeni received a gold medal from the Secretary of Commerce for her work on R and D while Chief Economist at the Bureau of Economic Analysis of the U.S. Department of Commerce. She also received the 2006 Carolyn Shaw Bell Award from the Committee on the Status of Women in the Economics Profession of the American Economics Association, given annually to the individual who has furthered the status of women in the economics profession through example, achievements, increasing our understanding of how women can advance in the profession, and the mentoring of others.

Victor Fuchs was elected an honorary member of Alpha Omega Alpha (the Phi Beta Kappa of Medical Schools) in fall 2006.

Xavier Gabaix received the "Young Scientist Award for Socio- and Econophysics" from the German Physical Society for his work on the origins of scaling laws in economics (*QJE* 1999, "Zipf's law for cities") and finance (*QJE* 2006, "Institutional Investors and Stock Market Volatility" and *Nature* 2003, "Theory of Power Law Distributions in Financial Market Fluctuations").

Sherry Glied was elected to the Institute of Medicine of the National Academy of Sciences.

Claudia Goldin received the 2005 Carolyn Shaw Bell Award from the Committee on the Status of Women in the Economics Profession of the American Economics Association. She also became a Fellow of the National Academy of Sciences and of the American Academy of Political and Social Science in 2006. Finally, she delivered the Ely Lecture to the American Economic Association in January 2006.

Austan Goolsbee was named a Fulbright Scholar for 2007 at the London School of Economics and the Institute of Fiscal Studies for his research on taxes and the Internet in the European Union and the United States.

Gary Gorton and Frank A. Schmid received the 2006 Hicks-Tinbergen Medal for their paper "Capital, Labor and the Firm: A Study of German Codetermination" at the 21st Congress in Vienna on August 27, 2006. The medal is awarded every two years for the best paper in the *Journal of the European Economic Association*.

John R. Graham and **Campbell Harvey** won a number of best paper awards: for their paper with Shiva Rajgopal, "The Economic Implications of Corporate Financial Reporting," the 2006 Notable Contribution to Accounting Literature Award and the 2006 FARS (Financial and Reporting Section) best paper award from the American Accounting Association. Also, for "Payout Policy in the 21st Century" with Alon Brav and Roni Michaely, the 2006 Jensen Prize for best corporate finance paper published in the *Journal of Financial Economics*.

Robert E. Hall became a Fellow of the Society of Labor Economists in 2006.

Lars Peter Hansen won the Erwin Plein Nemmers Prize in Economics, awarded biennially by Northwestern University and designed to recognize "work of lasting significance" in the discipline. He was also voted a Fellow of the American Finance Association.

Eric Hanushek became a member of the National Academy of Education and a Fellow of the Society of Labor Economists.

Oliver Hart is President of the American Law and Economics Association and Vice President of the American Economic Association.

Geoffrey Heal was named a Fellow of the Association of Environmental and Resource Economists in recognition of a lifetime of significant contributions to the area of environmental and resource

economics.

James Heckman won the Ulysses Medal from University College Dublin for his contribution to research in economics and human behavior.

Vernon Henderson was elected a Fellow of the Regional Science Association International.

Takeo Hoshi will be an inaugural recipient of the Enjoji Jiro Memorial Prize.

Erik Hurst and Mark Aguiar won the TIAA-CREF Paul A. Samuelson Award for their paper "Consumption vs. Expenditure" (published in the October 2005 *JPE*). The Award is designed to recognize the best scholarly writing on issues related to lifelong financial security.

Takatoshi Ito was appointed a member of the Council of Economic and Fiscal Policy (Japanese equivalent of the President's Council of Economic Advisers).

Michael C. Jensen was named Honoris Causa Professor by HEC Business School, Paris in November 2006. In March 2006 Jensen received the Dean's Leadership Award in Corporate Governance, Drexel University, LeBow College of Business, and in January 2006 he was awarded the LECG prize for his lifetime contributions to finance.

Dirk Jenter won "The CRA International Award for the Best Paper in Corporate Finance" at the 2006 WFA Meetings in Colorado.

Zorina Khan received the Economic History Association's Alice Hanson Jones Biennial Prize for an outstanding book on North American economic history for *The Democratization of Invention: Patents and Copyrights in American Economic Development, 1790–1920.*

Leonid Kogan won the 2006 Smith Breeden Prize (first prize) for his *Journal of Finance* paper, "The Price Impact and Survival of International Traders", co-authored by Stephen A. Ross, Jiang Wang, and Mark M. Westerfield.

Alan Krueger, in addition to the IZA Prize in Labor Economics shared with David Card, became a Fellow of the Society of Labor Economists.

Howard Kunreuther and **Mark Pauly's** paper, "Terrorism Losses and All Perils Insurance" was selected the 2005 article of the year by the *Journal of Insurance Regulation*.

Edward Lazear and **Richard Freeman** shared the 2006 Society of Labor Economists' Jacob Mincer prize honoring lifetime achievements in the field of labor.

David K. Levine is incoming President of the Society for Economic Dynamics.

Gary Libecap was President of the Western Economics Association and President of the Economic History Association in 2006.

Jens Ludwig was the winner of the 2006 David N. Kershaw Prize, presented by the Association for Public Policy Analysis and Management, established to honor persons who, under the age of 40, have made a distinguished contribution to the field of public policy analysis and management.

Lisa M. Lynch is the next Chairman of the Board of the Federal Reserve Bank of Boston.

Thomas MaCurdy became a Fellow of the Society of Labor Economists.

Ulrike Malmendier won the Citation of Excellence Award given annually by Emerald Management Reviews for top articles among the 15,000 peer-reviewed articles in the Reviews' database for her article "CEO Overconfidence and Corporate Investment".

Robert A. Margo was the 2006 recipient of the Clio Award from the Cliometrics Conference, awarded annually for "exceptional service" to the field of cliometrics.

Grant Miller received the inaugural best student paper award from the American Society of Health Economists and the Biennial Award for Distinguished Contribution to Scholarship in Population from the American Sociological Association's Section on Population (joint with David Cutler.)

Olivia S. Mitchell received an honorary Doctorate in Economics from the University of St. Gallen. She also was appointed to Singapore's Central Provident Fund Advisory Board.

Robert Moffitt was named a Fellow of the Society of Labor Economists.

Enrico Moretti received the 2006 IZA Young Labor Economist Award.

Tobias Moskowitz won (with co-authors **Annette Vissing-Jorgensen** and Marianne Bitler) the *Journal of Finance* Brattle Prize Distinguished Paper for 2005. He also won the AFA Fisher Black Prize for 2007, which honors the top finance scholar under age 40.

Joseph P. Newhouse was president of the American Society of Health Economists in 2006 and became a member of the Committee on National Statistics of the National Research Council.

Muriel Niederle received a Sloan Fellowship beginning in summer 2007.

Lubos Pastor and **Pietro Veronesi** won the 2006 Barclays Global Investors Prize for the best paper presented at the European Finance Association Meetings in Zurich: "Technological Revolutions and Stock Prices."

Mark Pauly's paper "Terrorism Losses and All Perils Insurance" (co-authored with **Howard Kunreuther**) was selected the 2005 article of the year by the *Journal of Insurance Regulation*.

Tomas Philipson was awarded the Kenneth Arrow prize of the International Health Economics Association for best paper in a given year.

Monika Piazzesi received the Elaine Bennett Award from the American Economics Association's Committee on the Status of Women in the Economics Profession. She also won the Bernacier Prize as best European economist under 40 working on finance or macroeconomics.

James M. Poterba is 2nd Vice President, National Tax Association.

Vincenzo Quadrini and **José-Víctor Ríos-Rull** shared the 2005 Arrow Prize for Senior Economists with Paul Klein for their paper, "Optimal Time-Consistent Taxation with International Mobility of Capital".

Joshua Rauh received the Brattle Prize, First Prize Paper, for the best corporate finance paper published in the *Journal of Finance*, 2006.

Ricardo A. Reis was the W. Glenn Campbell Rita Ricardo-Campbell National Fellow and the Arch W. Shaw Fellow at the Hoover Institution in 2006.

Matthew Richardson, Jacob

Boudoukh, and **Robert Whitelaw** won "The Goldman Sachs Asset Management Award for the Best Paper in Investments" at the 2006 WFA Meetings in Colorado.

Richard Rogerson was elected a Fellow of the Econometric Society.

Kenneth Rogoff was chosen a Vice President of the American Economic Association (for 2007).

Christina Romer served as Vice President of the American Economic Association.

David Romer was named a Fellow of the American Academy of Arts & Sciences.

Stephen A. Ross won the 2006 Smith Breeden Prize (first prize) for his *Journal of Finance* paper, "The Price Impact and Survival of International Traders", co-authored by Leonid Kogan, Jiang Wang, and Mark M. Westerfield.

Michael Rothschild was named a Distinguished Fellow of the American Economic Association in 2005. The award was presented in 2006.

Emmanuel Saez won the Doug Purvis Memorial Prize for an article co-authored with Michael Veall of McMaster University, "The Evolution of High Incomes in North America: Lessons from Canadian Evidence." The Purvis Prize is awarded annually to the authors of a highly significant written contribution to Canadian economic policy.

Thomas Sargent was elected President of the American Economic Association.

Douglas A. Shackelford received the Ray M. Sommerfeld Outstanding Tax Educator Award from the American Taxation Association.

Robert J. Shiller was inducted as Fellow of the American Finance Association in 2006. He is also 2006–7 President of the Eastern Economic Association. His term as vice president of the American Economic Association expired in January 2006.

Jody L. Sindelar is president of the recently formed American Society of Health Economics (ASHE).

Kenneth L. Sokoloff (and **Stanley L. Engerman**) won the Arthur H. Cole Prize for the outstanding article published in the *Journal of Economic History* from September 2005–6 for "The Evolution of Suffrage Institutions in the New World."

Pablo T. Spiller is 2nd Vice President of the International Society of New Institutional Economics.

James H. Stock became a Fellow of the American Academy of Arts & Sciences.

Richard Sutch was elected a Fellow of the American Association for the Advancement of Science, inducted in February 2006, and elected Honorary President of the International Economic History Association in August 2006.

Alan M. Taylor was on leave at London Business School for part of 2006 as the recipient of a fellowship from the John Simon Guggenheim Memorial Foundation.

Werner Troesken received the Economic History Association's Alice Hanson Jones Biennial Prize for an outstanding book on North American economic history: *Water, Race, and Disease* (MIT Press, 2004).

Aleh Tsyvinski received the NSF Career Award for 2007-12 in 2006.

Stijn Van Nieuwerburgh won the Glucksman Institute Research Prize (first prize) for an NYU Stern best paper of the year: "Information Immobility and the Home Bias Puzzle".

W. Kip Viscusi received the 2006 Distinguished Economist award from the Kentucky Economics Association. Also, he and **Richard J. Zeckhauser** won the 2006 Ronald H. Coase Prize for the best paper published by a University of Chicago Law School Journal.

Annette Vissing-Jorgensen won the *Journal of Finance* Brattle Prize Distinguished Paper for 2005 (with co-authors **Tobias Moskowitz** and Marianne Bitler.)

Jiang Wang won the 2006 Smith Breeden Prize (first prize) for his *Journal of Finance* paper, "The Price Impact and Survival of International Traders", co-authored by Leonid Kogan, Stephen A. Ross, and Mark M. Westerfield.

Robert Whitelaw, **Matthew Richardson,** and **Jacob Boudoukh** won "The Goldman Sachs Asset Management Award for the Best Paper in Investments" at the 2006 WFA Meetings.

Barbara L. Wolfe was appointed to the Advisory Committee to the Director of the National Institute of Health.

Daniel Wolfenzon won the Jensen Prize (second place) for "Best Paper Published in 2005 in the *JFE*."

Lu Zhang won the Smith Breeden Award (First Prize) for 2005 from American Finance Association and *Journal of Finance.*

Richard J. Zeckhauser and **W. Kip Viscusi** won the 2006 Ronald H. Coase Prize for the best paper published by a University of Chicago Law School Journal.

Program and Working Group Meetings

China Working Group Meeting

The NBER's Working Group on China met in Cambridge on October 13. NBER Research Associate Shang-Jin Wei of the IMF organized the meeting. The following papers were discussed:

Douglas Almond, Columbia University and NBER; **Lena Edlund**, Columbia University; and **Hongbin Li** and **Junsen Zhang**, Chinese University of Hong Kong, "Long-Term Effects of China's Great Famine in Hong Kong and Mainland China"
Discussant: Xiaobo Zhang, International Food Policy Research Institute

Tarun Khanna and **Felix**

Oberholzer-Gee, Harvard University, "The Political Economy of Firm Size Distributions: Evidence from Post-Reform China"
Discussant: Bruce Reynolds, University of Virginia

David Dollar, World Bank, and **Shang-jin Wei**, "Das (Wasted) Kapital: Firm Ownership and Investment Efficiency in China"
Discussant: Galina Hale, Federal Reserve Bank of San Francisco

Geert Bekaert, Columbia University and NBER; **Campbell R. Harvey**, Duke University and NBER; and **Christian Lundblad**, University of

North Carolina, "Financial Openness and the Chinese Growth Experience"
Discussant: Zhiwu Chen, Yale University

Chang-Tai Hsieh, University of California, Berkeley, and **Peter Klenow**, Stanford University and NBER, "Misallocation and Manufacturing TFP in China and India"
Discussant: Lee Branstetter, Carnegie Mellon University and NBER

Yi Qian, Northwestern University, "Pricing and Marketing Impacts of Entry by Counterfeiters and Imitators"
Discussant: Nancy Qian, Brown University

Almond and his co-authors evaluate whether the Great China Famine had negative effects on its survivors. According to the fetal-origins hypothesis, cohorts *in utero* during the famine should have suffered the greatest long-term damage. Consistent with this hypothesis, the authors finds a broad spectrum of compromised outcomes for cohorts born in 1960 who appear in the 2000 Chinese Census. These effects are greatest for those in rural areas, but extend to those who were born in urban areas. The authors also find that Hong Kong residents who were born in China exhibit inferior health outcomes, including reduced birth weight of children born to parents who themselves were *in utero* during the famine. Health effects exist among emigrants from mainland China despite the selective effects of emigration, which are generally positive. Moreover, no corresponding damage among cohorts born in Hong Kong, and thereby shielded from the famine, is observed.

Khanna and **Oberholzer-Gee** study the relationship between firm size distributions and some aspects of

political economy. They exploit a new database of up to five million observations in two years in China, 1999 and 2003. They are particularly interested in studying the effects of China's uneven march to the market on firms of different ownership, namely state-owned enterprises, collectively owned enterprises, foreign invested enterprises, and private firms. Their results show that massive liberalization in China has encouraged the growth of foreign-invested enterprises and, to a lesser extent, collective enterprises (including Township and Village Enterprises), but they have never encouraged genuinely private firms. The best thing that can be said for private enterprise in China is that foreign direct investment appears to spur the entry of small firms. Surprisingly, price flexibility, an important form of liberalization, does not help private firms, although it does help large foreign firms and large collectives to become even larger. The researchers are also able to distinguish between government interference directed at provincial insiders (incumbents, if you

will) and that directed at potential provincial outsiders (potential entrants, if you will) and show that the effects on the size distribution are opposite. The results are consistent with local governments — in an attempt to protect the autonomy granted them by the center during the reform process — "hitting back" at central government efforts to contain them, perhaps in order to encourage their own local (provincial) firms. The authors conclude that the simplest measures appear more important than conventional measures of financial constraints in determining firm size distributions, even after controlling for industry (technological) effects.

Based on a survey that **Dollar** and **Wei** designed, which covers a stratified random sample of 12,400 firms in 120 cities in China with firm-level accounting information for 2002–4, they examine the presence of systematic distortions in capital allocation that result in uneven marginal returns to capital across firm ownership, regions, and sectors. The survey pro-

vides a systematic comparison of investment efficiency among wholly and partially state-owned, wholly and partially foreign-owned, and domestic privately owned firms, conditioning on their sector, location, and size. The researchers find that even with a quarter-century of reforms, state-owned firms still have significantly lower returns to capital, on average, than domestic private or foreign-owned firms. Similarly, certain regions and sectors have consistently lower returns to capital than other regions and sectors. A back-of-the-envelope calculation suggests that if China could allocate capital more efficiently, it would reduce its investment intensity from the current 40 percent of GDP to 35 percent without sacrificing its economic growth (and hence deliver a greater improvement to its citizens' living standard).

Bekaert and his co-authors reflect on China's economic performance from the perspective of the experiences of a broad panel of countries. The authors formulate an econometric framework, building on standard growth regressions that allows them to measure the impact of various factors on economic growth and growth variability. Because China has become more and more integrated into the world's economic and financial landscape, the authors devote special attention to measures of (de jure) financial openness. They also document how the real effects of openness are affected by financial development, political risk, and the quality of insti-

tutions. Standard growth regressions cannot explain China's extraordinary growth experience, and the authors fail to find an important role for foreign trade and foreign direct investment. In contrast, the sheer volume of investment has played a significant role in China's growth. As China's per capita GDP continues to grow, it must find sustainable sources of growth. The authors identify a more efficient financial sector, less state ownership, higher quality of government institutions, and full financial openness as important factors. Interaction analysis suggests that the beneficial effects of financial openness first require further financial and institutional development. China is less of an outlier in its growth variability experience but has achieved high growth with surprisingly low growth volatility.

Resource misallocation can lower aggregate total factor productivity (TFP). **Hsieh** and **Klenow** use micro data on manufacturing establishments to quantify the extent of this misallocation in China and India in recent years. For each country, they measure sizable gaps in the marginal products of labor and capital across plants within narrowly-defined industries. When capital and labor are hypothetically reallocated to equalize the marginal products, they calculate manufacturing TFP gains on the order of a factor of 2. Output gains are nearly a factor of 4 if physical capital accumulates to restore the original average marginal product of capital.

Counterfeit and imitative products appear similar to authentic products but usually have lower quality. However, unlike imitation, counterfeiting infringes upon intellectual property rights by claiming a brand name that it does not own. **Qian** models the pricing, quality, and marketing strategies of producers of authentic and counterfeit goods in a setting of oligopolistic competition under both complete and asymmetric information. His model explains the effects of both counterfeit and imitative entry with different parameter specifications. He collects data from Chinese shoe companies from 1993–2004 to test the theoretical predictions. Exploiting the discontinuity of government enforcement efforts for the footwear sector in 1995, and the differences in authentic companies' relationships with their local governments, Qian uses two different techniques to measure the effects of counterfeit entry on authentic manufacturers' prices, qualities, and profits. The empirical results are consistent with the theoretical predictions. First, low-quality counterfeit entrants induce authentic producers to both produce higher quality products and raise prices. Second, there is empirical evidence for the presence of asymmetric information, under which authentic prices rise further to signal quality (or authenticity). However, this price-signaling effect diminishes over time. Third, other costly non-price devices are used for signaling and reducing counterfeit sales.

Health Care Program Meeting

The NBER's Program on Health Care met in Cambridge on October 20. David Meltzer, NBER and University of Chicago, organized the program. These papers were discussed:

Amy Finkelstein and **Daron Acemoglu**, MIT and NBER, "Input and Technology Choices in Regulated Industries: Evidence from the Health Care Sector"(NBER Working Paper No. 12254)

Darius Lakdawala and **Neeraj Sood**, The RAND Corporation and NBER, "Health Insurance as a Two-Part Pricing Contract"(NBER Working Paper No. 12681)

Dhaval Dave, Bentley College and NBER, and **Robert Kaestner**, University of Illinois at Chicago and NBER, "Medicare and Health Behaviors"

Joshua Graff Zivin, Columbia University and NBER; **Harsha Thirumurthy,** Yale University; and **Markus Goldstein**, The World Bank, "AIDS Treatment and Intrahousehold Resource Allocations: Children's Nutrition and Schooling in Kenya"

Sean Nicholson, Cornell University and NBER; **Michael Waldman**, Cornell University; and **Nodir Adilov**, Purdue University, "Does Television Cause Autism?"

David Meltzer, and **Domenico Salvatore**, Universita Bocconi, "Sex and Physician Practice Variation"

David M. Cutler and **Robert S. Huckman**, Harvard University and NBER, and **Jonathan T. Kolstad**, Harvard University, "Is Entry Efficient When Inputs are Constrained? Lessons from Cardiac Surgery"

Joshua Lerner, Harvard University and NBER, and **Ulrike Malmendier**, University of California, Berkeley and NBER, "Contractibility and the Design of Research Agreements"

Finkelstein and **Acemoglu** ask how regulatory change might affect the input mix and technology choices of regulated industries. They present a simple neoclassical framework that emphasizes the change in relative factor prices associated with a shift from full-cost to partial-cost reimbursement, and investigate how this affects firms' technology choices through substitution of (capital embodied) technologies for tasks previously performed by labor. Empirically, they study the change from full-cost to partial-cost reimbursement under the Medicare Prospective Payment System (PPS) reform, which increased the relative price of labor faced by U.S. hospitals. Using the interaction of hospitals' pre-PPS Medicare share of patient days with the introduction of these regulatory changes, they document a substantial increase in capital-labor ratios and a large decline in labor inputs associated with PPS. Most interestingly, they find that the PPS reform seems to have encouraged the adoption of a range of new medical technologies. They also show that the reform was associated with an increase in the skill composition of these hospitals, which is consistent with technology-skill or capital-skill complementarities.

Monopolies appear throughout medical care markets, as a result of patents, limits to the extent of the market, or the presence of unique inputs and skills. Economists typically think of such monopolies as necessary evils or even pure inefficiencies. However, in the health care industry, the deadweight costs of monopoly may be much smaller or even absent. Health insurance, frequently implemented as an ex ante premium coupled with an ex post co-payment per unit consumed, operates as a two-part pricing contract. This allows monopolists to extract consumer surplus without inefficiently constraining quantity. **Lakdawala** and **Sood** note that this view of health insurance contracts has several novel implications: 1) medical care monopolies may have smaller or no deadweight costs in the goods market, because insured consumers face low co-payments; 2) since monopolists have incentives to seek low co-payments, price regulation of health care monopolies is inferior to laissez-faire or simple tax-and-transfer schemes that redistribute monopoly profits; and 3) competitive health insurance markets or optimally designed public health insurance can eliminate static losses in the goods market while still improving dynamic effi-

ciency in the innovation market.

Basic economic theory suggests that health insurance coverage may cause a reduction in prevention activities, but empirical studies have yet to provide evidence to support this prediction. **Dave** and **Kaestner** extend the analysis of the effect of health insurance on health behaviors by allowing for the possibility that health insurance has a direct (ex ante moral hazard) and indirect effect on health behaviors. The indirect effect works through changes in health promotion information and the probability of illness that may be a byproduct of insurance-induced greater contact with medical professionals. The authors identify these two effects and in doing so identify the pure ex ante moral hazard effect. They find limited evidence that obtaining health insurance reduces prevention and increases unhealthy behaviors among elderly persons.

The provision of life-saving antiretroviral (ARV) treatment has emerged as a key component of the global response to HIV/AIDS, but very little is known about the impact of this intervention on the welfare of children in the households of treated persons. **Zivin**, **Thirumurthy,** and **Goldstein** estimate the impact of ARV treatment

on children's schooling and nutrition outcomes using longitudinal household survey data collected in collaboration with a treatment program in western Kenya. They find that children's weekly hours of school attendance increase by over 20 percent within about six months after treatment is initiated for the adult household member. For boys in treatment households, these increases are closely related to decreases in their market labor supply. Similarly, young children's short-term nutritional status — as measured by their weight-for-height Z-score — also improves dramatically. The researchers argue that these treatment effects will be considerably larger when compared to the counterfactual scenario of no ARV treatment. Their results show how intrahousehold resource allocation is altered in response to significant health improvements. Because the improvements in children's schooling and nutrition will affect their socioeconomic outcomes in adulthood, the provision of ARV treatment is likely to generate significant long-run macroeconomic benefits.

Autism is currently estimated to affect approximately one in every 166 children, yet the cause or causes of the condition are not well understood. One of the current theories concerning the condition is that among a set of children vulnerable to developing the condition because of their underlying genetics, the condition manifests itself when such a child is exposed to a (currently unknown) environmental trigger. **Nicholson**, **Waldman**, and **Adilov** empirically investigate the hypothesis that early childhood television viewing serves as such a trigger. Using the Bureau of Labor Statistics' American Time Use Survey, they first establish that the amount of television a young child watches is positively related to the amount of precipitation in the child's community. This suggests that, if television is a trigger for autism, then autism should be more prevalent in communities that receive substantial precipitation. Next they look at county-level autism data for three states — California, Oregon, and

Washington — characterized by high precipitation variability. Employing a variety of tests, they show that in each of the three states (and across all three states when pooled) there is substantial evidence that county autism rates are indeed positively related to countywide levels of precipitation. In the final set of tests, they use California and Pennsylvania data on children born between 1972 and 1989 to show, again consistent with the television-as-trigger hypothesis, that county autism rates are also positively related to the percentage of households that subscribe to cable television. The precipitation tests indicate that just under 40 percent of autism diagnoses in the three states studied are the result of television watching because of precipitation, while the cable tests indicate that approximately 17 percent of the growth in autism in California and Pennsylvania during the 1970s and 1980s is attributable to the growth of cable television. These findings are consistent with early childhood television viewing being an important trigger for autism.

In 2003, 281 attending physicians on the general medicine services of six academic hospitals were surveyed concerning demographic and professional attributes. They also were asked to name three other general medicine attendings to whom they were most likely to turn for advice during a typical month on the inpatient general medical services. Based on the survey results, **Meltzer** and **Salvatore** find that both professional and personal factors affect who such physicians ask for advice. Attendings are more likely to name colleagues who are more experienced (older), graduated from a higher-ranked medical school, and read more journals. However, personal factors are also highly influential, with attendings less likely to seek advice from colleagues who differed from them in gender, experience (age), sub-specialty, medical school rank, and journal readership. Women are more likely to name men as advisors than men are to name women .

Cutler, Huckman, and **Kolstad**

test their theoretical predictions concerning the welfare effects of free entry in the presence of scarce inputs and heterogeneous quality by considering how the 1996 repeal of certificate-of-need (CON) legislation in Pennsylvania affected the market for coronary artery bypass graft (CABG) surgery in that state from 1993 to 2003. Variation in entry across markets following this exogenous regulatory change allows them to estimate the effect of entry on market quantity, output quality, and welfare. The 1996 repeal of CON led to a 56 percent increase in the number of hospitals offering CABG by 2003. This dramatic entry was not associated with an increase in the number of surgeries performed in the state. Rather, entry led to a redistribution of surgeries from lower- to higher-quality surgeons. Further, the researchers argue, the inelastic supply of high-quality cardiac surgeons limited the degree of excess entry following the repeal of CON. While they cannot observe cost, the fact that quality improved and that excessive entry was limited by the availability of surgeons together suggest that free entry increased welfare in Pennsylvnia's market for cardiac surgery.

Lerner and **Malmendier** analyze how variations in contractibility affect the design of contracts in the context of biotechnology research agreements. A major concern of firms financing biotechnology research is that the R and D firms might use the funding to subsidize other projects or to substitute one project for another. The researchers develop a model based on the property-rights theory of the firm that allows for researchers in the R and D firms to pursue multiple projects. When research activities are non-verifiable, it is optimal for the financing company to obtain the option right to terminate the research agreement while maintaining broad property rights to the terminated project. The option right induces the biotechnology firm researchers not to deviate from the proposed research activities. The contract prevents opportunistic exercise of the

termination right by conditioning payments on the termination of the agreement. Using a new dataset on 584 biotechnology research agreements, the researchers find that the assignment of termination and broad intellectual property rights to the financing firm occurs in contractually difficult environments in which there is no specifiable lead product candidate. They also analyze how the contractual design varies with the R and D firm's financial constraints and research capacities and with the type of financing firm.

The additional empirical results allow them to distinguish the property-rights explanation from alternative stories, based on uncertainty and asymmetric information about the project quality or research abilities.

Entrepreneurship Working Group Meeting

The Entrepreneurship Working Group met in Cambridge on October 20. Group Director Josh Lerner, NBER and Harvard Business School, organized this program:

Steven J. Davis, NBER and University of Chicago; **John Haltiwanger**, NBER and University of Maryland; and **Javier Miranda** and **Ron Jarmin**, Bureau of the Census, "Volatility and Dispersion in Business Growth Rates: Publicly Traded versus Privately Held Firms" (NBER Working Paper No. 12354) Discussant: Richard Caves, Harvard University

Suresh De Mel, University of Peradeniya; **David McKenzie**, The World Bank; and **Chris Woodruff**, University of California, San Diego, "Returns to Capital in Microenterprises: Evidence from a Field Experiment" Discussant: Shawn Cole, Harvard University

Thomas Hellmann, University of British Columbia; **Laura Bottazzi**, Bologna University; and **Marco Da Rin**, Tilburg University, "The Importance of Trust for Investment: Evidence from Venture Capital" Discussant: Rebecca Zarutskie, Duke University

Morten Sorensen, University of Chicago, "Learning by Investing: Evidence from Venture Capital"

Discussant: Dirk Bergemann, Yale University

Panel Discussion: "Where is the Venture Capital Going? And Does it Matter?" **Paul Gompers**, Harvard University and NBER; **Bill Helman**, Greylock Partners; and **Philip Rotner**, MIT

Yael Hochberg, Northwestern University; and **Alexander Ljungvist** and **Yang Lu**, New York University, "Networking as a Barrier to Entry and the Competitive Supply of Venture Capital" Discussant: Toby Stuart, Harvard University

Davis and his co-authors study the variability of business growth rates in the U.S. private sector from 1976 onwards. They exploit the recently developed Longitudinal Business Database (LBD), which contains annual observations on employment and payroll for all U.S. businesses. Their central finding is a large secular decline in the cross-sectional dispersion of firm growth rates and in the average magnitude of firm-level volatility. Measured as in other recent research, the employment-weighted mean volatility of firm growth rates has declined by more than 40 percent since 1982. This stands in sharp contrast to previous findings of rising volatility for publicly traded firms in COMPUSTAT data. The researchers confirm the rise in volatility among publicly traded firms using the LBD, but show that its impact is overwhelmed by declining volatility among privately held firms. This pattern holds in every major industry group. Employment shifts toward older businesses account for 27 percent or more of the volatility decline among privately held firms. Simple cohort effects that capture higher volatility among more recently listed firms account for most of the volatility rise among publicly traded firms.

Small and informal firms account for a large share of employment in developing countries. The rapid expansion of microfinance services is based on the belief that these firms have productive investment opportunities and can enjoy high returns to capital if given the opportunity. However, measuring the return to capital is complicated by unobserved factors such as entrepreneurial ability and demand shocks, which are likely to be correlated with capital stock. **De Mel**, **McKenzie**, and **Woodruff** use a randomized experiment to overcome this problem, and to measure the return to capital for the average microenterprise in their sample, regardless of whether or not it applies for credit. The researchers provide cash and equipment grants to small firms in Sri Lanka, and measure the increase in profits arising from this exogenous (positive) shock to capital stock. They find the average real return to capital to be around 4 percent per month, substantially higher than the market interest rate. They then use the heterogeneity of treatment effects to explore whether

missing credit markets or missing insurance markets are the most likely cause of the high returns. Returns vary with entrepreneurial ability and with measures of other sources of cash within the household, but not with risk aversion or uncertainty. The researchers therefore conclude that credit constraints are the main reason for the high returns.

The social capital literature finds a positive relationship between trust and economic growth or trade. Yet the use of macro-level data makes it difficult to identify the direction of causality. **Hellmann**, **Bottazzi**, and **Da Rin** examine hand-collected micro data on the patterns of venture capital investments, where the trust between investors and companies' countries is clearly exogenous. The researchers find that trust among nations has a significant effect on the likelihood that a venture capitalist invests in a company. This holds even after accounting for alternative factors, such as geographic distance, informa-

tion, a variety of transaction costs, and even investor and company fixed effects. They also consider the relationship between trust and contracts and find no evidence that sophisticated contracts can be used to overcome lack of trust. They conclude that trust is a fundamental force driving investment choices.

Venture capital investors (VCs) can create value by actively exploring new investment opportunities to learn about their returns. In traditional financial markets, a free-rider problem reduces exploration and learning, but VCs' organizational structure may limit information spillovers and reduce this problem. **Sorensen** presents a basic model of learning, based on the statistical Multi-Armed Bandit model. The value of an investment consists of both its immediate return and an option value of learning. When he estimates the model, it turns out that VCs who explore more have higher returns.

Many financial markets are char-

acterized by strong relationships and networks, rather than arm's length, spot-market transactions. **Hochberg**, **Ljungvist** and **Lu** examine the potential entry-deterring effects of this organizational choice in the context of relationships established when VCs syndicate portfolio company investments using U.S. data for the period 1980 to 2003. The results show that networking does help reduce entry: VC markets with more extensive networking among the incumbent players experience less entry, and the economic effect is sizeable. However, potential entrants can use their prior relationships with the incumbents as well as previous investment experience in the industry or state to overcome this barrier to entry. The researchers also document that companies seeking venture capital raise money on worse terms in more densely networked markets, and that increased entry into a market is associated with companies receiving increased valuations.

International Finance and Macroeconomics

The NBER's Program on International Finance and Macroeconomics met in Cambridge on October 27. Research Associates Charles Engel and Linda Tesar, organized the program. The following papers were discussed:

Enrique G. Mendoza, International Monetary Fund and NBER; **Vincenzo Quadrini**, University of Southern California and NBER; and **Victor Rios-Rull**, University of Pennsylvania and NBER, "Financial Integration, Financial Deepness and Global Imbalances"
Discussant: Manuel Amador, Stanford University and NBER

Bong-Chan Kho, Seoul National

University; **Rene M. Stulz**, Ohio State University and NBER; and **Frank E. Warnock**, University of Virginia and NBER, "Financial Globalization, Governance, and the Evolution of the Home Bias"(NBER Working Paper No. 12389)
Discussant: Joshua Coval, Harvard University and NBER

Ricardo J. Caballero and **Guido Lorenzoni**, MIT and NBER, "Persistent Appreciations, Overshooting, and Optimal Exchange Rate Interventions"
Discussant: Enrique G. Mendoza

Michael W. Klein, Tufts University and NBER; and **Jay C. Shambaugh**, Dartmouth College, "The Nature of

Exchange Rate Regimes"
Discussant: Christian Broda, University of Chicago and NBER

Craig Burnside, Duke University and NBER; **Martin Eichenbaum** and **Sergio Rebelo**, Northwestern University and NBER; and **Issac Kleshchelski**, Northwestern University, "The Returns to Currency Speculation"
Discussant: Eric van Wincoop, University of Virginia and NBER

Marianne Baxter, Boston University and NBER, "International Risk Sharing in the Short Run and the Long Run"
Discussant: Fabrizio Perri, New York University and NBER

Large global financial imbalances need not be the harbinger of a world financial crash as many authors

believe. Instead, **Mendoza** and his co-authors show that large and persistent global imbalances can be the outcome

of financial integration when countries have different financial markets characteristics. In particular, countries

with more advanced financial markets accumulate foreign liabilities vis-a-vis countries with less developed financial systems in a gradual, long-lasting process. Moreover, differences in financial development affect the composition of foreign portfolios, so that a country with negative net foreign asset positions can receive positive factor payments. Three empirical observations support these arguments: 1) financial deepness varies widely even amongst industrial countries, with the United States ranking at the top; 2) the secular decline in the U.S. net foreign assets position started with a gradual process of financial markets liberalization; and 3) net exports and current account balances are negatively correlated with indicators of financial markets development.

Despite the disappearance of formal barriers to international investment across countries, **Kho** and his co-authors find that the average home bias of U.S. investors towards the 46 countries with the largest equity markets did not fall from 1994 to 2004 if countries are equally weighted but fell if countries are weighted by market capitalization. This is inconsistent with portfolio theory explanations of the home bias, but is consistent with what we call the optimal insider ownership theory of the home bias. Since foreign investors can only own shares not held by insiders, there will be a large home bias towards countries in which insiders own large stakes in corporations. Consequently, for the home bias to fall substantially, insider ownership has to fall in countries where it is high. Poor governance leads to concentrated insider ownership, so that governance improvements make it possible for corporate ownership to become more dispersed and for the home bias to fall. The researchers find that the home bias of U.S. investors decreased most towards countries in which the ownership by corporate insiders was low and countries in which ownership by corporate insiders fell. Using firm-level data for Korea, they find that portfolio equity investment by foreign inves-

tors in Korean firms is inversely related to insider ownership and that the firms that attract the most foreign portfolio equity investment are large firms with dispersed ownership.

Most economies experience episodes of large real exchange rate appreciations, when the question arises whether there is a need for intervention to protect the export sector. **Caballero** and **Lorenzoni** present a model of irreversible export destruction where exchange rate stabilization may be justified if the export sector is financially constrained. However, the criterion for intervention is not whether there are inefficient bankruptcies or not, but whether these can cause a large exchange rate overshooting (and real wage decline) once the factors behind the appreciation subside. The optimal policy often involves a mild initial intervention followed by an increasingly aggressive stabilization as the appreciation persists and the financial resources of the export sector dwindle. In some instances, the policy also involves an exacerbation of the initial overshooting during the depreciation phase.

The impermanence of fixed exchange rates has become a stylized fact in international finance. The combination of a view that pegs do not really peg with the "fear of floating" view that floats do not really float generates the conclusion that exchange rate regimes are, in practice, unimportant for the behavior of the exchange rate. This is consistent with evidence on the irrelevance of a country's choice of exchange rate regime for general macroeconomic performance. Recently, though, more studies have shown that the exchange rate regime does matter in some contexts. **Klein** and **Shambaugh** attempt to reconcile the perception that fixed exchange rates are only a "mirage" with the recent research showing the effects of fixed exchange rates on trade, monetary autonomy, and growth. First they demonstrate that, while pegs frequently break, many do last and those that break tend to reform, so a fixed exchange rate today is a good predictor that one will exist in the future. Second, they

study the exchange rate effect of fixed exchange rates. Fixed exchange rates exhibit greater bilateral exchange rate stability today and in the future. Pegs also display lower multilateral volatility, which may explain why exchange rate regimes have an effect on a number of different macroeconomic variables.

Currencies that are at a forward premium tend to depreciate. This "forward-premium puzzle"' represents an egregious deviation from uncovered interest parity. **Burnside** and his co-authors document the properties of returns to currency speculation strategies that exploit this anomaly. The first strategy, known as the carry trade, is widely used by practitioners. This strategy involves selling currencies forward that are at a forward premium and buying currencies forward that are at a forward discount. The second strategy relies on a particular regression to forecast the payoff to selling currencies forward. The researchers show that these strategies yield high Sharpe ratios which are not a compensation for risk. However, these Sharpe ratios do not represent unexploited profit opportunities. In the presence of microstructure frictions, spot and forward exchange rates move against traders as they increase their positions. The resulting "price pressure" drives a wedge between average and marginal Sharpe ratios. The authors argue that marginal Sharpe ratios are zero even though average Sharpe ratios are positive.

Baxter extends and refines the study of international risk-sharing in two dimensions. First, she investigates risk-sharing at different horizons. In other words, countries might pool risks associated with high-frequency shocks (for example, seasonal fluctuations in crop yields) but might not share risks associated with low frequency shocks (for example, different long-run national growth rates). Second, she studies bilateral risk-sharing, which is different from the approach taken in most previous studies of risk-sharing. Her focus on bilateral risk-sharing stems from the observation that,

because of such factors as financial linkages, common cultural linkages, or simply proximity, countries might share risks with some countries but not with others. Baxter compares direct tests of risk-sharing to indirect tests and finds that the indirect tests common in the literature are less informative in evaluating the extent of international risk-sharing.

The Social Security Amendments of 1983 reduced the generosity of benefits for retired workers in the United States by increasing the program's full retirement age from 65 to 67 and increasing the penalty for claiming benefits at the early retirement age of 62. These changes were phased in gradually, so that individuals born in, or before, 1937 were unaffected and those born in 1960 or later were fully affected. No corresponding changes were made to the program's disabled worker benefits, and thus the relative generosity of Social Security Disability Insurance (SSDI) benefits increased. **Duggan and his co-authors** investigate the effect of the Amendments on SSDI enrollment by exploiting variation across birth cohorts in the policy-induced reduction in the present value of retired worker benefits. They find that the Amendments significantly increased SSDI enrollment since 1983, with an additional 0.6 percent of men and 0.9 percent of women between the ages of 45 and 64 receiving SSDI benefits in 2005 as a result of the changes. Their results further indicate that these effects will continue to increase during the next two decades, as those fully exposed to the reduction in retirement benefit generosity reach their fifties and early sixties.

Liebman and **Saez** use SIPP data matched to longitudinal uncapped earnings records from the Social Security Administration for 1981 to 1999 to analyze earnings responses to increases in tax rates and to inform discussions about the likely effects of raising the Social Security taxable maximum. The earnings distribution of workers around the current taxable maximum is inconsistent with an annual model in which people are highly responsive to the payroll tax rate, even in the subset of self-employed individuals. Panel data on married men with high earnings display a tremendous increase in earnings relative to other groups over the 1980s and 1990s, with no clear breaks around the key tax reforms. This suggests that other income groups cannot serve as

a control group for the high earners. This analysis does not support the finding of a large behavioral response to taxation by wives of high earners. The researchers actually find a decrease in the labor supply of wives of high earners around both the 1986 and the 1993 tax reforms, which they attribute to an income effect attributable to the surge in primary earnings at the top. Policy simulations suggest that with an earnings elasticity of 0.5, lost income tax revenue and increased deadweight loss would swamp any benefits from the increase in payroll tax revenue. In contrast, with an elasticity of 0.2, the ratio of the gain in OASDI revenue to lost income tax revenue and deadweight loss would be much greater.

Gruber and **Hungerman** identify a policy-driven change in the opportunity cost of religious participation based on state laws that prohibit retail activity on Sunday, known as "blue laws." Many states have repealed these laws in recent years, raising the opportunity cost of religious participation. The researchers construct a model that predicts, under fairly general conditions, that allowing retail activity on Sundays will lower attendance levels but may increase or decrease religious donations. They then use a variety of datasets to show that when a state repeals its blue laws, religious attendance falls, and church donations and spending fall as well. These results do not seem to be driven by declines in religiosity prior to the law change, nor are comparable declines in membership or giving to nonreligious organizations after a state repeals its laws observed. The authors then assess the effects of changes in these laws on drinking and drug use reported in the NLSY. They find that repealing blue laws leads to an increase in drinking and drug use, and that this increase is found only among the initially religious individuals who were affected by the blue laws. The effect is economically significant; for example, the gap in heavy drinking between religious and non-religious individuals falls by about half after the laws are repealed.

Stiglitz and **Korinek** develop a life-cycle model of the firm to analyze the effects of dividend tax policy on aggregate investment. They find that new firms raise less equity and invest less as the level of dividend taxes increases, in accordance with the traditional view of dividend taxation. However, the dividend tax rate is irrelevant for the investment decisions of internally growing and mature firms, as postulated by the new view of dividend taxation. Since aggregate investment is dominated by these latter two categories, the level of dividend taxation as well as unanticipated changes in dividend tax rates have only a minor impact on aggregate investment and output. Anticipated dividend tax changes, on the other hand, allow firms to engage in inter-temporal tax arbitrage so as to reduce investors' tax burden. This can significantly distort aggregate investment. Anticipated tax cuts (increases) delay (accelerate) firms' dividend payments, which leads them to hold higher (lower) cash balances and, for capital constrained firms, can significantly increase (decrease) aggregate investment for periods after the tax change.

Albanesi studies optimal taxation of entrepreneurial capital and financial assets in economies with private information. Returns to entrepreneurial capital are risky and depend on entrepreneurs' hidden effort. The idiosyncratic risk in capital returns implies that the intertemporal wedge on entrepreneurial capital that characterizes constrained-efficient allocations can be positive or negative. The properties of optimal marginal taxes on entrepreneurial capital depend on the sign of this wedge. If the wedge is positive, the optimal marginal capital tax is decreasing in capital returns, while the opposite is true when the wedge is negative. Optimal marginal taxes on other assets depend on their correlation with idiosyncratic capital returns. The optimal tax system equalizes after tax returns on all assets, thus reducing the variance of after tax returns on capital relative to other assets. If entrepreneurs are allowed to sell shares

of their capital to outside investors, returns to externally owned capital are subject to double taxation: at the level of the entrepreneur and at the level of the outside investors. Even if entrepreneurs can purchase private insurance against their idiosyncratic risk, optimal asset taxes are essential to implement the constrained-efficient allocation if entrepreneurial portfolios are private information.

Coate and **Knight** investigate the problem of optimal districting in the context of a simple model of legislative elections. In the model, districting matters because it determines the seat-vote curve, which describes the relationship between seats and votes. The paper first characterizes the optimal seat-vote curve and shows that, under a weak condition, there exist districtings that generate this ideal relationship. The paper then develops an empirical methodology for computing seat-vote curves and measuring the welfare gains from implementing optimal districting. This is applied to the districting plans used to elect U.S. state legislators during the 1990s.

Capital gain distributions by open-end mutual funds accelerate the capital gains tax liability of their taxable investors, thereby reducing their after-tax return. Investors can reduce this acceleration by delaying the purchase of fund shares until after capital gain distributions tax place. Tax-exempt investors, including individual investors who hold mutual funds in their IRAs, Keogh plans, and 401(k) accounts, have no such disincentives to invest prior to distributions. **Johnson and Poterba** examine data on fund inflows and outflows, and account openings and closures, at a sample of open-end mutual funds offered by a single fund complex. The data display a significant increase in inflows to taxable accounts, and an increase in the number of new accounts opened, in the weeks following distribution dates relative to the weeks prior to distributions. These findings are consistent with the hypothesis that at least some taxable investors adapt their portfolio trades to

reduce their tax liabilities.

Insurance companies, employers, and the U.S. government all provide annuities and therefore assume aggregate mortality risk. Using the widely-cited Lee-Carter mortality model, **Friedberg** and **Webb** quantify aggregate mortality risk as the risk that the average annuitant lives longer than is predicted by the model, and determine that annuities expose providers to substantial risk. They also focus on other recent actuarial forecasts, some of which lie at the edge or outside of the 95 percent confidence interval of Lee-Carter. They focus on the implications of aggregate mortality risk for insurance companies; this analysis can

be extended to private pension providers and Social Security. Given the forecasts of the Lee-Carter model, they calculate that a markup of 3.9 percent on an annuity premium(or shareholders' capital equal to 3.9 percent of the expected present value of annuity payments) would be required to reduce the probability of insolvency resulting from aggregate mortality shocks to 5 percent, and a markup of 5.7 percent would reduce the probability of insolvency to 1 percent. Based on the same model, they find that a projection scale commonly referred to by the insurance industry underestimates aggregate mortality improvements and would leave annuities underpriced. Annuity

providers could deal with aggregate mortality risk more efficiently by transferring it to financial markets through mortality-contingent bonds. The researchers calculate the returns that one recently-proposed mortality bond would have paid had it been available over a long period. Using both the Capital and the Consumption Capital Asset Pricing Models, they determine the risk premium that investors would have required to hold the bond. At plausible coefficients of risk aversion, annuity providers should be able to hedge aggregate mortality risk via such bonds at very low cost.

Monetary Economics

The NBER's Program on Monetary Economics met in Cambridge on November 3. Christopher House and Matthew D. Shapiro, NBER and University of Michigan, organized the meeting, at which these papers were discussed:

Michael Elsby and **Gary Solon**, University of Michigan and NBER, and **Ryan Michaels**, University of Michigan, "Reassessing the Ins and Outs of Unemployment Again: Everyone's a Winner"
Discussant: Robert Shimer, University of Chicago and NBER

Olivier Blanchard, MIT and NBER, and **Jordi Gali**, Universitat Pompeu Fabra and NBER, "A New Keynesian Model with Unemployment"
Discussant: Robert E. Hall, Stanford University and NBER

Monika Piazzesi, University of Chicago and NBER, and **Martin Schneider**, New York University, "Inflation and the Price of Real Assets"
Discussant: Robert B. Barsky, University of Michigan and NBER

Laura Veldkamp, New York University, and **Justin Wolfers**,

University of Pennsylvania and NBER, "Aggregate Shocks or Aggregate Information? Costly Information and Business Cycle Comovement"
Discussant: Mirko Wiederholt, Northwestern University

Emi Nakamura and **Jon Steinsson**, Harvard University, "Five Facts About Prices: A Reevaluation of Menu Cost Models"
Discussant: Mark Bils, University of Rochester and NBER

Responding to Shimer's already-influential manuscript "Reassessing the Ins and Outs of Unemployment," **Elsby**, **Solon**, and **Michaels** reconsider the extent to which the increased unemployment during a recession arises from an increase in the number of unemployment spells versus an increase in their duration. Like Shimer, they find an important role for increased dura-

tion. But contrary to Shimer's conclusions, they find that even his own methods and data, when viewed in an appropriate metric, reveal an important role for increased inflows to unemployment as well. This finding is further strengthened by their refinements of Shimer's methods of correcting for data problems and by an extension of his approach that enables a more detailed

examination of particular components of the inflow to unemployment.

Blanchard and **Gali** develop a utility based model of fluctuations, with nominal rigidities and unemployment. In doing so, they combine two strands of research: the New Keynesian model, with its focus on nominal rigidities, and the Diamond-Mortensen-Pissarides model, with its focus on labor mar-

ket frictions and unemployment. Their analysis proceeds in two steps. First, they leave nominal rigidities aside and show that, under a standard utility specification, productivity shocks have no effect on unemployment in the constrained efficient allocation. Then they focus on the implications of alternative real wage setting mechanisms for fluctuations in unemployment. Next they introduce nominal rigidities in the form of staggered price setting by firms. They derive the relationship between inflation and unemployment and discuss how it is influenced by the presence of real wage rigidities. Finally, they show the nature of the tradeoff between inflation and unemployment stabilization and draw the implications for optimal monetary policy.

In the 1970s, U.S. asset markets witnessed: 1) a 25 percent dip in the ratio of aggregate household wealth relative to GDP; and 2) negative co-movement of house and stock prices that drove a 20 percent portfolio shift out of equity into real estate. **Piazzesi** and **Schneider** use an overlapping generations model with uninsurable nominal risk to quantify the role of structural change in these events. They attribute the dip in wealth to the entry of baby boomers into asset markets, and to the erosion of bond portfolios by surprise inflation, both of which lowered the overall propensity to save. They also show that the Great Inflation led to a portfolio shift by making housing more attractive than equity. Apart from tax effects, a new channel is that disagreement about inflation across age groups drives up collateral prices when credit is nominal.

When similar patterns of expansion and contraction are observed across sectors, we call this a business cycle. Yet explaining the similarity and synchronization of these cycles across industries remains a puzzle. Whereas output growth across industries is highly correlated, identifiable shocks, like shocks to productivity, are far less correlated. Previous work has examined complementarities in production, but **Veldkamp** and **Wolfers** propose that sectors make similar input decisions because of complementarities in information acquisition. Because information about driving forces has a high fixed cost of production and a low marginal cost of replication, it can be more efficient for firms to share the cost of discovering common shocks than to invest in uncovering detailed sectoral information. Firms basing their decisions on this common information make highly correlated production choices. This mechanism amplifies the effects of common shocks, relative to sectoral shocks.

Nakamura and **Steinsson** establish five facts about prices in the U.S. economy: 1) The median duration of consumer prices when sales are excluded at the product level is 11 months. The median duration of finished goods producer prices is 8.7 months. 2) One-third of regular price changes are price decreases. 3) The frequency of price increases responds strongly to inflation while the frequency of price decreases and the size of price increases and price decreases do not. 4) The frequency of price change is highly seasonal: it is highest in the first quarter and lowest in the fourth quarter. 5) The hazard function of price changes for individual consumer and producer goods is downward sloping for the first few months and then flat (except for a large spike at 12 months in consumer services and all producer prices). These facts are based on CPI microdata and a new comprehensive dataset of microdata on producer prices that they construct from raw production files underlying the PPI. They show that the first, second, and third facts are consistent with a benchmark menu-cost model, while the fourth and fifth facts are not.

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Higher Education

The NBER's Working Group on Higher Education met in Cambridge on November 9. Working Group Director Charles T. Clotfelter of Duke University organized the meeting. These papers were discussed:

Susan M. Dynarski, Harvard University and NBER, and **Judith E. Scott-Clayton**, Harvard University, "The Cost of Complexity in Federal Student Aid: Lessons from Optimal Tax Theory and Behavioral Economics" (NBER Working Paper No. 12227)
Discussant: Eric Bettinger, Case Western Reserve University

Marko Tervio, University of California, Berkeley, "Network Analysis of Three Academic Labor Markets"
Discussant: Richard Jensen, University of Notre Dame

Brian C. Cadena and **Benjamin J. Keys**, University of Michigan, "Self-Control Induced Debt Aversion: Evidence from Interest-Free Student Loans"
Discussant: Ofer Malamud, University of Chicago

Megan MacGarvie, Boston University and NBER, "Foreign Students and the Diffusion of Scientific and

Technological Knowledge to and from American Universities"
Discussant: William Kerr, Harvard University

Zeynep Hansen, Washington University and NBER; **Hideo Owan**, Aoyama Gakuin University; and **Jie Pan**, Washington University, "The Impact of Group Diversity on Performance and Knowledge Spillover: An Experiment in a College Classroom" (NBER Working Paper No. 12251)
Discussant: Jacob Vigdor, Duke University and NBER

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The federal system for distributing student financial aid rivals the tax code in its complexity. Both have been a source of frustration and a focus of reform efforts for decades, yet the complexity of the student aid system has received comparatively little attention from economists. **Dynarski** and **Scott-Clayton** describe the complexity of the aid system, and apply lessons from optimal tax theory and behavioral economics to show that complexity is a serious obstacle to both efficiency and equity in the distribution of student aid. They show that complexity disproportionately burdens those with the least ability to pay and undermines redistributive goals. They use detailed data from federal student aid applications to show that a radically simplified aid process can reproduce the current distribution of aid using a fraction of the information now collected.

Tervio analyzes the academic labor market as a citation network, where departments gain citations by placing their Ph.D. graduates into the faculty of other departments. The aim is to measure the distribution of influence and the possible division into clusters between academic departments in three disciplines (economics, mathematics, and comparative literature). Departmental influence is mea-

sured by a similar method to that used by Google to rank web pages. In all disciplines, the distribution of influence is significantly more skewed than the distribution of academic placements because of a strong hierarchy of schools in which movements are seldom upwards. This hierarchy is strongest in economics. Tervio also finds that, in economics, there are clusters of departments that are significantly more connected within than with each other. These clusters are consistent with anecdotal evidence about Freshwater and Saltwater schools of thought. There is a similar but weaker division within comparative literature, but not within mathematics.

Cadena and **Keys** use insights from behavioral economics to offer an explanation for a particularly surprising borrowing phenomenon: nearly 20 percent of undergraduate students who are offered interest-free loans turn them down. The authors present a formal model of the financial aid process emphasizing that a rational agent would not reject interest-free student loans because doing so requires foregoing a significant government subsidy. A student with time-inconsistent preferences, however, may optimally choose to turn down subsidized loans to avoid excessive consumption during school.

Thus, debt-averse behavior arises even among consumers who have no direct distaste for debt. Using the 2003-4 wave of the National Post-Secondary Student Aid Study (NPSAS), the authors investigate students' financial aid situations and subsidized loan take-up decisions. They exploit an institutional detail of the financial aid process to identify a group of students who should be especially vulnerable to self-control problems. Their results suggest that consumers choose to limit their liquidity in economically meaningful situations, consistent with the predictions of the behavioral model.

MacGarvie combines counts of the number of Science and Engineering doctorates by country of origin at U.S. universities with data on citations to and from U.S. universities' patents to study the relationship between labor mobility and international patterns of diffusion of scientific and technological knowledge. Preliminary findings suggest that knowledge diffuses from U.S. universities to foreign countries when doctoral recipients migrate internationally, and there is some evidence of foreign knowledge acquisition by U.S. universities when doctoral recipients move abroad. However, there appears to be little evidence that foreign countries benefit from improved access to

U.S. science and technology contained in patents when doctoral recipients remain in the U.S. after graduation.

Hansen, **Owan**, and **Pan** combine class performance data from an undergraduate class with students' personal records to explore diversity and knowledge spillover effects. A major advantage of their dataset is the exogenous assignment of groups, which rules out the self-selection problem. Their results indicate that male-dominant groups performed worse both in group work and in individually taken exams than female-dominant and equally-mixed gender groups. Individual members from a group with more diversity in age and gender scored higher in exams. Another novel aspect of this natural experiment is that each group chooses their own group contract form — members of "autonomous" groups receive equal grade for their group work while those in "democratic" groups can adopt differentiated point allocation, thus providing a proper mechanism to punish free riders. The estimation results show a significant correlation between the choice of a democratic contract and the group and individual performance.

Education Program Meeting

The NBER's Program on Education, directed by Caroline M. Hoxby of Harvard University, met in Cambridge on November 9 and 10. These papers were presented and discussed at the meeting:

Mark Hoekstra, University of Pittsburgh, "The Effect of Attending the Flagship State University on Earnings: A Regression Discontinuity Approach"

Carlos Dobkin, University of California, Santa Cruz, and **Fernando Ferreira**, University of Pennsylvania, "Should We Care About the Age at Which Children Enter School? The Impact of School Entry Laws on Educational Attainment and Labor Market Outcomes"

Philip Babcock, University of California, Santa Barbara, "From Ties to Gains? Evidence on Connectedness, Skill Acquisition, and Diversity"

Andrea Ichino, European University Institute; **Pietro Garibaldi**, University of Turin; **Francesco Giavazzi**, MIT and NBER; and **Enrico Rettore**, University of Padova, "College Cost and Time to Obtain a Degree: Evidence from Tuition Discontinuities"

Moshe Justman, Ben Gurion University, and **Yaakov Gilboa**, Sapir Academic College, "Equal Opportunity in Education: Lessons from the Kibbutz"

Adalbert Mayer and **Steven Puller**, Texas A&M University, "The Old Boy (and Girl) Network: Social Network Formation on University Campuses"

Sally Kwak, University of Hawaii-Manoa, "The Impact of Intergovernmental Incentives on Disability Rates and Special Education Spending"

By combining confidential admissions records from a large state university with earnings data collected through the state's Unemployment Insurance program, **Hoekstra** examines the effect of attending the flagship state university on the earnings of 28–33 year-olds. To distinguish this effect from the effects of confounding factors correlated with the university's admission decision, and/or the applicant's enrollment decision, he uses a regression discontinuity approach along with a conventional instrumental variable approach. The results indicate that attending the most selective state university causes earnings to be at least 10 percent higher for white men, an effect that is considerably higher than ordinary least squares estimates. However, he finds no effect on earnings for white women generally and only weak evidence of a positive effect for white women with strong attachment to the labor force.

Dobkin and **Ferreira** examine how state laws regulating the age at which students can enter school affect children's progression through school, adult educational attainment, and labor market outcomes. Using the exact day of birth from the 2000 Long Form Decennial Census for the states of California and Texas, the authors first show that students born right before the cut-off date for school enrollment are 50–60 percentage points more likely to enroll in kindergarten a year earlier than similar students that were born right after the cut-off date. This effect is significantly larger for minorities and the children of parents with less than a high school education. The researchers also find that almost one third of the initial differences in enrollment rates disappear by ninth grade because the youngest children in a cohort are considerably more likely to be held back a grade during elementary school. Despite the striking differences in the timing of enrollment and the rates at which students are held back, the authors find only a modest impact on adult educational attainment, with individuals who enter school a year earlier having only about one percentage point increase in their probability of completing high school. They find slightly larger

effects for Hispanics and older cohorts. However, the additional education resulting from early school entry does not result in differences in employment rates or wages. This may be because other confounding mechanisms, such as the impact of school entry laws on the age relative to peers, and the absolute age at which an individual is taught a particular material. These results suggest that it is problematic to use school entry laws as an instrument for educational attainment when trying to estimate the returns to education.

Babcock uses micro-level data on social networks in middle and secondary schools to estimate the effects of connectedness on education attainment outcomes and the association between racial diversity and connectedness. The analysis addresses concerns about unobserved neighborhood and school-level heterogeneity by using within-school variation between grade cohorts to identify effects of connectedness. There are two main findings: 1) Being part of a more connected cohort within a given secondary or middle school is associated with significantly higher years of schooling attained and higher probability of having attended college, seven years later. 2) Being part of a more racially diverse grade cohort, within a given school, is associated with significantly lower levels of connectedness — rare micro-level evidence to augment existing cross-region evidence on ethnic fractionalization and disconnectedness.

For many students throughout the world, time to obtain an academic degree extends beyond the normal completion time, while college tuition is essentially constant during the years of enrollment and, in particular, does not increase when a student remains in a program after its regu-

lar end. Using a Regression Discontinuity Design on data from Bocconi University in Italy, **Ichino** and his co-authors show that if tuition is raised by 1000 Euros in the last year of the program, the probability of late graduation decreases by 6.1 percentage points with respect to a benchmark average probability of 80 percent. The researchers conclude by showing that an upward sloping tuition profile may be efficient when effort is sub-optimally supplied in the presence of peer effects.

Justman and **Gilboa** use the unique circumstances of education in Israeli *kibbutzim* — communal villages — to derive two related findings. First, by regressing kibbutz members' test scores on parental education, the authors obtain an egalitarian standard of equal opportunity in education, measured as origin-independence, to which the degree of equal opportunity in other education systems can be compared. Second, by comparing this effect to its counterpart for the general Israeli population, they can quantitatively decompose the parental effect on test scores (in the general population) so as to distinguish between what money can and cannot buy.

Mayer and **Puller** document the structure and composition of social networks on university campuses and investigate the processes that lead to their formation. They use a large dataset that identifies students in one another's social network on campus and link these data to university records on each student's demographic and school outcome characteristics. The campus networks exhibit common features of social networks, such as clusteredness. The authors show that race is strongly related to social ties. In particular, blacks and Asians have disproportionately more same race friends

than would arise from the random selection of friends, even after controlling for a variety of measures of socioeconomic background, ability, and college activities. Also, two students are more likely to be friends if they share the same major, participate in the same campus activities, and, to a lesser extent, come from the same socioeconomic background. Next, the authors develop a model of the formation of social networks that decomposes the formation of social links into effects based upon the exogenous school environment and effects of endogenous choice arising from preferences for certain characteristics in one's friends. They use student-level data from an actual social network to calibrate the model, which generates many of the characteristics common to social networks. They then simulate network structures under alternative university policies and find that changes in the school environment that affect the likelihood that two students interact have only a limited potential to reduce the segmentation of the social network.

In California in 1998, the state converted from a system that awarded funds based on the number of disabled students in a district to one based on total enrollment. This change induced changes in the total funding awarded to different districts, and reduced the marginal "price" of an additional disabled student to zero. **Kwak** finds that the reform created both "income" and "substitution" effects on the number of students classified as disabled. In the short run, additional state special education grants translate into sizeable increases in special education spending, but in the longer run special education funds appear fungible across other spending needs.

Asset Pricing

The NBER's Program on Asset Pricing met at The Wharton School, University of Pennsylvania, on November 10. NBER researchers Leonid Kogan, Sloan School of Management at MIT, and Amir Yaron, The Wharton School, organized the meeting. These papers were discussed:

Stijn Van Nieuwerburgh, New York University and NBER, and **Pierre-Olivier Weill**, University of California, Los Angeles, "Why Has House Price Dispersion Gone Up?"
Discussant: Markus K. Brunnermeier, Princeton University and NBER

Robert Novy-Marx, University of Chicago, "Investment Cash Flow Sensitivity and the Value Premium"
Discussant: Joao Gomes, University of Pennsylvania

Arvind Krishnamurthy and **Annette Vissing-Jorgensen**, Northwestern University and NBER, "The Demand for Treasury Debt"
Discussant: Monika Piazzesi, University of Chicago and NBER

Martijn Cremers and **Antti Petajisto**, Yale University, "How Active is Your Fund Manager? A New Measure That Predicts Performance"

Discussant: Jonathan Berk, University of California, Berkeley and NBER

Long Chen, Michigan State University, and **Xinlei Zhao**, Kent State University, "Return Decomposition"
Discussant: John Heaton, University of Chicago and NBER

Lubos Pastor, University of Chicago and NBER, and **Robert Stambaugh**, University of Pennsylvania and NBER, "Predictive Systems: Living with Imperfect Predictors"
Discussant: Jonathan Lewellen, Dartmouth College and NBER

Nieuwerburgh and **Weill** investigate the 30-year increase in the level and dispersion of house prices across U.S. metropolitan areas, using a calibrated dynamic general equilibrium island model. The model is based on two main assumptions: households flow in and out of metropolitan areas in response to local wage shocks, and the housing supply cannot adjust instantly because of regulatory constraints. Feeding into the model the 30-year increase in cross-sectional wage dispersion that is documented based on metropolitan-level data, the authors generate the observed increase in house price level and dispersion. In equilibrium, workers flow towards exceptionally productive metropolitan areas and drive house prices up. The calibration also reveals that, while a baseline level of regulation is important, a tightening of regulation by itself cannot account for the increase in house price level and dispersion: in equilibrium, workers flow out of tightly regulated towards less regulated metropolitan areas, undoing most of the price impact of additional local supply regulations. Finally, the calibration with increasing wage dispersion suggests that the welfare effects of housing supply regulation are large.

Firms' equilibrium investment behavior explains two seemingly unrelated economic puzzles. Endogenous variation in firms' exposures to fundamental risks, resulting from optimal investment behavior, generates both investment-cash flow sensitivity and a countercyclical value premium. **Novy-Marx** explictly characterizes the investment strategies of heterogeneous firms as rules in industry average-Q that depend on the industry's concentration and capital intensity. Firms are unconstrained, investing when and because marginal-q equals one, but investment is still associated strongly with positive cash-flow shocks and only weakly with average-Q shocks, because firm value is insensitive to demand when demand is high. A value premium arises, both within and across industries, because the market-to-book sorting procedure over-weights the value portfolio with high-cost producers, firms in slow growing industries, and firms in industries that employ irreversible capital, which are riskier, especially in "bad" times. The two puzzles are linked directly, with theory predicting value firms should exhibit stronger investment-cash flow sensitivities than growth firms.

Krishnamurthy and **Vissing-Jorgensen** show that the U.S. debt/GDP ratio is negatively correlated with the spread between corporate bond yields and Treasury bond yields. The result holds even when controlling for the default risk on corporate bonds. The authors argue that the corporate bond spread reflects a convenience yield that investors attribute to Treasury debt. Changes in the supply of Treasury debt trace out the demand for convenience by investors. The authors further show that the aggregate demand curve for the convenience provided by Treasury debt is downward sloping; they provide estimates of the elasticity of demand. They also analyze disaggregated data from the Flow of Funds Accounts of the Federal Reserve and show that individual groups of Treasury bond holders have downward sloping demand curves. Even groups with the most elastic demand curves have demand curves that are far from flat. The authors discuss the implications for the behavior of corporate bond spreads, interest rate swap spreads, and the value of aggregate liquidity and for the financing of the U.S. deficit, Ricardian equivalence, and the effects of foreign central bank demand on Treasury yields.

To quantify active portfolio management, **Cremers** and **Petajisto** introduce a new measure they label "Active Share". It describes the share of portfolio holdings that differ from the portfolio's benchmark index. They argue that to determine the type of active management for a portfolio, they need to measure it in two dimensions, using both Active Share and tracking error. They apply this approach to the universe of all-equity mutual funds to characterize how much and what type of active man-

agement each practices. The authors test how active management is related to characteristics such as fund size, expenses, and turnover in the cross-section, and look at the evolution of active management over time. They find that active management predicts fund performance: the funds with the highest Active Share significantly outperform their benchmark indexes, both before and after expenses, while the non-index funds with the lowest Active Share underperform. The most active stock pickers tend to create value for investors while factor bets and closet indexing tend to destroy value.

Chen and Zhao study the robustness of the return decomposition approach, in which unexpected equity return is decomposed into discount rate (DR) news and cash flow (CF) news. In this approach, DR news is modeled directly but CF news is usually backed out as a residual component. The researchers argue that the approach has serious limitations because CF news, as a residual, depends critically on how successfully DR news is modeled. One miss-

ing forecasting variable can change the balance of the two news components, and the conclusions that compare the two parts. To illustrate this, the researchers apply their approach to Treasury bonds, which should have zero CF variance and zero CF betas. Instead, they find that the variance of the "CF news" is larger than that of the DR news, and that bonds with longer maturities have higher "CF betas." Applying the approach to equity returns, they show that the relative importance of CF variance and DR variance of the market portfolio is sensitive to the choice of forecasting variables; and, for most forecasting-variable specifications, value stocks usually do not have higher CF betas. These results run counter to what is reported using the decomposition approach in the current literature. Further decomposing the CF news in the current literature into directly-modeled CF news and residual news, the authors show that opposite conclusions can be drawn depending on the nature of the residual news. They also reconcile their finding that value stocks do not have higher CF betas

with the finding in a related literature that value stocks have higher CF covariation with aggregate CFs.

The standard regression approach to investigating return predictability seems too restrictive in one way but too lax in another. A predictive regression assumes that expected returns are captured exactly by a set of given predictors but does not exploit the likely economic property that innovations in expected returns are negatively correlated with unexpected returns. Pastor and Stambaugh develop an alternative framework — a predictive system — that accommodates imperfect predictors and beliefs about that negative correlation. In this framework, the predictive ability of imperfect predictors is supplemented by information in lagged returns as well as lags of the predictors. Compared to predictive regressions, predictive systems deliver different and substantially more precise estimates of expected returns as well as different assessments of a given predictor's usefulness.

Corporate Finance

The NBER's Program on Corporate Finance met in Cambridge on November 10. NBER Research Associate Andrei Shleifer of Harvard University organized the meeting. These papers were discussed:

Camelia M. Kuhnen, Northwestern University, and Jeffrey Zwiebel, Stanford University, "Executive Pay, Hidden Compensation, and Managerial Entrenchment"
Discussant: Xavier Gabaix, MIT and NBER

Jin Xu, University of Chicago, "What Determines Capital Structure? Evidence from Import Competition"

Discussant: Michael Weisbach, University of Illinois and NBER

Bart Lambrecht, University of Lancaster, and Stewart C. Myers, NBER and MIT, "Debt and Managerial Rents in a Real-Options Model of the Firm"
Discussant: Douglas W. Diamond, University of Chicago and NBER

Douglas Baird, University of Chicago; Arturo Bris, Yale University; and Ning Zhu, University of California, Davis, "The Dynamics of Large and Small Chapter 11 Cases: An Empirical Study"
Discussant: Michelle J. White, University of California, San Diego and NBER

Nicola Gennaioli, Stockholm University, and Stefano Rossi, Stockholm School of Economics, "Optimal Resolutions of Financial Distress by Contract"
Discussant: Kenneth Ayotte, Columbia University

Simeon Djankov and Caralee McLiesh, World Bank, and Oliver D. Hart and Andrei Shleifer, Harvard University and NBER, "Debt Enforcement Around the World"
Discussant: David S. Scharfstein, Harvard University and NBER

Kuhnen and Zwiebel consider a managerial optimal framework for top

executive compensation, where top management sets its own compensation subject to limited entrenchment, instead of the conventional setting where such com-

pensation is set by a board that maximizes firm value. Top management would like to pay themselves as much as possible, but are constrained by the need to ensure sufficient efficiency to avoid replacement. Shareholders can remove a manager, but only at a cost, and therefore will only do so if the anticipated future value of the manager (given by anticipated future performance net future compensation) falls short of that of a replacement by this replacement cost. In this setting, observable compensation (salary) and hidden compensation (perks, pet projects, pensions) serve different roles for management and have different costs, and both are used in equilibrium. The authors examine the relationship between observable and hidden compensation and other variables in a dynamic model, and derive a number of unique predictions regarding these two types of pay. They then test these implications and find results that generally support the predictions of their model.

Xu uses the exogenous shock of greater import competition to study the effect of product market competition on corporate capital structure in the U.S. domestic textile and apparel sector. Theoretically, when import competition increases, expected domestic profitability drops, increasing the probability of bankruptcy and reducing the tax benefit of debt. According to the trade-off theory, optimal financial leverage should go down. Xu finds that after a quota-eliminating trade law took effect, firms in the sector significantly de-levered by reducing debt and increasing outside equity. The average textile and apparel firm reduced its leverage by 0.10, a 30 percent reduction, while the rest of the manufacturing sector barely de-levered. Xu extends the analysis by looking at the relation of capital structure to industry-level import penetration in a large sample of all U.S. manufacturing industries. Financial leverage is strongly negatively correlated with industry-level import penetration, controlling for documented determinants of leverage. Economically, one standard deviation increase in import penetration corresponds to about a 20 percent standard deviation decrease in leverage. Since

import penetration could be endogenous to capital structure because of strategic behaviors of firms, Xu uses the industry tariff as an instrumental variable for import penetration. The IV result is consistent with the OLS result. Robustness checks with alternative leverage measures confirm the basic result. The results can be explained best by the trade-off theory. Xu also finds some evidence consistent with the disciplinary role of debt hypothesis, but it only accounts for a small portion of the competition-leverage effect.

Lambrecht and **Myers** present a theory of capital investment and debt and equity financing in a real-options model of a public corporation. The model assumes that managers maximize the present value of their future compensation (managerial rents), subject to constraints imposed by outside shareholders' property rights to the firms' assets. The authors show that managers adopt an optimal debt policy that generates efficient investment and disinvestment decisions. Optimal debt equals the liquidation value of the firms' assets and is therefore default-risk free. But managers' personal wealth constraints can justify additional risky debt to fund positive-NPV investments. Changes in cash flow can cause changes in investment by tightening or loosening the wealth constraints.

Baird and his co-authors show that the dynamics of Chapter 11 turn dramatically on the size of the business. The vast majority of the assets administered in Chapter 11 are concentrated in a handful of large cases, but most of the businesses in Chapter 11 are small, and the smaller the business, the smaller the distribution to general unsecured creditors. For businesses with assets above $5 million, unsecured creditors typically collect half of what they are owed. Where the business's assets are worth less than $200,000, ordinary general creditors usually recover nothing. In the typical small Chapter 11 case, the tax collector is the central figure. In small business bankruptcies, priority tax liabilities are the largest unsecured liabilities of the business. Tax obligations are entitled to priority and are obligations of both the corporation and those who run it. Given the large shadow tax

claims cast over small Chapter 11 reorganizations, accounts of small Chapter 11 must focus squarely on them.

Gennaioli and **Rossi** theoretically explore the possibility that parties might efficiently resolve financial distress by contract as opposed to exclusively relying on state intervention. They characterize which financial contracts are optimal depending on legal protection of investors against fraud, and how efficient is the resulting resolution of financial distress. They find that when legal protection against fraud is strong, issuing a convertible debt security to a large, secured creditor allows the parties to attain the first best. Conversion of debt into equity upon default allows the debtor to collateralize the whole firm to the creditor, not just certain physical assets, thereby inducing the creditor to internalize the upside from efficient reorganization. When instead legal protection against fraud is poor, straight debt with foreclosure is the only feasible contract, even if it induces over-liquidation. The normative implication of this analysis is that an efficient resolution of financial distress is attained under freedom of contracting and strong protection against fraud.

Djankov, **McLiesh**, **Hart**, and **Shleifer** present insolvency practitioners from 88 countries with an identical case of a hotel about to default on its debt, and ask them to describe in detail how debt enforcement against this hotel will proceed in their countries. The researchers use the data on time, cost, and the likely disposition of the assets (preservation as a going concern versus piecemeal sale) to construct a measure of the efficiency of debt enforcement in each country. They identify several characteristics of the debt enforcement procedure, such as the structure of appeals and the availability of floating charge finance, that influence efficiency. This measure of efficiency is strongly correlated with per capita income and legal origin and predicts debt market development across countries. Interestingly, it is also highly correlated with measures of the quality of government obtained in other studies.

Behavioral Economics

The NBER's Working Group on Behavioral Economics met in Cambridge on November 11. NBER Research Associates and Group Directors Robert J. Shiller of Yale University and Richard H. Thaler, University of Chicago, organized this program:

Am Tal Fishman and Harrison Hong, Princeton University, and Jeffrey D. Kubik, Syracuse University, "Do Arbitrageurs Amplify Economic Shocks?"
Discussant: Michael Rashes, Bracebridge Capital

John Y. Campbell, Harvard University and NBER, and Jens Hilscher and Jan Szilagyi, Harvard University, "In Search of Distress Risk" (NBER Working Paper No. 12362)
Discussant: Tyler Shumway, University of Michigan

Andrea Frazzini, University of Chicago, and Owen Lamont, Yale University and NBER, "The Earnings Announcement Premium and Trading Volume"
Discussant: Steven Heston, University of Maryland

David Hirshleifer and Siew Hong Teoh, University of California, Irvine, and Sonya Seongyeon Lim, DePaul University, "Driven to Distraction: Extraneous Events and Underreaction to Earnings News"
Discussant: Stefano Della Vigna, University of California, Berkeley and NBER

Robin Greenwood, Harvard University, and Stefan Nagel, Stanford University and NBER, "Inexperienced Investors and Speculative Bubbles"
Discussant: Jeremy C. Stein, Harvard University and NBER

Massimo Massa and Lei Zhang, INSEAD, "Cosmetic Mergers: The Effect of Style Investing on the Market for Corporate Control"
Discussant: Malcolm Baker, Harvard University and NBER

Fishman, Hong, and Kubik consider whether arbitrageurs amplify fundamental shocks in the context of short arbitrage in equity markets. The ability of arbitrageurs to hold on to short positions depends on asset values: shorts are often reduced following good news about a stock. As a result, the prices of highly shorted stocks are excessively sensitive to economic shocks. Using monthly short interest data and exploiting differences in short selling regulations across stock exchanges to instrument for the amount of shorting in a stock, the authors find: 1) The price of a highly shorted stock is more sensitive to earnings news than a stock with little short interest. 2) Short interest changes around announcements (proxied by share turnover) are more sensitive to earnings surprises for highly shorted stocks. 3) For highly shorted stocks, returns to shorting are higher following better earnings news. 4) These differential sensitivities are driven by very good earnings news as opposed to very bad earnings news. These findings point to the importance of limited arbitrage in affecting asset price dynamics and the potentially destabilizing role of speculators.

Campbell, Hilscher, and Szilagyi explore the determinants of corporate failure and the pricing of financially distressed stocks using U.S. data for 1963–2003. Firms with higher leverage, lower profitability, lower market capitalization, lower past stock returns, more volatile past stock returns, lower cash holdings, higher market-book ratios, and lower prices per share are more likely to file for bankruptcy, be de-listed, or receive a D rating. When predicting failure at longer horizons, the most persistent firm characteristics — market capitalization, the market-book ratio, and equity volatility — become relatively more significant. The model here captures much of the time variation in the aggregate failure rate. Since 1981, financially distressed stocks have delivered anomalously low returns. They have lower returns but much higher standard deviations, market betas, and loadings on value and small-cap risk factors than stocks with a low risk of failure. These patterns hold in all size quintiles but are particularly strong in smaller stocks. They are inconsistent with the conjecture that the value and size effects are compensation for the risk of financial distress.

On average, stock prices rise around scheduled earnings announcement dates. Frazzini and Lamont show that this earnings announcement premium is large, robust, and strongly related to the fact that volume surges around announcement dates. Stocks with high past announcement period volume earn the highest announcement premium, suggesting some common underlying cause for both volume and the premium. The authors show that high premium stocks experience the highest levels of imputed small investor buying, suggesting that the premium is driven by buying by small investors when the announcement catches their attention.

Psychological evidence indicates that it is hard to process multiple stimuli and perform multiple tasks at the same time. Hirshleifer and his co-authors test the *investor distraction hypothesis,* which holds that the arrival of extraneous news causes trading and market prices to react sluggishly to relevant news about a firm. They focus on the competition for investor attention between a firm's earnings announcements and the earnings announcements of other firms. They find that the immediate stock price and volume reaction to a firm's earnings surprise is weaker, and post-earnings announcement drift is stronger, when a greater number of earnings announcements by other firms are made on the same day. A

trading strategy that exploits post-earnings announcement drift is most profitable for earnings announcements made on days with a lot of competing news, but it is not profitable for announcements made on days with little competing news.

Asset market experiments suggest that inexperienced investors play a role in the formation of asset price bubbles. Without first-hand experience of a downturn, these investors are more optimistic and likely to exhibit trend chasing in their portfolio decisions. **Greenwood** and **Nagel** examine this hypothesis with mutual fund manager data from the technology bubble. Using age as a proxy for managers' investment experience, they find that around the peak of the bubble, mutual funds run by younger managers are more heavily invested in technology stocks, relative to their style benchmarks, than their older colleagues. Consistent with the experimental evidence, the authors find that young managers, but not old man-

agers, exhibit trend-chasing behavior in their technology stock investments. As a result, young managers increase their technology holdings during the run-up, and decrease them during the downturn. The economic significance of young managers' actions is amplified by large inflows into their funds prior to the peak in technology stock prices. These results are unlikely to be explained by standard career concerns models or by differences in the ability to pick technology stocks between young and old managers.

Massa and **Zhang** study the impact of style investing on the market for corporate control. By using data on the flows in mutual funds, they construct a measure of "neglectedness" that is not a direct transformation of stock market data, but directly relies on the identification of the sentiment-induced investor demand. They show that bidders tend to pair with targets that are relatively less neglected. The merger with a less neglected target generates a "halo

effect" from the target to the bidder that induces the market to evaluate the assets of the more neglected bidder at the (inflated) market value of the less neglected target. Both bidder and target premiums are positively related to the difference in neglectedness between bidder and target. However, the target's ability to appropriate the gain is reduced by the fact that its bargaining position is weaker when the potential for asset appreciation of the bidder is higher. The effect on the value of the bidder is persistent in the medium run (1–2 years). The authors document a better medium-term performance of more neglected firms taking over less neglected ones. The bidder managers engaging in these types of "cosmetic mergers" take advantage of the temporary window of opportunity created by the higher stock price induced by the M and A deal to reduce their stake in the firm at convenient conditions.

Labor Studies

The NBER's Program on Labor Studies met in Cambridge on November 17. NBER Research Associates Lawrence F. Katz and Richard B. Freeman, both of Harvard University, organized the program. These papers were discussed:

Joseph G. Altonji, Yale University and NBER, and **Anthony A. Smith** and **Ivan Vidangos**, Yale University, "Modeling Earnings Dynamics"

Thomas Lemieux, University of British Columbia and NBER; **W. Bentley Macleod**, Columbia University; and

Daniel Parent, McGill University, "Performance Pay and Wage Inequality"

Sandra E. Black, University of California , Los Angeles and NBER, and **Alexandra Spitz-Oener**, Humboldt University Berlin, "Explaining Women's Success: Technological Change and the Skill Content of Women's Work"

Bryan S. Graham, University of California, Berkeley and NBER; **Guido W. Imbens**, Harvard University and NBER; and **Geert Ridder**, University of Southern California, "Complementarity

and Aggregate Implications of Assortative Matching: A Nonparametric Analysis"

Carmit Segal, Harvard University, "Motivation, Test Scores, and Economic Success"

Anne Case and **Christina Paxson**, Princeton University and NBER, "Stature and Status: Height, Ability, and Labor Market Outcomes"(NBER Working Paper No. 12466)

Altonji, **Smith**, and **Vidangos** use generalized indirect inference to estimate a joint model of earnings, employment, job changes, wage rates, and work

hours over a career. Their model incorporates state and duration dependence in several variables, multiple sources of unobserved heterogeneity, job-specific

error components in both wages and hours, and measurement error. They estimate the dynamic response of wage rates, hours, and earnings to various shocks,

and measure the relative contributions of the shocks to the variance of earnings in a given year and over a lifetime. Shocks associated with job changes make a large contribution to the variance of career earnings and operate mostly through the job-specific error components in wages and hours. Unemployment shocks also make a large contribution and operate mostly through long-term effects on the wage rate.

An increasing fraction of jobs in the U.S. labor market explicitly pay workers for their performance using a bonus, a commission, or a piece rate. In this paper, **Lemieux**, **Macleod,** and **Parent** look at the effect of the growing incidence of performance pay on wage inequality. The basic premise of the paper is that performance pay jobs have a more "competitive" pay structure that rewards productivity differences more than other jobs. Consistent with this view, the authors show that compensation in performance pay jobs is more closely tied to both measured (by the econometrician) and unmeasured productive characteristics of workers. The authors conclude that the growing incidence of performance pay accounts for 25 percent of the growth in male wage inequality between the late 1970s and the early 1990s, and for most of the growth in top-end wage inequality (above the 80th percentile) during this period.

Black and **Spitz-Oener** adopt a task-based view of technological change and examine how the proliferation of computers in the 1980s and 1990s has affected women's tasks relative to those of men. Using data from West Germany, they find that women have witnessed large relative increases in non-routine analytic tasks and non-routine interactive tasks between 1979 and 1999. However, the most notable difference between the genders is the pronounced decline in routine task inputs among women with almost no change in routine task input for men. Consistent with the skill-biased technological change hypothesis, task changes were most pronounced *within* occupations, whereas only minor parts of the aggregate trends are attributable to women who were moving towards

more skill-intensive occupations. In addition, the task changes are occurring most rapidly in occupations in which computers have made major headway. Overall — and in contrast to recent literature that puts a strong emphasis on only one dimension of activities on the job, namely interactive tasks — the researchers show that changes in job content have evolved differently for men and women on several dimensions.

Graham, **Imbens**, and **Ridder** present methods for evaluating the effects of reallocating an indivisible input across production units. When production technology is nonseparable such reallocations, although leaving the marginal distribution of the reallocated input unchanged by construction, may nonetheless alter average output. Examples include reallocations of teachers across classrooms composed of students of varying mean ability and altering assignment mechanisms for college roommates in the presence of social interactions. The researchers focus on the effects of reallocating one input while holding the assignment of another, potentially complementary input, fixed. They present a class of such reallocations — correlated matching rules — that includes the status quo allocation, a random allocation, and both the perfect positive and negative assortative matching allocations as special cases. Their econometric approach involves first nonparametrically estimating the production function and then averaging this function over the distribution of inputs induced by the new assignment rule.

Segal investigates how low-stakes test scores relate to economic success. The inferences in the economic literature on this subject are mostly based on tests, without performance-based incentives, administered to survey participants. Segal argues that the lack of performance-based incentives allows for the possibility that higher test scores are caused by noncognitive skills associated with test-taking motivation, and not necessarily by cognitive skills alone. This suggests that the coding speed test, which is a short and very simple test available for participants in the

National Longitudinal Survey of Youth 1979 (NLSY), may serve as a proxy for test-taking motivation. To gather more definite evidence on the motivational component in the coding speed test, Segal conducts a controlled experiment, inducing motivation by the provision of incentives. In the experiment, the average performance improved substantially and significantly once incentives were provided. More importantly, there were heterogeneous responses to incentives. Roughly a third of the participants improved their performance significantly in response to performance-based incentives, while the others did not. These two groups have the same test score distributions when incentives are provided, suggesting that some participants are less motivated and invest less effort when no performance-based incentives are provided. These participants, however, are not less able. How do the coding-speed test scores relate to economic success? Focusing on male NLSY participants, Segal shows that the coding speed scores are highly correlated with earnings 23 years after NLSY participants took the test, even after controlling for usual measures of cognitive skills, like the Armed Forces Qualification Test (AFQT) scores. Moreover, for highly educated workers, the association between AFQT scores and earnings is significantly larger than the one between coding speed scores and earnings, while for less educated workers these associations are of similar size.

It has long been recognized that taller adults hold jobs of higher status and, on average, earn more than other workers. A large number of hypotheses have been put forward to explain the association between height and earnings. In developed countries, researchers have emphasized factors such as self esteem, social dominance, and discrimination. In this paper, **Case** and **Paxson** offer a simpler explanation. Prenatal and early childhood health and nutrition have critical effects on both growth and cognitive development. As a result, on average, taller people earn more because they are smarter. As early as age 3 — before schooling has had a chance to play a role — and throughout childhood, taller

children perform significantly better on cognitive tests. The correlation between height in childhood and adulthood is approximately 0.7 for both men and women, so that tall children are much more likely to become tall adults. As adults, taller individuals are more likely to select into higher paying occupations that require more advanced verbal and numerical skills and greater intelligence, for which they earn handsome returns. Using four datasets from the United States and the United Kingdom, the researchers find that the height premium in adult earnings can be explained by childhood scores on cognitive tests. Furthermore, they show that taller adults select into occupations that have higher cognitive skill requirements and lower physical skill demands.

Productivity

The NBER's Program on Productivity met in Cambridge on December 1, 2006. Nick Bloom and Kathryn L. Shaw, Stanford University and NBER, organized the program. These papers were discussed:

Jan De Loecker, New York University, "Product Differentiation, Multi-Product Firms and Structural Estimation of Productivity"
Discussant: Marc Muendler, University of California, San Diego

Francine Lafontaine and **Jagadeesh Sivadasan**, University of Michigan, "The Microeconomic Implications of Input Market Regulations:Cross-Country Evidence from Within the Firm"
Discussant: Lee Branstetter, Carnegie-Mellon University and NBER

Nick Bloom; **Raffaela Sadun**, London School of Economics; and **John Van Reenen**, London School of Economics and NBER, "It Ain't What You Do But the Way that You Do IT:Investigating the U.S. Productivity Miracle Using Multinationals"
Discussant: Susanto Basu, Boston College and NBER

Anne P. Bartel and **Casey Ichinowski**, Columbia University and NBER; **Kathryn L. Shaw;** and **Ricard Correa,** Federal Reserve Board of Governors, "International Differences in the Adoption and Impact of New Information Technologies and New HR Practices: The Valve-Making Industry in the U.S. and the U.K."
Discussant: Scott Stern, Northwestern University and NBER

Sabien Dobbelaere, Ghent University, and **Jacques Mairesse**, CREST and NBER, "Product Market and Labor Market Imperfections and Heterogeneity in Panel Data Estimates of the Production Function"
Discussant: Chad Syversson, University of Chicago and NBER

Bronwyn H. Hall, University of California, Berkeley and NBER; **Grid Thoma**, University of Bocconi; and **Salvatore Torrisi**, University of Bologna, "The Market Value of Patents and R&D: Evidence from European Firms"
Discussant: Megan MacGarvie, Boston University and NBER

De Loecker proposes a methodology for estimating (total factor) productivity in an environment of product differentiation and multi-product firms. In addition to correcting for the simultaneity bias in the estimation of production functions, he controls for the omitted price bias, as documented by Klette and Griliches (1996). By aggregating demand and production from product space into firm space, he can use plant-level data to estimate productivity. The productivity estimates are corrected for demand shocks and, as by-products, he recovers the elasticity of demand and implied mark-ups. He applies this methodology to the Belgian textile industry, using a dataset where he has matched firm-level with product-level information. The resulting production coefficients and productivity estimates change considerably after taking into account the demand variation and the product mix. Finally, he analyzes the effects of trade liberalization in the Belgian textile industry. While he finds significant productivity gains from trade liberalization, the estimated effects are approximately half of those obtained with standard techniques.

Lafontaine and **Sivadasan** investigate the microeconomic implications of labor regulations that protect employment and are expected to increase rigidity in labor markets. They exploit a unique outlet-level dataset obtained from a multi-national food chain operating about 2,840 retail outlets in over 48 countries outside the United States. The dataset provides information on output, input costs, and labor costs at a weekly frequency over a four-year period, allowing the authors to examine the consequences of increased rigidity at a much more detailed level than has been possible with commonly available annual frequency or aggregate data. They find that higher levels of the index of labor market rigidity are associated with significantly lower output elasticity of labor demand, as well as significantly higher levels of hysteresis (measured as the elasticity of cur-

rent labor costs with respect to the previous week's). Specifically, an increase of one standard deviation in the labor regulation rigidity index 1) reduces the response of labor cost to a one standard deviation increase in output (revenue) by about 4.7 percentage points (from 27.2 percent to 22.5 percent); and 2) increases the response of labor cost to a one standard deviation increase in lagged labor cost by about 9.6 percentage points (from 17.8 percent to 27.4 percent). These estimates imply an increase in gross misallocation of labor of about 2 to 5 percent for a single standard deviation increase in the index of labor regulation. Finally, they find that the Company delayed entry, operates fewer outlets, and favors franchising in countries with more rigid labor laws. Overall, the data imply a strong impact of rigid labor laws on labor input and related decisions at the micro level.

Productivity growth in sectors that intensively use information technologies (IT) appears to have accelerated much faster in the United States than in Europe since 1995, leading to the U.S. "productivity miracle". If this was partly attributable to the superior management or organization of U.S. firms (rather than simply the advantages of being located in the United States geographically), we would expect to see a stronger association of productivity with IT for U.S. multinationals (compared to non-US multinationals) located in Europe. **Bloom** and his co-authors examine a large panel of U.K. establishments and provide evidence that U.S.-owned establishments do have a stronger relationship between productivity and IT capital than either non-U.S. multinationals or domestic establishments. Indeed, the differential effect of IT appears to account for almost *all* of the difference in total factor productivity between U.S.-owned and all other establishments. This finding holds in the cross section, when including fixed effects, and even when the authors examine a sample of establishments taken over by U.S. multinationals. They find that the U.S. multinational effect on IT is particularly

strong in the sectors that intensively use information technologies (such as retail and wholesale): the very same industries that accounted for the U.S.-European productivity growth differential since the mid-1990s.

There is now a well-developed body of macroeconomic evidence that information technology (IT) investments are likely to have "paid-off" with higher levels of productivity growth in industries that invested more heavily in IT in recent years. In their earlier work, **Bartel, Ichniowski,** and **Shaw** provided evidence confirming that valve manufacturing plants that adopt new IT are in fact the same ones that increase the customization and reliability of their products and increase the speed and efficiency of their operations, thereby providing an explanation of what lies behind the macro-level trends. An important question is whether plants outside of the United States gain as much from IT as U.S. plants. In this paper with **Correa**, they add data from the United Kingdom to their U.S. dataset. Based on this combined data, they find that the plants in the United Kingdom have experienced the same changes that are evident in the United States: pronounced increases in productivity and increased skill demand associated with increases in the purchase of new capital that has IT imbedded in the capital.

Embedding the efficient bargaining model into the original R. E. Hall (1988) approach for estimating price-cost margins shows that imperfections in the product and labor markets generate a wedge between factor elasticities in the production function and their corresponding shares in revenue. **Dobbelaere** and **Mairesse** investigate these two sources of discrepancies, both at the sector level and the firm level, using an unbalanced panel of 10,646 French firms in 38 manufacturing sectors over the period 1978–2001. By estimating standard production functions and comparing the estimated factor elasticities for labor and materials and their shares in revenue, they are able to derive estimates of average

price-cost mark-up and extent of rent sharing parameters. For manufacturing as a whole, their preferred estimates of these parameters are of an order of magnitude of 1.3 and 0.5 respectively. Their sector-level results indicate that sector differences in these parameters, and in the underlying estimated factor elasticities and shares, are quite sizeable. Since firm production function, behavior, and market environment are very likely to vary even within sectors, they also investigate firm-level heterogeneity in estimated mark-up and rent-sharing parameters. To determine the degree of true heterogeneity in these parameters, they adopt the P.A. Swamy (1970) methodology, allowing them to correct the observed variance in the firm-level estimates from their sampling variance. The median of the firm estimates of the price-cost mark-up, ignoring labor market imperfections, is 1.10, while as expected it is higher — 1.20 — when taking them into account. The median of the corresponding firm estimates of the extent of rent sharing is 0.62. The Swamy corresponding robust estimates of true dispersion are about 0.18, 0.37, and 0.35, yielding very sizeable within-sector firm heterogeneity. The authors find that firm size, capital intensity, distance to the sector technology frontier, and investing in R and D seem to account for a significant part of this heterogeneity.

Hall and her co-authors provide novel empirical evidence on the private value of patents and R and D. They analyze an unbalanced sample of firms from five EU countries — France, Germany, Switzerland, Sweden, and the United Kingdom — in the period 1985–2005. They explore the relationship between firm's stock market value and patents, accounting for the "quality" of EPO patents. They find that Tobin's q is positively and significantly associated with R and D and patent stocks. In contrast to results for the United States, forward citations do not add information beyond that in patents. However, the composite quality indicator based on backward citations, forward citations, and the number of

technical fields covered by the patent is informative for value. Software patents account for a rising share of total patents in the EPO. Moreover, some scholars of innovation and intellectual property rights argue that software and business-methods patents on average are of poor quality and that these patents are applied for merely to build portfolios rather than for protection of real inventions. Therefore, the authors tested for the impact of software patents on the market value of the firm and did not find any significant effect, in contrast to results for the United States. However, in Europe, such patents are highly concentrated, with 90 percent of the software patents in this sample held by just 15 of the firms.

International Trade and Investment

The NBER's International Trade and Investment Program met at the NBER's office in California on December 1-2, 2006. Program Director Robert C. Feenstra, University of California, Davis, organized the meeting. These papers were discussed:

"Trading Tasks: A Simple Theory of Offshoring" — **Gene M. Grossman** and **Esteban Rossi-Hansberg**, Princeton University and NBER

"Trade, Diffusion, and the Gains from Openness" — **Andres Rodriguez-Clare**, Pennsylvania State University and NBER

"Multi-Product Firms and Trade Liberalization" — **Andrew B. Bernard**, Dartmouth College and NBER; **Stephen J. Redding**, London School of Economics; and **Peter K. Schott**, Yale University and NBER

"Quality Pricing and Endogenous Entry: A Model of Exchange Rate Pass-Through" — **Raphael Auer**, Swiss National Bank, and **Thomas Chaney**, University of Chicago and NBER

"Explaining Import Variety and Quality: The Role of the Income Distribution" — **Yo Chul Choi** and **Chong Xiang**, Purdue University, and **David Hummels**, Purdue University and NBER

"Trade Adjustment and Human Capital Investments: Evidence from Indian Tariff Reform" — **Eric Edmonds** and **Nina Pavcnik**, Dartmouth College and NBER, and **Petia Topalova**, International Monetary Fund

"Trade, Knowledge, and the Industrial Revolution" — **Kevin H. O'Rourke**, Trinity College, Dublin and NBER; **Ahmed S. Rahman**, United States Naval Academy; and **Alan M. Taylor**, University of California, Davis and NBER

"Buffalo Hunt: International Trade and the Virtual Extinction of the North American Bison" — **M. Scott Taylor**, University of Calgary and NBER

For centuries, most international trade involved an exchange of complete goods. But, with recent improvements in transportation and communications technology, it increasingly entails different countries adding value to global supply chains, or what might be called "trade in tasks." **Grossman** and **Rossi-Hansberg** propose a new conceptualization of the global production process that focuses on tradable tasks and use it to study how falling costs of offshoring affect factor prices in the source country. The authors identify a productivity effect of task trade that benefits the factor whose tasks are more easily moved offshore. In the light of this effect, reductions in the cost of trading tasks can generate shared gains for all domestic factors, in contrast to the distributional conflict that typically results from reductions in the cost of trading goods.

Rodriguez-Clare presents and then calibrates a model in which countries interact through trade and diffusion of ideas, and then quantifies the overall gains from openness and the contribution of trade to these gains. Having the model match the trade data (that is, the gravity equation) and the observed growth rate is critical for this quantification to be reasonable. It is shown that for this match it is necessary to introduce diffusion and/or knowledge spillovers to the basic model of trade and growth in Eaton and Kortum (2001). The main result of the paper is that, compared to the model without diffusion, the gains from trade are smaller whereas the gains from openness are much larger when diffusion is included in the model.

Bernard, **Redding**, and **Schott** develop a general equilibrium model of multi-product firms and analyze their behavior during trade liberalization. Firm productivity in a given product is modeled as a combination of firm-level "ability" and firm-product-level "expertise", both of which are stochastic and unknown prior to the firm's payment of a sunk cost of entry. Higher managerial ability raises a firm's productivity across all products, which induces a positive correlation between a firm's intensive (output per product)

and extensive (number of products) margins. Trade liberalization fosters productivity growth within and across firms and in the aggregate by inducing firms to shed marginally productive products and forcing the lowest-productivity firms to exit. Though exporters produce a smaler range of products after liberalization, they increase the share of products sold abroad as well as exports per product. All of these adjustments are shown to be relatively more pronounced in countries' comparative advantage industries.

Auer and **Chaney** develop a model of international trade under perfect competition and flexible prices that accounts for the slow and incomplete pass through of exchange rate fluctuations into consumer prices. They build an extension of the Mussa and Rosen (1978) model of quality pricing. Exporters sell goods of different quality to consumers with heterogeneous preferences for quality. In equilibrium, higher quality goods are more expensive. The authors derive three testable predictions. First, exchange rate fluctuations are only partially passed through to consumers. Second, there is more pass through in the long run than in the short run, and more pass through for aggregate prices than for individual prices. Third, there is more pass through for low quality goods than for high quality goods. When the exchange rate of an exporting country appreciates, existing exporters scale down their production, driving prices up. In the long run, low quality exporters pull out, driving prices up even further. Since those goods are inexpensive, aggregate prices go up more than individual prices. This exit of low quality exporters has a larger impact on the price of low quality goods than on the price of high quality goods. Low quality goods prices adjust more than high quality goods prices.

Choi, Xiang, and **Hummels** exam-

ine a generalized version of Flam and Helpman's (1987) model of vertical differentiation that maps cross-country differences in income distributions to variations in import variety and price distributions. The theoretical predictions are examined and confirmed using micro data on income from the Luxemburg Income Study for 30 countries over 20 years. The pairs of importers whose income distributions look more similar have more export partners in common and more similar import price distributions. Similarly, the importers whose income distributions look more like the world buy from more exporters and have import price distributions that look more like the world.

Can the short- and medium-term adjustment costs associated with trade liberalization have long-term consequences through their impact on schooling and child labor? **Edmonds**, **Pavcnik**, and **Topalova** examine this question in the context of India's 1991 tariff reforms. Overall, in the 1990s, rural India experienced a dramatic increase in schooling and a decline in child labor. However, communities that relied heavily on employment in protected industries before liberalization do not experience as large an increase in schooling or decline in child labor. The data suggest that this failure to follow the national trend of increasing schooling and diminishing work is associated with a failure to follow the national trend in poverty reduction. Schooling costs appear to play a large role in this relationship between poverty, schooling, and child labor. Extrapolating from these results, the estimates here imply that roughly half of India's rise in schooling and a third of the fall in child labor during the 1990s can be explained by falling poverty and therefore improved capacity to afford schooling.

O'Rourke, **Rahman**, and **Taylor**

address a basic empirical problem facing previous unified growth models, exemplified by Galor and Weil (2000). In such models, the onset of industrialization leads to an increase in skill premia, which is required in order to induce families to limit fertility and increase the education of their children. However, the onset of the Industrial Revolution saw a marked decline in skill premia, and this cannot be explained by supply-side educational reforms, since these only came much later. Thus the authors construct a model, in the tradition of Galor and Weil and Galor and Mountford (2004), which endogenizes the direction of technical change. They show that technological change during the early phases of the Industrial Revolution was inevitably unskilled-labor-biased. They also show that a growth in "Baconian knowledge" and international trade can explain a shift in the direction of technical change away from unskilled-labor-intensive innovations and towards skilled-labor-intensive innovations. Simulations show that the model does a good job in tracking reality, at least until the late nineteenth century with its mass education reforms.

In the sixteenth century, North America contained 25–30 million buffalo; by the late nineteenth century fewer than 100 remained. While removing the buffalo east of the Mississippi took settlers two centuries, the remaining 10 to 15 million buffalo on the Great Plains were killed in a punctuated slaughter in a little over ten years. **Taylor** uses theory, data from international trade statistics, and first person accounts to argue that the slaughter on the plains was initiated by a foreign-made innovation and fueled by a foreign demand for industrial leather. Ironically, the ultimate cause of this sad chapter in American environmental history was of European, and not American, origin.

Bureau Books

Globalization and Poverty

Globalization and Poverty, edited by Ann Harrison, is available from the University of Chicago Press for $99.00. This NBER Conference Report brings together experts on international trade and poverty to provide a detailed view of the effects of globalization on the poor in developing nations, answering such questions as: Do lower import tariffs improve the lives of the poor? Has increased financial integration led to more or less poverty? How have the poor fared during various currency crises? Does food aid hurt or help the poor?

To date, poverty has been used as a popular and convenient catch phrase by parties on both sides of the globalization debate to further their respective arguments. This volume provides the more nuanced understanding necessary to move that debate beyond the slogans.

Harrison is a Research Associate in the NBER's Program on International Trade and Investment and a Professor of Agricultural and Resource Economics at the University of California, Berkeley.

The Risks of Financial Institutions

The Risks of Financial Institutions, edited by Mark Carey and René M. Stulz, is available from the University of Chicago Press for $99.00. This NBER Conference Report examines the various risks affecting financial institutions and explores a variety of methods for helping institutions and regulators to more accurately measure and forecast risk. The contributors — academics, regulators, and bankers — bring a wide range of perspectives and experience to the issue. The result is a volume that points a way toward greater financial stability and better risk management of financial institutions.

Carey is a Finance Project Manager at the Federal Reserve Board of Governors in Washington. Stulz is an NBER Research Associate in the Programs on Asset Pricing and Corporate Finance and the Everett D. Reese Professor of Banking and Monetary Economics at The Ohio State University.

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