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Program Report

Industrial Organization

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The NBER's Program on Industrial Organization (IO) celebrates its fifteenth anniversary this year. Researchers in the IO program explore a wide range of topics within the field. Rather than attempting to skim the full scope of program activity, this report highlights work in three broad areas: regulation and antitrust policy; pricing behavior by firms; and auctions markets.[1] Discussion of the substantial body of research on technology and technical change is deferred to reports of the Productivity Program and the NBER Project on Industrial Technology and Productivity. Those interested in learning more about the IO program may visit the NBER website for links to the full set of Industrial Organization Working Papers: http://www.nber.org/programs/io/io.html

Regulatory and Antitrust Policy

When markets deviate from competitive ideals, assessing the desirability of government intervention requires a careful assessment of the costs of market failures relative to the benefits of imperfect regulation. The recognition that even imperfect markets may be preferable to regulated outcomes accompanied a dramatic transformation in the nature and extent of government intervention across a broad range of markets over the past thirty years. Many industries long subject to price and entry regulation in the United States — among them airlines, trucking, railroads, and banking — were deregulated. Telecommunications and electric utilities have been vertically disintegrated and structurally competitive segments were opened to market-based outcomes. Privatization of state-owned enter-

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prises outside the United States has substantially increased reliance on market outcomes in many sectors, although regulators in some cases have replaced government managers in providing oversight. Where government intervention has been maintained, various forms of incentive-based regulation increasingly have replaced state ownership or traditional cost-of-service rate determination.

IO program members are among the leading scholars of antitrust and regulatory policy, and many have been directly involved in the design or implementation of reforms through their government service, advice to regulatory agencies, or consulting to affected firms. In the face of continuing policy debates over regulatory reform, highlighted more than a decade ago by Paul Joskow and Roger Noll in the NBER's 1994 *American Economic Policy in the 1980s*, the NBER recently sponsored a research project designed to leverage this expertise. Project participants were asked to identify key issues in economic regulation, assess the impact of regulatory reforms across a variety of industries, and evaluate significant contemporary concerns about these reforms. Two dozen scholars assembled for a September 2005 conference in Cambridge to discuss the results of this project, to be assembled in an NBER volume on "Economic Regulation and Its Reform: What Have We Learned?" This project complements a substantial body of primary research by NBER associates on regulatory and antitrust policy. A selection of research from the conference and from NBER working papers is described below.

Economic Regulation and Its Reform

Electricity Restructuring: Competition and Incentive Regulation

NBER researchers continue in the vanguard of research, market design, and implementation of electricity restructuring. Much of the empirical work to date has focused on restructured generation markets, in which prices generally are determined through a competitive bidding process. Frank Wolak[2] describes the evolutionary nature of the restructuring process, emphasizing the tension between an imperfectly competitive market and an imperfect regulatory process in providing incentives for least-cost supply at various stages of the production process. In one of the first empirical analyses of restructuring supply-side benefits (11001), the potential for these incentives to reduce costs is highlighted: Kira Fabrizio, Catherine Wolfram, and I show that restructuring is associated with increased productivity, documenting generating-plant efficiency gains in the use of labor and materials input from replacing a regulated monopoly with market competition. As Wolak points out, though, the technical characteristics of electricity supply and demand suggest that market power may be of particular concern, limiting the benefits of restructuring. Joskow (8442) discusses the role of market power and other contributors to the 2000–1 California electricity crisis; Ali Hortacsu and Steven Puller (11123) measure efficiency losses from strategic bidding in the Texas ERCOT market; and Dae-Wook Kim and Chris Knittel (10895) compare direct measures of markups to those inferred from oligopoly models of market power in California generation markets. Wolak also describes market design and regulatory policies that limit the ability of suppliers to exercise unilateral market power — such as forward contracting, horizontal divestitures, demand-side participation, and local market power mitigation — and uses examples from worldwide wholesale electricity markets to illustrate the importance of effectively addressing each aspect of the market design process to ensure the maximum benefits of electricity restructuring.

While early empirical electricity research focused predominantly on generation markets, researchers increasingly have turned their attention to retail markets and demand-side policy. Peter Reiss and Matthew White (8687, 9986) use data from San Diego households to measure consumer responsiveness to changing electricity prices and conservation programs enacted during the California electricity crisis. They argue that consumers may be more responsive to price fluctuations than previously thought. Severin Borenstein and Stephen Holland (9922) suggest that substantial efficiency gains could be obtained from shifting even modest shares of relatively price-insensitive customers from fixed retail electricity prices to those that reflect time-varying wholesale electricity prices. Borenstein (11594) provides insight into continued resistance to real-time pricing, highlighting substantial distributional effects of real-time prices across heterogeneous industrial and commercial customers that may make it difficult to gain political support without some system to compensation losers.

For services such as transmission and distribution, which typically remain subject to regulation even in restructured markets, innovations have shifted the focus from cost-based price setting toward incentive mechanisms. Joskow[3] provides a comprehensive review of the theory and complexities involved in applying incentive-based regulation. He then discusses applications of incentive mechanisms to the regulation of prices and service quality for "unbundled" electricity transmission and distribution networks. Further, he assesses the evidence on the performance of incentive regulation for electric distribution and transmission networks and describes challenges for future policy and research.

Among those challenges are determining the role of competition in electricity retailing and transmission. Joskow and Jean Tirole (9534) analyze the likely performance of competitive merchant transmission markets, and conclude that this model is likely to yield substantial investment inefficiencies. While their prognosis for retail electricity competition is more optimistic (10473), they note a variety of challenges and efficiency limitations of competitive outcomes. In their work on "Reliability and Competitive Electricity Markets" (10472), they analyze the complexity involved in integrating economists' approach to market design with engineering system design for reliability across the entire electricity network. Finally, they highlight the implications for system investment, operation, and reliability of interactions among competitive markets, operational constraints, and regulatory and administrative practices.

Telecommunications

The telecommunications sector similarly has undergone a dramatic transformation over the past quarter century. Although telecommunications regulators adopted various incentive-based policies early, "forward-looking" cost-based regulation still plays a prominent role in setting prices for unbundled network elements (UNEs) that must be leased by local telephone companies to their competitors. As noted by Robert Pindyck (10287, 11225), the typical pricing formulas used to set UNE lease rates induce substantial investment and entry inefficiencies by failing to account properly for the substantial sunk costs of telecomm investments.[4] Jerry Hausman and Gregory Sidak[5] compare the outcomes of regulatory approaches in the United States, the United Kingdom, and New Zealand. They conclude that in both the United States and the United Kingdom, unbundling may have caused an increase in competition if one measures competition by market share of entrants, at the cost of adverse investment effects by both incumbents and new entrants. In the last section of their paper, they argue that emerging facilities-based competition should allow the end of telecomm price regulation and the regulatory burden that it creates for both consumers and the economy. If the nature of local exchange competition during the 1990s is a guide to the future, then Shane Greenstein and Michael Mazzeo's (9761) research suggests that we may see increasing product differentiation as a result of local competition.

Cable Television

Greg Crawford's[6] analysis of the cable television industry highlights the impact of economic regulation on product quality and innovation. Regulation in this industry has varied greatly over time, as federal legislation has deregulated, re-regulated, and deregulated consumer cable prices. More recently, penetration by Digital Broadcast Satellites raises questions about the need for regulation to constrain cable prices (see research by Austan Goolsbee and Amil Petrin on welfare gains from DBS introduction, 8317). Crawford analyzes the interplay of price regulation and firm quality choices, with attention to the implications of satellite competition for performance in cable television markets. His work highlights ongoing concern over horizontal concentration and vertical integration in the programming market, and bundling by both cable systems and programmers, the latter being the subject of current policy debate at the Federal Communications Commission.

Airline Deregulation

In general, the empirical evidence on deregulation of structurally competitive industries suggests considerable gains from removal of price and entry regulation, although the transition from regulated to competitive markets may be longer and more costly than academics or policymakers originally envisioned. Borenstein and I[7] describe the significant consumer benefits from reduced fares and increased flight frequencies and from nonstop service subsequent to airline deregulation, while acknowledging the industry's considerable financial volatility. We argue that market power concerns have diminished as growth by low-cost carriers now challenges legacy airlines in virtually all parts of the country. Recent research by Goolsbee and Chad Syverson suggests that even the threat of entry by carriers such as Southwest may reduce incumbent prices (11072). This surge in competition, combined with adverse demand shocks, high fuel prices, and high labor costs, has contributed to current financial distress among many legacy airlines, though. Financial distress and accompanying bankruptcies have been costly for shareholders, high-wage workers, and the Pension Benefit Guaranty Corporation, although many costs and dislocations may be transitional. For example, Borenstein and Rose (9636) show that schedule disruptions associated with airline bankruptcies are largely transitory; where they are more permanent, they appear to be modest relative to background fluctuations in flights and destinations served, and to be isolated to medium-sized airports. Overall airline investment and consumer benefits continue to be substantial. The greater long-run challenge may be the performance of government-controlled airports, air traffic control, and security infrastructure, which have not in general kept pace with the growth and changes in the industry.

Pharmaceutical Regulation

Pharmaceutical regulation has long generated concern over its effect on innovation incentives and product launch delays. Patricia Danzon and Eric Keuffel[8] tackle these and other issues in their analysis of pharmaceutical safety, price, and marketing regulations on a variety of industry performance measures. They note that regulatory reforms such as the adoption of user fees, fast track, and priority review may have reduced review-induced delays, especially for priority drugs. For example, Ernst Berndt et al. (10822) finds that implementation of performance goals and user fees for FDA drug applications substantially reduced approval lags — by an average of roughly six months. They estimate a net savings of more than 125,000 life-years from these reforms.

Discouragement of innovation also can be a significant hidden cost of price regulation. Price controls present in many countries may reduce the price of existing pharmaceuticals, but also appear to discourage the development and diffusion of innovative new treatments (see analyses by Danzon, Richard Wang, and Liang Wang (9874); Danzon and Jonathan Ketcham (10007); and the late Jean Lanjouw (11321)). In their work on Medicaid prescription drug purchasing, Mark Duggan and Fiona Scott Morton (10930) highlight another indirect effect of price regulation: government rules that base Medicaid purchase price on the average price of that drug across private-sector purchasers increase equilibrium drug prices for non-Medicaid purchasers, and increase a firm's incentives to introduce new versions of a drug at higher prices.

Financial Services

Randall Kroszner and Phillip Strahan[9] analyze the evolution of banking regulation of prices (interest rates), entry, capital, and investment decisions from the 1930s to the last part of the twentieth century. They note that while industry adaptations to constraints partially reduced the costs of regulatory distortions, banking efficiency improved following the removal of most price and entry controls, generating substantial real benefits for the economy as a whole. Patrick Bolton et al. (10571) show that opening the banking sector to price and product-offering competition also may improve information provision and consumer-product matching, given the superior information that financial services sellers may have about product suitability for buyers of those services.

Eric Zitzewitz[10] analyzes the implications of such asymmetric information for the regulation of non-banking financial services firms. He argues that agency conflicts created by information asymmetries and consumer behavioral biases may impede market efficiency. For example, asset management and financial advisor firms may have incentives to discriminate according to customer sophistication or search ability, offering low-price, high-quality products to sophisticated clients and high-price, low-quality products to the less sophisticated. Ali Hortacsu and Syverson (9728) provide some evidence of this phenomenon in research on product differentiation and search costs in the mutual fund industry. Zitzewitz too discusses the implications of these factors for regulatory and antitrust policy in this sector, with particular attention to recent interventions by the New York Attorney General and the SEC.

Antitrust Policy

In regulated industries, firms may be subject to overlapping jurisdiction by both regulators and antitrust authorities. Dennis Carlton and Randal Picker[11] analyze the tension that this produces, describing the historical origin of antitrust and regulation policy and the ongoing struggles to define the appropriate mechanism and substantive scope for regulating competition. They note that debates over the role of antitrust and regulation continue with particular prominence in today's network industries, whether telecommunications, transportation, or electricity. Moreover, core issues such as interconnection and mandatory access have increased in salience as reform-induced restructuring has led to vertical disintegration of firms and increased competition with incumbents in many industry segments, while the Supreme Court's decision in *Trinko* leaves open substantial questions about how these relationships will be governed.

For most sectors of the economy, interactions among firms are governed by court interpretations of antitrust policy rather than by economic regulatory agency decisions. NBER researchers have explored a variety of aspects of antitrust policy, from theoretical and empirical analyses of merger policy to consideration of vertical restraints. The appropriate role and application of antitrust policy in innovative sectors has attracted particular attention, both as a matter of principle and in the context of high-profile cases such as U.S. v. Microsoft.[12] In these sectors, the tension between encouraging competition through entry and maintaining profit incentives for dynamic growth and efficiency is particularly acute. Ilya Segal and Michael Whinston (11525) focus on this tension in research that analyzes a number of specific policies, highlighting those that benefit both entry and innovation. Carlton and Robert Gertner (8976) argue that dynamic efficiency requires coordination of antitrust policy with intellectual property laws in an attempt to resolve tensions created by the tendency for network industries to evolve toward closed systems. Michael Katz and Howard Shelanski (10710) argue that traditional merger analysis, based on static welfare analyses, may miss important dynamic efficiency implications of mergers in highly innovative sectors. Carlton (11645) emphasizes the importance of dynamic barrier-to-entry analysis as one component of this.[13]

Pricing Behavior in Oligopoly Markets

The behavior of firms in oligopoly markets is one of the mainstays of IO research. NBER researchers have made considerable progress in better understanding firms' pricing decisions, particularly with reference to price dispersion. Although competitive models tend to assume that consumers are perfectly informed about each firm's single price, many markets deviate substantially from this description. The ability to price discriminate — charging different prices for a product either across firms or to different customers of the same firm — may enable firms to extract greater consumer value from a transaction or to expand the set of customers they serve. This phenomenon appears ubiquitous in the economy.

Consumer search costs may be an important source of sustained price variability in a market. For example, cash prices for a given prescription drug vary widely across pharmacies within a particular geographic market. The magnitude of price dispersion is correlated with attributes that appear related to the costs and benefits of consumer search, for example, greater price variation for drugs prescribed for one-time use to treat an acute condition, relative to those prescribed for ongoing purchase as maintenance therapies. Alan Sorensen (8548) uses information on retail price dispersion and prescription attributes to analyze the distribution of consumer search costs for these products. His estimated model of consumer pharmacy choice suggests that search intensities in this market are relatively low — implying that, on average, only 5 to 10 percent of prescriptions are comparison-price shopped.

One way to increase search intensity is to lower its cost. Internet retailing often has been cited as intensely price competitive in large part because of easy consumer search for low-price vendors. Joel Waldfogel and Lu Chen (9942) argue that this reduces the price advantage of brand-name retailers. They find that consumer exposure to price comparison sites such as DealTime.com reduces Amazon purchase shares for those consumers, and that reductions are roughly twice as large for sites that include retailer reliability information (which may substitute for retailer brand reputation) in addition to item price. Goolsbee and Judith Chevalier (9085) develop a method of estimating price elasticities for online booksellers using publicly available data on Amazon and Barnes & Noble.com, and conclude that consumers are quite sensitive to prices, particularly at Barnes & Noble.com. Glenn Ellison and Sara Fisher Ellison (10570) show that Internet retailers respond strategically to the increased pricing pressure imposed by these price comparison sites, though. Their analysis of the online computer components market demonstrates that retailers engage in a variety of practices to mitigate the extreme price-sensitivity that price comparison sites may induce, allowing firms to mark-up prices at least enough to cover fixed as well as marginal costs for efficient retailers. Glenn Ellison (9721) provides a theoretical model of one such practice, "add-on pricing" — for example, advertising low prices for one good in the expectation of selling additional (or higher quality) products to consumers at a high price at the point of sale. His work shows that this practice can sustain softer price competition as a competitive equilibrium.

A rich body of research by Florian Zettelmeyer, Fiona Scott Morton, and Jorge Silva-Risso uses data on individual consumer automobile purchases to explore the interaction of retail auto pricing, consumer information, and Internet information and referral services. These researchers first document significant reductions in average automobile purchase price associated with using an Internet referral service (8667), on the order of 2.2 percent after controlling for selection effects in who uses the service. They then show that Internet referrals disproportionately benefit minority buyers, offsetting the average 2 percent price disadvantage these groups incur because of their personal costs of search or negotiation for purchases made through traditional dealer channels (8668). In research that matches consumer survey and transactions data to explore the mechanism underlying these price effects, these researchers conclude that increased transparency of dealer invoice costs combine with greater negotiating clout of the online referral service to reduce a customer's price by an average of 1.5 percent (11515). Consumer information appears to be particularly important in extracting value from auto price negotiations. For example, Megan Busse, Zettelmeyer, and Silva-Risso find that purchasers obtain 80 percent of the value of auto manufacturer promotions in the form of heavily promoted customer rebates, but only 35 percent of the value of promotions that are paid as dealer discounts (10887). This research agenda has provided unparalleled insights into pricing determinants in a significant consumer market, and generated important new findings for the role of the Internet in changing outcomes in conventional retail channels.

Auction Markets

While Internet retailing in general has attracted considerable attention and interest, the icon of Internet selling may well be eBay. Its popularity as a mechanism for matching buyers and sellers has spawned a rich economics literature as well as numerous competitors; much of this is described in Patrick Bajari and Ali Hortacsu's survey of Internet auctions research (10076). The seeming ubiquity of auctions, for goods ranging from fine art to Beanie Babies, and in settings that range from government procurement to pollution permits,[14] has prompted several NBER researchers to model the benefits of auctions over alternative market transaction mechanisms. Alexandre Ziegler and Edward Lazear (9795) analyze the choice between retail store-based and auction markets. They describe the relative benefits of each, and characterize the conditions that lead to more efficient market organization through retail stores relative to auctions. Eduardo Engel, Ronald Fischer, and Alexander Galetovic (8869) analyze Demsetzian auctions for exclusive rights in settings that range from procurement to royalty contracts, and conclude that "competition for the field" through ex ante auctions welfare dominates duopoly competition whenever marginal revenue is decreasing in quantities sold. Bajari, Robert McMillan, and Steve Tadelis (9757) highlight limitations of auctions relative to negotiations in procurement settings, particularly those dominated by incomplete information. With Stephanie Houghton, Bajari and Tadelis estimate adaptation and renegotiation costs to procurement contracts awarded by auction mechanisms (12051).

As Susan Athey and Philip Haile point out (12126, p. 1), "auctions have provided a fruitful area for combining economic theory with econometric analysis ... to understand behavior and inform policy." Athey and Haile describe methodological innovations, many by NBER researchers, which have facilitated estimation of more realistic models and provided significant insights into auction market operation and performance. A significant thrust of this work has been to allow the data more freedom to drive results by relaxing parametric and functional form assumptions. For example, Haile, Han Hong, and Matthew Shum (10105) develop nonparametric tests of one of the key valuation questions in auctions: are bidders' valuations generated by independent private values for the good, in which case bidders need not be concerned about the "winner's curse," or by common values, in which case bidders must optimally shade their bids knowing that winning means they had an excessively optimistic estimate of the good's true value. They apply this test to different types of U.S. Forest Service timber auctions, and find support for its ability to distinguish between settings in which common values are likely to be more or less significant.

Another approach to allaying concerns about constraints imposed by structural model estimates of auctions looks to experimental data. In this spirit, Bajari and Hortacsu (9889) use experimental data to calibrate the quality of structural estimation based on four alternative theoretical models of bidder behavior. Andreas Lange, John List, and Michael Price (10639) develop an innovative combination of field data and lab experimental data to evaluate the impact of secondary resale markets for timber on bidding behavior in timber auctions.

Improving the models and methods available to analyze auction markets can yield important economic insights into these markets, and can aid participants in developing appropriate bidding strategies. But an important policy goal is also to understand the performance of these markets. Mireia Jofre-Bonet and Martin Pesendorfer (8626) develop a method of estimating a dynamic model of behavior in repeated highway construction procurement auctions with firm-level capacity constraints, and then quantify efficiency losses that result in this setting. In many repeated auctions settings, the potential for collusion among bidders may also be a significant concern. Ken Hendricks, Rob Porter, and Guofu Tan (9836) develop a theory of collusion in affiliated private value and common value auction environments, and use their model to test for bidding rings in federal offshore oil and gas lease auctions. They show that the winner's curse in common value settings works against bid rigging for marginal tracts. Bajari and Fox (11671) analyze potential collusion in FCC spectrum auctions; Orley Ashenfelter and Kathryn Graddy (10795) provide a case study of price-fixing in auctions using the Sotheby's/Christie's art auctions case, drawing out the lessons for auctions and competition policy from details of this case.

Conclusion

This report of necessity focuses on a fraction of the IO research conducted by NBER scholars, although I hope it provides an indication of the breadth and depth of contributions made in this area. Interested readers are encouraged to peruse the NBER website to access the entire body of scholarly work in this area.

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1 *NBER researchers also have been responsible for an extensive body of work on methodological advances in empirical industrial organization. Ariel Pakes (10154) provides an overview. Areas that have attracted considerable attention include hedonic modeling: see, for example, papers by Pakes (8715), James Heckman, Rosa Matzkin, and Lars Nesheim (9895), Lanier Benkard and Patrick Bajari (9980, 10278). Considerable work also has focused on estimation of dynamic games: for example, papers by Igal Hendel and Aviv Nevo*

(9048, 11307), Jaap Abring and Jeffrey Campbell (9712), Martin Pesendorfer and Philipp Schmidt-Dengler (9726), Bajari, Benkard, and Jon Levin (10450), Pakes, Michael Ostrovsky, and Steven Berry (10506), Adam Copeland and George Hall (11870), Gabriel Weintraub, Benkard, and Ben Van Roy (11900), and Guillermo Caruana and Liran Einav (11958).

[2] *F. Wolak, "Regulating Competition in Wholesale Electricity Supply," NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005.*

[3] *P. L. Joskow, "Incentive Regulation in Theory and Practice: Electricity Distribution and Transmission Networks," NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005.*

[4] *Pindyck also examines the implications of sunk costs for competition policy (11430).*

[5] *J. Hausman and J.G. Sidak, "Telecommunications Regulation: Current Approaches with the End in Sight," NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005.*

[6] *G. Crawford, "Cable Television: Does Cable Need to be Regulated Any More?" NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005.*

[7] *S. Borenstein and N. L. Rose, "Regulatory Reform in the Airline Industry," NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005.*

[8] *Danzon, P.M. and E. Keuffel, "Regulation of the Pharmaceutical Industry," NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005.*

[9] *R. Kroszner and P. Strahan, "Regulation and Deregulation of the U.S. Banking Industry: Causes, Consequences, and Implications for the Future," NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005.*

[10] *E. Zitzewitz, "Financial Regulation in the Aftermath of the Bubble," NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005*

[11] *D. W. Carlton and R. Picker, "Antitrust and Regulation," NBER Conference on* Economic Regulation and Its Reform: What Have We Learned? *2005.*

[12] *David Evans, Albert Nichols, and Richard Schmalensee's analysis of the Microsoft case (11727) argues that the remedies imposed struck a reasonable balance among competing concerns.*

[13] *See also antitrust analysis in more general settings; for example, Charles Calomiris and Thanavut Pornrojnangkool (11351) on anticompetitive effects of bank mergers in lending markets, Evans and Schmalensee (11603) on competition policy in markets with two-sided platforms, and Carlton and Michael Waldman (11407) on tying in durable goods markets.*

[14] *See, for example, Orley Ashenfelter and Kathryn Graddy (8997) on art auctions, Bajari and Jeremy Fox (11671) on FCC spectrum auctions, and Luis Cabral and Hortacsu (NBER WP 10363) on reputation mechanisms in e-Bay auctions.*

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Europe

Alberto Alesina*

Per capita income in Continental Western Europe (in short, Europe) was catching up with the United States from the end of the Second World War until the mid-1980s; from 1950 to about 1975, we speak of a European miracle. Then, something changed. The United States re-emerged from the difficult decades of the 1970s with a renewed political energy that led to deregulation, increased competition, reduction of marginal tax rates, and restructuring of corporations, which later facilitated the immediate adoption of the innovations from the information revolution. Europe, instead, seemed "stuck:" incapable of gathering sufficient energy to reform itself. This was especially the case for the largest countries: Germany, France, Italy, and Spain.

What Happened?

Let's start with the basics. One of the most remarkable facts about Europeans is that they work much less than Americans. Europeans worked more than Americans in the 1950s and 1960s, when they were lowering their heads in the war reconstruction efforts, first, and then during a period of boom. But then Europeans began to work fewer and fewer hours per capita. While in the early 1970s hours worked per person were about the same in Europe and in the United States, today the French, German, and Italians work about 1400 hours per person per year versus about 1800 hours per person in the United States.

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There are three reasons why work hours per person are lower in Europe: 1) fewer people are in the labor force (early retirements, lower worker participation, delayed entry into the labor force, all in various combinations depending on the country); 2) more vacation time for those who do work; 3) lower hours in a "normal" work week. In different proportions for different countries, all three factors matter. For instance, in Italy the first factor, lower participation, is the driving force. In France and Germany, all three factors explain about a third each of the difference with the United States.

Europeans are working less and less for three reasons: first, increasing marginal tax rates (especially from the 1960s to the 1980s); second, a preference for leisure; and, third, labor regulation and union-imposed standards for work time, including retirement regulations. Social multipliers compounds these effects: if a family member or friend has more time off, your own benefit from leisure increases, creating more social demand for leisure. When it becomes the social norm, because of regulations requiring six weeks of vacation, or retirement at age 60 because the law imposes it, then it is difficult to change people's minds about what is "fair".

Working less and maintaining reasonable growth rates is possible if your productivity increases at a healthy pace. In fact, this has been the case for several decades in Europe in the 1950s, 1960s, and later through the 1980s. So, Europeans managed to keep up with the United States by working less but being more and more productive. But in the 1990s, European productivity growth fell below that of the United States. Europe was slower to capture the benefits of the technological revolution in information technology (IT). Part of the reason was lack of competition in the product and, especially, the service markets. The slow pace of deregulation in these sectors created disincentives to innovation and investment.[1] An early deregulation in the1980s, restructuring of companies, and a new generation of aggressive and powerful CEOs in the United States created the fertile ground on which the IT revolution could generate an exceptional period of rapid growth. In Europe, instead, incumbent firms continued with the old practice of government protection from competition and government hidden subsidies.

The second major rigidity in Europe is, of course, in the labor market. Firing costs interfere with firms' decisions, making them cautious about hiring. Rather than removing these impediments (and introducing well thought out unemployment insurance schemes), several countries, especially France, seem unable to reform. Europeans remain enamored of "job security" which often means "security" for those insiders who have a job and no work for those who are not "in". Progress in this direction, achieved in Denmark and Sweden, both of which have vastly reduced firing costs, has been immediately followed by a significant reduction in unemployment.

In summary, you can work less and less and not fall behind if you are more and more productive when you work. But several countries in Europe may have pushed this too far, and their policies are not sufficiently productivity enhancing. Perhaps Europeans have more or less consciously "chosen" to grow less than the United States and to fall behind economically and, as a consequence, politically, but this does not seem to be the official rhetoric emanating from European capitals.

The Role of the EU

Has the European Union been able to increase competition and move the continent to market-friendly growth-enhancing reforms? The record is mixed. On the one hand, some progress has been achieved in the area of trade, government subsidies, and goods markets. But, on the other hand, Europe remains full of impediments to free market competition across national boundaries, especially in the service sectors and when it comes to mergers and acquisition. [2]

Rather than concentrating on this critical point of a common and truly continental free market, EU institutions have vested much energy in areas that are better left to national governments. An excessive tendency to "coordinate" and "plan" in Brussels has led to inconclusive rhetoric and displaced efforts.[3] One prime example of this is the glorified "Lisbon process" that sets detailed targets on socioeconomic variables, identical for all countries in Europe, and all to be reached within a certain time period. For example, the Lisbon targets specify how many children of different age groups should be in public childcare facilities in 2010 in all European Union countries, what the women's participation rate should be in the labor force, and so on. Another example is the "obsession" with the coordination of fiscal policy imbedded in the details of the Growth and Stability Pact.[4] The need for tight coordination of fiscal policy in a monetary union has been vastly overemphasized. Part of the problem is that certain countries historically incapable of keeping the fiscal house in order (like Italy and Greece) needed to be "constrained" with some external commitments, but lately even France and Germany have violated these budget rules.

Why did EU institutions make this mistake, namely focusing on excessive coordination? There are two reasons: one is, in part, a typical European tendency to "plan," and a favorable view of government dictated policies for achieving a multitude of social goals. The second is the resistance of national governments to truly open their markets, a resistance that has created obstacles to those European leaders who indeed understood the benefits of competition. In European capitals, often one hears a grand pro-European rhetoric, but as soon as non-domestic (but European) firms try to acquire domestic ones, the European rhetoric is immediately forgotten and nationalistic protection resurfaces.

And the Euro?

Overall, the first six years of the Euro have confirmed the pros and cons that economists had identified regarding the construction of an average monetary union.[5] The Euro has eliminated the possibility of competitive devaluations that, in the end, cause inflation and has vastly reduced the risk premise of government debt of highly indebted countries, such as Italy. It also has facilitated financial market integration and possibly interregional trade and may have increased cross-national price competition.

On the other hand, it has imposed the same monetary policy on all country members. As it turns out, the economic cycles of countries in "Euro land" have been less correlated than one might have predicted; therefore, the common monetary policy does not indeed fit all countries at all times. The European Central Bank has been repeatedly accused of checking European growth and compared negatively to the pro-growth policies of the Federal Reserve Bank of Alan Greenspan. However, these criticisms of the European Central Bank are almost totally misplaced. First, this institution is often a convenient scapegoat for governments that do not have the will or courage to implement reforms. Second, these criticisms come from the misplaced view that the European sluggish growth problem is demand driven and that monetary policy could have helped in this regard.

Above and beyond the economic arguments in favor or against a momentary union in Europe, an additional more "political argument" was put forward in favor of the Euro: the common currency, by shutting down competitive devaluations as a temporary "drug" for a national economy, would have facilitated the adoption of structural reforms in the labor, goods, and service markets. Thus far it has not quite worked, certainly not everywhere and with the necessary speed. Labor and goods market reforms, with the exception of a few northern countries, have been very slow to materialize and encounter great political opposition of two types. One is that of "insiders" who fear losing their privileges. Think of incumbent protected firms, unionized workers with job security, service providers sheltered by international competition, banks protected by foreign acquisitions, and so on. The second stems from the general European public, which by and large is "ideologically" averse to free market thinking. In fact, Europe, especially France, seems to be embracing more and more protectionist policies when it comes to foreign competition; and the Anglo-American pro-market approach is viewed more and more suspiciously. These tendencies are ingrained in European culture and reflect the history of ideas of this continent.[6]

Europeans talk about a "European model," something that Germans refer to as a "social market economy," and they contrast it to the Anglo-American free market model. Unfortunately, much of this thinking about a "European model" is fuzzy and ends up facilitating political compromises with privileged insiders. Europe does not have to adopt the American model; it certainly can have something distinct from it, say a system of efficient competitive markets coupled with extensive but efficient redistributive programs and social protection. Northern European countries are moving in this direction, but the major European countries are far from it. In these countries, the combination of regulation, protectionism, high tax rates, and redistributive programs end up creating unnecessary distortion and often directing flows of resources not to the truly needy but to politically powerful categories. Measure of effectiveness of welfare states in moving in the desired direction for income flows from rich to poor vary dramatically across European countries; northern European countries do relatively well, Mediterranean countries are the worst. Lack of swift reforms in many European countries does not depend only on the inability of their leaders. Europeans themselves remain very suspicious of market liberalization. An interesting case in this respect is Germany. This country has received recently the "political shock" due to the assimilation of former East Germans. Evidence shows that their Communist experience has accustomed them to extensive government intervention and, as a result, they have moved the preference of the average German in this direction.[7] Europe faces great challenges in the near future. The need for reforms is clear; the political will is lacking.

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Consumer Demand for Health Insurance

Thomas C. Buchmueller*

Since the early 1990s, prominent proposals for health insurance reform have focused on increasing consumer choice and competition among integrated health plans. Under "managed competition" models, consumers choose from a menu of health plans on the basis of price and quality. Proponents of these market-oriented plans argue that, in such a system, consumers will sort themselves into lower cost, higher quality plans; this pressure by consumers will provide strong incentives to health plans and their affiliated providers to control costs and increase quality in order to compete for enrollment. The Clinton administration's Health Security Act and the "premium support" proposals for reforming Medicare are variants of the managed competition approach. Although a "managed competition" model has yet to be adopted as national policy, many large employers organize their health benefits programs according to the same basic principles. Research on the behavior of employees and retirees in these employer programs provides a useful laboratory for the role of price and quality in consumer health insurance decisions.

One distinct problem for market-oriented solutions to health insurance is that, when consumers are offered a choice of

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health insurance options, the healthy (less risky) consumers may sort themselves into certain plans and the more risky consumers into others. Consequently, some plans will attract a disproportionate share of less costly low risk consumers, while others will attractive older, sicker consumers who are more costly to insure. This "risk selection," in turn, is influenced in part by the rules concerning how insurers are allowed to vary premiums according to subscriber characteristics. State reforms that tightened these rules provide good case studies for understanding the relationship between pricing and risk selection.

The Effect of Premiums on Consumer Health Plan Choices

Two notable experiments in "managed competition" took place in the mid-1990s: the University of California (UC) and Harvard University both offered a menu of plans that varied in generosity, but adopted a "fixed dollar contribution" policy. The plans also varied significantly in cost, so employees had a greater incentive to consider price when selecting a health plan. Because out-of-pocket premiums increased for some employees but not for others, these changes provide a natural experiment for estimating the impact of price on employee health insurance decisions. Studies that I have conducted with colleagues at the University of California, Irvine,[1] and by David M. Cutler and Sarah J. Reber,[2] analyze the effect of these policy changes on employee plan choices, total spending, and risk selection.

The results for UC and Harvard are strikingly similar. In both cases, employees were quite sensitive to price, and were willing to switch plans to save as little as $5 per month in out-of-pocket premiums. Cutler and Reber estimate a short-run premium elasticity of -2. In addition to this demand response, participating insurers lowered their premiums in order to compete for enrollment. At Harvard, the combined effect of employees shifting to lower cost plans and the premium reductions was a 10 percent reduction in total spending in one year. Over a three-year period, total spending in the UC program fell by over 25 percent. This was at a time when increased competition among managed care health plans was causing premiums to decline throughout the country, so these savings cannot be attributed entirely to the adoption of a fixed dollar contribution policy. However, the reduction in premiums charged to Harvard and UC were larger than those observed in the general market, suggesting that the pricing reforms enacted by each university did result in a one-time savings.

In both cases, however, this also came at the expense of the number of choices employees had. The most generous indemnity insurance — which covered care from the doctor of your choice — was subject to an "adverse selection death spiral." Faced with an initial increase in price for this coverage, the healthiest dropped out of indemnity insurance into lower cost plans. Those who remained in the plan were, therefore, sicker on average. To cover their costs, the price of the coverage was raised, which led to more dropouts until, after a few years, no one was covered by the indemnity plan.

One possibly important impediment to market based solutions is that consumers often face substantial "switching costs" when they try to change their health insurance plan. Under managed care, switching insurers often means having to change providers, and even when that is not necessary, individuals may be reluctant to switch plans for fear of suffering an interruption of treatment. "Status quo bias" in decisionmaking is another potential source of persistence. Combining the UC enrollment files with hospital discharge and cancer registry data, Bruce Strombom, Paul Feldstein, and I estimate separate premium elasticities for groups of employees whom we hypothesize to face different switching costs. Specifically, we define 18 distinct groups based on age, job tenure, and health risk, where "high risk" individuals were defined as those who had recently been hospitalized or diagnosed with cancer. Consistent with the switching cost hypothesis, we find that young, low-risk employees who had recently joined the university were the most price-sensitive; older, high-risk employees with long job tenure were the least price-sensitive.

The fact that younger, healthier consumers are more willing to switch health plans in response to a change in prices contributes to adverse selection against plans that are favored by higher-risk consumers. Adverse selection reduces efficiency by distorting the prices of competing plans and, in the extreme, driving certain options from the market. In both the UC and Harvard examples, this dynamic caused the most expensive plan available at each university to experience an "adverse selection death spiral" and to be priced out of the market. Cutler and Reber estimate that after two years, the efficiency loss from adverse selection in the Harvard program was roughly 2 percent of premiums.

These and other similar studies[3] tell a consistent story about the price sensitivity of active employees. Proponents of managed competition Medicare reform proposals point to these results and the experiences of other large employers to explain how such reforms would work. However, the extent to which these results generalize to elderly adults in the Medicare program is unclear. In particular, the switching costs that we show to be important for active employees are likely to be even larger for elderly Medicare beneficiaries. In a recent paper, I use administrative data from a different employer-sponsored health benefits program to estimate premium elasticities for Medicare-eligible retirees.[4] This employer's contribution to retiree coverage depends on when a person retired and her years of service at that date. Therefore, two otherwise similar individuals who retired at different points in time, or at the same time with different years of service, face very different out-of-pocket premiums for the same menu of health insurance options. Because this price variation is uncorrelated with the features of those options, or other retiree characteristics, it can be used to obtain unbiased estimates of elasticity. The results indicate a negative and statistically significant effect of price on the choice of a health plan, albeit one that is slightly smaller than the results from the literature on active employees. While this is consistent with the hypothesis that older consumers are less price-sensitive than younger ones, the price effects are large enough to suggest that if Medicare went from a system of administered pricing to competitive bidding, health plans would face strong incentives to compete on price.

From a policy perspective, the "near elderly" adults — that is, those between the ages of 55 and 64 — constitute another important population. Because many firms have cut back on retiree health benefits, early retirees in this age group are especially at risk of being uninsured. Some recent policy proposals, such as allowing individuals under age 65 to buy into Medicare, would address this problem directly. Other proposals, such as tax credits for the purchase of non-group insurance, do not explicitly target the "near elderly" but would be especially relevant for this group. A key parameter for evaluating the cost of such proposals is the price elasticity of take-up.

Sabina Ohri and I [5] estimate the effect of out-of-pocket premiums on the decision by early retirees between the ages of 55 and 64 to take up insurance coverage offered by their former employer. The data are from the same employer-sponsored program I used to model the health plan choices of Medicare-eligible retirees. We find a statistically significant, but small effect of price. The range of our elasticity estimates, from -0.10 to -0.16, is consistent with other studies that use different types of data and different research designs.[6]

Does Limiting Insurers' Discretion Help Consumers in Insurance Markets?

One factor contributing to adverse selection in the UC and Harvard cases is that, in each system, premium contributions faced by employees and premium payments to plans were "community rated" — that is, they did not vary with the risk characteristics of those being insured. As discussed earlier, one result is thus that the most generous plan faced an adverse selection death spiral.

The relationship between the way premiums are rated and risk selection is a major issue in the regulation of private insurance markets, particularly the small group market (typically defined as employer-sponsored groups of 50 or fewer employees) and the individual (or non-group) market. In the early 1990s, nearly every state enacted reforms that targeted insurers' underwriting practices that were seen as discriminating against high-risk groups. The most extreme type of regulation, "pure community rating," mandates that the same premium must be charged for a given plan to all subscribers, regardless of age, gender, or any other risk characteristic. A main goal of these new regulations was to increase coverage, although critics argued that by raising premiums for low risk groups the laws may have reduced coverage, inducing low-risk consumers to drop it.

Although the Harvard and UC experiences suggest that these "adverse selection death spirals" could be important, the results don't tell us how adverse selection affects the overall level of insurance coverage in a market because the universities are closed systems. In both cases, employees facing higher premiums simply switched to other, less expensive plans. John DiNardo and I test for an effect of underwriting regulations on insurance coverage, focusing on reforms enacted by New York in 1993.[7] New York's reforms, which mandated pure community rating in both the small group and individual insurance markets, were the strongest, and hence most controversial, in the country. We compare trends in New York to those in two neighboring states: Pennsylvania, which was one of a handful of states that enacted no reform, and Connecticut, which enacted moderate reforms. We show that, while insurance coverage did fall in New York after the reforms took effect, coverage also was falling in Pennsylvania and Connecticut. One important prediction of the death spiral hypothesis is that coverage should have fallen most among younger consumers for whom the reforms caused the greatest premium increases. This should cause the average age of the insurance pool to increase. While we find some evidence of such changes in New York, the trends for the two comparison states are nearly identical, suggesting that they are driven by factors other than the reforms.

The fact that New York's community rating law did not immediately reduce the number of people with insurance does not mean it had no effect. It may have influenced the types of plans purchased by consumers. In fact, consistent with the simplest Rothschild-Stiglitz model and with the results from the UC and Harvard cases, we find that New York's reforms led to a shift in enrollment away from traditional indemnity plans to health maintenance organizations (HMOs). In a follow-up study, Su Liu and I use national data to test whether this result from New York generalizes to other states.[8] We find that HMO penetration among small employer-sponsored groups increased more in states that enacted relatively strong small group reforms than in states without such reforms.

Recent Developments and Future Research

Recent developments in public programs and private health insurance markets have resulted in significant changes in the options available to consumers and suggest fruitful areas for future research. January 2006 marked the introduction of Medicare Part D, which provides prescription drug coverage. Beneficiaries can obtain this coverage through the same HMOs that were already available in the program or through new stand-alone drug plans offered by private insurers. The resulting menu of options is quite different from what had been envisioned by most managed competition advocates, most notably in the large — some would say bewildering — set of options. Research on the choices made in this new environment is important not only for evaluating the prescription drug benefit, but also as it may inform policymakers concerning future reforms.

The legislation that created Medicare Part D also established Health Savings Accounts (HSAs), tax-free savings accounts that, when used in conjunction with a high deductible insurance plan, can be used to fund medical expenses. In the past, consumers have shown little enthusiasm for high deductible policies, although certain attractive features of HSAs combined with steady increases in premiums for other types of health insurance may change this. Some worry that these plans will be most attractive to low risk consumers who do not anticipate a great need for medical care, thus causing more comprehensive plans to experience adverse selection. If this occurs, it may be HMOs, which benefited in the 1990s from risk-based sorting in the small group market and within employer-sponsored programs like those of Harvard and the UC, that are adversely affected. How the introduction of HSAs affects consumer health insurance decisions and what these new products mean for the stability of insurance markets are interesting areas for future research.

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International Organization of Production and Distribution

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International trade has grown rapidly since World War II, and in the last two decades the acquisition of subsidiaries in foreign countries (that is, foreign direct investment, or FDI) has grown even faster. Not only have foreign trade and FDI expanded rapidly, but their nature also has changed as production has become more fragmented and its individual stages have been dispersed across many countries. These trends have been accompanied by growing domestic and international outsourcing.[1] As a result, we now have a more complex web of international trade and FDI than ever before, which cannot be explained by traditional trade theory. In response, theorists have developed new analytical tools for thinking about these issues. I will describe some of this research in which I was involved.

In order to understand the new organizational forms, it is useful to think about a simple two-dimensional choice that a business firm has to make concerning an intermediate input: it has to decide whether to produce it in-house or to outsource its production to another firm, and in either case it has to decide whether to make it offshore or not. This yields four possibilities. First, an input can be produced in-house in the home country of the firm, in which case there is neither

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foreign trade nor FDI. Second, an input can be outsourced in the home country, in which case there is also neither foreign trade nor FDI. Third, an input can be produced in-house in a foreign subsidiary, in which case there is foreign direct investment. If the input is imported back to the home country for further processing or assembly, there is also intra-firm trade. Finally, an input can be outsourced to a foreign supplier, in which case there is no FDI, but if the input is imported to the home country for further processing or assembly there is arm's-length trade. An understanding of what drives these choices is essential for an understanding of the recent trends in the world economy.

Incomplete Contracts

Grossman and I started to study these issues in the late 1990s, focusing first on the internalization decision (that is, a firm's decision to produce in-house or to outsource). We took an incomplete contracts approach to the theory of the firm. Having in mind dealing with trade and FDI, we first developed an analytical framework suitable for general equilibrium applications.[2] In this framework, final goods producers need specialized intermediate inputs, and they enter an industry as either integrated or outsourcing enterprises, while suppliers of intermediate inputs enter as independent entities. An outsourcing final goods producer has to find an input supplier, and a supplier has to find a buyer. An outsourcing firm pairs up with only one supplier, and vice versa. The probability of each side finding a match depends on the number of producers and suppliers seeking partners. Once a match has formed, the supplier decides on how much to invest in the buyer's specialized input. This is the point at which the incompleteness of contracts kicks in. This model implies that trade has no effect on the organization of industries when matching is subject to constant returns to scale. But when matching leads to increasing returns to scale, the model predicts more outsourcing the more countries engage in foreign trade.[3]

Grossman and I explored related issues in two additional papers, in which the quality of a match is explicitly modeled and it varies endogenously across countries.[4] The first paper focuses on the offshoring decision, the second on the decision to internalize abroad (that is, foreign outsourcing versus FDI). In both, we introduced variations in the degree of contract incompleteness which allow us to examine how differences in the quality of legal institutions across countries, or changes in these institutions in one country, affect firm structure. To illustrate, consider the outsourcing decisions of firms in a country called North, which can buy inputs in North or South, where wages are lower in South and so is the quality of its legal system. In this case, the model finds that improvements in North's legal institutions shift outsourcing from South to North, as we would expect. Yet improvements in South's legal institutions shift outsourcing from North to South only when the gap in the quality of the legal systems is large. The last result shows how labor and product markets interact with institutions to produce unexpected outcomes.

The impact of legal-system quality on trade, via the endogenous formation of Ricardian-type comparative advantage, is explored in a joint paper with Acemoglu and Antràs.[5] We develop a simple framework in which final good producers choose a technology from a set that features a tradeoff between costs and efficiency, and find that the optimal choice depends on the degree of contract incompleteness. In our model, firms want to adopt more efficient technologies, except that their demand for better technologies bids up the acquisition costs of those technologies. As a result, in countries with better legal institutions, firms upgrade their technology only in industries that are relatively vulnerable to contract incompleteness. These happen to be the sectors with relatively low elasticities of substitution across intermediate inputs. In sectors with relatively high elasticities of substitution, the higher cost of technology adoption induces technological downgrading. As a result, countries with better legal systems gain comparative advantage in sectors with low elasticities of substitution, which are particularly sensitive to the incompleteness of contracts. Thus the quality of a country's legal system differentially affects its export performance in sectors that vary by the degree to which they use contract-sensitive inputs.[6]

Sorting into Organizational Forms

Scholars have also developed models of international trade in which firms choose which markets to serve and how to serve them. This work has responded to the accumulated evidence that only a small fraction of firms engage in either foreign trade or FDI, that exporting firms are more productive than non-exporters, multinationals are more productive than exporters, and firm productivity dispersion varies widely across sectors. Melitz developed the most useful model.[7] In his model, firms within an industry differ by productivity and they face fixed costs of exporting. As a result, only the most productive firms export while the less productive firms serve only the domestic market. This sorting pattern is consistent with the evidence, and it has important implications for trade structure and the impact of trade liberalization on the reorganization of industries.

Melitz, Yeaple, and I extended this model to allow firms to serve foreign markets either by exporting or by establishing subsidiaries in foreign countries that sell directly to the host country (horizontal FDI).[8] In this case, only the most productive firms engage in horizontal FDI, low productivity firms serve only the domestic market, and firms with intermediate productivity export. Moreover, the variation across sectors in the ratio of subsidiary sales to export sales is positively correlated with the variation across sectors in the productivity dispersion of firms. The U.S. data support this prediction: productivity dispersion affects trade and FDI. Importantly, the economic size of this effect is large; it is of the same order of magnitude as the impact of fixed costs or freight charges, which are traditional determinants of the proximity-concentration tradeoff in the theory of horizontal FDI.

While the last model focuses attention on horizontal FDI (that is, FDI designed to serve the host market only) and the model from the previous section focuses attention on vertical FDI (that is, FDI designed to reduce manufacturing costs), this neat distinction between two extreme forms of FDI has become less appealing over time, simply because the data show that multinationals are engaged in "complex" integration strategies, which are neither purely horizontal nor purely vertical.[9] Grossman, Szeidl, and I studied such complex integration strategies for industries with productivity dispersion across firms.[10] In our model, firms assemble intermediate inputs to manufacture final goods, and a firm can locate the assembly or the production of intermediates in a combination of countries: home in North, or foreign in North or South. The model predicts a strong complementarily between the two forms of FDI. For example, a low production cost of components in South encourages FDI in components in South as well as FDI in assembly there. This model produces rich patterns of trade and FDI.

Heterogeneity and Incomplete Contracts

Combining heterogeneity in the productivity of firms with incomplete contracts produces predictions about all four organizational forms mentioned at the beginning of this review: integration at home, outsourcing at home, integration in a foreign country, and outsourcing to a foreign country. I study this combination in a joint paper with Antràs.[11] In this model, the tradeoff between integration and outsourcing is driven by the tradeoff between agency costs and the costs of organization. When integration has higher fixed costs than outsourcing and offshoring has higher fixed costs than home sourcing, the model predicts variation in the prevalence of the four organizational forms as a function of industry characteristics. For example, in sectors in which final good producers provide few headquarter services, outsourcing dominates integration. Low-productivity firms in these industries outsource at home, while high-productivity firms outsource to a low-wage foreign country, say South. More productivity dispersion in such industries raises foreign relative to domestic outsourcing. On the other hand, in sectors with a high intensity of headquarter services, all four organizational forms can coexist: the most productive firms engage in FDI, the least productive firms outsource at home, and in between the more productive firms outsource to South while the less productive firms integrate at home. More productivity dispersion raises offshoring relative to domestic supplying of intermediates, and it raises integration relative to outsourcing. Higher headquarter intensity also makes integration more prevalent.

Managerial Incentives

Grossman and I have also studied the sorting pattern of heterogeneous firms when the agency problem arises from managerial incentives rather than incomplete contracts.[12] In this model, outsourcing provides the supplier with better incentives, but integration gives the final good producer better monitoring opportunities. As a result, the least and the most productive firms outsource while firms with intermediate productivity integrate. Among those who integrate, the more productive integrate at home and the less productive engage in FDI. This sorting pattern is quite different from the sorting pattern discussed above, where incomplete contracts were the source of the agency problem. Yet there is evidence for both patterns.[13]

I have reviewed a number of studies that can be used to explain rich patterns of trade and FDI, and the relationship between them. Much of this theory has been motivated by new evidence, and some new implications of the various models have been tested. There remains, however, much more that needs to be done, and new data are needed for this purpose.[14]

1 *The term "outsourcing" has been used in more than one way. I use it in the traditional sense, as the acquisition of an input or service from an unaffiliated firm. In this case domestic outsourcing refers to the acquisition of an input from a domestic unaffiliated firm while international outsourcing refers to the acquisition of an input from a foreign unaffiliated firm.*

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5 *See D. Acemoglu, P. Antràs, and E. Helpman, "Contracts and the Division of Labor," NBER Working Paper No. 11356, May 2005.*

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12 *See G.M. Grossman and E. Helpman, "Managerial Incentives and the International Organization of Production," NBER Working Paper No. 9403, December 2002, published in the* Journal of International Economics *63(2), July 2004, pp. 237–62.*

13 *See S.F. Lin and C. Thomas, "When Do Multinational Firms Outsource? Evidence From the Hotel Industry," mimeo, Harvard University, 2005*

14 *See E. Helpman, "Trade, FDI, and the Organization of Firms," mimeo, Harvard University, February 2006, forthcoming in the* Journal of Economic Literature, *for a detailed review of the literature on these topics.*

Historical Aspects of U.S. Trade Policy

Douglas A. Irwin*

While international trade and trade policy continue to be as controversial as ever, the United States has been committed for more than half a century to maintaining an open market. It was not always that way. For most of U.S. history, the United States imposed fairly substantial barriers to imports in an effort to protect domestic producers from foreign competition.

For the past several years, I have been investigating the historical aspects of U.S. trade policy as part of the NBER's research on international trade and the development of the American economy. The purpose of this research has been to study the economic effects of past trade policies on the U.S. economy and understand the political and economic forces that have shaped those policies.[1]

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Early American Trade Policy

To say much about the stance of a country's trade policy requires, at a minimum, data on the average tariff level. Unfortunately, standard U.S. trade statistics only started calculating average tariff figures from 1821. To fill the gap in the historical data, I gathered information from early government documents to calculate the average tariff on total and dutiable imports for the period from 1790 to 1820.[2] These figures reveal that tariffs started out at relatively low levels, about 15 percent in the 1790s, but rose thereafter to generate additional revenue and help finance the War of 1812. Because reexports were a significant component of U.S. foreign trade at this time, my study suggests that it is important to adjust for drawbacks (rebated tariff revenue on reexported goods) to determine the true level of the tariff.

One of the classic, early statements on U.S. trade policy is Alexander Hamilton's Report on Manufactures in 1791. This report called for government support of manufacturing through subsidies and import tariffs, but it is commonly believed that the report was never implemented. Although Hamilton's proposals for bounties (subsidies) failed to receive support, my research has shown that Congress adopted virtually every tariff recommendation put forward in the report by early 1792.[3] These tariffs were not highly protectionist duties, because Hamilton feared discouraging imports, the critical tax base on which he planned to fund the public debt. Indeed, because his policy toward manufacturing was one of limited encouragement and not protection, Hamilton was not as much of a protectionist as he is often made out to be. Hamilton's moderate tariff policies found support among merchants and traders, the backbone of the Federalist Party. But disappointed domestic manufacturers shifted their political allegiance to the Republican Party, led by Thomas Jefferson and James Madison, both of whom were willing to consider much more draconian trade policies aimed at Britain.

Indeed, as president, Jefferson was responsible for one of the most unusual policy experiments in the history of U.S. trade policy. At his request, Congress imposed a nearly complete embargo on international commerce from December 1807 to March 1809. The Jeffersonian trade embargo provides a rare opportunity (or natural experiment) to observe the effects of a nearly complete (albeit short-lived) elimination of international trade. Economists usually describe the gains from international trade by comparing welfare at a free-trade equilibrium with welfare at an autarky equilibrium. In practice, such a comparison is almost never feasible because the autarky equilibrium is almost never observed, except in unique cases such as this one. By mid-1808, the United States was about as close to being fully shut off from international commerce as it has ever been during peacetime.

Monthly price data allow us to observe the dramatic impact of the embargo: the export-weighted average of the prices of raw cotton, flour, tobacco, and rice, which accounted for about two-thirds of U.S. exports in the United States, fell by one third within a month or two of the embargo. The price of imported commodities rose by about a third as the number of ships entering U.S. ports fell to a trickle and imports became increasingly scarce. According to my calculations, the static welfare cost of the embargo was about 5 percent of GDP.[4] Thus, the embargo inflicted substantial costs on the economy during the short period that it was in effect.

The embargo, along with the dramatic reduction in trade as a result of the War of 1812, is commonly believed to have spurred early U.S. industrialization by promoting the growth of nascent domestic manufacturers. Joseph Davis and I used his newly available series on U.S. industrial production to investigate how this protection from foreign competition affected domestic manufacturing.[5] On balance, the trade disruptions did not decisively accelerate U.S. industrialization as trend growth in industrial production was little changed over this period. However, the disruptions may have had a permanent effect in reallocating resources between domestic infant industries (such as cotton textiles) and trade-dependent industries (such as shipbuilding).

Antebellum Trade Policy

During the 1820s, the average tariff on dutiable imports rose sharply, peaking at over 60 percent in 1830, even higher than under the notorious Hawley-Smoot tariff of 1930. Over the next decade, the average tariff fell by half, and stood at less than 20 percent by the Civil War. In fact, the period from 1830 to 1860 was one of just two in American history when tariffs exhibited a secular decline (the other being from the mid-1930s to the present). What political economy factors explain the rise and fall of tariffs during this period?

A shift in the economic interests of the West (the Midwest of today) appears to explain this pattern.[6] In the highly sectional politics of the day, the North favored high tariffs, the South favored low tariffs, and the West was a swing region. In the 1820s, a coalition in Congress between the North and West raised tariffs by exchanging votes on import duties for spending on internal improvements, which benefited the West. But when President Andrew Jackson began vetoing internal improvements bills, he effectively de-linked these issues and destroyed the North-West alliance. South Carolina's refusal to enforce the existing high tariffs sparked the nullification crisis and paved the way for the Compromise Tariff of 1833, which phased out tariffs above 20 percent over a nine year period. Although Congress could not credibly commit to implementing the staged reductions or maintaining the lower duties, the Compromise held because of the growing economic interest of the West in exporting grains (due, ironically, to transportation improvements as the railroad network expanded) which gave it a stake in maintaining a lower tariff equilibrium in cooperation with the South.

Aside from revenue, the ostensible purpose of such import tariffs was to protect import-competing manufacturers from foreign competition. The role of the tariff in promoting the expansion of the early American cotton textile industry has been quite controversial, with older scholarship by Frank Taussig suggesting that the industry was well established by the 1830s and more recent work suggesting that the tariff remained critical for some time. In joint work, Peter Temin and I concluded that Taussig was correct in that the cotton textile industry could survive without the tariff by the early 1830s.[7] Using data from 1826 to 1860, we estimated the sensitivity of domestic production to fluctuations in import prices and concluded that most of the industry could have survived even if the tariff had been completely eliminated. The lack of responsiveness of domestic production to changes in import prices was mainly due to the specialization of American and British producers in different types of textile products that were imperfect substitutes for one another: imports consisted of intricate ginghams, whereas New England power looms were supplying plain weaves, such as sheeting.

In terms of exports, the United States produced about 80 percent of the world's cotton in the decades prior to the Civil War, most of which was exported. A long-standing question has been the degree to which the United States had market power in cotton and how much it could have gained from an optimal export tax on cotton. To address this question, I estimated the elasticity of foreign demand for U.S. cotton exports and used it in a simple partial equilibrium model to determine the optimal export tax and its probable impact on prices, trade, and welfare.[8] The results indicate that the export demand elasticity for U.S. cotton was about -1.7 and that the optimal export tax of about 50 percent would have raised U.S. welfare by about $10 million, that is about 0.3 percent of U.S. GDP or about 1 percent of the South's GDP. (Such a tax was not implemented, however, partly because the U.S. Constitution forbids the imposition of export taxes.) One implication is that the welfare gains from an export tax are not necessarily large, even for a country with considerable market power.

Post Civil War Industrialization and Growth

After the Civil War, the United States maintained high tariffs to protect domestic manufacturers from foreign competition. Tariff advocates claimed that high import duties helped to expand industrial employment and keep wages high, while also aiding farmers by creating a steady demand in the home market for the food and raw materials that they produced. Tariff critics charged that those import duties raised the cost of living for consumers and harmed agricultural producers by effectively taxing their exports, thus redistributing income from consumers and farmers to big businesses in the North.

One approach to examining the magnitude of protection given to import-competing producers and the costs imposed on export-oriented producers is to focus on changes in the domestic prices of traded goods relative to non-traded goods.[9] Because the tariff also increased the prices of non-traded goods, the degree of protection was much less than indicated by nominal rates of protection; my results suggest that the 30 percent average tariff on imports yielded just a 15 percent implicit subsidy to import-competing producers while effectively taxing exporters at a rate of 11 percent. The paper also indicates that the tariff policy redistributed large amounts of income (about 9 percent of GDP) across groups, although the impact on consumers was roughly neutral because they devoted a sizeable share of their expenditures to exportable goods. These findings may explain why import-competing producers pressed for even greater protection in the face of already high tariffs and why consumers (as voters) did not strongly oppose the policy.

Were protectionist policies essential for domestic industries after the Civil War? In the case of pig iron, high import tariffs may have helped those producers, but they harmed other manufacturers who needed access to cheap iron to produce other products, such as machinery and bridges.[10] One justification for the tariffs is that they promoted the growth of infant industries. I examined the case that has been heralded as possibly the best example of infant industry protection: the tinplate industry, which produces thin sheets of iron or steel that have been coated with tin.[11] Although the tinplate industry is an obscure one, it is unique because, unlike most manufacturing industries, it did not receive significant tariff protection after the Civil War, apparently because of a mistaken interpretation of the tariff code. Left without adequate protection, there was virtually no domestic production prior to 1890. The McKinley tariff of 1890 substantially raised the duty on imported tinplate to encourage the entry and growth of domestic producers. The act also contained an unusual provision in which the tariff would be completely eliminated in six years if, by that time, domestic production did not amount to at least one-third of imports. The tariff succeeded in promoting domestic production and output rapidly expanded, and by about 1910 the price of U.S. tinplates fell below those produced in the United Kingdom.

The tinplate example has all the elements of an apparently successful application of infant industry protection. But in asking the counterfactual question — would the industry have developed anyway, and were the tariffs worthwhile? — I answer yes and no. My analysis suggests that tinplate was not an "infant industry" that floundered because of the lack of previous production experience (learning by doing), but rather an industry in which domestic production was not profitable because of the high domestic cost of iron and steel inputs attributable to tariffs. The tinplate industry suffered from negative effective protection due to the existing tariff structure; while a second-best optimal tariff could have corrected that distortion, and improved welfare, such an optimum was not imposed. In the absence of the McKinley tariff, the U.S. tinplate industry would have established itself about a decade later as the material input costs of iron and steel converged with those in Britain. Over this time horizon, the McKinley duty fails to pass a cost-benefit test.

Were high import tariffs somehow related to the strong U.S. economic growth during the late nineteenth century? One paper investigates the multiple channels by which tariffs could have promoted growth during this period.[12] I found that 1) late nineteenth century growth hinged more on population expansion and capital accumulation than on productivity growth; 2) tariffs may have discouraged capital accumulation by raising the price of imported capital goods; and 3) productivity growth was most rapid in non-traded sectors (such as utilities and services) whose performance was not directly related to the tariff.[13]

At the end of the nineteenth century, though, the pattern of U.S. trade changed dramatically. For most of the century, the United States had a strong comparative advantage in agricultural goods and exported mainly raw cotton, grains, and meat products in exchange for imports of manufactured goods. But in the mid-1890s, America's exports of manufactures began to surge. Manufactured goods jumped from 20 percent of U.S. exports in 1890 to 35 percent by 1900 and nearly 50 percent by 1913. In about two decades, the United States reversed a century-old trade pattern and became a large net exporter of manufactured goods. What accounts for this abrupt change in the structure of U.S. exports?

My research suggests that natural resource abundance fueled a dramatic expansion of iron and steel exports, in part by enabling a sharp reduction in the price of U.S. exports relative to other competitors.[14] In this case, the commercial exploitation of the Mesabi iron ore range in Minnesota reduced domestic ore prices by 50 percent in the mid-1890s and was equivalent to over a decade's worth of industry productivity improvement in its effect on iron and steel export prices. The non-tradability of American ore resulted in its distinctive impact on the pattern of U.S. trade; whereas raw cotton was tradable, and hence the domestic cotton textile industry did not reap an advantage from having local production of cotton, iron ore and other minerals were difficult to trade, and therefore they were exported in final products, not in raw form.

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1 *This is an update from my previous report in the Winter 1999* NBER

Reporter. *See D.A. Irwin, "Historical Perspectives on U.S. Trade Policy,"* NBER Reporter, *Winter 1999.*

2 *D.A. Irwin, "New Estimates of the Average Tariff of the United States, 1790-1820," NBER Working Paper No. 9616, April 2003, and* Journal of Economic History, *63 (June 2003), pp. 506–13.*

3 *D.A. Irwin, "The Aftermath of Hamilton's Report on Manufactures," NBER Working Paper No. 9943, September 2003, and "The Aftermath of Hamilton's Report on Manufactures,"* Journal of Economic History, *64 (September 2004), pp. 800–21.*

4 *D.A. Irwin, "The Welfare Costs of Autarky: Evidence from the Jeffersonian Embargo, 1807-1809," NBER Working Paper No. 8692, December 2001; and "The Welfare Costs of Autarky: Evidence from the Jeffersonian Embargo, 1807-1809,"* Review of International Economics *13 (September 2005): pp. 631–45.*

5 *J. H. Davis and D.A. Irwin, "Trade Disruptions and America's Early Industrialization," NBER Working Paper No. 9944, September 2003.*

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NBER Profile: *Thomas C. Buchmueller*

Thomas C. Buchmueller is a Research Associate in the NBER's Programs in Health Care and Health Economics. He received his B.A. in Economics from Carleton College in 1985 and his Ph.D. in Economics from the University of Wisconsin, Madison in 1992. Since 1992, he has taught at the University of California, Irvine, where he is Professor of Economic and Public Policy at the Paul Merage School of Business. He has also been a visiting scholar at University of York (UK), INSEAD and CREDES in France, and at the Federal Reserve Bank of San Francisco. Buchmueller will be spending the 2006–7 academic year in Australia as a Packer Policy Fellow. Then, he will be joining the faculty of the University of Michigan's Stephen Ross School of Business, where he will hold the Waldo O. Hildebrand Chair in Risk Management and Insurance.

Buchmueller's research focuses on the economics of health insurance and related public policy issues. In particular, he is interested in the relationship between health insurance and labor market outcomes, the interaction between the public sector and private insurance markets, and consumer demand for health insurance. From 2002 to 2006, he was a Deputy Editor of *Medical Care*. He is currently a Deputy Editor of the *Journal of Economics and Management Strategy* and is on the Editorial Board of *Inquiry*.

Buchmueller lives in Irvine, California with his wife Liz Phillips, a social worker; his children, Sophie and Adam; and a 14-year old beagle. He enjoys playing basketball, traveling, and following the Red Sox from afar.

Conferences

"New Ideas about New Ideas"

Considerable work has been done on creativity across a wide-range of disciplines, including business, cognitive neuroscience, economics, history, psychology, and sociology, but until recently there had been little interaction among these researchers. But on March 10 and 11, fifteen experts on innovation and creativity from these disciplines — both established senior scholars and emerging younger researchers — met at the NBER in Cambridge for a "New Ideas About New Ideas Conference" designed to foster cross-disciplinary dialogue on creativity and innovation. The conference, supported by the Sloan Foundation, was organized by NBER Research Associate Richard Freeman of Harvard University and Faculty Research Fellow Bruce Weinberg of Ohio State University. Weinberg also prepared this summary article for the NBER *Reporter*.

Given the varied group and the nature of scientific papers presented, one might have been concerned about the ability to communicate across disciplinary lines, let alone to find common interest, but soon cognitive neuroscientists were discussing history, psychologists were talking about economics, and everyone was poring over images of the brain. And, after close to 20 hours of discussions, some during an informal stroll along the Charles River, a set of themes emerged quite clearly along with policy implications and directions for future research.

Indeed, the timing was also fortuitous from a policy perspective. As the most recent State of the Union Address indicated, the United States increasingly sees its economic position challenged, and creativity and innovation are viewed as the most promising directions for us to take in maintaining our position. On the other hand, this increased interest in creativity and innovation may conflict with demographics — the workforce has been aging, and creativity and innovation traditionally have been regarded as linked to youth.

I. The Idiosyncrasy of Innovation

With innovation viewed as a way for the United States to maintain its economic position, it is natural to ask what can be done to foster it. As **Daniel Goroff** — a mathematician and the Dean of Faculty at Harvey Mudd College — discussed, colleges and universities increasingly are prioritizing creativity, and the Mills Commission is recommending systematic testing of higher education outcomes.

Our working definition of creativity was "the production of novel and useful ideas or artifacts." The discussion touched on the arts, industry, and sciences. Perhaps the single point on which there was the widest agreement was that, while there are recognizable patterns in creativity, the motivations of creators and the processes by which creative ideas arise are frequently specific to the individual, or idiosyncratic. The idiosyncratic nature of innovation showed up in brain images, in problem-solving experiments, and in analyses of historical and contemporary innovations and innovators. Participants were optimistic about our ability to foster creativity; however, we agreed that, to be successful, we must attempt to confront the idiosyncratic nature of creativity.

The Idiosyncratic Nature of the Creative Brain

At the finest level, the cognitive neuroscientists at the conference showed the idiosyncratic nature of creativity in brain functioning. **Mark Jung-Beeman**, a cognitive neuroscientist at Northwestern University, showed that distinct brain areas contribute when people solve problems with insight, that is, when solutions are accompanied by "Aha" moments. The patterns of brain activity suggest an increase in "top-down" processing, and increased contributions from the brain's right hemisphere. Beeman attributed the latter effect to the more diffuse links in the right brain, which allow for novel or idiosyncratic connections across distantly related concepts.

John Kounious, a cognitive neuroscientist at Drexel University, showed that, although the final moment of insight is sudden, there are substantial changes in brain activity leading up to insight solutions to problems, such as a quieting of the sensory areas of the brain in the seconds before the solution reaches consciousness. He interpreted these results as the unconscious brain searching for solutions, but having to quiet down external inputs to bring a candidate solution into consciousness. Moreover, patterns of brain activity before people even see a problem predict whether they will solve that problem with insight, or more analytically. Finally, he also reports that moderate rates of arousal are best for problem solving, with the optimal amount of arousal being lower as problems become more difficult.

Sohee Park, a cognitive neuroscientist at Vanderbilt University, discussed the link between psychosis and creativity. She showed that while psychosis itself may interfere with creativity, the more idiosyncratic associations among people who are psychosis-prone (but clinically normal) enhance creativity. She interpreted these results by arguing that psychosis increases the novelty of associations, but interferes with memory and other processes that are essential for creativity. Healthy but psychosis-prone people also show increased use of their right frontal lobe when they are generating novel ideas.

Teresa Amabile, a psychologist at Harvard Business School, discussed how emotions can influence the creative process. Although research on psychopathology has found a connection between depression and creativity among artists and writers, the emotion-creativity connection has been virtually unexamined among adults working in business organizations. Amabile discussed the results of an extensive study that found a consistent, positive relationship between positive emotion and creativity. Exploiting the longitudinal nature of the data, she showed that positive affect preceded creativity in the coming days. She also found that getting a new idea or having an insight can evoke immediate (though short-lived) feelings of elation — even when the idea is a relatively minor one. Thus, her study revealed bi-directional causality in the connection between positive emotion and creativity at work, and it also suggested an incubation effect whereby positive emotion on one day can stimulate new cognitive associations that bear fruit in the coming days. Given the different domains studied, these results are consistent with those of Park and others who study the link between psychosis and creativity.

Perhaps the most extreme statement of the view of innovation as idiosyncratic is the chance permutation model of **Dean Keith Simonton**, a psychologist at the University of California, Davis. In his model, important contributions are the result of purely random combinations of ideas. He discussed a broad range of evidence supporting his approach.

The Idiosyncratic Nature of Creative Motivations

The motivations of innovators also are idiosyncratic, and this is particularly true in the initial development of an innovation. **Josh Lerner**, an economist at Harvard Business School, showed that many of the early developers of open-source code were hackers who contributed to open source code for the stimulation of programming, the recognition of their peers, or to oppose commercial software manufacturers. Companies only contribute to open source code once a large body of code has been developed and the commercial benefits are clear.

David Galenson and **Bruce Weinberg**, economists at the University of Chicago and Ohio State University, find that early phases of revolutions in the arts, industry, and science are more likely to arise from individuals pursuing their aesthetic goals or from serendipity. As revolutions develop, market factors become more important. In physics for instance, many of the discoveries that led to the development of quantum mechanics arose accidentally, but later contributions were self-conscious attempts to explain earlier results.

Consistent with these findings, Teresa Amabile's research has revealed an intrinsic motivation principle of creativity: people will be most creative when they are motivated primarily by the interest, enjoyment, satisfaction, meaningfulness, and personal challenge of the work itself, rather than by extrinsic inducements or constraints. This principle is best understood within a social-psychological view of creativity. Although peoples' production of creative (novel and appropriate) work certainly depends on both their domain expertise and their creative thinking skills, it also depends on their level of intrinsic motivation for the work, which can be strongly influenced by the inducements and constraints in their social environment. Experimental and non-experimental research has revealed several aspects of work environments, such as a primary focus on tangible rewards or critical evaluation, which can undermine intrinsic motivation and creativity. Also, several aspects of work environments — such as autonomy and optimal challenge in the work — can support intrinsic motivation and creativity. For example, using their diary database, Amabile and her colleagues have discovered a number of specific leader behaviors in the everyday work environment that have positive or negative effects on daily perceptions of leader support for creativity and, thus, on creativity itself.

Richard Freeman sought to understand gender differences in involvement in the sciences in terms of gender differences in the response to incentives. He noted that incentives for innovation often take the form of tournaments, where the first person to succeed receives most or all of the returns. The evidence indicates that women shy away from these situations, providing an explanation for the underrepresentation of women in the sciences.

Gerald Holton, a physicist and historian of science, discussed the role of thema: unquestioned principles held by individuals that guide their creativity. For instance, Newton's view of the universe as being designed by God shaped the questions he asked and the answers he gave. Thus, thema are individual influences that shape a person's creative work.

David Kaiser, a physicist and historian at MIT, presented a cautionary tale from the rapid, post-war expansion of physics. He showed how the expansion led teachers to emphasize the most mechanical sides of quantum mechanics, which were easier to teach, while shying away from more qualitative questions of interpretation — the "What does it all mean?" musings that had so exercised the discipline's leaders before the war. In this way, concrete pedagogical pressures helped to change how modern physics was handled in the classroom, and, indeed, what would count as "creative" among the younger generation.

Thus, cognitive neuroscientists, economists, historians, and psychologists all see creativity as being idiosyncratic in terms of the processes through which it develops and the motivations of creators. Given this view, there was great concern about efforts to test outcomes in higher education. Similarly, the group was concerned about the ability to identify areas for innovation and target support to them, as opposed to supporting innovation more broadly. Nevertheless, the Unites States must strive for excellence in education and support scientific research that will provide the basis for future economic growth in a flexible way.

II. The Geography of Creativity

Technological centers, such as Silicon Valley and the Route 128 Corridor outside of Boston, have been attributed to knowledge spillovers that arise among innovators. In other words, the presence of many others working on related problems is assumed to lead to informal interactions that foster creativity. This phenomenon can operate at the level of cities and even nations, and is an important motivation for public investment in research.

Perhaps the finest grained evidence here comes from the work of **David Kaiser,** who has traced the flow of ideas among physicists, looking at the development, mutations, and spread of Feynman diagrams. Using these diagrams, which illustrate interactions between particles, he shows how interacting communities modify and define techniques.

Weinberg has shown that geography affects the probability of contributing to a scientific revolution. People who went to graduate school at a place where they were exposed to the people who pioneered the new paradigm were more likely to make contributions to that paradigm than people who attended other schools. The nature of their work also was affected.

Lynne Zucker and **Michael Darby**, a sociologist and economist at the University of California, Los Angeles, have studied the flow of knowledge from academia to industry. For a variety of leading technologies — including semiconductors, biotechnology, and nanotechnology — startup firms are more likely to develop in cities where there are more star academic researchers. This work provides an important, direct link between academic research and industrial innovation.

While there was considerable optimism about the future of the United States as a leader in creativity and innovation, there was a general view that the distance between the United States and other countries likely would shrink. As other countries develop their research capabilities, scientific breakthroughs and their commercial applications likely will shift overseas, at least to some extent. For us to maintain a strong position, we will have to invest in our scientific and industrial innovative communities.

III. Innovation and an Aging Workforce

Work on the effect of age on creativity dates back at least to Harvey Lehmann's *Age and Achievement*, published in 1953. The relationship between age and creativity is particularly important today with new technologies developing rapidly and the workforce aging, driven by the large baby boom generation. Will our ability to innovate and take advantage of innovations be affected by the aging workforce? How can companies that need to innovate adapt to an aging workforce?

While there seems to be a presumption that creativity is associated with youth, there was a consensus that older individuals can, and frequently are highly creative. **David Galenson** outlined a distinction between experimental and conceptual innovators. Conceptual innovators work deductively and frequently make their most important contributions early in their careers. Experimental innovators work inductively, accumulating knowledge from trial-and-error experiments, and tending to do their most important work later in their careers. These experimental innovators may be entering their peak years of creativity.

Dean Keith Simonton discussed a different approach, one that focuses on disciplines rather than the styles of individual innovators. In his view, creativity varies across disciplines depending on the rate at which ideas can be developed and elaborated. He argued that in many fields, creativity increases for much of life; and, even in fields where creativity is greatest at early ages, older individuals make important contributions at the same rate as younger individuals after one controls for their lower rate of publication.

Regardless of the approach — and there was an active, scholarly discussion of the relative merits of the two approaches — it is clear that older individuals are often highly creative. Both approaches imply that there will be differences across fields in the age at which people are most creative: in Galenson's approach, the shares of conceptual innovators, who tend to be most creative when young, and experimental innovators, who tend to be most creative later in their careers, vary across fields. One wonders whether the development of information technology was due at least in part to the relative youth of the workforce and if technological progress may shift to other areas as the workforce ages.

Ben Jones, an economist at Northwestern University's Kellogg School of Management, and **Bruce Weinberg** took another view of the relationship between age and creativity. Jones argued that the accumulation of knowledge over time generates a burden of knowledge. In his words, while later generations have the advantage of being able to see further by standing on the shoulders of giants, they suffer from having longer climbs. He showed that the age at which innovators in the sciences and industry do important work has been increasing over the twentieth century. While his view is pessimistic at some level — it implies that innovators will spend more of their careers getting to the knowledge frontier and less time innovating — now we may have the advantage of having a population that has reached an age where they are largely done climbing.

Weinberg's work has shown that people who make contributions to new scientific paradigms tend to have been exposed to them in their formative professional years. While this result would suggest that younger individuals are more involved with important innovations, he has also found that older individuals often make the contributions that set off innovative revolutions. Thus, older individuals have a crucial role to play in the innovative process.

IV. Future Work

Many directions for future work emerged from the meeting. There was considerable interest in using the emerging tools of cognitive neuroscience to test the foundations of other theories. Among the possibilities would be to probe the effect of age on creativity and receptivity to new ideas by looking at changes in cognition over the life cycle. Another area in which links could be made was the relationship between affect and psychosis and creativity across domains. There was also interest in linking observational data on the creative output of scientists or industrial innovators to information about cognitive functioning. Similarly, it would be valuable to study cognition under various incentives and other aspects of the social environment. Work is also necessary to reconcile differences in views of creativity that have emerged across the various disciplines.

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Twenty-first Annual Conference on Macroeconomics

The NBER's twenty-first Annual Conference on Macroeconomics, organized by NBER Research Associates Daron Acemoglu, MIT, Kenneth Rogoff, Harvard University, and Michael Woodford, Columbia University, took place in Cambridge on April 7 and 8. The program was:

Lawrence J. Christiano and **Martin Eichenbaum**, Northwestern University and NBER, and **Robert Vigfusson**, Federal Reserve Board, "Assessing Structural VARs"
Discussants: Patrick Kehoe, Federal Reserve Bank of Minneapolis, and Mark W. Watson, Princeton University and NBER

Steven J. Davis, University of Chicago and NBER; **John C. Haltiwanger**, University of Maryland and NBER; and **Ron Jarmin** and **Javier Miranda**, U.S. Census Bureau, "Volatility and Dispersion in Business Growth Rates: Publicly Traded versus Privately Held Firms"
Discussants: Chris Foote, Federal Reserve Bank of Boston, and Eva Nagypal, Northwestern University

Lars Ljungqvist, Stockholm School of Economics, and **Thomas J. Sargent**, New York University and NBER, "Indivisible Labor, Human Capital, Lotteries and Personal Savings: Do Taxes Explain European Unemployment?"
Discussants: Olivier J. Blanchard, MIT and NBER, and Edward C. Prescott, Arizona State University and NBER

Troy Davig, Federal Reserve Bank of Kansas City, and **Eric M. Leeper**, Indiana University and NBER, "Fluctuating Macro Policies and the Fiscal Theory"(NBER Working Paper No. 11212)
Discussants: Jordi Gali, MIT and NBER, and Christopher A. Sims, Princeton University and NBER

Mikhail Golosov, MIT and NBER; **Aleh Tsyvinski**, Harvard University and NBER; and **Ivan Werning**, MIT and NBER, "New Dynamic Public Finance: a User's Guide"
Discussants: Peter A. Diamond, MIT and NBER, and Kenneth L. Judd, Stanford University and NBER

Monika Piazzesi, University of Chicago and NBER; and **Martin Schneider**, Federal Reserve Bank of Minneapolis, "Equilibrium Yield Curves"
Discussants: Pierpaolo Benigno, New York University and NBER, and John Y. Campbell, Harvard University and NBER

Christiano, **Eichenbaum**, and **Vigfusson** analyze the quality of VAR-based procedures for estimating the response of the economy to a shock. They focus on two key questions. First, do VAR-based confidence intervals accurately reflect the actual degree of sampling uncertainty associated with impulse response functions? Second, what is the size of bias relative to confidence intervals, and how do coverage rates of confidence intervals compare to their nominal size? They address these questions using data generated from a series of estimated dynamic, stochastic general equilibrium models. They organize most of their analysis around a particular question that has attracted a great deal of attention in the literature: how do hours worked respond to an identified shock? In all of their examples, as long as the variance in hours worked attributable to a given shock is above the remarkably low number of 1 percent, structural VARs perform well. This is true regardless of whether identification is based on short-run or long run restrictions. Confidence intervals are wider in the latter case. Even so, long run identified VARs can be useful for discriminating between competing economic models.

Davis, **Haltiwanger**, **Jarmin**, and **Miranda** study the distribution of growth rates among establishments and firms in the U.S. private sector from 1976 onwards. To carry out their study, they exploit the recently developed Longitudinal Business Database (LBD), which contains annual observations on employment and payroll for all business establishments and firms. Their main 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 in the same way as in other recent research, the employment-weighted mean volatility of firm growth rates in the private sector has declined by more than 40 percent since 1982. This result stands in sharp contrast to previous findings of rising volatility for publicly traded firms based on COMPUSTAT data. They 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. The rising activity share, higher volatility, and increasingly volatile character of newly listed firms after 1979 explains much of the trend increase in volatility among publicly traded firms. They also show that business volatility and dispersion declined much more rapidly in Retail Trade and Services than in Manufacturing.

To appreciate the role of a "not-so-well-known aggregation theory" that underlies Prescott's (2002) conclusion that higher taxes on labor have depressed Europe relative to the United States, **Ljungqvist** and **Sargent** compare aggregate outcomes for economies with two alternative arrangements for coping with indivisible labor: employment lotteries plus complete consumption insurance; and individual consumption smoothing via borrowing and lending at a risk-free interest rate. Under idealized conditions, the two arrangements support equivalent outcomes when human capital is not present; when it is present, outcomes are naturally different. Households' reliance on personal savings in the incomplete markets model constrains the "career choices" that are implicit in their human capital acquisition plans relative to those that can be supported by lotteries and consumption insurance in the complete markets model. Lumpy career choices make the incomplete markets model better at coping with a generous system of government funded compensation to people who withdraw from work. Adding generous government supplied benefits to Prescott's model with employment lotteries and consumption insurance causes employment to implode and prevents the model from matching outcomes observed in Europe.

Davig and **Leeper** estimate regime-switching rules for monetary policy and tax policy over the post-war period in the United States and impose the estimated policy process on a model with nominal rigidities. Decision rules are locally unique and produce a stationary rational expectations equilibrium in which (lump-sum) tax shocks always affect output and inflation. Tax non-neutralities in the model arise solely through the mechanism articulated by the fiscal theory of the price level. This paper quantifies that mechanism and finds it to be important in U.S. data, reconciling a popular class of monetary models with the evidence that tax shocks have substantial impacts. Because long-run policy behavior determines existence and uniqueness of equilibrium, in a regime-switching environment more accurate qualitative inferences can be gleaned from full-sample information than by conditioning on policy regime.

Golosov, **Tsyvinski**, and **Werning** present a simple dynamic Mirrleesian model. There are two main goals for this paper: to review some recent results and contrast the Mirrlees approach with the Ramsey framework in a dynamic setting; and to present new numerical results for a flexible two-period economy featuring aggregate shocks.

Piazzesi and **Schneider** consider how the role of inflation as a leading business-cycle indicator affects the pricing of nominal bonds. They examine a representative-agent asset-pricing model with recursive utility preferences and exogenous consumption growth and inflation. They solve for yields under various assumptions on the evolution of investor beliefs. If inflation is bad news for consumption growth, the nominal yield curve slopes up. Moreover, the level of nominal interest rates and term spreads are high in times when inflation news are harder to interpret. This is relevant for periods such as the early 1980s, when the joint dynamics of inflation and growth was not well understood.

These papers will appear in an annual volume published by the MIT Press. Its availability will be announced in a future issue of the *Reporter*. They can also be found at "Books in Progress" on the NBER's website.

Innovation Policy and the Economy

The NBER's seventh annual Conference on Innovation Policy and the Economy took place in Washington on April 19. The conference was organized by NBER Research Associates Adam B. Jaffe of Brandeis University, Joshua Lerner of Harvard University, and Scott Stern of Northwestern University. The following papers were discussed:

Iain M. Cockburn, Boston University and NBER, "Is the Pharmaceutical Industry in a Productivity Crisis?"

Fiona Murray, MIT, and **Scott Stern**, Northwestern University and NBER, "When Ideas Are Not Free: The Impact of Patents on Scientific Research"

Paula Stephan, Georgia State University, "Wrapping it up in a Person: The Mobility Patterns of New PhDs"

Erik Brynjolfsson and **Xiaoquan (Michael) Zhang**, MIT, "Innovation Incentives for Information Goods"

Daniel Diermeier, **Wallace J. Hopp,** and **Seyed Iravani**, Northwestern University, "Innovating under Pressure — Towards a Science of Crisis Management"

Rising R and D expenditures and falling counts of new drug approvals since 1996 have led many observers to conclude that there has been a sharp decline in research productivity in the pharmaceutical industry over the past decade. But a close look at the underlying data, **Cockburn** suggests, shows that these trends are greatly exaggerated: properly measured, research output is unlikely to have fallen as much as these figures imply, while trends in R and D expenditure are seriously overstated by failing to account for inflation in R and D input costs. Some of the increase in R and D investment is a necessary, indeed welcome, response to new technological opportunities and can be expected to deliver a handsome return of innovative drugs in future years. The rising cost per new drug approved is nonetheless a serious cause for concern, particularly where this is driven by transactions costs and other inefficiencies in the market for basic research, and by late-stage abandonment of drug development projects on purely economic grounds. Policies that make "small" markets more attractive, build capacity in translational medicine, reduce the cost, time, and uncertainty of regulatory review, maximize access to basic research, and encourage greater cooperation and collaborative research within the industry can all contribute to greater R and D efficiency.

Murray and **Stern** describe the impact of formal intellectual property rights (IPR) on the production and diffusion of "dual knowledge" — ideas that are simultaneously of value as a scientific discovery and as a useful, inventive construct. They argue that a great deal of knowledge generated in academia, particularly in the life sciences, falls into this category (sometimes referred to as Pasteur's Quadrant). The production and diffusion of dual purpose knowledge challenges the premise of most science policy analysis, implicitly based on a clear separation between basic scientific knowledge and applied knowledge useful in the development of new technology. Instead, dual knowledge simultaneously makes both a basic and an applied contribution. The authors review qualitative and quantitative evidence relating to the policy challenges raised by the production and dissemination of dual knowledge, highlighting three broad findings. First, rather than facing a fundamental tradeoff between applied research and more fundamental scientific knowledge, research agencies can and do invest in dual purpose knowledge. Indeed, the dual purpose knowledge framework suggests a distinct rationale for public sector involvement in the funding and conduct of research: the social impact of a given piece of knowledge may be enhanced when knowledge is produced and disclosed in accordance with the norms of the scientific research community (particularly compared to secrecy). Second, within Pasteur's Quadrant, the increased use of formal IPR seems to be significantly shaping the structure, conduct, and performance of both university and industry researchers. On the one hand, from the perspective of individual researchers, patenting does not seem to come at the expense of scientific publication, and both respond to the process of scientific discovery. However, there is some evidence that patent grants may reduce the extent of use of knowledge: the citation rate to a scientific article describing a dual-purpose discovery experiences a modest decline after patent rights are granted over that knowledge. Finally, the impact of patents may be indirect; rather than directly affecting behavior through patent enforcement, scientific conduct may be influenced by related mechanisms, such as material transfer agreements. Not simply a legal document within a seamless web of cooperation, nor a bludgeon to stop scientific progress in its tracks, patents seem to be changing the "rules of the game" for scientific exchange, cooperation, and credit.

Stephan analyzes data concerning the placements of new PhDs who had definite plans to go to work in industry for the period 1997-2002. Her data come from the Survey of Earned Doctorates overseen by the National Science Foundation. She finds knowledge sources to be heavily concentrated in certain regions and states. Moreover, the geographic distribution of knowledge sources, as measured by where PhDs going to work in industry are trained, is different than other measures of knowledge sources, such as university R and D-expenditure data, would suggest. A major headline is the strong role played by Midwestern universities, which educate over 26.5 percent of all PhDs going to industry but are responsible for only 21.1 percent of university R and D. Stephan finds that only 37 percent of PhDs trained in science and engineering stay in their state of training. Particularly among certain Midwestern states, many students leave for employment on the Coasts. The firms most likely to hire new PhDs are found in computer and electrical products, followed by firms in publishing and professional, scientific, and technical services. Almost one out of ten new PhDs going to work for industry heads to San Jose; 58 percent go to work in one of twenty cities. The placement data also suggest that small firms play a larger role in innovation than R and D expenditure data would suggest.

Innovations can often be targeted to be more valuable for some consumers than others. This is especially true for digital information goods. **Brynjolffson** and **Zhang** show that the traditional price system not only results in significant deadweight loss, but also provides incorrect incentives to the creators of these innovations. In contrast, they propose and analyze a profit-maximizing mechanism for bundles of digital goods which is more efficient and more accurately provides innovation incentives for information goods. Their "statistical couponing mechanism" does not rely on the universal excludability of information goods, which creates substantial deadweight loss, but instead estimates social value created from new goods and innovations by offering coupons to a relatively small sample of representative consumers. They find that the statistical couponing mechanism can operate with less than 0.1 percent of the deadweight loss of the traditional price-based system, while more accurately aligning incentives with social value.

Diermeier, **Hopp,** and **Iravani** propose a rigorous modeling framework for characterizing the structural ability of organizations to respond quickly and effectively to unanticipated events. As such, the authors seek to provide a theoretical basis for improved crisis management strategies. Their framework conceptualizes organizations as adaptive, responsive networks. Most of the existing models of complex social networks to date, however, have not explicitly modeled human capacity constraints or system congestion. As a result, no viable frameworks exist for investigating the responsiveness of various organizational structures under crisis conditions. The authors propose to integrate the social-network approach to modeling communication and collaboration with the flow-network approach from production-systems modeling as a way of representing task processing and flow under crisis conditions. By providing an analytic structure for decisionmaking environments currently viewed as not amenable to formal methods, this research may improve the performance of various organizations in both the private and public sectors.

These papers will appear in an annual volume published by the MIT Press. Its availability will be announced in a future issue of the *Reporter*. They can also be found at "Books in Progress" on the NBER's website.

Conference on Asset Prices and Monetary Policy

The NBER held a conference on Asset Prices and Monetary Policy on May 5 and 6. Organized by NBER Research Associate John Y. Campbell of Harvard University, the conference brought together academic researchers with economists from the Federal Reserve System, as well as individuals with experience both in academe and in the policy sphere. The program was:

Simon Gilchrist, Boston University and NBER, and **Masashi Saito**, Bank of Japan, "Expectations, Asset Prices, and Monetary Policy: The Role of Learning"
Discussant: Michael Woodford, Columbia University and NBER

Glenn D. Rudebusch and **John C. Williams**, Federal Reserve Bank of San Francisco, "Revealing the Secrets of the Temple: The Value of Publishing Interest Rate Projections"
Discussant: Marvin Goodfriend, Carnegie Mellon University

Hans Dewachter, Katholiek Universiteit Leuven, and **Marco Lyrio**, University of Warwick, "Learning, Macroeconomic Dynamics, and the Term Structure of Interest Rates"
Discussant: Jordi Gali, Universitat Pompeu Fabra and NBER

Jeffrey A. Frankel, Harvard University and NBER, "Commodity Prices, Monetary Policy, and Currency Regimes"
Discussant: Lars E. O. Svensson, Princeton University and NBER

Stephen G. Cecchetti, Brandeis University and NBER, "GDP at Risk: A Framework for Monetary Policy Responses to Asset Price Movements"
Discussant: Andrew Levin, Federal Reserve Board

Panel Discussion: Chair, Martin Feldstein, Harvard University and NBER
Donald Kohn, Federal Reserve Board
Laurence Meyer, Macroeconomic Advisers, LLC
William Dudley, Goldman Sachs

Richard H. Clarida, Columbia University and NBER, and **Daniel Waldman**, Columbia University, "Is Bad News About Inflation Good News for the Exchange Rate?"
Discussant: Charles M. Engel, University of Wisconsin and NBER

Roberto Rigobon, MIT and NBER and **Brian Sack**, Macroeconomic Advisers, LLC, "Noisy Macroeconomic Announcements, Monetary Policy, and Asset Prices"
Discussant: Leonardo Bartolini, Federal Reserve Bank of New York

Tommaso Monacelli, Bocconi Universit, "Optimal Monetary Policy with Collateralized Household Debt and Borrowing Constraints"
Discussant: Hanno Lustig, University of California, Los Angeles and NBER

Monika Piazzesi, University of Chicago and NBER, and **Martin Schneider**, New York University, "Inflation Illusion, Credit, and Asset Prices"
Discussant: Markus Brunnermeier, Princeton University and NBER

Gilchrist and **Saito** study the implications of financial market imperfections represented by a countercyclical external finance premiums and gradual recognition of changes in the drift of technology growth for the design of an interest rate rule. Asset price movements induced by changes in trend growth influence balance sheet conditions which in turn determine the premium on external funds. The presence of financial market frictions provides a motivation for responding to the gap between the observed asset price and the potential asset price in addition to responding strongly to inflation. This is because the asset price gap represents distortions in the resource allocation induced by financial market frictions more distinctly than inflation. Policymakers' imperfect information about the drift of technology growth makes the calculation of potential imprecise and thus reduces the benefit of responding to the asset price gap. Asset price targeting which does not take into account changes in potential tends to be welfare reducing.

The modern view of monetary policy stresses its role in shaping the entire yield curve of interest rates in order to achieve various macroeconomic objectives. A crucial element of this process involves guiding financial market expectations of future central bank actions. Recently, a few central banks have started to explicitly signal their future policy intentions to the public, and two of these banks have even begun publishing their internal interest rate projections. **Rudebusch** and **Williams** examine the macroeconomic effects of direct revelation of a central bank's expectations about the future path of the policy rate. They show that, in an economy where private agents have imperfect information about the determination of monetary policy, central bank communication of interest rate projections can help shape financial market expectations and improve macroeconomic performance.

Dewachter and **Lyrio** present a macroeconomic model in which agents learn about the central bank's inflation target and the output-neutral real interest rate. They use this framework to explain the joint dynamics of the macroeconomy, and the term structures of interest rates and inflation expectations. Introducing learning into the macro model generates endogenous stochastic endpoints which act as level factors for the yield curve.

These endpoints are sufficiently volatile to account for most of the variation in long-term yields and inflation expectations. As such, this paper complements the current macro-finance literature in explaining long-term movements in the term structure without reference to additional latent factors.

Commodity prices are back. **Frankel** looks at connections between monetary policy and agricultural and mineral commodities. He begins with the monetary influences on commodity prices, first for a large country such as the United States, then for smaller countries. The claim is that low real interest rates lead to high real commodity prices. The theory is an analogy with Dornbusch overshooting. The relationship between real interest rates and real commodity prices also is supported empirically. One channel through which this effect is accomplished is a negative effect of interest rates on the desire to carry commodity inventories. Frankel concludes with a consideration of the reverse causality: the possible influence of commodity prices on monetary policy, under alternative currency regimes. The new proposal for PEPI — Peg the Export Price Index — is compared (favorably) with the popular regime of CPI targeting by the criterion of robustness with respect to changes in the terms of trade such as oil price shocks.

Cecchetti uses data from a broad cross-section of countries to examine GDP at risk and price-level at risk arising from booms and crashes in equity and property markets. He shows that the distribution of GDP and price-level deviations from their trends both have fat tails, so the probability of extreme events is higher than implied by a normal distribution. Specifically, housing booms create outsized risks of output declines. This means that policymakers who are intent on averting catastrophes should react. The question is: How?

Clarida and **Waldman** make a theoretical point and provide some empirical support for it: they show in a simple, but robust, theoretical monetary exchange rate model that the sign of the covariance between an inflation surprise and the nominal exchange rate can tell us something about how monetary policy is conducted. Specifically, they show that "bad news" about inflation – that it is higher than expected – can be "good news" for the nominal exchange rate – which appreciates on this news – if the central bank has an inflation target that it implements with a Taylor Rule. The model is one of inflation – not price level – targeting, so that in the model a shock to inflation has a permanent effect on the price level. Since PPP holds in the long run of the model, the nominal exchange rate depreciates in the long run to an inflation shock, even though, on impact, it can appreciate in response to this shock. The empirical work in this paper examines point sampled data on inflation announcements and the reaction of nominal exchange rates in 10-minute windows around these announcements for ten countries and several different inflation measures for the period July 2001 through March 2005. Eight of the countries in the study are inflation targeters, and two are not. In the data, the authors indeed find that bad news about inflation is good news for the nominal exchange rate, and that the results are statistically significant. They also find significant differences comparing the inflation targeting countries and the two non-inflation targeting countries. For the non-IT countries, there is no significant impact of inflation announcements on the nominal exchange rate, although the estimated sign is indeed in line with the story here. For each of the IT countries, the sign is as predicted by the theory and quite significant. Finally, Clarida and Waldman study two countries, the United Kingdom and Norway, in which there was a clear regime change during a period for which they have data. They study the granting of independence to the Bank of England in 1997 and the shift to formal inflation targeting by Norway in 2001. For both countries, the correlation between the exchange rate and the inflation surprise before the regime change reveal that "bad news about inflation was bad news about the exchange rate." After the regime change, they find, "bad news about inflation is good news about the exchange rate."

The current literature has provided a number of important insights about the effects of macroeconomic data releases on monetary policy expectations and asset prices. However, one puzzling aspect of that literature is that the estimated responses are quite small. Indeed, these studies typically find that the major economic releases, taken together, account for only a small amount of the variation in asset prices – even those closely tied to near-term policy expectations. **Rigobon** and **Sack** argue that this apparent detachment arises in part from the difficulties associated with measuring macroeconomic news. They propose two new econometric approaches that allow them to account for the noise in measured data surprises. Using these estimators, they find that asset prices and monetary policy expectations are much more responsive to incoming news than previously believed. Their results also clarify the set of facts that should be captured by any model attempting to understand the interactions between economic data, monetary policy, and asset prices.

Monacelli studies optimal monetary policy in an economy with nominal private debt, borrowing constraints and price rigidity. Private debt reflects equilibrium trade between an impatient borrower, who faces an endogenous collateral constraint, and a patient saver, who engages in consumption smoothing. Since inflation can positively affect borrower's net worth, monetary policy optimally balances the incentive to offset the price stickiness distortion with the one of marginally affecting the borrower's collateral constraint. He finds that the optimal volatility of inflation is increasing in three key parameters: 1) the borrower's weight in the planner's objective function; 2) the borrower's impatience rate; 3) the degree of price flexibility. In general, however, deviations from price stability are small for a small degree of price stickiness. In a two-sector version of the model, in which durable price movements can directly affect the ability of borrowing, the optimal volatility of (non-durable) inflation is more sizeable. In the context used here, and relative to simple Taylor rules, the Ramsey-optimal allocation entails a partial smoothing of real durable goods prices.

Piazzesi and **Schneider** consider asset pricing in a general equilibrium model in which some, but not all, agents suffer from inflation illusion. The model predicts that housing booms occur both when inflation is unusually high and when it is unusually low, which they also find in cross-country data. The key mechanism is that illusionary and smart investors disagree about the level of real interest rates, especially when inflation is far from its historical average. This disagreement stimulates borrowing and lending and drives up the price of collateral.

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. They are also available at "Books in Progress" on the NBER's website.

Firms and the Evolving Structure of Global Economic Activity

The NBER held an NBER-Universities Research Conference on "Firms and the Evolving Structure of Global Economic Activity" in Cambridge on May 19 and 20. Organizers Andrew Bernard of NBER and Dartmouth College and Marc Melitz of NBER and Harvard University chose these papers for discussion:

Jens Arnold, **Beata S. Javorcik,** and **Aaditya Mattoo**, The World Bank, "The Productivity Effects of Services Liberalization Evidence from the Czech Republic"
Discussant: Bruce Blonigen, University of Oregon and NBER

Rebecca Hellerstein, Federal Reserve Bank of New York, and **Sofia Villas-Boas**, University of California, Berkeley, "Arm's Length Transactions as a Source of Incomplete Cross-Border Transmission: The Case of Autos"
Discussant: Gita Gopinath, Harvard University and NBER

Josh Ederington, University of Kentucky, and **Phillip McCalman,** University of California, Santa Cruz, "Shaking All Over? International Trade and Industrial Dynamics"
Discussant: Andres Rodriguez-Clare, Pennsylvania State University and NBER

Patrick Conway, University of North Carolina at Chapel Hill, "Import Price Pressure on Firm Productivity and Employment: The Case of U.S. Textiles"
Discussant: James Harrigan, Federal Reserve Bank of New York and NBER

Albert Park and **Xinzheng Shi**, University of Michigan; **Dean Yang**, University of Michigan and NBER; and **Yuan Jiang**, National Bureau of Statistics, China, "Exporting and Firm Performance: Chinese Exporters and the Asian Financial Crisis"
Discussant: Roberto Rigobon, MIT and NBER

Nick Bloom, Stanford University, and **Raffaella Sadun** and **John Van Reenan**, London School of Economics, "It Ain't What You Do It's the Way That You Do I.T. Investigating the Productivity Miracle Using Multinationals"
Discussant: Stephen Yeaple, University of Pennsylvania and NBER

Marc-Andreas Muendler, University of California, San Diego, and **Sascha O. Becker**, University of Munich, "Margins of Multinational Labor Substitution"
Discussant: Stephen Redding, Princeton University

Huiya Chen, University of California, Davis, and **Deborah Swenson**, University of California, Davis and NBER, "Multinational Firms and New Chinese Export Transactions"
Discussant: Juan Carlos Hallak, University of Michigan and NBER

While there is considerable empirical evidence on the impact of liberalizing trade in goods, the effects of services liberalization have not been established empirically. **Arnold**, **Javorcik,** and **Mattoo** examine the link between service sector reforms and the productivity of manufacturing industries that rely on service inputs. Their results, based on firm-level data from the Czech Republic for the period 1998-2003, show a positive relationship between service sector reform and the performance of domestic firms in downstream manufacturing sectors. When several aspects of services liberalization are considered – namely the presence of foreign providers, privatization, and the level of competition – they find that allowing foreign entry into service industries may be the key channel through which services liberalization contributes to improved performance of downstream manufacturing sectors. As most barriers to foreign investment today are not in goods but in services sectors, these findings may strengthen the argument for reform in this area.

A growing share of international trade occurs through intra-firm transactions: those between domestic and foreign subsidiaries of a multinational firm. The difficulties associated with writing and enforcing a vertical contract are compounded when a product must cross a national border, and this may explain the high rate of multinational trade across such borders. **Hellerstein** and **Villas-Boas** show that this common cross-border organization of the firm may have implications for the well-documented incomplete transmission of shocks across borders. They present new evidence of a positive relationship between an industry's share of multinational trade and its rate of exchange rate pass-through to prices. They then develop a structural econometric model with both manufacturers and retailers to quantify how firms' organization of their activities across borders affects their pass-through of a foreign cost shock. They apply the model to data from the auto market. Counterfactual experiments show why cross-border transmission may be much higher for a multinational transaction than for an arm's-length transaction. In the structural model, firms' pass-through of foreign cost shocks is on average 29 percentage points lower in arm's-length transactions than in multinational transactions because the higher markups from a double optimization along the distribution chain create more opportunity for markup adjustment following a shock. Since arm's-length transactions account for about 60 percent of U.S. imports, this difference may explain up to 20 percent of the incomplete transmission of foreign-cost shocks to the United States in the aggregate.

Ederington and **McCalman** develop a model of international trade and industrial evolution. Evolution is driven by the endogenous technology choices of firms, which generate a rich industrial environment that includes the possibility of a dramatic shakeout. The likelihood, magnitude, and timing of this shakeout depends not only on the size of the innovation but also on the structure of production costs. In this setting, trade liberalization reduces the likelihood of a shakeout, resulting in a more stable industrial structure. However, when shakeouts arise in global markets, the distribution of firm exits can vary widely across countries. Furthermore, conditions exist so that a shakeout occurs in a closed economy but not in an open economy. The empirical evidence presented here is consistent with the prediction that the more internationally integrated sectors are less likely to experience a shakeout.

Theoretical research has predicted three different effects of increased import competition on plant-level behavior: reduced domestic production and sales; improved average efficiency of plants; and increased exit of marginal firms. **Conway** uses detailed plant-level information available in the U.S. Census of Manufacturers and the Annual Survey of Manufacturers for the period 1983-2000 to decompose these effects. He derives the relative contribution of technology and import competition to the increase in productivity and to the decline in employment in textiles production in the United States in recent years. He then simulates the impact of removal of quota protection on the scale of operation of the average plant and on the incentive for plant closure.

Park and his coauthors analyze firm panel data to examine how export demand shocks associated with the 1997 Asian financial crisis affected Chinese exporters. They construct firm-specific exchange rate shocks based on the pre-crisis destinations of firms' exports. Because the shocks were unanticipated and large, they are an ideal instrument for identifying the impact of exporting on firm productivity and on other aspects of firm performance. The authors find that firms whose export destinations experience greater currency depreciation have slower growth in exports; export growth also increases firm productivity, as well as other measures of firm performance. Consistent with the "learning-by-exporting" hypothesis, greater exports increase the productivity of firms exporting to developed countries but not of firms exporting via Hong Kong or directly to poorer destinations.

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/organization of U.S. firms (rather than simply the U.S. geographical or regulatory environment), then we would expect to see a stronger association of productivity with IT for U.S. multinationals located in Europe than for other firms. **Bloom** and his coauthors examine a large panel of U.K. establishments and show that U.S.-owned establishments have a significantly higher productivity of IT capital than either non-U.S. multinationals or domestically owned establishments do. 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 fixed effects are included, and even when a sample of establishments taken over by U.S. multinationals (relative to takeovers by other multinationals and by domestic firms) is examined. The authors 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.

Multinational labor demand responds to wage differentials at the extensive margin, when a multinational enterprise (MNE) expands into foreign locations, and at the intensive margin, when an MNE operates existing affiliates across locations. **Muendler** and **Becker** derive conditions for parametric and nonparametric identication of an MNE model to infer elasticities of labor substitution at both margins, controlling for location selectivity. Prior studies have rarely found foreign wages or operations to affect employment. The strategy here detects salient adjustments at the extensive margin for German MNEs. With every percentage increase in German wages, German MNEs allocate 2,000 manufacturing jobs to Eastern Europe at the extensive margin and 4,000 jobs overall.

Chen and **Swenson** study Chinese trade between 1997 and 2003 to see how the presence of multinational firms affected the quality, frequency, and survival of new export transactions by private Chinese traders. By exploiting the richness of the data that come from the fine geographical and product detail, they show how own-industry multinational firm presence helped to stimulate new trade, and to elevate the quality of those trades. In contrast, they find that greater concentrations of other industry multinational activity were associated with less-favorable outcomes, as one would predict if multinational presence brought with it local factor market congestion, or elevated levels of competition.

Bureau News

National Security Working Group

The NBER's Working Group on National Security met in Cambridge on February 24 and 25. NBER President and Research Associate Martin Feldstein, who directs the group, organized the meeting, at which the following topics were discussed:

Eli Berman, University of California, San Diego and NBER, and **David D. Laitin**, Stanford University, "Hard Targets: Theory and Evidence on Suicide Attacks"(NBER Working Paper No. 11740)

Joel Slemrod, University of Michigan and NBER, and **Naomi Feldman**, Ben-Gurion University, "War, Social Identity, and Taxation: Capitalizing Patriotism Through Voluntary Tax Compliance"

Eugene N. White, Rutgers University and NBER; **Kim Oosterlinck,** Free University of Brussels; and **Filippo Occhino**, Rutgers University, "How Occupied France Financed Its Own Exploitation in World War II"

Raymond Fisman, Harvard University and NBER; **David Fisman**, Princeton University; and **Rakesh Khurana** and **Julia Galef**, Harvard University, "Estimating the Value of Connections to Vice-President Cheney"

Alexander Gelber, Harvard University, "Military Enlistments: A Study of Compensating Differentials and Labor Supply"

Edward Miguel, University of California, Berkeley and NBER, and **John Bellows**, University of California, Berkeley, "War and Institutions in Sierra Leone"

Neil F. Johnson, Oxford University; and **Michael Spagat**, University of London; **Jorge Restrepo,** Universidad Javeriana; **Oscar Becerra** and **Nicolas Suárez**, Conflict Analysis Resource Center, Bogotá, Colombia; **Juan Camilo Bohórquez**, **Elvira Maria Restrepo**, and **Roberto Zarama**, Universidad de los Andes, Bogotá, Colombia; "Universal Patterns Underlying Ongoing Wars and Terrorism"

James Dertouzos, RAND Corporation, "Recruiter Missioning, Market Quality, Recruiter Effort, and Enlistment"

David Loughran, RAND Corporation, "Earnings Loss of Activated Reservists"

James Hosek, RAND Corporation, "Analysis of Reserve Retirement Reform"

John T. Warner and **Curtis J. Simon**, Clemson University, "Uncertainty about Job Match Quality and Youth Turnover: Evidence From U.S. Military Attrition"

Claude Berrebi, RAND Corporation, and **Esteban F. Klor**, Hebrew University of Jerusalem, "The Impact of Terrorism Across Industries: An Empirical Study"

Darius Lakdawalla, RAND Corporation and NBER, and **Eric Talley**, RAND Corporation, "Optimal Liability for Terrorism"

Berman and **Laitin** model the choice of tactics by rebels, bearing in mind that a successful suicide attack imposes the ultimate cost on the attacker and the organization. They first ask what a suicide attacker would have to believe to be deemed rational. They then embed the attacker and other operatives in a club-good model that emphasizes the function of voluntary religious organizations as providers of benign local public goods. The sacrifices that these groups demand make clubs well suited for organizing suicide attacks, a tactic in which defection by operatives (including the attacker) endangers the entire organization. The model also analyzes the choice of suicide attacks as a tactic, predicting that suicide will be used when targets are well protected and when damage is great. Those predictions are consistent with the patterns described above. The model has testable implications for tactic choice of terrorists and for damage achieved by different types of terrorists, which the authors find to be consistent with the data.

Feldman and **Slemrod** explore the relationship among war, government financing, and citizens' willingness to voluntarily comply with tax and other obligations because of social identity. Their motivating idea is that the willingness to voluntarily comply with obligations to the government may be a function of the perceived military threat to a country, and the willingness to pay in turn affects the marginal efficiency cost of raising resources, both via taxes and conscription. A model of the interactions generates predictions about the effect of the external threat on military spending, non-military spending, and the share of military resources raised via conscription, as well as predictions concerning the effect of wars and external threats on the willingness to voluntarily pay taxes. The authors test these predictions empirically using cross-country data from 1970 to the present on government finances, the Correlates of War Militarized Interstate Disputes dataset, and data on attitudes toward tax evasion and military service from the World Values Survey.

Most studies of war finance have focused on how belligerent powers funded hostilities with their own resources. The collapse of the Third Republic in 1940 left Berlin in control of a nearly equally powerful industrial economy. The resources extracted from France by the Nazis represent perhaps the largest international transfer. **Occhino, Oosterlinck,** and **White** assess the welfare costs of the policies that the French chose to fund payments to Germany and alternative plans with a neoclassical growth model that incorporates essential features of the occupied economy and the postwar stabilization. Although the mix of taxes, bonds, and seigniorage employed by Vichy, resembles methods chosen by belligerents, the French economy sharply contracted. Vichy's postwar debt overhang would have required substantial budget surpluses; but inflation, which erupted after Liberation, reduced the debt well below its steady state level and redistributed the adjustment costs. The Marshall Plan played only a minor direct role, and international credits helped to substantially lower the nation's burden.

Fisman, **Fisman**, **Galef**, and **Khurana** estimate the value of personal ties to Richard Cheney through three distinct approaches that have been used recently to measure the value of political connections. Their proxies for personal ties are based on corporate board linkages that are prevalent in the network sociology literature. They measure the value of these ties using three event studies: 1) market reaction of connected companies to news of Cheney's heart attacks; 2) correlation of the value of connected companies with probability of Bush victory in 2000; and 3) correlation of the value of connected companies with the probability of war in Iraq. In all cases, the value of ties to Cheney is precisely estimated as zero. The authors interpret this as evidence that U.S. institutions are effective in controlling rent seeking through personal ties with high-level government officials.

A general problem facing estimates of the elasticity of labor supply to a profession is that the wage is "endogenous": when a profession is particularly pleasant, the wage tends to be low but the supply of labor high. In studying the supply of recruits to the military, **Gelber** solves this problem by instrumenting for the endogenous military wage—he uses a statutory formula that usually governs increases in the wage. Using Department of Defense administrative data on all 3.5 million enlistment contracts signed by recruits over 16 recent years, he estimates that elasticities of labor supply with respect to wages are quite high. Ordinary least squares regressions sometimes show a negative or insignificant impact of the military wage on enlistments, but instrumental variables regressions show a positive and significant effect. The high elasticities imply that enlarging the military would be substantially less costly than previous estimates have suggested.

Bellows and **Miguel** study the aftermath of the brutal 1991–2002 Sierra Leone civil war. One notable aspect of their project is the availability of extensive household data on conflict experiences and local institutions (broadly defined) for Sierra Leone. They first confirm that there are no lingering effects of war violence on local socioeconomic conditions, a mere three years after the end of the civil war, in line with the existing war impact studies. They find that measures of local community mobilization and collective action—including the number of village meetings and the voter registration rate—are significantly *higher* in areas that experienced more war violence, conditional on extensive prewar and geographic controls. In other words, if anything, areas where there was greater violence against civilians during the recent war have arguably better local outcomes. These findings speak to the remarkable resilience of ordinary Sierra Leoneans. The authors view these results as complementary to the other recent studies of war, none of which examines local institutional or political economy impacts. These findings echo the claims of other observers of Sierra Leone (including Keen 2005 and Ferme 2002) who also argue that the war increased political awareness and mobilization and generated far-reaching institutional changes.

Becerra, **Bohórquez**, **Johnson**, **Restrepo**, **Spagat**, **Suárez**, and **Zarama** report a remarkable universality in the frequency of violence arising in two high-profile ongoing wars, and in global terrorism. Their results suggest that these quite different conflict arenas currently feature a common type of enemy, that is the various insurgent forces are beginning to operate in a similar way regardless of their underlying ideologies, motivations, and the terrain they operate in. The authors provide a theory to explain their main observations which treats the insurgent forces as a generic, self-organizing network, dynamically evolving through the continual coalescence and fragmentation of attack units.

Dertouzas documents research methods, findings, and policy conclusions from a project analyzing human resource management options for improving recruiting production. He details research designed to develop new insights to help guide future recruiter-management policies. The research involves econometric analyses of three large and rich datasets. The first analysis compares the career paths of enlisted personnel, including recruiters. The second analyzes individual recruiter characteristics and links those characteristics with their productivity, controlling for a variety of independent factors. Finally, the research focuses on station-level recruiting outcomes, paying close attention to the management options that can affect recruiter production and effort. These empirical analyses demonstrate that various types of human resource management policies can be very helpful in meeting the Army's ambitious recruiting requirements. For example, the findings have implications for human resource policies in the areas of selecting soldiers for recruiting duty, assigning recruiters to stations, missioning to promote equity across recruiters, missioning to increase recruiter productivity, using promotions to motivate and reward recruiters, and screening out recruiters who are underproducing. Although the gains from any individual policy appear to be modest, the cumulative benefits of implementing multiple policies could save the Army over $50 million in recruiting resources on an annual basis. This work will interest those involved in the day-to-day management of recruiting resources as well as researchers and analysts engaged in analyses of military enlistment behavior.

Loughran describes research using a sample of Army and Air Force reservists activated in 2001 and 2002 for the Global War on Terrorism. It combines information on their civilian earnings from Social Security Administration (SSA) data for 2001 with information on military earnings from Department of Defense (DoD) administrative files to estimate the effect of activation on their earnings. This measure of military earnings includes pays, allowances, and an approximation to the value of the federal tax preference accorded military allowances and military pay received while serving in a combat zone. The results on earnings and activation reported in this document are early and subject to a number of important caveats, but the estimates do imply less prevalent and severe earnings losses among activated reservists than do estimates derived from DoD survey data.

Congress has put forward several proposals to increase the generosity of the retirement benefits payable to reservists. The proposals have the potential to affect reserve retention behavior, yet also could create cross effects on retention in the active-duty force. **Hosek** and his colleagues, Beth Asch and Daniel Clendenning, developed a dynamic programming model of active and reserve retention, estimated it on actual data, and used it to simulate the effects of the proposals. The most generous proposal, which starts retirement benefits as soon as the individual leaves the reserves after 20 or more years of active and reserve service, increased mid-career retention in the actives but increased the outflow from the actives to the reserves. Reserve retention increased prior to 20 years but decreased afterwards, by so much that expected years of service declined on net. None of the congressional proposals was found to be cost effective.

Simon and **Warner** model first-term enlisted attrition as the outcome of a process of learning about true tastes for service. Attrition occurs when recruits learn that their true tastes for service are sufficiently lower than their forecasted tastes as to render their gain to staying negative. Preference shocks might arise from different sources, but in this model they arise when youth are ill informed about the actual on-the-job effort requirement and (optimistically) understate this requirement prior to entry. Larger mistakes in forecasting the effort requirement lead to higher early attrition, but a steeper decline in attrition relative to the better-informed groups. The authors' empirical analysis provides evidence supporting this view of the attrition process. More educated groups, males, and nonwhites are estimated to have lower, flatter attrition profiles, a result consistent with the model. The model also explains the empirical finding of lower and flatter attrition profiles for individuals who entered and remained longer in Delayed Entry Program (DEP). This last result has important implications for current military manpower policy. The length and lethality of the second Iraq war has strained the existing force, the Army in particular, which along with the Marine Corps has borne the brunt of the conflict. As public support for the mission in Iraq has declined, the Army has missed its recruiting targets in recent months. In response, the Army has reduced the time that newly signed recruits spend in the DEP in order to place them in service more quickly. In addition to reducing the pipeline of future manpower supply, the empirical results here suggest that the result will also entail higher attrition in service. The Army recognizes the problem and has adjusted basic training to reduce attrition. It remains to be seen whether this adjustment in training policies will reduce attrition longer term.

Berrebi and **Klor** use scoring matching techniques and event study analysis to elucidate the impact of terrorism across different economic sectors. Using the Israeli-Palestinian conflict as a case study, they differentiate between Israeli companies that belong to the defense, security, or anti-terrorism related industries and other companies. Their findings show that, whereas terrorism has a significant negative impact on non-defense-related companies, the overall effect of terrorism on defense and security-related companies is significantly positive. Similarly, using panel data on countries' defense expenditures and imports from Israel, they find that terror fatalities in Israel have a positive effect on Israeli exports of defense products. These results suggest that the expectation of future high levels of terrorism has important implications for resource allocation across industries.

Lakdawalla and **Talley** analyze the normative role for civil liability in aligning terrorism pre-caution incentives, when the perpetrators of terrorism are unreachable by courts or regulators. The authors consider the strategic interaction among targets, subsidiary victims, and terrorists within a sequential, game-theoretic model. Their model reveals that, while an "optimal" liability regime indeed exists, its features appear at odds with conventional legal templates. For example, it frequently prescribes damages payments from seemingly unlikely defendants, directing them to seemingly unlikely plaintiffs. The challenge of introducing such a regime using existing tort law doctrines, therefore, is likely to be prohibitive. Instead, the authors argue, efficient precaution incentives may be best provided by alternative policy mechanisms, such as a mutual public insurance pool for potential targets of terrorism, coupled with direct compensation to victims of terrorist attacks.

Entrepreneurship Working Group

The NBER's Entrepreneurship Working Group met in Cambridge on March 10. NBER Research Associate Josh Lerner of the Harvard Business School, who directs this group, organized the following program:

Entrepreneurship in the Service Sector

Francine Lafontaine, University of Michigan, and **Renata Kosová**, George Washington University, "Firm Survival and Growth in Retail and Service Industries: Evidence from Franchised Chains"
Discussant: Eric Van Den Steen, MIT

Iain M. Cockburn, Boston University and NBER, and **Stefan Wagner**, INNO-tech, "Patents and the Survival Of Internet-Related IPOs"
Discussant: Baruch Lev, New York University

David G. Blanchflower, Dartmouth College and NBER, and **Jon Wainwright**, NERA Economic Consulting, "An Analysis of the Impact of Affirmative Action Programs on Self-Employment in the Construction Industry"(NBER Working Paper No. 11793)
Discussant: Scott Wallsten, AEI-Brookings Joint Center for Regulatory Studies

Entrepreneurial Finance

Antoinette Schoar, MIT and NBER, " Judge Specific Differences in Chapter 11 and the Effect on Firm Outcomes?"
Discussant: Karin Thorburn, Dartmouth College

Robert W. Fairlie, University of California, Santa Cruz, and **Harry A. Krashinsky**, University of Toronto, "Liquidity Constraints, Household Wealth, and Entrepreneurship Revisited"
Discussant: Annamaria Lusardi, Dartmouth College and NBER

Boyan Jovanovic, New York University and NBER, and **Balazs Szentes**, University of Chicago, "An Estimated Model of the Market for Venture Capital"
Discussant: Lucy White, Harvard University

Kosová and **Lafontaine** analyze the survival and growth of franchised chains using an unbalanced panel data set that covers about 1000 franchised chains each year from 1980 to 2001. The empirical literature on firm survival and growth has focused almost exclusively on manufacturing. This analysis allows the authors to explore whether chain age and size have the same effect on the survival and growth of retail and service chains as firm and establishment age and size have been found to have on survival and growth in manufacturing. In addition, while the researchers focus on the effect of age and size as the prior literature has done, their large and long panel data set allows them to control for the first time for chain-specific effects as well as for other chain characteristics that might affect chain survival and growth. They find that controlling for chain-level unobserved heterogeneity is statistically warranted, and affects the conclusions they reach on the effect of chain age and size in our regressions. They also find that other chain characteristics affect the survival and growth of individual chains. Finally, their long panel allows them to examine a subsample of mature chains, for which they find that age and size no longer affect exit. However, they find that chain size continues to have a negative effect on chain growth, a result that implies that chains converge in size to chain-specific levels.

Cockburn and **Wagner** examine the effect of patenting on the survival prospects of 356 internet-related firms that made an initial public offering on the NASDAQ at the height of the stock market bubble of the late 1990s. By March 2005, almost two thirds of these firms had delisted from the exchange. Changes in the legal environment in the United States in the 1990s made it much easier to obtain patents on software, and ultimately, on business methods, although less than half of the firms in the sample obtained, or attempted to obtain, patents. For those that did, the authors hypothesize that patents conferred competitive advantages that translated into higher probability of survival, although they may also simply have been a signal of firm quality. Controlling for other determinants of firm survival, such as age, venture-capital backing, financial characteristics, and stock market conditions, patenting is positively associated with survival. Quite different processes appear to govern exit via acquisition compared to exit via delisting from the exchange because of business failure. Firms that applied for more patents were less likely to be acquired, although if they obtained unusually highly cited patents, they meght be a more attractive acquisition target. These findings do not hold true for business method patents, which do not appear to confer a survival advantage.

Blanchflower and **Wainwright** find that despite the existence of various affirmative action programs designed to improve the position of women and minorities in public construction, little has changed in the last 25 years. They show that where race-conscious affirmative action programs exist, they appear to generate significant improvements: when these programs are removed or replaced with race-neutral programs, the utilization of minorities and women in public construction declines rapidly. They also show that the programs have not helped minorities to become self-employed or to raise their earnings over the period 1979–2004, using data from the Current Population Survey and the Census, but have improved the position of white females. There has been a growth in incorporated self-employment rates of white women in construction such that currently their rate is significantly higher than that of white men. The data are suggestive of the possibility that some of these companies are "fronts" which are actually run by their white male spouses or sons to take advantage of the affirmative action programs.

Schoar uses information on Chapter 11 filings for almost 5000 private companies across five district courts in the United States between 1989 and 2003. For each case, she codes the entire docket, in particular all of the decisions that the judge made during a Chapter 11 process. She first establishes that while there are some significant differences across districts in the types of firms that file for Chapter 11, within districts, cases appear to be assigned randomly to judges. She then estimates judge-specific fixed effects to analyze whether judges differ systematically in their Chapter 11 rulings. She finds very strong and economically significant differences across judges in their propensity to grant or deny specific motions. Some judges appear to rule persistently more favorably towards allowing the use of cash collateral, lifting the automatic stay, or conversion of cases into other chapters, such as 7. Next, she uses the estimated judge fixed effects to instrument for the exogenous variation in the propensity to grant a specific motion. She shows that the use of cash collateral and the extension of the exclusivity period increase a firm's likelihood of re-filing for bankruptcy. Finally, based on the judge fixed effects, she also creates an aggregate index to measure the pro-debtor (pro-creditor) friendliness of the judges. She provides suggestive evidence that a pro-management bias leads to increased rates of re-filing and lower post-bankruptcy credit ratings.

Hurst and Lusardi (2004) recently challenged the long-standing belief that liquidity constraints are important causal determinants of entry into self-employment. They demonstrated that the oft-cited positive relationship between entry rates and assets is actually unchanging as assets increase from the first to the 95th percentile of the asset distribution, but rise drastically after this point. They also applied a new instrument, unanticipated changes in house prices, for wealth in the entry equation, and showed that instrumented wealth is not a significant determinant of entry. **Fairlie** and **Krashinsky** reinterpret these findings: first, they demonstrate that bifurcating the sample into workers who enter self-employment after job loss and those who do not reveals steadily increasing entry rates as assets increase in both subsamples. They argue that these two groups merit a separate analysis, because a careful examination of the entrepreneurial choice model of Evans and Jovanovic (1989) reveals that the two groups face different incentives, and thus have different solutions to the entrepreneurial decision. Second, they use microdata from matched Current Population Surveys (1993–2004) to demonstrate that unanticipated housing appreciation measured at the MSA-level is a significantly positive determinant of entry into self-employment. In addition, they perform a duration analysis to demonstrate that pre-entry assets are an important determinant of entrepreneurial longevity.

Jovanovic and **Szentes** model the market for venture capital. VCs have the expertise to assess the profitability of projects, and have liquidity to finance them. The scarcity of VCs enables them to internalize their social value, so that the competitive equilibrium is socially optimal. This optimality obtains on an open set of parameter values. The scarcity of VCs also leads to an equilibrium return on venture capital higher than the market rate, but the preliminary estimates here show this excess return to be negligible. The ability to earn higher returns makes VCs less patient when waiting for a project to succeed; this explains why companies backed by venture capitalists reach IPOs earlier than other start-ups and why they are worth more at IPO.

NBER Director John Lipsky to the IMF

NBER Director-at-Large John Lipsky, who was elected to the Board in 1998 and became a member of the Executive Committee in 2002, will become first deputy managing director of the International Monetary Fund on September 1. Lipsky succeeds Anne O. Krueger, an NBER Research Associate and international economist, in that position.

Lipsky is currently vice chairman of J.P.Morgan Chase & Company, but worked at the IMF earlier in his career, from 1974-84. In 1984 he joined Salomon Brothers, where he spent 13 years. He then moved to Chase Manhattan Bank, serving as Chief Economist for three years. He was appointed chief economist of J.P. Morgan Chase when the two banks merged.

NBER Researcher to Head Philadelphia Fed

NBER Research Associate Charles I. Plosser, a professor of economics and former dean of the William E. Simon Graduate School of Business Administration, University of Rochester, has been named president of the Federal Reserve Bank of Philadelphia. He takes office on August 1. Plosser had been a member of the NBER's Program on Economic Fluctuations and Growth.

Labor Studies

The NBER's Program on Labor Studies met in Cambridge on March 17. NBER Research Associates Lawrence F. Katz and Richard B. Freeman, both of Harvard University, organized this program:

Judith K. Hellerstein, University of Maryland and NBER, and **Melinda Sandler**, University of Maryland, "The Changing Impact of Fathers on Women's Occupational Choices"

James J. Heckman, University of Chicago and NBER, and **Jora Stixrud** and **Sergio Urzua**, University of Chicago, "The Effects of Cognitive and Non-Cognitive Abilities on Labor Market Outcomes and Social Behavior"(NBER Working Paper No. 12006)

Hanh Ahee, Stanford University, and **Ulrike Malmendier**, Stanford University and NBER, "Biases in the Market: the Case of Overbidding in Auctions"

Over the past century, the labor force participation rate of women has increased dramatically. **Hellerstein** and **Sandler** examine one potential ramification of this, namely whether the transmission of occupation-specific skills between fathers and daughters has increased. They develop a model of intergenerational human capital investment in which increased labor force participation by women gives fathers more incentives to invest in daughters' skills that are specific to the fathers' occupations. As a result, daughters are more likely to enter the labor market and to take up their fathers' occupations. Testing whether the transmission of occupation-specific skills between fathers and daughters has increased is confounded by the fact that occupational upgrading of women alone will generate an increased probability over time that women work in their fathers' occupations. The authors show that, under basic assumptions of assortative mating, a comparison of the rates of change over time in the probability that a woman enters her father's occupation relative to her father-in-law's occupation can be used to test whether there has been increased transmission of occupation-specific human capital. Using data for the birth cohorts of 1909–77 containing information on womens' occupations and the occupations of their fathers and fathers-in-law, Hellerstein and Sandler demonstrate an increase in occupation-specific transmission between fathers and daughters. They show that this is a phenomenon unique to women, as it should be if it is a response to rising female labor force participation rates. The magnitude of the shift in women working in their fathers' occupations that results from increased transmission is large — about 20 percent of the total increase in the probability a woman enters her father's occupation over our sample period — and this is an estimate that they argue is likely a lower bound.

Heckman, **Stixrud**, and **Urzua** establish that a low-dimensional vector of cognitive and noncognitive skills explains a variety of labor market and behavioral outcomes. For many dimensions of social performance, cognitive and noncognitive skills are equally important. Their analysis addresses the problems of measurement error, imperfect proxies, and reverse causality that plague conventional studies of cognitive and noncognitive skills that regress earnings (and other outcomes) on proxies for skills. Noncognitive skills strongly influence schooling decisions, and also affect wages given schooling decisions. Schooling, employment, work experience, and choice of occupation are affected by latent noncognitive and cognitive skills. These authors study a variety of correlated risky behaviors, such as teenage pregnancy and marriage, smoking, marijuana use, and participation in illegal activities. They find that the same low-dimensional vector of abilities that explains schooling choices, wages, employment, work experience, and choice of occupation explains these behavioral outcomes.

Ahee and **Malmendier** argue that individual biases inducing overpayment are exacerbated in auctions. If consumers are heterogeneous in their ability to identify the lowest-price item of a given quality, then the auction mechanism will systematically select as winners those consumers whose estimate is most biased upward. Using a novel dataset on eBay auctions of a popular board game, the authors find that buyers neglect lower prices once they have started bidding. In 51 percent of all auctions, the price is higher than the"buy-it-now" price at which the same good is available for immediate purchase from the same website. However, only 12 percent of bidders systematically overbid. The authors also find that prices are more likely to be above the buy-it-now price in longer auctions, auctions with more bids, and if the seller's item description explicitly mentions the (higher) retail price of the manufacturer. Experience does not diminish the suboptimal bidding behavior. Instead, high experience is correlated with more distortion, such as higher bidding in auctions where the manufacturer's price is mentioned. The latter result suggests that overbidding reflects individual biases rather than search cost or other standard explanations for suboptimal purchase decisions.

Productivity Program Meeting

The NBER's Program on Productivity met in Cambridge on March 17. Program Director Ernst Berndt of MIT organized the meeting, where the following papers were discussed:

Bruce A. Weinberg, Ohio State University and NBER, "Which Labor Economists Invested in Human Capital? Geography, Vintage, and Participation in Scientific Revolutions"

David H. Autor, MIT and NBER; **William R. Kerr**, Harvard University; and **Adriana D. Kugler**, University of Houston and NBER, "Do Employment Protections Reduce Productivity? Evidence from U.S. States"

Carol A. Corrado, Federal Reserve Board; **Charles R. Hulten**, University of Maryland and NBER; and **Daniel E. Sichel**, Federal Reserve Board, "Intangible Capital and Economic Growth"(NBER Working Paper No. 11948)

Marcela Eslava, Universidad de Los Andes; **John Haltiwanger**, University of Maryland and NBER; **Adriana Kugler**, University of Houston and NBER; and **Maurice Kugler**, University of Southhampton, "Factor Adjustments After Deregulation: Panel Evidence from Colombian Plants"
Discussant: Chad Syverson, University of Chicago and NBER

Johannes Van Biesebroeck, University of Toronto and NBER, "Wages Equal Productivity: Fact or Fiction"
Discussant: Wayne Gray, Clark University and NBER

Boyan Jovanovic, New York University and NBER, and **Chung-Yi Tse**, "Creative Destruction in Industries"
Discussant: Shane Greenstein, Northwestern University and NBER

Weinberg studies how proximity and vintage are related to innovation, using evidence from the human capital revolution in labor economics. He finds a strong effect of geography on the probability of making a contribution and on the nature of the contribution. Contributors to the human capital paradigm are significantly more likely to have studied at the University of Chicago or Columbia University and to have been in graduate school in the early years of the human capital revolution, earning their doctorates during the mid-1960s. These results also indicate that a small number of contributors played a large role in the development of human capital, especially at the beginning.

Theory predicts that mandated employment protections may reduce productivity by distorting production choices. Firms facing (non-Coasean) worker dismissal costs will curtail hiring below efficient levels and retain unproductive workers, both of which should affect productivity. **Autor**, **Kerr**, and **Kugler** use the adoption of wrongful-discharge protections by U.S. state courts over the last three decades to evaluate the link between dismissal costs and productivity. Drawing on establishment-level data from the Annual Survey of Manufacturers and the Longitudinal Business Database, they find that wrongful-discharge protections significantly reduce employment flows. Moreover, analysis of plant-level data provides evidence of capital deepening and a decline in total factor productivity following the introduction of wrongful-discharge protections. This last result is potentially quite important, suggesting that mandated employment protections reduce productive efficiency, as theory would suggest. However, the analysis also presents some puzzles including, most significantly, evidence of strong employment growth following adoption of dismissal protections. In light of these puzzles, the authors read their findings as suggestive but tentative.

Published macroeconomic data traditionally exclude most intangible investment from measured GDP. This situation is beginning to change, but the estimates here suggest that as much as $800 billion is still excluded from U.S. published data (as of 2003), and that this leads to the exclusion of more than $3 trillion of business intangible capital stock. To assess the importance of this omission, coauthors **Corrado**, **Hulten**, and **Sichel** add intangible capital to the standard sources-of-growth framework used by the BLS, and find that the inclusion of our list of intangible assets makes a significant difference in the observed patterns of U.S. economic growth. The rate of change of output per worker increases more rapidly when intangibles are counted as capital, and capital deepening becomes the unambiguously dominant source of growth in labor productivity. The role of multifactor productivity is correspondingly diminished, and labor's income share is found to have decreased significantly over the last 50 years.

Eslava, **Haltiwanger**, **Kugler**, and **Kugler** analyze employment and capital adjustments using a panel of plants from Colombia. They allow for nonlinear adjustment of employment to reflect not only adjustment costs of labor but also adjustment costs of capital, and vice versa. Using data from the Annual Manufacturing Survey, which include plant-level prices, they generate measures of plant-level productivity, demand shocks, and cost shocks, and use them to measure desired factor levels. They then estimate adjustment functions for capital and labor as a function of the gap between desired and actual factor levels. As in other countries, they find nonlinear adjustments in employment and capital in response to market fundamentals. In addition, they find that employment and capital adjustments reinforce each other, in that capital shortages reduce hiring and labor shortages reduce investment. Moreover, they find that the market-oriented reforms introduced in Colombia after 1990 increased employment adjustments, especially on the job destruction margin, while reducing capital adjustments. Finally, they find that while completely eliminating frictions from factor adjustments would yield a dramatic increase in aggregate productivity through improved allocative efficiency, the reforms introduced in Colombia generated relatively modest improvements.

Using a matched employer-employee data set of manufacturing plants in three sub-Saharan countries, **Van Biesebroeck** compares the marginal productivity of different categories of workers with the wages they earn. In each country, he observes approximately 135 firms and an average of 5.5 employees per firm. Under certain conditions, the wage premiums for worker characteristics should equal the productivity benefits associated with them. He finds that equality holds strongly in Zimbabwe (the most developed country in the sample), but not at all for Tanzania (the least developed country). The results for Kenya are intermediate. Differences between wage and productivity premiums are most pronounced for characteristics that are clearly related to human capital, such as schooling, training, experience, and tenure. Moreover, where the wage premium differs from the productivity benefit, general human capital tends to receive a wage return that exceeds the productivity return, and the reverse holds for more specific human capital investments. Schooling tends to be overrewarded, even though most of the productivity benefit comes from job training. Wages tend to rise with experience, even though productivity is mostly increasing in tenure. Sampling errors, nonlinear effects, and nonwage benefits are rejected as explanations for the gap between wage and productivity effects. Localized labor markets and imperfect substitutability of different worker-types provide a partial explanation.

Most industries go through a "shakeout" phase during which the number of producers in the industry declines. Industry output generally continues to rise, though, which implies a reallocation of capacity from exiting firms to incumbents and new entrants. Thus, shakeouts seem to be classic creative destruction episodes. Shakeouts of firms tend to occur sooner in industries where technological progress is more rapid. Existing models do not explain this. In fact, the relationship emerges in a vintage-capital model in which shakeouts of firms accompany the replacement of capital, and in which a shakeout is the first replacement echo of the capital created when the industry is born. **Jovanovic** and **Chung-Yi** fit the model, with some success, to the Gort-Klepper data.

Cohort Studies

The NBER's Working Group on Cohort Studies, directed by Dora Costa of MIT, met in Cambridge on March 24. These papers were discussed:

Robert A. Pollak, Washington University and NBER; **Liliana E. Pezzin,** Medical College of Wisconsin; and **Barbara S. Schone**, Agency for Healthcare Research and Quality, "Long-Term Care of the Disabled Elderly: Do Children Increase Caregiving by Spouses?"

Hoyt Bleakley, University of Chicago, "Malaria in the Americas: A Retrospective Analysis of Childhood Exposure"

Werner Troesken, University of Pittsburgh and NBER, and **Karen Clay**, Carnegie Mellon University, "Deprivation and Disease in Early Twentieth-Century America"

Chulhee Lee, Seoul National University, "Socioeconomic Differences in Wartime Morbidity and Mortality of Black Union Army Soldiers"

Do adult children influence the care that elderly parents provide for each other? **Pezzin, Pollak,** and **Schone** develop two models in which the anticipated behavior of adult children provides incentives for elderly parents to increase care for their disabled spouses. The "demonstration effect" assumes that children learn from a parent's example that family caregiving is appropriate behavior. For the "punishment effect," if the nondisabled spouse fails to provide spousal care, then children may respond by not providing future care for the nondisabled spouse when necessary. Joint children act as a commitment mechanism, increasing the probability that elderly spouses will provide care; stepchildren may provide weaker incentives for spousal care. Using data from the Health and Retirement Study, the authors find some evidence that spouses provide more care when they have children with strong parental attachment.

Bleakley considers the malaria-eradication campaigns in the United States (circa 1920), and in Brazil, Colombia, and Mexico (circa 1955), with a specific goal of measuring how much childhood exposure to malaria depresses labor productivity. These eradication campaigns happened because of advances in medical and public-health knowledge, which mitigates concerns about reverse causality of the timing of eradication efforts. Bleakley collects data from regional malaria eradication programs and collates them with publicly available census data. Malarious areas saw large drops in their malaria incidence following the campaign. In both absolute terms and relative to those in non-malarious areas, the cohorts born after eradication had higher income as adults than the preceding generation. Similar increases in literacy and the returns to schooling also occur. The results for years of schooling are mixed, though.

Troesken and **Clay** confirm that deprivation early in life can have lingering physiological effects. In particular, their results suggest that crowded housing conditions in early life facilitate the spread of tuberculosis, which in turn, increases the risk of cancer and stroke later in life. In the typical city, eradicating tuberculosis in 1900 would have reduced the death rates from cancer and stroke in 1915 by 32 percent. Similarly, drinking impure water in early life raises the likelihood that one will be infected with typhoid fever, which in turn, increases the risk of heart and kidney disease later in life. In the typical city, eradicating typhoid fever in 1900 would have reduced the death rate from heart disease by 21 percent, and the death rate from kidney disease by 23 percent. These results are obtained after the authors include controls for the contemporaneous disease environment and lagged values of the dependent variable and the overall disease environment.

Lee investigates the patterns of socioeconomic differences in wartime morbidity and mortality of black Union Army soldiers, and compares them with white recruits. Light-skinned soldiers, former slaves who had been engaged in non-field occupations, men from large plantations, and enlistees from urban areas were less likely to contract diseases and/or to die from disease while in service than, respectively, dark-skinned soldiers, field hands, men from small farms, and enlistees from rural areas. Patterns of disease-specific mortality and timing of death suggests that the differences in development of immunity against diseases and nutritional status prior to enlistment are responsible for the observed mortality differentials. The patterns of wartime mortality of black and white soldiers are generally similar, but the relative effects of the two factors were somewhat different by race. It appears that the health of white recruits was more strongly influenced by the disease environment they were exposed to prior to enlistment. For black soldiers, on the other hand, socioeconomic status, a proxy for nutritional status and general economic wellbeing, was a perhaps more powerful determinant of health. Lee suggests that the larger occupational differences in wartime mortality among blacks could reflect the differences in health and living conditions of blacks and whites prior to enlistment. The stronger health effect of prior residence in urban areas among whites could be explained by the differences in prior exposure to disease between blacks and whites.

International Finance and Macroeconomics

The NBER's Program on International Finance and Macroeconomics met in Cambridge on March 24. NBER Research Associates Menzie D. Chinn, University of Wisconsin, and Lars E.O. Svensson, Princeton University, organized this program:

Ricardo J. Caballero, MIT and NBER; **Emmanuel Farhi**, MIT; and **Pierre-Olivier Gourinchas**, University of California, Berkeley and NBER, "An Equilibrium Model of 'Global Imbalances' and Low Interest Rates"
Discussant: Paolo A. Pesenti, Federal Reserve Bank of New York

Andrew K. Rose, University of California, Berkeley and NBER, and **Mark M. Spiegel**, Federal Reserve Bank of San Francisco, "Offshore Financial Centers: Parasites or Symbionts? (NBER Working Paper No. 12044)
Discussant: Sebnem Kalemli-Ozcan, University of Houston and NBER

Romain Ranciere, IMF; **Aaron Tornell**, University of California, Los Angeles and NBER; and **Frank Westermann**, University of Munich, "Systemic Crises and Growth"
Discussant: Roberto Chang, Rutgers University and NBER

Julian Di Giovanni and **Andrei A. Levchenko**, IMF, "Openness, Volatility, and the Risk Content of Exports"
Discussant: Sylvain Leduc, Federal Reserve Board

Michael Kumhof and **Stijn Van Nieuwerburgh** , IMF, "Monetary Policy in an Equilibrium Portfolio Balance Model"
Discussant: Michael Devereux, University of British Columbia

Eduardo A. Cavallo, Harvard University, and **Jeffrey A. Frankel**, Harvard University and NBER, "Does Openness to Trade Make Countries More Vulnerable to Sudden Stops, or Less? Using Gravity to Establish Causality"
Discussant: Graciela L. Kaminsky, George Washington University and NBER

Three of the most important recent facts in global macroeconomics — the sustained rise in the U.S. current account deficit, the stubborn decline in long-run real rates, and the rise in the share of U.S. assets in global portfolio — appear as anomalies from the perspective of conventional wisdom and models. **Caballero**, **Farhi**, and **Gourinchas** provide a model that rationalizes these facts as an equilibrium outcome of two observed forces: 1) potential growth differentials among different regions of the world and, 2) heterogeneity in these regions' capacity to generate financial assets from real investments. In extensions of the basic model, they also generate exchange rate and gross flows patterns that are broadly consistent with the recent trends observed in these variables. Unlike the conventional wisdom, in the absence of a large change in the two forces, the model does not augur any catastrophic event. More generally, the framework is flexible enough to shed light on a range of scenarios in a global equilibrium environment.

Rose and **Spiegel** analyze the causes and consequences of offshore financial centers (OFCs). Since OFCs are likely to be tax havens and money launderers, they encourage bad behavior in source countries. Nevertheless, OFCs may also have unintended positive consequences for their neighbors, since they act as a competitive fringe for the domestic banking sector. The authors derive and simulate a model of a home country monopoly bank facing a representative competitive OFC that offers tax advantages attained by moving assets offshore at a cost that is increasing in distance between the OFC and the source. The model predicts that proximity to an OFC is likely to have pro-competitive implications for the domestic banking sector, although the overall effect on welfare is ambiguous. Rose and Spiegel test and confirm the predictions empirically. OFC proximity is associated with a more competitive domestic banking system and greater overall financial depth.

Ranciere, **Tornell**, and **Westermann** document the fact that countries that have experienced occasional financial crises have, on average, grown faster than countries with stable financial conditions. The authors measure the incidence of crisis using the *skewness* of credit growth, and find that it has a robust negative effect on GDP growth. This link coexists with the negative link between variance and growth typically found in the literature. To explain the link between crises and growth, the authors present a model in which contract enforce-ability problems generate financial constraints and low growth. Systemic risk-taking relaxes borrowing constraints and increases investment. This leads to higher long-run growth, but also to a greater incidence of crises. The authors find that the negative link between skewness and growth emerges under similar restrictions in the model and in the data.

It has been observed that more open countries experience higher output growth volatility. **DiGiovanni** and **Levchenko** use an industry-level panel dataset of manufacturing production and trade to analyze the mechanisms through which trade can affect the volatility of production. They find that sectors with higher trade are more volatile and that trade leads to increased specialization. These two forces act to increase overall volatility. They also find that sectors that are more open to trade are less correlated with the rest of the economy, an effect that acts to reduce aggregate volatility. The point estimates indicate that each of the three effects has an appreciable impact on aggregate volatility. Added together they imply that a single standard deviation change in trade openness is associated with an increase in aggregate volatility of about 15 percent of the mean volatility observed in the data. The results are also used to provide estimates of the welfare cost of increased volatility under several sets of assumptions. The authors then propose a summary measure of the riskiness of a country's pattern of export specialization, and analyze its features across countries and over time. There is a great deal of variation in countries' risk content of exports, but it does not have a simple relationship to the level of income or other country characteristics.

Standard theory shows that sterilized foreign exchange interventions do not affect equilibrium prices and quantities, and that domestic and foreign currency-denominated bonds are perfect substitutes. **Kumhof** and **Van Nieuwerburgh** show that when fiscal policy is not sufficiently flexible in response to spending shocks, exchange rates must adjust to restore budget balance. This exchange rate adjustment generates a capital gain or loss for holders of domestic currency denominated bonds and causes perfect substitutability to break down. Because of imperfect asset substitutability, uncovered interest rate parity no longer holds. Government balance sheet operations can be used as an independent policy instrument to target interest rates. Sterilized foreign exchange interventions should be most effective in developing countries, where fiscal volatility is large and where the fraction of domestic currency denominated government liabilities is small.

Openness to trade is one factor that has been identified as determining whether a country is prone to sudden stops in capital inflow, currency crashes, or severe recessions. Some believe that openness *raises* vulnerability to foreign shocks, while others believe that it makes adjustment to crises *less* painful. Several authors have offered empirical evidence that having a large tradable sector reduces the contraction necessary to adjust to a given cutoff in funding. This would help explain lower vulnerability to crises in Asia than in Latin America. Such studies may, however, be subject to the problem that trade is endogenous. **Cavallo** and **Frankel** use the gravity instrument for trade openness, which is constructed from geographical determinants of bilateral trade. They find that openness indeed makes countries *less* vulnerable, both to severe sudden stops and currency crashes, and that the relationship is even stronger when correcting for the endogeneity of trade.

Asset Pricing

The NBER's Program on Asset Pricing met in Chicago on March 31. Program Director John H. Cochrane and Research Associate Lars P. Hansen, both of the University of Chicago, organized this agenda:

Luca Benzoni, University of Minnesota; **Robert S. Goldstein**, University of Minnesota and NBER; and **Pierre Collin-Dufresne**, University of California, Berkeley and NBER, "Can Standard Preferences Explain the Prices of Out-of-the-Money S&P 500 Put Options?"
Discussant: George Constantinides, University of Chicago and NBER

Riccardo Colacito and **Mariano M. Croce**, New York University, "Risk for the Long Run and the Real Exchange Rate"
Discussant: Adrien Verdelhan, Boston University

Ravi Jagannathan, Northwestern University and NBER; **Alexey Malakhov**, University of North Carolina; and **Dmitry Novikov**, Goldman Sachs, "Do Hot Hands Persist Among Hedge Fund Managers? An Empirical Evaluation"
Discussant: David Hsieh, Duke University

Stavros Panageas and **Jiangeng Yu**, University of Pennsylvania, "Technological Growth, Asset Pricing, and Consumption Risk Over Long Horizons"
Discussant: Tano Santos, Columbia University and NBER

Torben G. Andersen, Northwestern University and NBER, and **Luca Benzoni**, "Can Bonds Hedge Volatility Risk in the U.S. Treasury Market? A Specification Test for Affine Term Structure Models"
Discussant: Jun Pan, MIT and NBER

Brad Barber and **Ning Zhu**, University of California, Davis, and **Terrance Odean**, University of California, Berkeley, "Do Noise Traders Move Markets?"
Discussant: Sheridan Titman, University of Texas and NBER

Before the stock market crash of 1987, the Black-Scholes model implied that volatilities of S&P 500 index options were relatively constant. Since the crash, though, deep out-of-the money S&P 500 put options have become "expensive" relative to the Black-Scholes benchmark. Many researchers have argued that such prices cannot be justified in a general equilibrium setting if the representative agent has "standard preferences." However, **Benzoni**, **Goldstein**, and **Collin-Dufresne** demonstrate that the "volatility smirk" can be rationalized if the agent is endowed with Epstein-Zin preferences and if the aggregate dividend and consumption processes are driven by a persistent stochastic growth variable that can jump. They identify a realistic calibration of the model that simultaneously matches the empirical properties of dividends, the equity premium, the prices of both at-the-money and deep out-of-the-money puts, and the level of the risk-free rate. A more challenging question (that apparently has not been previously investigated) is whether one can explain within a standard preference framework the stark regime change in the volatility smirk that has existed since the 1987 market crash. To this end, the authors extend their model to a Bayesian setting in which the agents update their beliefs about the average jump size in the event of a jump. Such beliefs only update at crash dates, and hence can explain why the volatility smirk has not diminished over the last 18 years. The authors find that the model can capture the shape of the implied volatility curve both pre- and post-crash while maintaining reasonable estimates for expected returns, price-dividend ratios, and risk-free rates.

Brandt, Cochrane, and Santa-Clara (2004) pointed out that the implicit stochastic discount factors computed using prices, on the one hand, and consumption growth, on the other hand, have very different implications for their cross-country correlation. They leave this as an unresolved puzzle. **Colacito** and **Croce** explain it by combining Epstein and Zin (1989) preferences with a model of predictable returns and by positing a very correlated long-run component. They also assume that the intertemporal elasticity of substitution is larger than one. This setup brings the stochastic discount factors computed using prices and quantities close together, by keeping the volatility of the depreciation rate in the order of 12 percent and the cross-country correlation of consumption growth around 30 percent.

Jagannathan, **Malakhov**, and **Novikov** empirically demonstrate that both hot and cold hands among hedge fund managers tend to persist. To measure performance, they use statistical model-selection methods for identifying style benchmarks for a given hedge fund, and they allow for the possibility that hedge fund net asset values may be based on stale prices for illiquid assets. They are able to eliminate the backfill bias by deleting all of the backfill observations in their dataset. They also take into account the self-selection bias introduced by the fact that both successful and unsuccessful hedge funds stop reporting information to the database provider. The former stop accepting new money and the latter get liquidated. The authors find statistically as well as economically significant persistence in the performance of funds relative to their style benchmarks. It appears that half of the superior or inferior performance during a three-year interval will spill over into the following three-year interval.

Panageas and **Jianfeng** develop a theoretical model in order to understand comovements between asset returns and consumption over longer horizons. They develop an intertemporal general equilibrium model featuring two types of shocks: "small," frequent, and disembodied shocks to productivity and "large" technological innovations, which are embodied in new vintages of the capital stock. The latter affect the economy with significant lags, because firms need to make irreversible investments in the new types of capital and there is an option value to waiting. The model produces endogenous cycles, countercyclical variation in risk premia, and only a very modest degree of predictability in consumption and dividend growth as observed in the data. The authors then use their model as a laboratory to show that, in their simulated data, the unconditional consumption Capital Asset Pricing Model performs badly, while its "long-horizon" version performs significantly better.

Andersen and **Benzoni** investigate whether bonds can hedge volatility risk in the U.S. Treasury market, as predicted by most "affine" term structure models. To this end, they construct powerful and model-free empirical measures of the quadratic yield variation for a cross-section of fixed-maturity zero-coupon bonds ("realized yield volatility") over daily, weekly, and monthly maturities through the use of high-frequency data. They find that the yield curve fails to span yield volatility, as the systematic volatility factors appear largely unrelated to the cross-section of yields. They conclude that a broad class of affine diffusive, quadratic diffusive, and affine jump-diffusive models is incapable of accommodating the observed yield volatility dynamics at daily, weekly, and monthly horizons. Hence, yield volatility risk per se cannot be hedged by taking positions in the Treasury bond market. The authors also advocate using these empirical yield volatility measures more broadly as a basis for specification testing and (parametric) model selection within the term structure literature.

Barber, **Ning**, and **Odean** study the trading behavior of individual investors using the Trade and Quotes (TAQ) and Institute for the Study of Security Markets (ISSM) transaction data for the period 1983 to 2001. They document three results: First, order imbalance based on buyer- and seller-initiated small trades from the TAQ/ISSM data correlates well with the order imbalance based on trades of individual investors from brokerage firm data. This indicates that trade size is a reasonable proxy for the trading of individual investors. Second, order imbalance based on TAQ/ISSM data indicates strong herding by individual investors. Individual investors predominantly contemporaneously buy (sell) the same stocks as each other. Furthermore, they predominantly buy (sell) the same stocks in one week (month) that they did the previous week (month). Third, when measured over one year, the imbalance between purchases and sales of each stock by individual investors forecasts cross-sectional stock returns the next year. Stocks heavily bought by individuals one year underperform stocks heavily sold by 4.4 percentage points in the following year. The spread in returns of stocks bought and stocks sold is greater for small stocks and stocks heavily traded by individual investors. Among stocks heavily traded by individual investors, the spread in returns between stocks bought and stocks sold is 13.5 percentage points the following year.Over shorter periods, such as a week or a month, a different pattern emerges. Stocks heavily bought by individual investors one week earn strong returns in the subsequent week, while stocks heavily sold one week earn poor returns in the subsequent week. This pattern persists for a total of three to four weeks and then reverses for the subsequent several weeks. In addition to examining the ability of small trades to forecast returns, the authors look at the predictive value of large trades. In striking contrast to their small trade results, they find that stocks heavily purchased with large trades one week earn poor returns in the subsequent week, while stocks heavily sold one week earn strong returns in the subsequent week.

Corporate Finance

The NBER's Program on Corporate Finance met in Chicago on March 31. The meeting was organized by Kose John, New York University, and Ivo Welch, NBER and Brown University. The program was:

SESSION 1: Geography and Corporate Finance

Augustin Landier, New York University, and **Vinay B. Nair** and **Julie Wulf**, University of Pennsylvania, "Tradeoffs In Staying Close: Corporate Decisionmaking and Geographic Dispersion"

Simi Kedia, Rutgers University; **Venkatesh Panchapagesan**, Goldman Sachs; and **Vahap B. Uysal**, University of Oklahoma, "Geography and Acquirer Returns"
Discussant for both papers: Joshua Coval, Harvard University and NBER

SESSION 2: Capital Structure

Michael L. Lemmon, University of Utah; **Michael R. Roberts**, University of Pennsylvania; and **Jaime F. Zender**, University of Colorado at Boulder, "Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure"
Discussant: Ivo Welch

Sreedhar T. Bharath and **Paolo Pasquariello**, University of Michigan; and **Guojun Wu**, University of Houston, "Does Asymmetric Information Drive Capital Structure Decisions?"
Discussant: Stewart C. Myers, MIT and NBER

SESSION 3: Regulation, Contracts, and Firms

Efraim Benmelech, Harvard University; and **Tobias J. Moskowitz**, University of Chicago and NBER, "The Political Economy of Financial Regulation: Evidence from U.S. State Usury Laws in the 18th and 19th Century"

Mark J. Garmaise, University of California, Los Angeles, "Ties that Truly Bind: Non-Competition Agreements, Executive Compensation, and Firm Investment"

Steven N. Kaplan, University of Chicago and NBER; **Berk A. Sensoy**, University of Chicago; and **Per Stromberg**, SIFR, "What Are Firms? Evolution From Early Business Plans to Public Companies"

SESSION 4: Self-dealing and Dividends

Simeon Djankov, The World Bank; **Rafael La Porta**, Dartmouth College and NBER; **Florencio Lopez-de-Silanes**, University of Amsterdam; and **Andrei Shleifer**, Harvard University and NBER, "The Law and Economics of Self-Dealing"
Discussant: Paul Mahoney, University of Virginia

Gerard Hoberg and **Nagpurnanand R. Prabhala**, University of Maryland, "Dividend Policy, Risk, and Catering"
Discussant: Malcolm Baker, Harvard University and NBER

Landier, **Nair**, and **Wulf** document the role of geographic dispersion on corporate decisionmaking. They find that geographically dispersed firms are less employee-friendly. Also, using division-level data, they find that employee dismissals are less common in divisions located close to corporate headquarters. Finally, it turns out that firms are reluctant to divest in-state divisions. To explain these findings, the authors consider two mechanisms. First, they investigate whether headquarter proximity to divisions is related to internal information flows. They find that firms are geographically concentrated when information is more difficult to transfer over long distances (soft information industries). Additionally, the protection of proximate employees is stronger in such soft-information industries. Second, they investigate how headquarter proximity to employees affects managerial alignment with shareholder objectives. They document that the protection of proximate employees only holds when the headquarters are located in less-populated counties, suggesting concern for such employees. Moreover, stock markets respond favorably to divestitures of close divisions, especially for these smaller-county firms. These findings suggest that social factors work alongside informational considerations in making geographic dispersion an important factor in corporate decision-making.

Kedia, **Panchapagesan**, and **Uysal** examine the impact of geographical proximity on the acquisition decisions of U.S. public firms over the period 1990-2003. Transactions in which the acquirer and target firms are located within 100 kilometers of each other are classified as local transactions. The authors find that acquirer returns in local transactions are more than twice those in non-local transactions. The higher returns to local acquirers are, at least partially, attributable to information advantages arising from geographical proximity. These information advantages facilitate acquisition of targets that, on average, create higher overall return. However, bidders use their information advantages to earn a higher share of the surplus created.

Lemmon, **Roberts**, and **Zender** examine the evolution of the cross-sectional distribution of capital structure and find it to be remarkably stable over time: firms with high (low) leverage remain relatively high (low) levered for over 20 years. Additionally, this relative ranking is observed for both public and private firms, and is largely unaffected by the process of going public. These persistent differences in leverage across firms are associated with the presence of an unobserved firm-specific effect that is responsible for the majority of variation in capital structure. Over 90 percent of the explained variation in leverage is captured by firm fixed effects, whereas previously identified determinants (for example, size, market-to-book, industry) are responsible for less than 10 percent. These findings show that firms use net security issuances to maintain their leverage ratios in relatively confined regions around their long-run means, consistent with a dynamic rebalancing of capital structure. Importantly, the results imply that the primary determinants of cross-sectional variation in corporate capital structures are largely time invariant, which significantly reduces the set of candidate explanations to those based on factors that remain relatively stable over long periods of time.

Using an information asymmetry index based on measures of adverse selection developed by the market microstructure literature, **Bharath, Pasquariello**, and **Guojun** test whether information asymmetry is the sole determinant of capital structure decisions, as suggested by the pecking order theory. Their tests rely exclusively on measures of the market's assessment of adverse selection risk, rather than on ex-ante firm characteristics. They find that information asymmetry does affect capital structure decisions of U.S. firms over the period 1973-2002, especially when firms' financing needs are low and when firms are financially constrained. They also find a significant degree of intertemporal variability in firms' degree of information asymmetry, as well as in its impact on firms' debt issuance decisions. These findings, based on the information asymmetry index, are robust to sorting firms based on size and firm insider trading activity, two popular alternative proxies for the severity of adverse selection. Overall, this evidence explains why the pecking order theory is only partially successful in explaining all of firms' capital structure decisions. It also suggests that the theory finds support when its basic assumptions hold in the data, as should reasonably be expected of any theory.

Benmelech and **Moskowitz** study the political economy of financial regulation by examining the determinants and effects of U.S. state usury laws during the eighteenth and nineteenth centuries. They argue that regulation is the outcome of private interests using the coercive power of the state to extract rents from other groups. They find that the strictness of usury coexists with other exclusionary policies, such as suffrage laws and lack of general incorporation, or free banking laws, which also respond less to competitive pressures for repeal. Furthermore, the same determinants of financial regulation that favor one group and limit access to others, are associated with lower future economic growth rates, highlighting the endogeneity of financial development and growth.

Garmaise studies the effects of non-competition agreements by analyzing time-series and cross-sectional variation in the enforceability of these contracts across U.S. states. He finds that increased enforceability reduces executive compensation and shifts its form towards greater use of salary. He also shows that tougher non-competition enforcement reduces research and development spending and capital expenditures per employee. Non-competition agreements promote executive stability and board participation, but higher quality managers apparently shun firms in high-enforcement jurisdictions. These results have implications for theories of executive compensation and firm organization.

Kaplan, **Sensoy**, and **Strömberg** study how firm characteristics evolve from early business plan to initial public offering to public company for 49 venture capital financed companies. The average time elapsed is almost six years. They describe the financial performance, business idea, point(s) of differentiation, non-human capital assets, growth strategy, customers, competitors, alliances, top management, ownership structure, and the board of directors. Their analysis focuses on the nature and stability of those firm attributes. Firm business lines remain remarkably stable from business plan through public company. Within those business lines, non-human capital aspects of the businesses appear more stable than human capital aspects. In the cross-section, firms with more alienable assets have substantially more human capital turnover.

Djankov, **La Porta**, **Lopez-de-Silanes**, and **Shleifer** present a new measure of legal protection of minority shareholders against expropriation by corporate insiders: the anti-self-dealing index. Assembled with the help of Lex Mundi law firms, the index is calculated for 72 countries based on legal rules prevailing in 2003, and focuses on private enforcement mechanisms, such as disclosure, approval, and litigation, governing a specific self-dealing transaction. This theoretically-grounded index predicts a variety of stock market outcomes, and generally works better than the commonly used index of anti-director rights.

Fama and French (2001a) show that the propensity to pay dividends declines significantly in the 1990s, the disappearing dividends puzzle. Baker and Wurgler (2004a, 2004b) suggest that these appearing and disappearing dividends are an outcome of firms "catering" to transient fads for dividend paying stocks. **Hoberg** and **Prabhala** empirically examine disappearing dividends and its catering explanation through the lens of risk. They report two main findings: 1) risk is a significant determinant of the propensity to pay dividends and explains up to 40 percent of the disappearing dividends puzzle; 2) catering is insignificant once they account for risk. Risk is also related to payout policies in general: it explains the decision to increase dividends and to repurchase shares. These findings affirm theories and field evidence on the role of risk in dividend policy and suggest that the 1990s increase in volatility noted by Campbell, Lettau, Malkiel, and Xu (2001) has corporate finance implications.

International Trade and Investment

The NBER's Program on International Trade and Investment met in Cambridge on March 31. Giovanni Maggi, NBER and Princeton University, and Andres Rodriguez-Clare, NBER and Pennsylvania State University, organized the meeting. These papers were discussed:

Julian Di Giovanni and **Andrei Levchenko**, IMF, "Openness, Volatility, and the Risk Content of Exports"

Pol Antras, Harvard University and NBER; **Luis Garicano**, University of Chicago; and **Esteban Rossi-Hansberg**, Princeton University and NBER, "Organizing Offshoring: Middle Managers and Communication Cost"

Doireann Fitzgerald, University of California, Santa Cruz, "Trade Costs, Limited Enforcement, and Risk Sharing: A Joint Test"

Jorge Balat and **Guido Porto**, World Bank; and **Irene Brambilla**, Yale University and NBER, "Export Crops, Marketing Costs, and Poverty"

Christian Broda, University of Chicago; **Joshua Greenfield**, Columbia University; and **David Weinstein**, Columbia University and NBER; "From Groundnuts to Globalization: A Structural Estimate of Trade and Growth"

It has been observed that more open countries experience higher output growth volatility. **DiGiovanni** and **Levchenko** use an industry-level panel dataset of manufacturing production and trade to analyze the mechanisms through which trade can affect the volatility of production. They find that sectors with higher trade are more volatile and that trade leads to increased specialization. These two forces act to increase overall volatility. They also find that sectors that are more open to trade are less correlated with the rest of the economy, an effect that acts to reduce aggregate volatility. The point estimates indicate that each of the three effects has an appreciable impact on aggregate volatility. Added together, they imply that a single standard deviation change in trade openness is associated with an increase in aggregate volatility of about 15 percent of the mean volatility observed in the data. The authors also use these results to provide estimates of the welfare cost of increased volatility under several sets of assumptions. They then propose a summary measure of the riskiness of a country's pattern of export specialization, and analyze its features across countries and over time. There is a great deal of variation in countries' risk content of exports, but it does not have a simple relationship to the level of income or other country characteristics.

Why do firms decide to offshore certain parts of their production process? What qualifies certain countries as particularly attractive locations to offshoring? **Antràs**, **Garicano**, and **Rossi-Hansberg** address these questions with a theory of international production hierarchies in which teams arise endogenously to make efficient use of agents' knowledge. Their theory highlights the role of host-country management skills (middle management) in bringing about the emergence of international offshoring. By shielding top management in the source country from routine problems faced by host country workers, the presence of middle managers improves the efficiency of the transmission of knowledge across countries. The model further predicts that the positive effect of middle management skills on offshoring is weaker, the more advanced are communication technologies in the host country. The authors provide evidence consistent with this prediction.

Fitzgerald addresses the question of whether both goods and asset market frictions are necessary to explain the failure of consumption risk sharing across countries. She presents a multi-country model with Armington specialization. There are iceberg costs of shipping goods across countries. In asset markets, contracts are imperfectly enforceable. Both frictions separately limit the extent to which countries can pool risk. The model suggests a test for the presence of each of the two types of friction that exploits data on bilateral imports. Fitzgerald implements this test using a sample of developed and developing countries. She finds that both trade costs and asset market imperfections are necessary in order to explain the failure of perfect consumption risk sharing. The rejection of complete markets is weaker for developed than developing countries. At the same time, financial autarky is also rejected, indicating that some risk sharing is possible through asset markets.

Balat, **Brambilla**, and **Porto** advance a hypothesis to explain the small estimated impacts of trade barriers on poverty, especially in rural Africa. They study the case of Uganda and claim that high marketing costs prevent the realization of the gains from trade. Their basic hypothesis is that the availability of markets for agricultural export crops leads to a higher participation into export cropping and that this, in turn, leads to lower poverty. They use data from the Uganda National Household Survey to test it. They first establish that farmers living in villages with fewer outlets for sales of agricultural exports are likely to be poorer than farmers residing in market-endowed villages. Further, they show that market availability leads to increased household participation in export cropping (coffee, tea, cotton, fruits) and that households engaged in export cropping are less likely to be poorer than subsistence-based households. They conclude that the presence of marketing costs affects the way that trade lowers poverty by hindering farmers from engaging in export cropping. In addition, these effects are non-linear: the poverty impacts of higher market availability are much stronger in low market density villages than in medium or high market villages. This uncovers the role of market access and price competition among buyers and intermediaries as key building blocks in the link between export opportunities and the poor.

Starting with Romer (1987) and Rivera-Batiz-Romer (1991), economists have been able to model how trade enhances growth through the creation and import of new varieties. In this framework, international trade increases economic output through two channels. First, trade raises productivity because producers gain access to new imported varieties. Second, increases in the number of varieties drive down the cost of innovation and result in ever more variety creation. Using highly disaggregated trade data — for example Gabon's imports of Gambian raw, unshelled, groundnuts — **Broda**, **Greenfield**, and **Weinstein** structurally estimate the impact that new imports have had in approximately 4000 markets per country. They then move from groundnuts to globalization by building an exact total factor productivity index that aggregates these micro gains to obtain an estimate of trade on productivity growth around the world. They find that in the typical country in the world, new imported varieties contribute 0.13 percentage points per year to total factor productivity or 12 percent of their productivity growth. Individual country experiences vary substantially, with trade explaining 5 percent of the productivity growth in the typical developed country but about a quarter of productivity growth in the typical developing country. They also find that the creation of new varieties is correlated with R and D activities across countries in ways consistent to semi-endogenous growth models proposed by Jones (1995).

Behavioral Finance

The NBER's Working Group on Behavioral Finance met in Chicago on April 1. Directors Robert J. Shiller of Yale University and Richard H. Thaler of the University of Chicago organized this program:

Ulrike Malmendier, Stanford University and NBER, and **Enrico Moretti**, University of California, Berkeley and NBER, "Winning by Losing: Evidence on Overbidding in Mergers"
Discussant: Yiming Qian, University of Iowa

Harrison Hong, Princeton University, and **Jose Scheinkman** and **Wei Xiong**, Princeton University and NBER, "Advisors and Asset Prices: A Model of the Origins of Bubbles"
Discussant: Pietro Veronesi, University of Chicago

Malcolm Baker, Harvard University and NBER; **Stefan Nagel**, Stanford University and and NBER; and **Jeffrey Wurgler**, New York University and NBER, "The Effects of Dividends on Consumption"
Discussant: Erik Hurst, University of Chicago and NBER

Lauren Cohen, Yale University, and **Andrea Frazzini**, University of Chicago, "Economic Links and Predictable Returns"
Discussant: Josef Lakonishok, University of Illinois and NBER

Amil Dasgupta, **Andrea Prat**, and **Michela Verardo**, London School of Economics "The Price of Conformism"
Discussant: Markus Brunnermeier, Princeton University

Nicholas Barberis, Yale University and NBER, and **Wei Xiong**, "What Drives the Disposition and Momentum Effects? An Analysis of a Recent Preference-Based Explanation"
Discussant: Bing Han, Ohio State University

Do acquiring companies profit from acquisitions, or do acquiring CEOs destroy shareholder value? Answering this question empirically is difficult since the hypothetical counterfactual is hard to determine. While negative stock reactions to the announcement of mergers are consistent with value-destroying mergers, they are also consistent with overvaluation of the acquiror at the time of the announcement. Similarly, studies of long-term returns to acquirors are affected by slowly declining overvaluation. **Malmendier** and **Moretti** study bidding contests to address this identification issue. They construct a novel dataset on all mergers with overlapping bids of at least two potential acquirors between 1983 and 2004. They then compare adjusted abnormal returns of all candidates both before and after a merger fight. The key identifying assumption is that the returns and other corporate outcomes of losing bidders are a valid counterfactual for the winner, after employing the usual controls and matching criteria. The authors find that stock returns of bidders are not significantly different before the merger fight, but diverge significantly after one bidder has completed the merger. Winners significantly underperform losers over a five-year horizon.

Many asset price bubbles occur during periods of excitement about new technologies. **Hong**, **Scheinkman**, and **Xiong** focus on the role of advisors and the communication process with investors in explaining this stylized fact. Advisors are well-intentioned and want to maximize the welfare of their advisees (like a parent and child). But only some of them understand the new technology (the tech-savvys); others do not and can only make a downward-biased recommendation (the old-fogies). While smart investors recognize the heterogeneity in advisors, naive ones mistakenly take whatever is said at face value. Tech-savvys inflate their forecasts to signal that they are not old-fogies because more accurate information about their type improves the welfare of investors in the future. A bubble arises for a wide range of parameters and its size is maximized when there is a mix of smart and naive investors in the economy.

Classical models predict that the division of stock returns into dividends and capital appreciation does not affect investor consumption patterns, while mental accounting and other economic frictions predict that investors are more likely to consume from stock returns in the form of dividends. Using two microdata sets, **Baker**, **Nagel**, and **Wurgler** find that investors are indeed far more likely to consume from dividends than capital gains. In the Consumer Expenditure Survey, household consumption increases with dividend income, after controlling for total wealth, total portfolio returns, and other sources of income. In a sample of household investment accounts data from a brokerage, net withdrawals from the accounts increase one-for-one with ordinary dividends of moderate size, after controlling for total portfolio returns, and also increase with mutual fund and special dividends.

Cohen and **Frazzini** find evidence of return predictability across economically linked firms. They test the hypothesis that, in the presence of investors subject to attention constraints, stock prices do not promptly incorporate news about economically related firms, generating return predictability across assets. They use a dataset of firms' principal customers to identify a set of economically related firms, and show that stock prices do not incorporate news involving related firms, generating predictable subsequent price moves. A long/short equity strategy based on this effect yields monthly alphas of over 150 basis points, or over 18 percent per year.

As previous agency models have shown, fund managers with career concerns have an incentive to imitate the recent trading strategy of other managers. **Dasgupta**, **Prat**, and **Verardo** embed this rational conformist tendency in a stylized financial market with limited arbitrage. Equilibrium prices incorporate a reputational premium or discount, which is a monotonic function of past trade between career-driven traders and the rest of the market. Their prediction is tested with quarterly data on U.S. institutional holdings from 1983 to 2004. They find that stocks that have been persistently bought (sold) by institutions in the past 3 to 5 quarters underperform (overperform) the rest of the market in the next 12 to 30 months. These results are of similar magnitude to, but distinct from, other known asset pricing anomalies. The findings challenge the mainstream view of the roles played by individuals and institutions in generating asset pricing anomalies.

One of the most striking portfolio puzzles is the "disposition effect": the tendency of individuals to sell stocks in their portfolios that have risen in value, rather than fallen in value, since purchase. Perhaps the most prominent explanation for this puzzle is based on prospect theory. Despite its prominence, this hypothesis has received little formal scrutiny. **Barberis** and **Xiong** take up this task, and analyze the trading behavior of investors with prospect theory preferences. Surprisingly, they find that, in its simplest implementation, prospect theory often predicts the *opposite* of the disposition effect. They provide intuition for this result, and identify the conditions under which the disposition effect holds or fails. They also discuss the implications of their results for other disposition-type effects that have been documented in settings such as the housing market, futures trading, and executive stock options.

International Trade and Organization

The NBER's Working Group on International Trade and Organization met in Cambridge on April 1. Director Gordon H. Hanson of the University of California, San Diego, organized the meeting, at which these papers were discussed:

Robert C. Feenstra, University of California, Davis and NBER, and **Barbara J. Spencer**, University of British Columbia and NBER, "Contractual versus Generic Outsourcing: The Role of Proximity"

Dalia Marin, University of Munich, and **Thierry Verdier**, Centre for Economic Policy Research, "Corporate Hierarchies and International Trade: Theory and Evidence"

Volker Nocke, University of Pennsylvania, and **Stephen Yeaple**, University of Pennsylvania and NBER, "Endogenizing Firm Scope: Trade Liberalization and the Size Distribution of Multiproduct Firm"

Feenstra and **Spencer** explore the relationship between proximity of buyers and sellers and the organizational form of outsourcing. Outsourcing can be "contractual" — in which suppliers undertake specific investments — or involve "generic" market transactions. Proximity expands the variety of products sourced through contracts abroad rather than at home, but does not change the range of generic imports. A higher-quality foreign workforce raises the variety of contractual trade, but at the expense of generics. The authors confirm these predictions using data for ordinary versus processing exports from Chinese provinces to destination markets and the predictions of an extended model that allows for multinational production.

Corporate organization varies within a country and across countries with country size. Larger countries have larger firms with flatter more decentralized corporate hierarchies than smaller countries. Firms in larger countries change their corporate organization more slowly than firms in smaller countries. Furthermore, corporate diversity within a country is correlated with the pattern of heterogeneity among firms in size and productivity. **Marin** and **Verdier** develop a theory to explain these stylized facts and link these features to the trade environment that countries and firms face. They introduce heterogenous firms with internal hierarchies into a Krugman (1980) model of trade. The model simultaneously determines firms' organizational choices and heterogeneity across firms in size and productivity. They show that international trade and the toughness of competition in international markets induce a power struggle in firms, eventually leading to decentralized corporate hierarchies. They show further that trade triggers inter-firm reallocations towards more productive firms in which CEOs have power. Based on unique data from 660 Austrian and German corporations, they offer econometric evidence consistent with the model's predictions.

Nocke and **Yeaple** develop a theory of multiproduct firms and endogenous firm scope that can explain a well-known empirical puzzle: larger firms appear to be less efficient in that they have lower values of Tobin's Q. The authors extend this theory to study the effects of trade liberalization and market integration on the size distribution of firms. They show that a symmetric bilateral trade liberalization leads to a less skewed size distribution. The opposite result obtains in the case of a unilateral trade liberalization in the liberalizing country. In this model, trade liberalization affects not only the distribution of observed productivities but also productivity at the firm level. In the empirical section, the authors show that the key predictions are consistent with the data.

Public Economics Program Meeting

The NBER's Program on Public Economics met in Cambridge on April 6–7. Program Director James M. Poterba of MIT organized the meeting at which these papers were discussed:

Seth H. Giertz, Congressional Budget Office, "The Elasticity of Taxable Income During the 1990s: A Sensitivity Analysis"

Monica Singhal, Harvard University and NBER, and **Adam Looney**, Federal Reserve Board, "The Effect of Anticipated Tax Changes on Intertemporal Labor Supply and the Realization of Taxable Income"

Bruce D. Meyer, University of Chicago and NBER, and **Bradley T. Heim**, Duke University, "Identification and Estimation of Structural Models of Labor Supply and Program Participation"
(No discussants for these three papers.)

Joseph J. Doyle, Jr., MIT and NBER, and **Krislert Samphantharak**, University of California, San Diego, "$2.00 Gas! Studying the Effect of Gas Tax Moratorium"
Discussant: Andrew Samwick, Dartmouth College and NBER

Douglas A. Shackelford, University of North Carolina and NBER; **Zhonglan Dai** and **Harold H. Zhang**, University of Texas; and **Edward Maydew**, University of North Carolina, "Capital Gains Taxes and Asset Prices: Capitalization or Lock-in?"
Discussant: Scott Weisbenner, University of Illinois and NBER

Robert Moffitt, John Hopkins University and NBER, "Welfare Work Requirements with Paternalistic Government Preferences"
Discussant: Emmanuel Saez, University of California, Berkeley and NBER

Amy Finkelstein, MIT and NBER, "The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare"
Discussant: Jonathan Skinner, Dartmouth College and NBER

Raj Chetty, University of California, Berkeley and NBER, "Why Do Unemployment Benefits Raise Unemployment Durations? Moral Hazard vs. Liquidity"
Discussant: Mark Duggan, University of Maryland and NBER

Stephen Coate, Cornell University and NBER, and **Marco Battaglini**, Princeton University, "A Dynamic Theory of Public Spending, Taxation, and Debt"
Discussant: Aleh Tsyvinski, Harvard University and NBER

Patrick Bayer, Yale University and NBER; **Nathaniel Keohane**, Yale University; and **Chris Timmins**, Duke University, "Migration and Hedonic Valuation : The Case of Air Quality"
Discussant: Kenneth Chay, University of California, Berkeley and NBER

Giertz examines alternative methodologies for measuring responses to the 1990 and 1993 federal tax increases. The methodologies build on those employed by Gruber and Saez (2002), Carroll (1998), Auten and Carroll (1999), and

Feldstein (1995). Internal Revenue Service tax return data for the project are from the Statistics of Income, which heavily oversamples high-income filers. Special attention is paid to the importance of sample income restrictions and methodology. Estimates are broken down by income group to measure how responses to tax changes vary by income. In general, estimates are quite sensitive to a number of different factors. Using an approach similar to Carroll's yields elasticity of taxable income (ETI) estimates as high as 0.54 and as low as 0.03, depending on the income threshold for inclusion into the sample. Gruber and Saez's preferred specification yields estimates for the 1990s of between 0.20 and 0.30. Yet another approach compares behavior in a year before a tax change to behavior in a year after the tax change. That approach yields estimated ETIs ranging from 0 to 0.71. The results suggest tremendous variation across income groups, with people at the top of the income distribution showing the greatest responsiveness. In fact, the estimates suggest that the ETI could be as high as 1.2 for those at the very top of the income distribution. The major conclusion, however, is that isolating the true taxable income responses to tax changes is extremely complicated by a myriad of other factors and thus little confidence should be placed on any single estimate. Additionally, focusing on particular components of taxable income might yield more insight.

Looney and **Singhal** use anticipated changes in tax rates associated with changes in family composition to estimate intertemporal labor supply elasticities and elasticities of taxable income with respect to the net-of-tax wage rate. A number of provisions of the tax code are tied explicitly to child age and dependent status. Changes in the ages of children can thus affect marginal tax rates through phase-in or phase-out provisions of tax credits or by shifting individuals across tax brackets. The authors identify the response of labor and taxable income to these tax changes by comparing families who experienced a tax-rate change to families who had a similar change in dependents but no resulting tax-rate change. A primary advantage of this approach is that the changes are anticipated and therefore should not cause re-evaluations of lifetime income. Consequently, the estimates of substitution effects should not be confounded by life-cycle income effects. The empirical design also allows for comparison of similar families and can be used to estimate elasticities across the income distribution. In particular, the authors provide estimates for low and middle income families. Using data from the Survey of Income and Program Participation (SIPP), they estimate an intertemporal elasticity of family labor earnings close to one for families earning between $30,000 and $75,000.The estimates for families in the EITC phase-out range are lower but still substantial. Estimates from the IRS-NBER individual tax panel are consistent with the SIPP estimates. Tests using alternate control groups and simulated ""placebo" tax schedules support the identifying assumptions. The high-end estimates suggest substantial efficiency costs of taxation.

Heim and **Meyer** estimate a structural model of employment, hours, and program participation choices of single women over the 1984–96 period. During the 1980s and 1990s, tax and welfare policy dramatically altered the labor supply and program participation incentives of single mothers. The authors use this setting to explore identification in structural labor supply models. Through the judicious use of special samples (specific states, years, women with certain numbers of children), control variables, and separate coefficients for different types of income, they isolate the different sources of variation in the aftertax reward to work. They explore the role of the intensive hours choice versus the extensive work/nonwork decision, examine the role of the point-in-time shape of the tax schedule for a given demographic group versus changes over time, the tax treatment of children, and the role of functional form. They also provide substantive results on effects of the Earned Income Tax Credit (EITC) and welfare programs. Studies analyzing the effects of the EITC using difference-in-difference methods have found that hours per year among those working increased in response to the EITC expansions. This change occurred even though both the income effect of the larger credits and the substitution effect of the higher phase-out rates implied a decline in hours. They address these surprising EITC results as well as the effects of welfare budget set changes using a joint model of labor supply and program participation.

Despite the considerable attention paid to the theory of tax incidence, there are surprisingly few estimates of the pass-through rate of sales taxes on retail prices. **Doyle** and **Samphantharak** estimate the effect of a suspension and subsequent reinstatement of the gasoline sales tax in Illinois and Indiana on retail prices. Earlier laws set the timing of the reinstatements, providing plausibly exogenous changes in the tax rates. Using a unique dataset of daily gasoline prices at the station level, the authors find that retail gas prices drop by 3 percent following the elimination of the 5 percent sales tax, and increase by 4 percent following the reinstatements, compared to neighboring states. Some evidence also suggests that the tax reinstatements are associated with higher prices up to an hour into neighboring states, which provides some evidence on the size of the geographic market for gasoline.

Shackelford and his co-authors examine the impact on asset prices of a reduction in the long-term capital gains tax rate using an equilibrium approach that considers both buyers' and sellers' responses. They demonstrate that the equilibrium impact of capital gains taxes reflects both the capitalization effect (capital gains taxes decrease demand) and the lock-in effect (capital gains taxes decrease supply). Depending on time periods and stock characteristics, either effect may dominate. Using the Taxpayer Relief Act of 1997 as their event, they find evidence supporting a dominant capitalization effect in the week following news that sharply increased the probability of a reduction in the capital gains tax rate and a dominant lock-in effect in the week after the rate reduction became effective. Non-dividend paying stocks (whose shareholders only face capital gains taxes) experience higher average returns during the week the capitalization effect dominates and stocks with large embedded capital gains and high individual ownership exhibit lower average returns during the week the lock-in effect dominates. They also find that the tax cut increases the trading volume in non-dividend paying stocks during the dominant capitalization week and in stocks with large embedded capital gains and high individual ownership during the dominant lock-in week.

Work requirements in means-tested transfer programs have grown in importance in the United States and in some other countries. The theoretical literature that considers their possible optimality generally operates within a traditional welfarist framework where some function of the utility of the poor is maximized. Here **Moffitt** argues that society instead has preferences over the actual work allocations of welfare recipients and that the resulting paternalistic social welfare function is more consistent with the historical evidence. With this social welfare function, optimality of work requirements is possible but depends on the accuracy of the screening mechanism which assigns work requirements to some benefit recipients and not others. Numerical simulations show that the accuracy must be high for such optimality to occur. The simulations also show that earnings subsidies can be justified with the type of social welfare function used here.

Finkelstein investigates the effects of market-wide changes in health insurance by examining the single largest change in health insurance coverage in American history: the introduction of Medicare in 1965. She estimates that the impact of Medicare on hospital spending is over six times larger than what the evidence from individual-level changes in health insurance would have predicted. This disproportionately larger effect may arise if market-wide changes in demand alter the incentives of hospitals to incur the fixed costs of entering the market or of adopting new practice styles. She presents some evidence of these types of effects. A back of the envelope calculation based on the estimated impact of Medicare suggests that the overall spread of health insurance between 1950 and 1990 may be able to explain about half of the increase in real per capita health spending over this time period.

It is well known that unemployment benefits raise unemployment durations. This result has traditionally been interpreted as a substitution effect caused by a distortion in the price of leisure relative to consumption, leading to moral hazard. **Chetty** questions this interpretation by showing that unemployment benefits can also affect durations through an income effect for agents with limited liquidity. The empirical relevance of liquidity constraints and income effects is evaluated in two ways. First, he divides households into groups that are likely to be constrained and unconstrained based on proxies such as asset holdings. He finds that increases in unemployment benefits have small effects on durations in the unconstrained groups but large effects in the constrained groups. Second, he finds that lump-sum severance payments granted at the time of job loss significantly increase durations among constrained households. These results suggest that unemployment benefits raise durations primarily because of an income effect induced by liquidity constraints rather than moral hazard from distorted incentives.

Battaglini and **Coate** present a dynamic political economy theory of public spending, taxation, and debt. Policy choices are made by a legislature consisting of representatives elected by geographically-defined districts. The legislature can raise revenues via a distortionary income tax and by borrowing. These revenues can be used to finance a national public good and district-specific transfers (interpreted as pork-barrel spending). The value of the public good is stochastic, reflecting shocks such as wars or natural disasters. In equilibrium, policymaking cycles between two distinct regimes: "business-as-usual" in which legislators bargain over the allocation of pork, and "responsible-policymaking" in which policies maximize the collective good. Transitions between the two regimes are brought about by shocks in the value of the public good. In the long run, equilibrium tax rates are too high and too volatile, public good provision is too low and debt levels are too high. In some environments, a balanced budget requirement can improve citizen welfare.

Conventional hedonic techniques for estimating the value of local amenities rely on the assumption that households move freely among locations. **Bayer**, **Keohane**, and **Timmins** show that when moving is costly, the variation in housing prices and wages across locations may no longer reflect the value of differences in local amenities. They develop an alternative discrete-choice approach that considers the household location decision directly, and apply it to the case of air quality in U.S. metro areas in 1990 and 2000. Because air pollution is likely to be correlated with unobservable local characteristics such as economic activity, they instrument for air quality using the contribution of distant sources to local pollution — excluding emissions from local sources, which are most likely to be correlated with local conditions. Their model yields an estimated elasticity of willingness to pay with respect to air quality of 0.34 to 0.42. These estimates imply that the median household would pay $149 to $185 (in constant 1982-4 dollars) for a one-unit reduction in average ambient concentrations of particulate matter. These estimates are three times greater than the marginal willingness to pay estimated by a conventional hedonic model using the same data. The results are robust to a range of covariates, instrumenting strategies, and functional form assumptions. The findings also confirm the importance of instrumenting for local air pollution.

Health Economics

The NBER's Program on Health Economics met in Cambridge on April 7. Program Director Michael Grossman and NBER Research Associate Ted Joyce organized the program, at which these papers were discussed:

Christopher Carpenter, University of California, Irvine, "How Do Workplace Smoking Laws Work?"

John Vernon, University of Connecticut and NBER, and **Rexford Santerre**, University of Connecticut, "Consumer Welfare Implications of the Nursing Home Ownership Mix"

Carlos Dobkin, University of California, Santa Cruz and NBER, and **Steven Puller**, Texas A&M University, "The Effects of Government Transfers on Monthly Cycles of Drug Abuse, Crime, and Mortality"

Douglas Almond, Columbia University and NBER, and **Bhashkar Mazumder**, Federal Reserve Bank of Chicago, "How Did Compulsory Schooling Reduce Mortality Risk Among the Elderly?"

William N. Evans, University of Maryland and NBER, and **Heng Wei**, University of Maryland, "Postpartum Hospital Stay and the Outcomes of Mothers and Newborns"

Jens Ludwig, Georgetown University and NBER; **Dave Marcotte**, University of Maryland; and **Karen Norberg**, Washington University and NBER, "Anti-Depressants and Suicide"

A large literature shows that state and local laws requiring smoke-free workplaces are associated with improved worker outcomes (lower secondhand smoke exposure and own smoking rates.) **Carpenter** provides new quasi-experimental evidence on the effects of workplace smoking laws by using the differential timing of adoption of over 100 local smoking by-laws in Ontario, Canada over the period 1997-2004. He is able to control for demographic characteristics, year fixed effects, and county fixed effects. Because he observes the respondent's report of the smoking policy at her worksite, he can test directly for compliance. Although the results indicate that local by-laws increase workplace bans in the aggregate, Carpenter finds that the effects are driven entirely by blue collar workers. Among blue collar workers, local by-laws significantly reduced the fraction of worksites without any smoking restrictions (that is, where smoking is allowed anywhere at work), by over half. These local policies also improved health outcomes: adoption of a local by-law significantly reduced second hand smoke exposure among blue collar workers, by 25-30 percent, and workplace smoking laws did reduce smoking. For all of the outcomes, Carpenter finds plausibly smaller and insignificant estimates for white collar and sales/service workers, the vast majority of whom worked in places with privately initiated smoking bans well before local by-laws were adopted. Overall, these findings confirm that workplace smoking bans do reduce smoking; they document the underlying mechanisms through which local smoking by-laws improve health outcomes; and they show that the effects of these laws are strongly heterogeneous with respect to occupation.

Vernon and **Santerre** compare the likely consumer benefits of higher quality with the potentially higher production costs that result from increased not-for-profit activity in a nursing home services market area. They compare consumer benefits and costs by observing empirically how an increased market penetration of not-for-profit facilities affects the utilization of private-pay nursing home care. Increased (decreased) utilization of nursing home care reflects that the consumer benefits associated with additional not-for-profit nursing homes are greater (less) than consumer costs. The empirical results indicate that, from a consumer's perspective, too few not-for-profit nursing homes exist in the typical market area of the United States. The policy implication is that more quality of care per dollar might be obtained by attracting a greater percentage of not-for-profit nursing homes into most market areas.

Dobkin and **Puller** analyze the monthly patterns of adverse outcomes attributable to the consumption of illegal drugs by recipients of government transfer payments. They find evidence that certain subpopulations on government cash aid significantly increase their consumption of drugs when their checks arrive at the beginning of the month and, as a result, experience adverse events including arrest, hospitalization, and death. Using data from California, they find that the overall rate of drug related hospital admissions increases abruptly at the beginning of the month, with admissions increasing 25 percent during the first five days of the month. This cycle is driven largely by recipients of Supplemental Security Income (SSI). SSI recipients also experience an abrupt 22 percent increase in within-hospital mortality after receiving their checks on the first of the month. The authors also document pronounced monthly cycles in drug related crimes. On the first of the month, arrests for drug possession and sale increase by 20 percent and prostitution arrests decline by 16 percent. These findings suggest that "full wallets" adversely affect some aid recipients and that policymakers should explore alternate disbursement regimes, such as a staggered disbursement schedule or in-kind support, that have the potential to reduce the rate of adverse events.

It is widely believed that education improves health. And, empirical evidence substantiating that the relationship is causal has progressed in recent years. A pinnacle in this progression is arguably Lleras-Muney's 2005 analysis of state compulsory school law changes in the United States, which were found to improve educational attainment and consequently to reduce mortality. **Almond** and **Mazumder** revisit these results, noting that they are not robust to state time trends, even when the Census sample is tripled and a coding error rectified. They use a new dataset with greater detail on health outcomes and statistical power, yielding two primary findings: 1) they replicate Lleras-Muney's results for aggregate measures of health; and 2) the pattern of effects for specific health conditions appears to depart from theoretical predictions of how education should affect health. They also find that state differences in vaccination rates against smallpox during the period of compulsory school law reform may account for the improvement in health and its association with educational attainment.

During the 1980s and 1990s, the lengths of postpartum hospital stays declined for both vaginal and cesarean births. Health professionals and policymakers expressed concern that shorter hospital stays might jeopardize the health of both mothers and infants. The federal government and states responded by passing laws requiring that insurance carriers provide coverage for longer postpartum stays. **Evans** and **Heng** use a restricted-use dataset of all births in California over a six-year period to examine the effect of these early discharge laws.They demonstrate that early discharge laws considerably reduced the fraction of newborns and mothers who were discharged early. They also find that an additional day in the hospital reduced the probability of readmission by about one percentage point for vaginal deliveries with complications and for c-sections of all types. The former result is statistically significant at conventional levels but the latter result is only significant at a p-value of around 0.10. There was no statistically significant change in 28-day newborn readmission rates for babies whose mothers had uncomplicated vaginal deliveries. Finally, although the statutes did not cover Medicaid patients and patients with no insurance, their postpartum length of stay was affected by the changes in the law as well.

Does drug treatment for depression with selective serotonin reuptake inhibitors (SSRIs) increase or decrease the risk of completed suicide? The question is important in part because of the substantial social costs associated with severe depression and suicide; by plausible clinical and behavioral arguments, SSRIs could have either positive or negative effects on suicide mortality. Randomized clinical trials on this topic have not been very informative because of small samples and other problems. **Ludwig**, **Marcotte**, and **Norberg** use data from 27 countries for up to twenty years to estimate the association between SSRI sales and suicide mortality using only the variation across countries in the timing of when SSRIs were first sold that can be explained by differences in the speed with which countries approve new drugs for sale more generally. This source of variation is plausibly unrelated to unmeasured mental health conditions or other factors that may influence both SSRI sales and suicide outcomes. The authors find that an increase in SSRI sales of 1 pill per capita (about a 13 percent increase over 1999 sales levels) is associated with a decline in suicide mortality of around 3-4 percent. These estimates imply a cost per statistical life saved of around $66,000, far below most other government interventions to improve health outcomes.

Environmental Economics

The NBER's Working Group on Environmental Economics met in Cambridge on April 7-8. Group Director Don Fullerton of the University of Texas organized this program:

Meredith Fowlie, University of California, Berkeley, "Emissions Trading, Electricity Industry Restructuring, and Investment in Pollution Abatement"
Discussant: Erin Mansur, Yale University

Malgosia Madajewicz, **Alexander Pfaff**, **Alexander van Geen**, **Joseph Graziano**, **Iftikhar Hussein**, **Hasina Momotaj**, **Roksana Sylvi**, and **Habibul Ahsan**, Columbia University, "Can Information Alone Change Behavior? Arsenic Contamination of Groundwater in Bangladesh"
Discussant: David Bloom, Harvard University and NBER

Stephen Polasky, University of Minnesota, and **Nori Tarui**, Columbia University, "Environmental Regulation in a Dynamic Model with Uncertainty and Investment"
Discussant: Larry Karp, University of California, Berkeley

William A. Pizer, Resources for the Future, and **Richard G. Newell**, "Indexed Regulation"
Discussant: Ian Sue Wing, Boston University

Hilary Sigman, Rutgers University and NBER, "Environmental Liability and Redevelopment of Old Industrial Land"
Discussant: Kathleen Segerson, University of Connecticut

Policymakers increasingly rely on emissions trading programs to address the environmental problems caused by air pollution. If polluting firms in an emissions trading program face different economic regulations and investment incentives in their respective industries, then emissions markets may fail to minimize the total cost of achieving pollution reductions. **Fowlie** analyzes an emissions trading program that was introduced to reduce smog-causing pollution from large stationary sources (primarily electricity generators) in 19 eastern states. She develops and estimates a model of a plant's environmental compliance decision. Using variation in state-level electricity-industry restructuring activity, she identifies the effect of economic regulation on pollution permit market outcomes. She finds first that plants in states that have restructured electricity markets are less likely to adopt more capital intensive compliance options. Second, this economic regulation effect, together with a failure of the permit market to account for spatial variation in marginal damages from pollution, has resulted in increased health damages. Had permits been defined in terms of units of damages instead of units of emissions, more of the mandated emissions reductions would have occurred in restructured electricity markets, thereby avoiding on the order of hundreds of premature deaths per year.

Pfaff and his co-authors study how effectively information alone induces people to incur the cost of avoiding a health risk. Arsenic contamination of the groundwater in Bangladesh provides an unfortunate natural experiment. The authors find that the response to specific information about the safety of one's well is large and rapid; having an unsafe well raises the probability by 0.5 that the individual changes to another well within one year. The estimate of the impact of information is unbiased, because arsenic levels are uncorrelated with individual characteristics. The evidence suggests that a media campaign communicates general information about arsenic as effectively as a more expensive door-to-door effort does.

Tarui and **Polasky** study dynamic environmental regulation with endogenous choice of emissions abatement technology by regulated firms and exogenous learning about environmental damages from emissions by a regulator. Investments in abatement technology by one firm that lower abatement costs for the firm may also lower abatement costs of other firms (technology spillovers). There are two issues facing environmental regulators: setting regulation to achieve optimal abatement given available information; and setting regulations to achieve optimal investment given possible strategic investment and technology spillovers. The authors compare taxes, standards, and marketable permits under flexibility, in which the policy is updated upon learning new information, versus under commitment, in which the policy is not updated. Flexible policy allows regulation to reflect the most up-to-date information. However, under flexible policy, firms can invest strategically to influence future regulation. The authors find that an optimal solution for both investment and abatement decisions can be achieved under a flexible marketable permit scheme in which the permit allocation to a firm is increasing in the firm's investment. No other policy scheme, taxes, auctioned permits, or standards, under either flexibility or commitment, will guarantee achieving an optimal solution. These results run counter to prior literature that finds that price-based mechanisms are superior to quantity-based mechanisms, or that such comparisons depend on conditions.

Weitzman (1974) revealed that prices are preferred to quantities when marginal benefits are relatively flat as compared to marginal costs. **Newell** and **Pizer** extend this comparison to indexed policies, where quantities are proportional to an index, such as output. They find that policy preferences hinge on additional parameters describing the first and second moments of the index and the ex post optimal quantity level. When the ratio of these variables' coefficients of variation divided by their correlation is less than 2, indexed quantities are preferred to fixed quantities. A slightly more complex condition determines when indexed quantities are preferred to prices. Applied to the case of climate change, the authors find that quantities indexed to GDP are preferred to fixed quantities for about half of the 19 largest emitters, including the United States and China, while prices dominate for all other countries.

Many communities are concerned about the reuse of old industrial land and believe that environmental liability is a hindrance to redevelopment. However, with land price adjustments, liability might not impede redevelopment. Existing literature has found price reductions in response to liability, but few studies have looked for an effect on redevelopment. **Sigman** studies variations in state liability rules — specifically, strict liability and joint and several liability — that affect the level and distribution of expected private cleanup costs. She explores the effects of this variation on industrial land prices and vacancy rates in a panel of cities across the United States from 1989 through 2000. In the estimated equations, joint and several liability reduces land prices and increases vacancy rates in central cities. Neither a price nor quantity effect is estimated from strict liability. The results suggest that liability is at least partly capitalized, but does still deter redevelopment.

Monetary Economics Program Meeting

The NBER's Monetary Economics Program met in Cambridge on April 21. Jean Boivin, NBER and Columbia Business School, and John Leahy, NBER and New York University, organized this program:

Bartosz Mackowiak and **Mirko Wiederholt**, Humboldt University Berlin, "Optimal Sticky Prices under Rational Inattention"
Discussant: Laura Veldkamp, New York University

George-Marios Angeletos, MIT and NBER, and **Alessandro Pavan**, Northwestern University, "Efficient Use of Information and Welfare Analysis in Economies with Complementarities and Asymmetric Information"
Discussant: Hyun Shin, Princeton University

Lars E.O. Svensson and **Noah Williams**, Princeton University and NBER, "Monetary Policy with Model Uncertainty: Distribution Forecast Targeting"
Discussant: Alexei Onatski, Columbia University

Frederic S. Mishkin, Columbia University and NBER, and **Niklas Westelius**, Hunter College, "Inflation Band Targeting and Optimal Inflation Contracts"
Discussant: John Williams, Federal Reserve Bank of San Francisco

Jordi Gali, MIT and NBER, and **Tommaso Monacelli**, IGIER, "Optimal Monetary and Fiscal Policy in a Currency Union"
Discussant: Paolo Pesenti, Federal Reserve Bank of New York

Virgiliu Midrigan, Ohio State University, "Menu Costs, Multi-Product Firms, and Aggregate Fluctuations"
Discussant: Ariel Burstein, University of California, Los Angeles

In standard sticky price models, frequent and large price changes imply that the aggregate price level responds quickly to nominal shocks. **Mackowiak** and **Wiederholt** present a model in which price setting firms optimally decide what to pay attention to, subject to a constraint on information flow. When idiosyncratic conditions are more variable or more important than aggregate conditions, then firms pay more attention to idiosyncratic conditions than to aggregate conditions. When the authors calibrate the model to match the large average absolute size of price changes observed in the data, prices react fast and by large amounts to idiosyncratic shocks, but prices react only slowly and by small amounts to nominal shocks. Nominal shocks have persistent real effects. The authors use their model to investigate how the optimal allocation of attention and the dynamics of prices depend on the firms' environment.

Angeletos and **Pavan** analyze equilibrium and welfare for a tractable class of economies with externalities, strategic complementarity or substitutability, and incomplete information. They first characterize the equilibrium use of information and show how strategic payoff effects can heighten the sensitivity of equilibrium actions to noise. Then they characterize the efficient use of information, which allows them to address whether such heightened sensitivity is socially undesirable. They show how the efficient use of information trades off volatility for dispersion, and how this relates to the socially optimal degree of coordination. Finally, they show how the relation between equilibrium and efficient use of information is instrumental in understanding the social value of information. They conclude with a few applications, including production externalities, Keynesian frictions, inefficient fluctuations, efficient market competition, and large Cournot and Bertrand games.

Svensson and **Williams** examine optimal and other monetary policies in a linear-quadratic setup with a relatively general form of model uncertainty: so-called Markov jump-linear-quadratic systems extended to include forward-looking variables. The form of model uncertainty that their framework encompasses includes: simple i.i.d. model deviations; serially correlated model deviations; estimable regime-switching models; more complex structural uncertainty about very different models, for instance, backward- and forward-looking models; time-varying central-bank judgment about the state of model uncertainty; and so forth. They provide an algorithm for finding the optimal policy, as well as solutions for arbitrary policy functions. This allows them to compute and plot consistent distribution forecasts — fan charts — of target variables and instruments. Their methods hence extend certainty equivalence and "mean forecast targeting" to more general certainty non-equivalence and "distribution forecast targeting."

Inflation band targeting is a simpler form of an inflation contract that is widely used in practice and is more politically tenable than alternative strategies, such as appointment of a conservative central banker, or an optimal, pecuniary, inflation contract. **Mishkin** and **Westelius** provide the first theoretical treatment (that they know of) of how inflation target bands can be designed to mitigate the time-inconsistency problem. Their paper analyzes inflation target ranges in the context of a Barro-Gordon (1983) type model, but has a more realistic setting, in that the time-inconsistency problem stems not from the preferences of the central bank, as in Barro-Gordon, but instead from political pressures from the government. They demonstrate that inflation target bands, or a range, can achieve many of the benefits of these other strategies, providing a possible reason why this strategy has been used by so many central banks. Their theoretical model also enables them to outline how an inflation targeting range should be designed optimally and how it should change when there are changes in the nature of shocks to the economy.

Gali and **Monacelli** lay out a tractable model for fiscal and monetary policy analysis in a currency union, and analyze its implications for the optimal design of such policies. Monetary policy is conducted by a common central bank, which sets the interest rate for the union as a whole. Fiscal policy is implemented at the country level, through the choice of government spending level. The model incorporates country-specific shocks and nominal rigidities. Under these assumptions, the optimal monetary policy requires that inflation be stabilized at the union level. On the other hand, the relinquishment of an independent monetary policy, coupled with nominal price rigidities, generates a stabilization role for fiscal policy, one beyond the efficient provision of public goods. Interestingly, the stabilizing role for fiscal policy is shown to be desirable, not only from the viewpoint of each individual country, but also from that of the union as a whole. In addition, this paper offers some insights on two aspects of policy design in currency unions: the conditions for equilibrium determinacy and the effects of exogenous government spending variations.

Midrigan uses a large set of scanner price data collected in retail stores to document that: 1) although the average magnitude of price changes is large, a substantial number of price changes are small in absolute value; 2) the distribution of non-zero price changes has fat tails; and 3) stores tend to adjust prices of goods in narrow product categories simultaneously. He extends the standard menu costs model to a multi-product setting in which firms face economies of scale in the technology of adjusting prices. The model, because of its ability to replicate this additional set of microeconomic facts, can generate aggregate fluctuations much larger than those in standard menu costs economies.

Education Program Meeting

The NBER's Program on Education met on April 27 in Cambridge. Program Director Caroline M. Hoxby of Harvard University organized the meeting at which these papers were discussed:

Caroline Hoxby, and **Gretchen Weingarth**, Harvard University, "Taking Race Out of the Equation: School Reassignment and the Structure of Peer Effects"

Mary A. Burke, Federal Reserve Bank of Boston, and **Tim R. Sass**, Florida State University, "Classroom Peer Effects and Student Achievement"

Michael Anderson, MIT, "Uncovering Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects"

Erich Battistin and **Barbara Sianesi**, Institute for Fiscal Studies, "Misreported Schooling and Returns to Education: Evidence from the UK"

Andrew Leigh, Australian National University, " Teacher Pay and Teacher Aptitude"

Harry Krashinsky, University of Toronto, " How Would One Extra Year of High School Affect Academic Performance in University? Evidence from a Unique Policy Change"

In the last and current decade, the Wake County school district has reassigned numerous students to schools, moving up to 5 percent of the student population in any given year. Before 2000, the explicit goal was balancing schools' racial composition; after 2000, it was balancing schools' income composition. Throughout, finding space for the area's rapidly expanding student population was the most important concern. The reassignments generate a very large number of natural experiments in which students experience new peers in the classroom. As a matter of policy, exposure to an "experiment" should have been and actually appears to have been random, conditional on a student's fixed characteristics such as race and income. Using panel data on students before and after they experience policy-induced changes in peers, **Hoxby** and **Weingarth** explore which models of peer effects explain the data. Their results reject the models in which a peer has a homogeneous effect that does not depend on the student's own characteristics. They find support for models in which a student benefits from peers who are somewhat higher achieving than himself but not very different. A student benefits least from peers who are very different (in either positive or negative ways) and peers who create an unfocused (bimodal or "schizophrenic") classroom. These results also indicate that, when we properly account for the effects of peers' achievement and peers' race, the student's ethnicity, income, and parental education have no, or at most very slight, effects.

Burke and **Sass** analyze a unique micro-level panel dataset encompassing all public school students in grades 3-10 in the state of Florida for each of the years 1999/2000 to 2003/4. The authors are able to directly link each student and teacher to a specific classroom and thus can identify each member of a student's classroom peer group. The ability to track individual students through multiple classrooms over time, and multiple classes for each teacher, enables the authors to control for many sources of spurious peer effects including fixed individual student characteristics and fixed teacher inputs, and allows them to compare the strength of peer effects across different groupings of peers and across grade levels. They are also able to compare the effects of fixed versus time-varying peer characteristics. The authors find mixed results on the importance of peers in the linear-in-means model, and resolve some of these apparent conflicts by considering non-linear specifications of peer effects. Their results suggest that some grouping by ability may create Pareto improvements over uniformly mixed classrooms. In general, they find that contemporaneous behavior wields stronger influence than peers' fixed characteristics.

The view that the returns to investments in public education are highest for early childhood interventions primarily stems from several influential randomized trials — Abecedarian, Perry, and the Early Training Project — that point to super-normal returns to preschool interventions. **Anderson** implements a unified statistical framework to present a de novo analysis of these experiments, focusing on core issues that have received little attention in previous analyses: treatment effect heterogeneity by gender, over-rejection of the null hypothesis due to multiple inference, and robustness of the findings to attrition and deviations from the experimental protocol. The primary finding of this reanalysis is that girls garnered substantial short- and long-term benefits from the interventions, particularly in the domain of total years of education. However, there were no significant long-term benefits for boys. These conclusions change little when allowance is made for attrition and possible violations of random assignment.

Battistin and **Sianesi** study the impact of misreported treatment status on the estimation of causal treatment effects. Although the bias of matching-type estimators computed from misclassified data cannot, in general, be signed, the authors show that the bias is most likely to be downward if misclassification does not depend on variables entering the selection-on-observables assumption, or if it only depends on such variables via the propensity score index. They extend the framework to multiple treatments and then provide results to bound the returns to a number of educational qualifications in the United Kingdom, semi-parametrically. By using the unique nature of their data, they assess the plausibility for the two biases – from measurement error and from omitted variables – to cancel each other out.

Can changes in teacher pay encourage more able individuals to enter the teaching profession? So far, studies of the impact of pay on the aptitude distribution of teachers have provided mixed evidence on the extent to which altering teacher salaries represents a feasible solution to the teacher quality problem. Using a unique dataset of test scores for every individual admitted into an Australian university between 1989 and 2003, **Leigh** explores how changes in average pay or pay dispersion affect the decision to enter teacher education courses in the eight states and territories that make up Australia. A single percent rise in the salary of a starting teacher boosts the average aptitude of students entering teacher education courses by 0.6 percentile ranks, with the effect being strongest for those at the median. This result is robust to instrumenting for teacher pay using uniform salary schedules for public schools. Leigh also finds some evidence that pay dispersion in the non-teaching sector affects the aptitude of potential teachers.

Krashinsky uses a unique policy change in Canada's most populous province, Ontario, to provide direct evidence on the effect of reducing the length of high school on student performance in university. In 1999, the Ontario government eliminated the fifth year of education from its high schools, and mandated a new four-year program. This policy change created two cohorts of students who graduated from high school together and entered university with different amounts of high school education, thus making it possible to indentify the effect of one extra year of high school education on university academic performance. Using several different econometric approaches on original survey data, the results demonstrate that students who receive one less year of high school education perform significantly worse than their counterparts in all subjects, even after accounting for the age difference between cohorts. Overall, both in terms of individual courses and grade point average, four-year graduates perform 5 percentage points, or approximately one-half of a letter grade, lower than undergraduates with one more year of high school education.

Program Meeting on Children

The NBER's Program on Children met in Cambridge on April 28. Program Director Jonathan Gruber of MIT organized the meeting. These papers were discussed:

Samuel Berlinski, University College, London; **Sebastian Galiani**, Universidad de San Andres; and **Paul Gertler**, University of California, Berkeley and NBER, "The Effect of Pre-primary Education on Primary School Performance"

Todd Elder and **Darren Lubotsky**, University of Illinois, Urbana-Champaign, "Kindergarten Entrance Age and Children's Achievement: The Impact of State Policies, Family Background, and Peers"

Gustavo J. Bobonis, University of Toronto, and **Frederico Finan**, University of California, Berkeley, "Endogenous Peer Effects in School Participation"

Elizabeth O. Ananat, MIT, and **Daniel M. Hungerman**, University of Notre Dame, "The Pill and Reproductive Behavior of Young Women"

Margherita Fort, University of Padova, "Education and the Timing of Births: Evidence from a Natural Experiment in Italy"

Emily Oster, University of Chicago, "Does a Rising Tide Lift All Boats Evenly? Health Investments and Gender Inequality in India"

Although the theoretical case for universal pre-primary education is strong, the empirical foundation is weak. **Berlinski**, **Galliani**, and **Gertler** contribute to the empirical case by investigating the effect of a large expansion of universal pre-primary education on subsequent primary school performance in Argentina. They estimate that one year of pre-primary school increases average third grade test scores by 8 percent of a mean, or by 23 percent of the standard deviation, of the distribution of test scores. They also find that pre-primary school attendance positively affects student's self-control in the third grade as measured by behaviors such as attention, effort, class participation, and discipline.

The average age at which children enter kindergarten has climbed steadily in the past 25 years. Using data from the Early Childhood Longitudinal Study and the National Educational Longitudinal Study of 1988, **Elder** and **Lubotsky** examine the effect of age at entrance to kindergarten on achievement test performance, grade retention, and diagnoses of learning disabilities. State kindergarten cutoff dates generate two sources of plausibly exogenous variation in the age at which children enter kindergarten, which these authors use to estimate instrumental variables models of the effect of entrance age on outcomes. Consistent with recent work in the United States and other countries, they find that children who are older when they enter kindergarten have higher reading and math test scores. Older children are also less likely to be held back later and less likely to be diagnosed with a learning disability. Next the authors ascertain why entrance age affects achievement. They find evidence of substantial heterogeneity in the impact of entrance age, with richer children benefiting considerably more than poorer children. This is consistent with the idea that wealthy parents are more willing or more able to develop their children's human capital prior to the start of kindergarten. Although older children in kindergarten tend to be taller, the authors find no evidence of heterogeneity in this correlation. They conclude that older children tend to have more cognitive skills and better preparation prior to entering kindergarten, and that physical maturity is not the primary cause of the entrance age effect. Finally, school entrance cutoffs also influence the average age of classes, and the authors are able to separately identify the influence of an individual's own age at entry from the influence of his or her classmates' age. They find some evidence for both positive and negative peer effects: conditional on a child's own age, older classmates increase test scores, but also increase the probability of being retained in grade or being diagnosed with a learning disability.

The use of experimental designs has enabled researchers to identify social interactions or neighborhood effects on individual behavior. However, a remaining obstacle in the literature has been the inability to distinguish between peer effects that are determined by a person's reference group *behavior* (endogenous peer effects) and effects that are generated as a result of specific background characteristics of the groups themselves (contextual peer effects). **Bobonis** and **Finan** identify and estimate endogenous peer effects on children's school participation decisions using evidence from the Progresa program. Under Progresa, payments were provided to poor mothers conditional upon school enrollment of their children. Because program eligibility was randomly assigned, the authors use this exogenous variation in school participation to identify peer effects on the school enrollment of ineligible children residing in the same communities. They find that peers have considerable influence on the enrollment decision of program-ineligible children, and these effects are nonlinear and concentrated among children from relatively poorer households. These findings imply that educational policies aimed at encouraging enrollment can produce large social multiplier effects.

A growing literature documents how the availability of oral contraception affected the outcomes of young women in the 1960s and 1970s, but the effects of oral contraception on women's fertility remains disputed. In this paper, **Ananat** and **Hungerman** examine whether increased access to the pill affected women's fertility and whether the pill substituted for other fertility technologies. Using census data, the authors document that access to the pill led to falling short-term fertility rates for young women. They then use two different datasets to examine the impact of legal oral contraception on unwanted pregnancies, and in particular on abortions, in order to identify whether these fertility technologies were viewed to some extent as substitutable by young women. In both datasets, the authors find that access to oral contraception lowers the number of abortions for young women.

Fort assesses the causal effects of education on the timing of first order births, allowing for heterogeneity in the effects while controlling for self-selection of women into education. Identification relies on exogenous variation in schooling induced by a mandatory school reform rolled out nationwide in Italy in the early 1960s. Findings based on Census data (Italy, 1981) suggest that a large fraction of the women affected by the reform postpone the time of the first birth but catch up with this fertility delay before turning 26. There is some indication that the fertility behavior of these women is different from that of the average women in the population.

Gender inequality in South Asia is an important policy issue; gender imbalances in mortality have been of particular concern. Policymakers often argue that increasing the level of development and access to health care are crucial to addressing this inequality. **Oster** analyzes the relationship between access to child health investments and gender inequality in those investments in India. The first part of her paper explores the proximate causes of the gender imbalance in mortality in India. She finds that a large share of the gender imbalance (about 30 percent) can be explained by differential access to vaccination. The second part of the paper estimates the effect of changes in access to vaccination on gender inequality. Oster argues that the direction of these effects is not obvious. A simple model of (gender-biased) parental investments, and empirical work using variation in access to vaccination, both suggest that initial increases in vaccination availability from low levels will increase gender inequality; further increases will then decrease inequality. This non-monotonic pattern is also reflected in differences in mortality. This result may shed light on the contrast between the cross-sectional and time-series evidence on gender and development.

Higher Education

The NBER's Working Group on Higher Education met in Cambridge on April 28. Group Director Charles T. Clotfelter of Duke University organized this program:

Jill M. Constantine and **Neil S. Seftor**, Mathematica Policy Research, "A Study of the Effect of Talent Search on Secondary and Postsecondary Outcomes in Florida, Indiana, and Texas"
Discussant: Scott Carrell, Dartmouth College

Florian Hoffman, University of Toronto, and **Philip Oreopoulos**, University of Toronto and NBER, "Do Better Professors Produce Better Students? The Effects of Objective and Subjective Measures of Teacher Quality on Academic Achievement "
Discussant: William Becker, Indiana University

James D. Adams, Rensselaer Polytechnic Institute and NBER, and **J. Roger Clemmons**, University of Florida, "The Growing Allocative Inefficiency of the U.S. Higher Education Sector"
Discussant: Richard Jensen, University of Notre Dame

David Figlio, University of Florida and NBER; **Colleen Donovan**, University of California, Berkeley; and **Mark Rush**, University of Florida, "Cramming: The Effects of School Accountability on College Study Habits and Performance"
Discussant: Christopher Avery, Harvard University and NBER

John Bound, University of Michigan and NBER; **Michael Lovenheim**, University of Michigan; and **Sarah Turner**, University of Virginia and NBER, "Understanding the Increased Time to the Baccalaureate Degree"
Discussant: Thomas Kane, Harvard University and NBER

Peter Arcidiacono, Duke University; **Shakeeb Khan**, University of Rochester; and **Jacob L. Vigdor**, Duke University and NBER, "Race-Conscious Admissions and Inter-Racial Contact: Does Homophily Matter?"
Discussant: Jesse Rothstein, Princeton University and NBER

Low-income students and students whose parents have not attended college typically are less likely than middle- and upper-income students to complete high school and attend college, and are thus less likely to reap the benefits of attending college. By providing information on the types of high school courses students should take to prepare for college and on the financial aid available to pay for college, the Talent Search program seeks to address substantial informational hurdles. Using a large amount of administrative data compiled in Florida, Indiana, and Texas for one complete cohort of students, **Constantine** and **Seftor** were able to use complex propensity score matching models to identify nonparticipating students who were most similar to Talent Search participants. They find that Talent Search participants were more likely than comparison students to apply for federal financial aid and enroll in public postsecondary institutions in all three states. These findings suggest that assisting low-income students who have college aspirations to overcome information barriers—an important objective of the Talent Search program—may be effective in helping these students achieve their aspirations.

Teaching is the central task that colleges and universities perform for students. Differences in teaching quality, across instructors and institutions, thus may play a key role in determining students' academic experiences, interests, and successful transition into the labor force. Yet research about the importance of teacher quality focuses almost exclusively on the primary or secondary level. **Hoffmann** and **Oreopoulos** use administrative data from a large Canadian university between 1996 and 2005, matched to course instructors and instructors' teaching evaluations. Their main approach is to use the fact that many entering first-year students end up with different instructors because of scheduling conflicts or year-to-year replacements. They estimate the overall influence of postsecondary instructors on course dropout, enrollment, and grade outcomes by estimating the variance of the value added that instructors contribute to various outcome measures of academic achievement. They also examine more direct effects by estimating the consequences of entering a class with an instructor who ranks high or low in subjective teaching evaluations. Their main finding is that the variance among first-year students taking same courses but with different instructors is small, but not trivial: a two standard deviation switch in instructor quality would be expected to lower the likelihood of dropping the course by 1.5 percentage points, and increase the number of course subjects enrolled in the following year by less than 0.05 of its standard deviation. They also find little evidence that student evaluations of teacher quality significantly relate to student achievement.

Adams and **Clemmons** present new evidence on research and teaching productivity in universities. Their findings are based on a panel that covers 1981-99 and includes 102 top U.S. schools. Faculty size grows at 0.6 percent per year compared with growth of 4.9 percent in the industrial science and engineering workforce. Measured by papers and citations per researcher, productivity grows at 1.4-6.7 percent per year and productivity and its rate of growth are higher in private than public universities. Measured by baccalaureate and graduate degrees per teacher, teaching productivity grows at 0.8-1.1 percent per year and growth is faster in public than private universities. A decomposition analysis shows that growth in research productivity within universities exceeds overall growth. This is because research shares grow more rapidly in universities whose productivity grows less rapidly. Likewise, the research share of public universities increases even though productivity grows less rapidly in public universities. Together, these findings imply that allocative efficiency of U.S. higher education may have declined during the late twentieth century. Regression analysis of individual universities finds that R and D stock, endowment, and post-doctoral students increase research productivity, that the effect of nonfederal R and D stock is less, and that research is subject to decreasing returns. Since the nonfederal R and D share grows and is much higher in public universities, this could account for some of the rising allocative inefficiency. The evidence for decreasing returns in research also suggests limits on scale that restrict the ability of more efficient institutions to expand. Besides all this, the data strongly hint at growing financial pressures on U.S. public universities.

School accountability -- the practice of evaluating schools on the basis of the observed performance of students and rewarding and punishing schools according to these evaluations -- is ubiquitous in the world today, with nations on every continent experimenting with such policies. While there has been considerable research attention paid to the effects of school accountability plans on the standardized test scores of average students or low-performing students, as well as evidence concerning the incentives embedded within school accountability plans, there has been no published research to date investigating the effects of these plans on the high end of the academic distribution: those students who would surely have attained proficiency in the absence of school accountability plans. **Figlio**, **Donovan**, and **Rush** seek to fill this void; they exploit data from a state that changed the basis of its accountability system in 1999. This change directly influenced a large number of schools that immediately either transitioned from being threatened with sanctions to not being threatened at all, or vice versa. Using this identification strategy, they can measure the impact on students of the school they attend either becoming threatened or becoming less threatened. In order to implement this identification strategy, the authors use a remarkable dataset from a large selective public university in the state in question. They observe that school accountability plans have the potential to substantially affect high-achieving students' performance and study habits in college. They observe that accountability systems, whether they are based on a low-level test of basic skills or based on a higher-level standards-based assessment, tend to lead to increased cramming behavior and poorer study habits in college. However, the two types of accountability systems apparently lead to very different outcomes in college, as measured by course grades. An accountability system based on a low-level test of basic skills is associated with unambiguously worse performance by students in college. On the other hand, an accountability system based on a rigorous standards-based assessment apparently results in significantly improved mathematics performance in college, as well as improved performance in other technical mathematics-based courses such as chemistry, economics, engineering and physics that were not directly covered by the accountability system, with no ill effects on performance in less technical courses. These results indicate that the design of accountability systems is critically important in determining the degree to which high-performing students obtain skills that help them succeed in college.

Time to completion of the baccalaureate degree has increased markedly among college graduates in the United States over the last two decades. Between the cohorts graduating from high school in 1972 and 1992, the percent of graduates receiving a degree within 4 years dropped from 57.6 percent to 44 percent. Among the reasons that students may extend the collegiate experiences beyond the four-year norm are: the need for academic remediation, which lengthens the course of study; inability to finance full-time attendance, requiring part-time enrollment and employment; or simply a desire to extend the consumption experience of collegiate life. The consequences of extended time-to-degree may include individual loss of earnings, as well as the social cost of potentially reduced economic growth as the supply of college-educated workers is limited by tradeoffs between school and work. **Bound**, **Lovenheim**, and **Turner** find that the increase in time to degree is localized among graduates of non-selective public colleges and universities. They find no evidence that changes in student characteristics, including pre-collegiate achievement or parental characteristics, explain the observed increase in time to degree. The increase in time to degree has been the largest within states that have the largest increases in cohort size, consistent with dilution in resources per student at public colleges. As proximate causes, the authors find evidence of increased hours employed and greater propensity to transfer among institutions.

Two recent U.S. Supreme Court rulings have armed the constitutionality of certain types of racial preferences in college admissions. The main premise behind the Supreme Courts decisions was that affirmative action benefits not only the minority students targeted by the policy, but majority students as well. The purported benefit to majority students is rooted in an increased likelihood of inter-racial contact associated with increased minority representation on campus. However, affirmative action itself may not foster these relationships. **Arcidiacono**, **Khan**, and **Vigdor** show that inter-racial relationships are more likely to form among students with comparable test scores. Their simulations suggest that less aggressive admissions policies would actually increase inter-racial contact by reducing the disparities between majority and minority student characteristics.

Health Care Program Meeting

The NBER's Program on Health Care met in Cambridge on May 5. NBER Research Associate Douglas O. Staiger of Dartmouth College organized this program:

Amitabh Chandra, Harvard University and NBER; **Jonathan Gruber**, MIT and NBER; and **Robin McKnight**, University of Oregon and NBER, "Medical Price Sensitivity and Optimal Health Insurance for the Elderly"

Sean Nicholson, Cornell University and NBER; **Andrew Epstein,** Yale University; and **Jonathan Ketcham**, Arizona State University, "Specialization and Sorting in the Obstetrics Market"

Tomas J. Philipson, University of Chicago and NBER, and **Anupam B. Jena**, University of Chicago, "Surplus Appropriation from R&D and Health Care Technology Assessment Procedures"

Leemore Dafny, Northwestern University and NBER, and **David Dranove**, Northwestern University, "Regulatory Exploitation and the Market for Corporate Control"

Avi Dor, Case Western Reserve University and NBER, and **William Encinosa**, AHRQ, "Does Cost-Sharing Affect Compliance? Insurance and the Market for Prescription Drugs"

David M. Cutler, Harvard University and NBER, and **Angus S. Deaton** and **Adriana Lleras-Muney**, Princeton University and NBER, "The Determinants of Mortality"(NBER Working Paper No. 11963)

As private insurers and the government attempt to constrain elderly medical spending in the coming years, a first-order consideration is the price sensitivity of the medical consumption of the elderly. For the non-elderly, the famous RAND Health Insurance Experiment (HIE) addressed the question of the sensitivity of medical consumption to its price, but RAND did not include the elderly in its HIE. The purpose of **Gruber, Chandra**, and **McKnight**'s paper is to remedy this deficiency by studying a major set of copayment changes in a modern, managed care environment. The California Public Employees Retirement System (CalPERS) enacted a series of substantial copayment increases for both active employees and retirees, first for the state's PPO plans, and then for its HMO plans. The result was a staggered set of copayment changes that allow these authors to carefully evaluate the impact on the medical care utilization of the elderly. To evaluate these policy changes, the authors have compiled a comprehensive database of all medical claims for those enrolled continuously in several of the CalPERS plans. They find that both physician office visits and prescription drug utilization are price sensitive among the elderly, although the elasticities are modest, as with the RAND HIE. Unlike the HIE, however, this paper finds significant "offset" effects in terms of increased hospital utilization in response to the combination of higher copayments for physicians and prescription drugs. The most chronically ill individuals are equally responsive to copay increases in terms of their reduced use of physician care or prescription drugs, but there are much larger offset effects for these populations, so that there is little net gain from higher copayments for that group. This suggests that copayment increases targeted to health would be part of an optimal health insurance arrangement for the elderly.

The welfare implications of variations in how physicians treat patients depend on whether patients have different optimal treatments and are treated by physicians who are likely to provide those optimal treatments. **Epstein**, **Ketcham**, and **Nicholson** examine the extent to which expecting mothers direct themselves, or are directed to, particular physicians based on their preferences for physicians' treatment styles and the patients' health conditions. The authors capitalize on the largely random assignment to weekdays of weekend patients because of physicians' call schedules and the concentration of induced deliveries and scheduled c-sections, both opportunities for a patient to choose her physician. Using Florida and New York discharge data from 1999 to 2004 linked to information on physician practices, the authors find that one-third of the variation in treatment styles across physicians is attributable to patient-physician matching on unobserved characteristics, which implies that a considerable part of the variation in medical treatment rates may enhance welfare. In one-third of the group practices, certain physicians specialize in treating weekday patients with relatively high observed risk and others with relatively low observed risk, and there is more than twice as much variation across physicians within a practice in patients' observed health than one would expect if weekday patients were randomly assigned.

Given the rapid growth in health care spending that is often attributed to technological change, many private and public institutions are grappling with how to best assess and adopt new health care technologies. The leading technology adoption criteria proposed in theory and used in practice involve so called "cost-effectiveness" measures. However, little is known about the dynamic efficiency implications of such criteria, in particular how they influence the R and D investments that make technologies available in the first place. **Philipson** and **Jena** argue that such criteria implicitly concern maximizing *consumer surplus,* which many times is consistent with maximizing static efficiency after an innovation has been developed. Dynamic efficiency, however, concerns aligning the social costs and benefits of R and D and is therefore determined by how much of the social surplus from the new technology is appropriated as *producer surplus.* The authors analyze the relationship between cost-effectiveness measures and the degree of surplus appropriation by innovators driving dynamic efficiency. They illustrate how to estimate the two for the new HIV/AIDS therapies that entered the market after the late 1980s and find that only 5 percent of the social surplus is appropriated by innovators. They show how this finding can be generalized to other existing cost-effectiveness estimates by deriving how those estimates identify innovator appropriation for a set of studies of over 200 drugs. They find that these studies implicitly support a low degree of appropriation as well. Despite the high annual cost of drugs to patients, very low shares of social surplus may go to innovators, which may imply that cost-effectiveness is too high in a dynamic efficiency sense.

Dafny and **Dranove** evaluate the possibility that a failure to exploit regulatory loopholes could motivate corporate takeovers. They use the U.S. hospital industry in 1985-96 as a case study. A 1988 change in Medicare rules widened a pre-existing loophole in the Medicare payment system, presenting hospitals with an opportunity to increase operating margins by 5 or more percentage *points* simply by "upcoding" patients to more lucrative codes. The authors find that "room to upcode" is a statistically and economically significant predictor of for-profit but not of not-for-profit acquisitions in the period immediately following this policy change. They also find that hospitals acquired by for-profit systems subsequently upcoded more than a sample of similar hospitals that were not acquired, as identified by propensity scores. These results suggest that firms that do not fully exploit regulatory loopholes are vulnerable to takeover.

Insurance for prescription drugs is characterized by two regimes: flat copayments and variable coinsurance. **Dor** and **Encinosa** develop a simple model to show that patient compliance is lower under coinsurance because of uncertainty in cost sharing. Empirically, the authors derive comparable models for compliance behavior in the two regimes. Using claims data from nine large firms, they focus on diabetes, a common chronic condition that leads to severe complications when inappropriately treated. In the coinsurance model, an increase in the coinsurance rate from 20 to 75 percents results in the share of persons who never comply to increase by nearly 10 percent and reduces the share of fully compliant persons by almost 25 percent. In the co-payment model, an increase in the copayment from \$6 to \$10 results in a 6.2 percent increase in the share of never-compliers, and a concomitant 9 percent reduction in the share of full compliers. Similar results hold when the level of cost-sharing is held constant across regimes. While non-compliance reduces expenditures on prescription drugs, it may also lead to increases in indirect medical costs attributable to avertable complications. Using available aggregate estimates of the cost of diabetic complications, the authors calculate that the \$6-\$10 increase in copayment would have the direct effect of reducing national drug spending for diabetes by \$125 million. However, the increase in non-compliance rates is expected to increase the rate of diabetic complications, resulting in an additional \$360 million in treatment costs. These results suggest that both private payers and public payers may be able to reduce overall medical costs by switching from coinsurance to copayments in prescription drug plans.

Mortality rates have fallen dramatically over time, starting in a few countries in the eighteenth century, and continuing to fall today. In just the past century, life expectancy has increased by over 30 years. At the same time, mortality rates remain much higher in poor countries, with a difference in life expectancy between rich and poor countries too of about 30 years. This difference persists despite the remarkable progress in health improvement in the last half century, at least until the HIV/AIDS pandemic. In both the time-series and the cross-section data, there is a strong correlation between income per capita and mortality rates, a correlation that also exists within countries, where richer, better-educated people live longer. **Cutler**, **Deaton**, and **Lleras-Muney** review the determinants of these patterns: over history, over countries, and across groups within countries. While there is no consensus about the causal mechanisms, they tentatively identify the application of scientific advance and technical progress (some of which is induced by income and facilitated by education) as the ultimate determinant of health. Such an explanation allows a consistent interpretation of the historical, cross-country, and within-country evidence. They downplay direct causal mechanisms running from income to health.

Political Economy

The NBER's Political Economy Program met in Cambridge on May 6. Program Director Alberto Alesina of Harvard University organized the meeting at which these papers were discussed:

Enrico Spolaore, Tufts University, and **Romain Wacziarg**, Stanford University and NBER, "The Diffusion of Development"
Discussant: Francesco Caselli, London School of Economics and NBER

Paola Giuliano and **Antonio Spilimbergo**, IMF, and **Giovanni Tonon**, Dana-Farber Cancer Institute, "Genetic Map for Economist"
Discussant: Luigi Zingales, Harvard University and NBER

Alberto Alesina; **William Easterly**, New York University; and **Janina Matuszeski**, Harvard University, "Artificial States"
Discussant: Ernesto Dalbo, University of California, Berkeley

Efraim Benmelech, Harvard University, and **Tobias J. Moskowitz**, University of Chicago and NBER, "The Political Economy of Financial Regulation: Evidence from U.S. State Usury Laws in the 18th and 19th Century"
Discussant: Antoinette Schoar, MIT and NBER

Edward L. Glaeser and **Andrei Shleifer**, Harvard University and NBER, and **Giacomo Ponzetto**, Harvard University, "Why Does Democracy Need Education?"
Discussant: Simon Johnson, MIT and NBER

Raghuram G. Rajan, IMF and NBER, and **Luigi Zingales**, "The Persistence of Underdevelopment: Institutions, Human Capital, or Constituencies?"
Discussant: Pedro Dalbo, Brown University

Spolaore and **Wacziarg** study the barriers to the diffusion of development across countries over the very long run. They find that genetic distance, a measure associated with the amount of time elapsed since two populations' last common ancestors, bears a statistically and economically significant correlation with pairwise income differences, even after controlling for various measures of geographical isolation, and other cultural, climatic, and historical differences. These results hold not only for contemporary income differences but also for income differences measured since 1500, and for income differences within Europe. Similar patterns of coefficients exist for the proximate determinants of income differences, particularly for differences in human capital and institutions. This paper discusses the economic mechanisms that are consistent with these facts. It presents a framework in which differences in human characteristics transmitted across generations — including culturally transmitted characteristics — can affect income differences by creating barriers to the diffusion of innovations, even when they have no direct effect on productivity. The empirical evidence over time and space is consistent with this "barriers" interpretation.

What does genetic distance between populations measure? And, is it a good proxy for culture as well as a valid instrument for disentangling the causal relationship between culture and economic outcomes? **Guiliano**, **Spilimbergo**, and **Tonon** examine how economists may interpret the correlation between genetic distance and cultural and economic variables. They argue that currently used measures of genetic distance are a poor proxy for cultural differences. Rather, genetic distance, being determined among other things by geographical barriers, reflects transport costs between countries. To demonstrate this point, the authors construct a new measure of geographic distance within Europe that takes into account the existence of major geographical barriers. They show that this measure explains both genetic distance and trade between European countries.

Artificial states are those in which political borders do not coincide with a division of nationalities desired by the people on the ground. **Alesina**, **Easterly**, and **Matuszeski** propose and compute for all countries in the world two new measures of the degree to which states are artificial. One is based on measuring how borders split ethnic groups into two separate adjacent countries. The other measures how straight land borders are, under the assumption the straight land borders are more likely to be artificial. The authors then show that these two measures seem to be highly correlated with several measures of political and economic success.

Benmelech and **Moskowitz** study the political economy of financial regulation by examining the determinants and effects of U.S. state usury laws during the 18th and 19th centuries. They argue that regulation is the outcome of private interests using the coercive power of the state to extract rents from other groups. They find that strictness of usury coexists with other exclusionary policies, such as suffrage laws and lack of general incorporation or free banking laws, which also respond less to competitive pressures for repeal. Furthermore, the same determinants of financial regulation that favor one group and limit access to others, are associated with lower future economic growth rates, highlighting the endogeneity of financial development and growth.

Across countries, education and democracy are highly correlated. **Glaeser**, **Shleifer**, and **Ponzetto** empirically motivate and then model a causal mechanism that explains this correlation. In their model, schooling teaches people to interact with others and raises the benefits of civic participation, including voting and organizing. In the battle between democracy and dictatorship, democracy has a wide potential base of support but offers only weak incentives to its defenders. Dictatorship provides stronger incentives, but to a narrower base. As education raises the benefits of civic participation, it also raises the support for more democratic regimes *relative to* dictatorships. This increases the likelihood of democratic revolutions against dictatorships, and reduces that of successful anti-democratic coups.

Why is underdevelopment so persistent? One explanation is that poor countries do not have institutions that can support growth. Because institutions (both good and bad) are persistent, underdevelopment is persistent. An alternative view is that underdevelopment comes from poor education. Neither explanation is fully satisfactory, the first because it does not explain why poor economic institutions persist even in fairly democratic but poor societies, and the second because it does not explain why poor education is so persistent. **Rajan** and **Zingales** try to reconcile these two views by arguing that the underlying cause of underdevelopment is the initial distribution of factor endowments. Under certain circumstances, this leads to self-interested constituencies that, in equilibrium, perpetuate the status quo. In other words, poor education policy might well be the proximate cause of underdevelopment, but the deeper (and more long lasting) cause is the initial conditions (like the distribution of education) that determine political constituencies, their power, and their incentives. Although the initial conditions may well be a legacy of the colonial past, and may well create a perverse political equilibrium of stagnation, persistence does not require the presence of coercive political institutions. The authors present some suggestive empirical evidence. On the one hand, such an analysis offers hope that the destiny of societies is not preordained by the institutions they inherited through historical accident. On the other hand, it suggests that we need to understand better how to alter factor endowments when societies may not have the internal will to do so.

Market Microstructure

The NBER's Working Group on Market Microstructure met in Cambridge on May 12. NBER Research Associate Bruce Lehmann of the University of California, San Diego, Duane Seppi of Carnegie Mellon's Tepper School of Business, and Avanidhar Subrahmanyam of the University of California, Los Angeles's Anderson School of Management, organized the meeting. These papers were discussed:

Michael J. Fleming, Federal Reserve Bank of New York, and **Monika Piazzesi**, University of Chicago and NBER, "Monetary Policy Tick-by-Tick"
Discussant: Clara Vega, University of Rochester

Laura Frieder and **Rodolfo Martell**, Purdue University, "On Capital Structure and the Liquidity of a Firm's Stock"
Discussant: Naveen Khanna, Michigan State University

Ronald L. Goettler and **Christine A. Parlour**, Carnegie Mellon University, and **Uday Rajan**, University of Michigan, "Information Acquisition in a Limit Order Market"
Discussant: Dmitry Livdan, Texas A&M University

Anurag Gupta and **Ajai Singh**, Case Western Reserve University, and **Allan Zebedee**, San Diego State University, "Liquidity in the Pricing of Syndicated Loans"
Discussant: Amir Sufi, University of Chicago

Terrence Hendershott and **Mark S. Seasholes**, University of California, Berkeley, "Market Maker Inventories and Stock Prices"
Discussant: Marc Lipson, University of Virginia

Amrut Nashikkar and **Marti Subrahmanyam**, New York University, "Latent Liquidity and Corporate Bond Yield Spreads"
Discussant: Michael Piwowar, U.S. Securities and Exchange Commission

Analysis of high-frequency data shows that yields on Treasury notes are highly volatile around FOMC announcements, even though the average effects of fed funds target rate surprises on such yields are fairly modest. **Fleming** and **Piazzesi** partially resolve this puzzle by showing that yield changes seem to depend not only on the surprises themselves, but also on the shape of the yield curve at the time of announcement. They also show that the reaction of yields to FOMC announcements is sluggish, but that much of this sluggishness can be attributed to the few inter-meeting moves. Market liquidity around FOMC announcements behaves in a manner generally consistent with that found for other announcements, although the richness of FOMC announcement release practices induces differences in the market-adjustment process.

Earlier literature on the capital structure has only touched on a causal relation between liquidity and leverage (that is, liquidity affects leverage). **Frieder** and **Martell** use a two-stage least squares analysis to explore the notion that these variables are jointly determined. Consistent with the idea that debt forces managers to make better investment decisions, they find that as leverage increases, equity bid-ask spreads decrease. Using the fitted values from their first-stage regression, the results from the second-stage regression further imply that as liquidity decreases, leverage increases. This is consistent with the notion that managers rely on debt financing when the cost of equity financing increases. While controlling for the endogenous relationship between spreads and leverage greatly reduces the impact of spreads on leverage, the results here suggest that a single standard deviation increase in spreads results in a 3 percent increase in leverage. Not only do these results add to the understanding of the complex relationship between capital structure and liquidity, but they also shed light on the determinants of leverage and bid-ask spreads.

Goettler, Parlour, and **Rajan** model endogenous information acquisition in a limit-order market for a single financial asset. The asset has a common value and each trader has a private value for it. Traders randomly arrive at the market, after choosing whether to purchase information about the common value. They may either post prices or accept posted prices. If a trader's order has not executed, then he randomly re-enters the market, and may change his previous order. The model is thus a dynamic stochastic game with asymmetric information. The authors numerically solve for the equilibrium of the trading game, and characterize equilibria with endogenous information acquisition. Agents with the lowest intrinsic benefit from trade have the highest value for information and also tend to supply liquidity. As a result, market observables, such as bid and ask quotes, in addition to transaction prices, are informative about the common value of the asset. Asymmetric information creates a volatility multiplier (prices are more volatile than the fundamental value of the asset) that is especially severe when the fundamental volatility is high. In the latter case, the time to execution of each type of agent increases, and there is a change in the composition of trader types in the market at any given time.

Gupta, **Singh**, and **Zebedee** examine whether banks price expected liquidity in syndicated loan spreads. Using extensive data on U.S. term loans, they show that banks have the ability to discern the expected liquidity of a loan at the time of origination. More importantly, they show that loans with higher expected liquidity have significantly lower spreads at origination, after controlling for other determinants of loans spreads such as borrower, loan, syndicate, and macroeconomic variables. Therefore, they identify a new factor (expected liquidity) being priced in syndicated term loans, which, in the aggregate, results in an annual saving of $1.5 billion to the borrowing firms in their sample. Thus, for the first time in the literature, they document a link between the secondary market liquidity of an asset and its pricing in the primary market.

Using eleven years of NYSE specialist data, **Hendershott** and **Seasholes** examine daily inventory/asset price dynamics. The unique length and breadth of their sample enables the first longer-horizon testing of market making inventory models. They confirm such models' predictions: that specialists' positions are negatively correlated with past price changes and positively correlated with subsequent changes. A portfolio that is long in stocks with the highest inventory positions and short in stocks with the lowest inventory positions has returns of 0.10 percent and 0.33 percent over the next one and five days, respectively. These findings empirically validate the causal mechanism — liquidity supplier inventory — that underlies models linking liquidity provision and asset prices. Inventories complement past returns when predicting return reversals. A portfolio long on high-inventory/low-return stocks and short on low-inventory/high-return stocks yields 1.05 percent over the following five days. Order imbalances calculated from signing trades relative to quotes also predict reversals and are complementary to inventories and past returns. Finally, specialist inventories can be used to predict return continuations over a one-day horizon.

Recent research has shown that default risk explains only part of the total yield spread on risky corporate bonds relative to their riskless benchmarks. One candidate for the unexplained portion of the spread is a premium for the illiquidity in the corporate bond market. Using the portfolio holdings database of the largest custodian in the market**, Nashikkar** and **Subrahmanyam** relate the liquidity of corporate bonds, as measured by their ease of market access, to the non-default component of their corporate bond yields. They estimate the ease of access of a bond using a recently developed measure called latent liquidity, which weights the turnover of funds holding the bond by their proportional holdings of the bond. They use the credit default swap (CDS) prices of the bond issuer to control for the credit risk of a bond. At an aggregate level, they find a contemporaneous relationship between aggregate latent liquidity and the average non-default component in corporate bond prices. Additionally, for individual bonds, they find that bonds with higher latent liquidity have a lower non-default component of their yield spread. Bonds that are held by funds exhibiting greater buying activity command lower spreads (are more expensive), while the opposite is true for those that exhibit greater selling activity. Also, the liquidity in the CDS market has an impact on bond pricing, over and above bond-specific liquidity effects.

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