National Bureau of Economic Research (NBER) (Ed.)

Periodical Part

NBER Reporter Online, Volume 1998

NBER Reporter Online

Provided in Cooperation with:
National Bureau of Economic Research (NBER), Cambridge, Mass.

NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH

Reporter OnLine at: www.nber.org/reporter

FALL 1998

In This Issue

Program Report

Public Economics

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It has been three years since the last report on the NBER Program on Public Economics. During that brief period, substantial federal budget deficits have been replaced by surpluses. There has been a significant tax reform (the Taxpayer Relief Act of 1997) and discussion of Social Security reform has moved from the outskirts to the center of national policy debate. As the questions that attract the most attention in public policy debates have changed, so too have the issues studied by NBER researchers associated with the Program on Public Economics. These researchers have been carrying out important work on a wide range of topics related to taxation, social insurance, and the economic impact of government expenditure programs. This report highlights several strands of this research but, since there have been more than 250 Public Economics working papers during this period, it necessarily excludes some interesting and significant work.

Social Security

The economic effects of the current Social Security system and the potential consequences of modifying that system in the United States and other nations have been active research topics for the past three years. The current Social Security system is a pay-as-you-go, defined-benefit system. A substantial body of NBER research has focused on the consequences of shifting to alternative systems, possibly with greater reliance on a defined-contribution structure. Several studies, using a range of theoretical and computational models, have investigated the efficiency effects of replacing part or all of the current system with a system of individual accounts [WP 5281, 5330, 5413]. Among the related questions that have been studied are: the nature of the transition from the current system to a modified system; the funding of existing but unfunded liabilities; and the length of time needed to reach a new steady state [WP 5761, 5776, 6055, 6149, 6229, 6540]. Some

The NBER Working Papers cited in brackets by number throughout this report are listed, and in many cases their full text is available, at the NBER's web site* *(www.nber.org).*** *This Program Report is also available on the NBER's web site, where the individual Working Paper abstracts can be accessed automatically.*

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NATIONAL BUREAU OF ECONOMIC RESEARCH

Preparation of the *NBER Reporter* is under the supervision of Donna Zerwitz.

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research has also considered the distributional effects of potential Social Security reforms [WP 6428, 6430].

Another topic of interest in both public economics and labor economics is the effect of defined-benefit Social Security programs on labor market behavior. A number of recent studies have explored the impact of Social Security on retirement in the United States [WP 6097, 6534, 6548]. Also, NBER researchers have participated in a major international comparative study of Social Security programs and labor supplied by older workers [WP 6134].

In addition to research directed specifically at the effects of the Social Security system, many studies have looked at the provision of retirement income security. The research findings in these studies provide important background for discussions of reform. Two examples of such research are work on the determinants of household saving [WP 5568, 5571, 5609, 5655, 5667, 6085, 6227] and research on the functioning of annuity markets [WP 6001, 6002, 6525].

In the recent past, there have been major Social Security reforms in Chile, Australia, and a number of other nations. A substantial volume of NBER research has investigated the effects of Social Security reform in these and other nations [WP 5780, 5799, 5811, 6316]. Additional work has focused on the historical development of Social Security in the United States [WP 5949].

Taxation of Individuals and Firms

How taxation affects individual decisions about work, saving, and many other behaviors is one of the central questions in public economics. The impact of corporate and investor taxes on firm behavior is a similarly critical issue. During the last three years, NBER researchers have carried out a wide range of studies on these issues.

One of the most important questions that has arisen in recent discus-

sions of income tax reform is how changing marginal tax rates will affect reported taxable income. Understanding the magnitude of this behavioral response is essential for revenue estimation, and it is also a potentially important determinant of the efficiency costs of income taxation. A number of recent studies [WP 5218, 5370, 6333, 6395, 6576, 6582, 6584] have provided new estimates of the impact of tax rates on taxable income and on the extent to which past experience may provide a guide to the impact of future tax changes.

Another set of studies have described how income taxation affects the labor supply of two-earner couples [WP 5155], the demand for employer-provided health insurance [WP 5147], investment decisions by self-employed individuals [WP 6578], capital gains realization [WP 6399], and human capital accumulation [WP 6462]. The effect of retirement saving programs, such as Individual Retirement Accounts and 401(k) plans, on the net accumulation of assets also has been an active research topic [WP 5287, 5599, 5686, 5736, 5759, 6295].

On the related subject of taxation and saving, one 1997 study [WP 5815] documented the substantial marginal tax rates that were associated with the then-present tax on excess distributions from pension plans. This tax was enacted as part of the Tax Reform Act of 1986; for some taxpayers, it could result in an effective tax rate of more than 90 percent on earned income bequeathed to heirs. The tax was repealed in the Taxpayer Relief Act of 1997, in part as a result of the attention that it received following publication of this study. Other research [WP 6337] also has focused on the behavioral effects of estate taxation.

Studies of taxation usually focus on individual or corporate tax rules, but one study [WP 6260] points out that regulatory policies too may place additional taxes on economic activity. That paper estimates that the Federal Communication Commission's decision to levy a tax on long distance service as a means of financing high school connections to the Internet imposed efficiency costs that were larger than the revenue collected.

Corporate taxation has attracted less policy attention in recent years than individual tax reform, but there has still been a steady flow of new research on the economic effects of corporate income taxation. This work has focused on investment behavior [WP 5189, 5232, 5683] and particularly the impact of the investment tax credit on investment levels [WP 6192, 6526] and the financial policy distortions that are induced by the tax system [WP 6433]. One area of significant research attention is the effect of tax rules on the behavior of multinational firms. This is a complex topic, in which research requires mastery of both institutional details and conceptual models. Several studies have investigated the impact of taxation on the investment and financing choices of international corporations [WP 5589, 5755, 5810]. Program members have also analyzed another intricate set of tax rules that concern the taxation of insurance companies [WP 5652, 6590].

A perennial issue in public economics is the design of transition rules for phasing in a major tax reform, such as a shift from income to consumption taxation. Ongoing work has provided new insight into such rules [WP 5290, 6465], on the consequences of changing the tax base in a consumption tax framework, and more generally on the economic effects of moving from the current income tax system to a consumption tax [WP 5397, 5832, 5885, 6248].

Economics of Public Education

Social Security and tax reform are debated at the federal level, but many major tax and expenditure reforms are also discussed at the level of state and local government. One of the most exciting issues today is the financing of locally provided public education. A related question concerns the best way to deliver public education; for example, through local school districts that serve all residents of a given geographic area or through vouchers or "school choice." Researchers have considered how the basic goals of equity and efficiency trade off in the case of education [WP 5265], and they have developed models in which it is possible to evaluate the economic consequences of school finance reforms [WP 5642]. These conceptual analyses are complemented by detailed empirical analysis of the impact of education finance reform in California and Massachusetts [WP 5369, 6196] and of voucher programs in Milwaukee [WP 5964]. Related research has focused on the design of intergovernmental aid [WP 5420], on the factors that explain the heavy reliance on property taxes among local governments [WP 5419], and on the impact of demographic structure on the level of voter support for education spending [WP 5677, 5995].

Tax Policy and Environmental Objectives

The last decade has witnessed growing interest in the use of tax policy to achieve environmental goals, with the "carbon tax" as a prime example. This has raised new issues for analysis using the standard methods of public economics. Recent research has explored the efficiency consequences of environmental taxes [WP 5117, 5511, 5641, 5967] as well as the distributional effects of raising environmental taxes [WP 6546]. A related body of research has explored a range of questions concerned with environmental regulation and environmental taxes. These include the compliance cost associ-

ated with existing environmental regulations [WP 5542], the net impact of existing air quality regulations [WP 5118], the effect of interstate differences in hazardous waste taxes [WP 6314], and the choice of discount rate in cost–benefit analysis [WP 5920].

Welfare Programs and the Earned Income Tax Credit

The effects of welfare programs and other transfer programs are perennial topics of interest in public economics. Recent research provides new insights on the impact of welfare programs on family structure [WP 5149, 5644, 6047], the variability of consumption by welfare-eligible households [WP 5738], the effects of Medicaid health insurance expansions on the health of children [WP 5831, 6139], and the health and other effects of public housing programs [WP 6305].

Ongoing research by program members considers the impact of various social insurance programs that target households with temporarily low income. Unemployment insurance is one of the most studied of these social insurance programs, probably because it is of interest both to microeconomists, who study its impact on household behavior, and to macroeconomists, who are concerned about its potential effects on the aggregate unemployment rate. Recent work has drawn attention to the incidence of the payroll taxes that are used to finance unemployment insurance [WP 5201].

One of the most important recent developments in transfer policy has been the growing importance of the Earned Income Tax Credit (EITC) as a mechanism for raising the after-tax incomes of low-wage families. This program expansion has prompted research on how the EITC affects the labor supply of eligible individuals and households [WP 5158].

Economics of Privatization

In the United States, there has been a significant shift in the last two decades in the state and local public sector's reliance on private providers of services. The services that have been privatized range from accounting to prison management. Several researchers have investigated the factors that explain privatization decisions in the United States [WP 5113].

Privatization has occurred on a grander scale in some developing countries and in the economies of Eastern Europe and the former Soviet Union. Research is just starting to evaluate the impact of privatization in these nations [WP 5136, 6215, 6524]. More generally, the growth of privatization has prompted new analysis of the economic determinants of the size of the public sector [WP 5537, 5744, 6024].

Fiscal Rules and Budgeting

The dramatic change in the federal government's deficit position during the 1990s and the wide disparities across nations in net fiscal deficits have prompted new research on the links between budget processes and budget outcomes. This work has addressed a range of issues, including the relationship between budget projections and budget outcomes for the U.S. federal government [WP 5009, 6119], the impact of state fiscal rules on state deficits in the United States [WP 5449, 5533, 5550, 5838], and the correlation between various fiscal rules and budget outcomes in other nations [WP 5586, 6341, 6358]. Research also has explored the costs and benefits of different fiscal rules [WP 5614], the fiscal policy consequences of centralized as opposed to fragmented fiscal rules [WP 6286], and the extent to which credit markets discipline sovereign borrowers [WP 6237]. Much of this research can be applied to the formation of new budget rules for nations that participate in the European Monetary Union.

Government Service

Members of the Program on Public Economics have a long tradition of putting their scholarly insights to practical application through government service. The last three years have seen a continuation of this tradition. Program members Jonathan Gruber, Mark B. McClellan, and John Karl Scholz have served as Deputy Assistant Secretaries at the U.S. Treasury Department. Jeffrey B. Liebman has worked as a Special Assistant to the President for Economic Policy at the National Economic Council. Lawrence H. Summers has continued his work at the Treasury Department, now as Deputy Secretary. Mervyn A. King is the Chief Economist and Executive Director of the Bank of England. Joseph E. Stiglitz is the Chief Economist of the World Bank.

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Research Summaries

Entrepreneurs, Star Scientists, and Biotechnology

Lynne G. Zucker and
Michael R. Darby*

We are studying the interaction of scientific and technological progress —particularly when breakthroughs or discontinuities occur—through in-depth case studies and econometric analysis of the science underlying biotechnology, the resulting formation of a new industry, and the transformation of existing industries.[1] Our results indicate that the very best "star" scientists play central roles in both the development of the science and its successful commercialization. The importance of these individuals, especially the more entrepreneurial among them, derives from the tacit character of new breakthrough discoveries. In this way, knowledge, at least when it is new, is embodied in particular individuals; it cannot diffuse rapidly, as might easily-duplicated recipes.

How these star scientists balance their multiple roles as leading scientists and participants—often principals—in the commercialization of their discoveries is shaped by the institutional and legal framework in which they operate. These frameworks differ most sharply at the country level. We therefore have extended our analysis to Japan, which is the second-largest country in terms of both bioscience and commercial application of biotechnology.

Zucker and Darby are Research Associates with the NBER's Program on Productivity and Technological Change. Darby is also a Research Associate with the NBER's Program on International Finance and Macroeconomics. Both are professors at the University of California, Los Angeles. Their profiles appear later in this issue.

To assess how often discoveries in basic science—made by the stars—shape commercial technology and business success, we are currently extending our work with our project team to investigate other "high technologies" including semiconductors and interactive media.

Project Team and Relational Database

In 1988, Zucker and Marilynn B. Brewer began a study at the University of California, Los Angeles (UCLA) of elite scientists and the founding of biotech firms, and of the effect of commercial involvement on the productivity of those bioscientists. They defined star scientists for their project as those who by 1990 had recorded more than 40 genetic-sequence discoveries or had authored at least 20 articles reporting such discoveries. . . GenBank collected discoveries and articles internationally without regard to language or location of publication, so this definition did not favor any particular nationality.[2]

By the time Darby joined the collaboration in 1992, Zucker and Brewer had hand-collected all the genetic-sequence articles by these 327 star scientists, coded the names of all their co-authors (whether another star or a collaborator), located all of these scientists by affiliation on each article, coded data in all U.S. universities, and collected extensive data on all the firms that had entered biotechnology in the United States.

Since 1992, the relational database has been greatly extended to cover articles up to 1994, has added extensive data on Japanese firms and universities, and has added some initial data on European firms and universities.[3] A parallel database is nearly complete for semiconductors and one has been started for interactive media. The quantitative studies based on this data have all been informed by fieldwork and case studies in which more than 100 scientists, executives, and government and university officials have been interviewed across the United States, Japan, Europe, and Australia.

Star Scientists and Commercialization

Until recently, economists and sociologists studying science and technology have been averse to viewing scientists—particularly top scientists—as pursuing private motives, viewing them instead as disinterested contributors to a shared common pool of knowledge. Our results suggest that star scientists often are better viewed as entrepreneurial individuals who value both financial rewards and the pleasure, recognition, and resources that come from being the first to make a significant new discovery. Collaborations expected to lead to higher valued discoveries, for example, are more likely to be limited to authors from a single organization, and increased use of single-organization collaborations retards the rate of diffusion to new scientists.[4] One of our interviewees, when asked about delays of publication to enable patenting, responded, "In the university, it's hardly unknown to hold off publishing a breakthrough until you've skimmed off some of the cream."

The key role of star scientists in commercialization of their discover-

ies is suggested by some of our early results but confirmed more strongly in our most recent analysis. Where and when star scientists are actively publishing scientific articles is a key determinant of where and when firms enter into biotechnology in the United States.[5] This result seems to support the "geographically localized knowledge spillovers model" in which those nearby—for example, within Route 128 (in Massachusetts) or in Silicon Valley—hear first of breakthrough discoveries as the scientists give the knowledge away in seminars or barroom gossip. However, this model is inconsistent with our interviews, which suggest that the stars are fully cognizant of the value of their discoveries and use it either as the basis for starting their own firms or trading with existing firms.

Our database permits us to see which star scientists have published with scientists from firms—generally agreed by the scientists to be an indicator of both bench-science collaboration and alignment of interests. When we consider the success of California firms in terms of new products in development, there is an apparent value to being located in the same region as universities with star scientists who have many publications. However, this turns out to result entirely from the large positive effects on firm success of those firms that have jointly authored articles with university stars. The large impact of these articles is apparent in other measures of success such as products on the market and employment growth.[6] We have since replicated these results in work underway for the United States and in Japan, in which we substituted number of patents granted for unavailable data on employment growth.[7] We illustrate the magnitude and robustness of the effects of these linked star-firm articles in Figure 1. In the United States, linked articles appeared by 1985 for 9 of the 10 most successful (to date) new biotech firms, as measured by market valuation.

An initial working hypothesis of the project—and one still popular in the literature—is that a star scientist who becomes involved in commercialization of his or her discoveries is a loss to the progress of science. We have found instead that the scientists who are more involved in commercialization and patenting are more productive scientifically during their period of involvement. To compare the extreme cases, for example, up until 1990, stars who were ever affiliated with firms and had some patents had an average annual citation rate in genetic-sequence discovery articles 9.17 times that of pure academic stars who neither patented nor ever published with, or as an employee, of a firm.[8] It could be that only the most successful of the stars have the opportunity to work with existing firms or to obtain financial backing to start their own firms, but by examining their publication history before, during, and after publishing as firm employees, or jointly with firm employees, we find that U.S. scientists publish significantly more articles with significantly higher citation rates during than before or after firm ties. (Japanese stars also publish significantly more while tied to firms, but their increase in citation rate is not statistically significant.) Thus, we conclude that stars who are involved commercially use part of their gains to advance their independent scientific careers: they are partly venture capitalists, rather than wholly tied to the National Institutes of Health or the National Science Foundation.

Because university star links to firms are important in determining both the firms that will be successful and the rate of advancement of the underlying science base, we examine that process in our work with Maximo Torero. We find that the probability that the first article published with, or as, a firm employee will occur in a given period increases with the academic star's total citations to articles written to date, the percentage of co-authors in other institutions, the number of nearby firms, and, notably, the increase in research productivity of other nearby stars who have already established such commercial ties.[9] Again, the most productive stars are the most desirable to firms and those stars respond not only to the financial but also to the scientific rewards of commercial involvement.

Effects of Institutions

In collaboration with Shingo Kano of the University of Tokyo; Takuma Takahashi of Nomura Research Institute, Limited; and Kazuo Ueda of the Bank of Japan, we are currently preparing a monograph examining the adoption of biotechnology in Japan, with particular emphasis on how institutional differences have caused that process to differ from what has been observed in the United States. Two key institutional differences are: In Japan, until recently, financial market regulations precluded the venture capital and initial public offering processes that have financed so many U.S. startups, so that virtually all Japanese adoption of the technology has been by pre-existing firms. Japanese national university professors have been precluded from starting firms on the side, but generally they have been able to patent in their own name any discoveries made in their universities. As a result, star-firm collaborations generally occur in Japanese university laboratories, as opposed to U.S. collaborations, in which the work is frequently done in firm laboratories to secure the property rights.

As a result, we see that although stars' publishing still plays the leading role in determining where and when Japanese firms enter, the stars'

impact is significantly less and the impact of pre-existing economic structure is significantly greater than in the United States.[10] As indicated earlier, the effects of university star-firm collaborations on firm success appear to be about as potent in Japan as in the United States, but because Japanese firms send their employees to work in the university laboratories, the stars' economic impact is not nearly so geographically localized as in the United States.[11] For a visual summary of highlights of our results, refer again to Figure 1.

The breakthrough technology in the United States has led to a transformation of the pharmaceutical industry, earliest and most importantly through the creation of new firms but also through the transformation of existing firms. Many of the previous incumbent firms have disappeared and others have successfully transformed themselves, even as new entrants have become important players in the drug-discovery part of the business or, in a few cases, full-fledged pharmaceutical firms.[12] Our Japanese collaborators are examining both the transformation of Japanese incumbent pharmaceutical firms and successful and unsuccessful entry by pre-existing firms from other industries.

We have recently found evidence that the European reliance on national research institutes instead of research universities may have disadvantaged European commercial adoption of biotechnology. Figure 2 illustrates that although Europe has a substantial percentage of the world's stars, it has fewer than 10 percent of those who have written articles with or as firm employees. Across countries, the correlation of percentage of stars with firm ties and percentage of stars in research institutes is large, significant, and negative.[13] Also, the United States and Japan, with the largest percentages of stars tied to firms, have been drawing stars from the rest of the world, a process that has continued in the 1990s.

Relevance and Future Research

The new growth theory or endogenous growth models generally treat discoveries as a sort of software, "knowledge or information that can be stored in a form which exists outside of the brain," and is therefore nonrivalrous (and possibly nonexcludable) so that public good issues arise.[14] Our evidence for biotechnology indicates instead that the relevant knowledge or information—at least in the breakthrough stage we are investigating—has important elements that are tacit and must be learned by working, directly or indirectly, with discovering scientists. Ultimately, the knowledge diffuses widely and earns only the normal rate of return on the cost of learning it in any reputable graduate program. But between initial discovery and the long run, natural excludability implies extraordinary financial and scientific returns to scientists adept in discovery and ensures that discoveries are normal rivalrous goods. To the extent that our results generalize to other areas of rapid technological progress, revisions in the new growth theories are required.

Policy analysts find our research of interest because by clarifying the potentially important role of star scientists in commercializing their work —and the virtuous circles through which that accelerates scientific advance[15]—we are able to identify particular institutions or policies that facilitate or interfere with that process. Examples include across-university variations in rights of professors to serve as principals or consult for companies on the side, research institute rules that effectively insulate scientists from direct commercial involvement, and the role of the Bayh-Dole Act and similar rules in providing incentives for commercialization.

Our future research agenda attempts to balance opportunities to exploit and extend the unique relational biotechnology database and to apply our methodology to other technologies and science bases. With the collaboration of excellent colleagues and students at UCLA, NBER, and elsewhere, we are continuing the biotech work and simultaneously initiating data collection and research in other high-technology areas.

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1. This research has been supported over the years by grants from the National Science Foundation (SES 9012925), the University of California Systemwide Biotechnology Research and Education Program, the Alfred P. Sloan Foundation through the NBER Research Program on Industrial Technology and Productivity, the University of California's Pacific Rim Research Program, the University of California President's Initiative for Industry-University Cooperative Research, and the Center for Global Partnership of The Japan Foundation.

2. The definition is biased against those scientists not working in the recombinant-DNA or genetic engineering area. However, as the included areas are the dominant ones in commercial applications of biotechnology, the definition has proven quite useful in practice. The cutoff date is before the perfection of mechanical sequencers that would later inflate the number of sequences a particular scientist could discover.

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New Products and Price Indexes

Jerry A. Hausman*

What is the value to consumers of new products? The number of new products introduced in any year is astounding. New varieties of consumer goods such as cereal brands are evident, as any shopping trip to a local supermarket or Wal-Mart demonstrates. Potentially even more important are the new products based on technology: more than 55 million cellular telephones are in use in the United States, and more than 20 million people subscribe to the Internet, for example. Does consumer welfare increase significantly with these new goods and services? If so, then the Bureau of Labor Statistics (BLS) is likely miscalculating the consumer price index (CPI), because the CPI does not take into account the value to consumers of new goods and services.

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The economic theory behind the CPI is well developed. The CPI approximates an ideal cost-of-living index (COLI) which, in turn, tells us how much more (or less) income a consumer would need to be as well off in Period 1 as in Period 0 given changes in prices, changes in the quality of goods, and the introduction of new goods (or the disappearance of existing goods). The omission of the effect of the introduction of new goods in the CPI seems quite surprising since most common business strategies fall into one of two categories: either become the low-cost producer of a good just like your competitors' or differentiate your product from theirs. The latter strategy has become the hallmark of much of American (and Japanese) business practices. The sheer number of brands of cars, beer, cereal, soda, ice cream, yogurt, appliances such as refrigerators, and cable television programming all demonstrate the ability of firms to differentiate their products successfully. Furthermore, consumers demonstrate a preference for these products, because they buy enough of them that businesses make the expected positive profits on the new brands.

In my first paper on this subject,[1] which considers new cereal brands, I find a significant consumer value placed on new goods. This value may cause the CPI to be seriously overstated, since it neglects new products. In the paper, I first explain the theory of cost-of-living indexes. Then, using the classical theories of Hicks[2] and Rothbarth,[3] I demonstrate how new goods could be included. The correct price to use for the good in the pre-introduction period is the "virtual price," which sets demand equal to zero. Estimation of this virtual price requires estimation of a demand function, which in turn provides an expenditure function, and thus allows exact calculation of the CPI.

As an example, I use the introduction of a new type of cereal by General Mills in 1989, Apple Cinnamon Cheerios. The cereal industry has been among the most prodigious

in terms of new brand introduction. My specification permits differing amounts of similarity among cereal brands; that is quite important given that Apple Cinnamon Cheerios are more like other types of Cheerios than they are Shredded Wheat, for example. I find that the virtual price is about twice the actual price of Apple Cinnamon Cheerios and that the increase in consumer surplus is substantial. Based on some simplifying approximations, I find that the CPI for cereal may be overstated by about 25 percent, because it neglects the effect of introducing new cereal brands.

In my next paper on this subject,[4] I consider the value to consumers of two new telecommunications products, cellular telephones and voice mail, and demonstrate how to value the introduction of new services in telecommunications. Much public discussion has centered on the evolving information superhighway and on the many new services that may be offered as high-capacity fiber-optic transmission networks are extended into the telecommunications infrastructure. How can society establish the value of these new services and increased choices? This question has potentially important economic consequences and equally important public policy implications. Because of the network structure of telecommunications, public policy has always played a large role in its production and regulation.

I find that introduction of new telecommunications services can lead to very large gains in consumer welfare. Voice messaging services, for example, were introduced in 1990. I estimate that the gain in consumer welfare from voice messaging services was about $1.27 billion per year by 1994. Similarly, I estimate that the introduction of cellular telephone services has led to gains in consumer welfare which now exceed $25 billion per year.

Introduction of a new telecommunications service is typically quite different from the introduction of a new product in an unregulated industry. If General Mills wants to introduce a new brand of cereal, it simply manufactures the cereal and convinces supermarkets to stock the new brand on their shelves.[5] Consumers then decide whether the new brand will be successful by voting with their dollars.

Because of regulation, though, introduction of new telecommunications services is different. In the United States, telecommunications companies typically must file an application with both federal regulators—the Federal Communications Commission—and state regulators. Approval of these applications can take years and even decades. What is the cost of these delays? Because consumers are not able to use the new service during the delay period, the price of the new service is implicitly set by regulators at the virtual price, causing demand to be zero.

I estimate that the cost of the regulatory delays is quite high. For 1994 I estimate the consumer value from voice messaging services to be about $1.27 billion. Thus, the approximate 10-year delay attributable to regulation can cost consumers billions of dollars. Next, I apply my methodology to the cost of regulatory delay in the introduction of cellular telephone service. I estimate the cost to consumers to be closer to $100 billion. This cost of regulatory delay perhaps is not recognized nearly as much as it should be.

Next I consider the value of the Internet to consumers.[6] Using data from 1997, I estimate the consumer value of the Internet to be about $6.8 billion per year. Given the extremely rapid growth in consumer use of the Internet, any public policy that permits construction of high-speed access to the Internet would significantly increase consumer welfare.

In my last paper on this subject,[7] I consider the effect of including cellular telephone service in the CPI. Cellular telephone is an example of a new product that has significantly affected how Americans live. Since their introduction in 1983, the adoption rate of cellular telephones has grown at 25 percent to 35 percent per year, so that by the end of 1997 about 55 million cellular telephones were in use in the United States. Thus, approximately 20 percent of all Americans use cellular telephones, and there are about one third as many cellular telephones in the United States as there are regular (landline) telephones. The average cellular customer spends about $588 per year on cellular service. This could indicate that consumers and businesses have found cellular telephones to be valuable additions to their lifestyles.

The BLS did not know that cellular telephones existed, at least in terms of calculating the CPI, until 1998, when cellular service was finally included in the CPI. By 1998, 15 years after the introduction of cellular telephones, more than 55 million Americans were using cellular and personal communications services (PCS), mobile telephones based on the next generation of cellular technology. When the BLS finally included cellular in the CPI in February 1998, its inclusion had *no effect* on the CPI because the BLS reported that the price of cellular had not changed from the previous month.

This neglect of new goods which is implicit in their introduction into the CPI only after a long delay leads to an upward bias in the CPI. The recent Boskin Committee Report[8] found it to be large and significant. However, even if the BLS did not delay the introduction of new products, such as cellular telephones, into the CPI for periods of up to 15 years, its calculation of the CPI for new products still would be biased upward because it does not calculate

the gains in consumer welfare from new products. I demonstrate how this gain in consumer welfare could be estimated, and provide an approximation result, which the BLS could use to calculate gains in consumer welfare from new products for use in the CPI.

The BLS has three potential approaches to the inclusion of new goods into the CPI: 1) It can ignore the new goods for a long time, as with the 15 year delay for cellular. This paper demonstrates that the BLS missed approximately 50 percent of the price decline in cellular using this approach. 2) It can add new products to the CPI earlier. My calculation shows that if cellular service had been included in the CPI in 1988, 5 years after its introduction, the BLS would have missed only about 25 percent of the price decrease, which would have been a significant improvement. 3) It could introduce a true COLI measure that reflects the value to consumers of the new product's introduction, as well as the subsequent decrease in price. I demonstrate that the value of new products such as cellular service to consumers can be very large. Thus, even if the BLS includes new products earlier, the CPI will still miss a large part of the effect on a COLI of new products. I demonstrate how an approximate measure of the consumer value of new goods can be included in the CPI.

I find a bias in the BLS estimate of the telecommunications services index of between 0.8 percent and 1.9 percent per year over the period 1988–97, because of the omission of cellular telephones from the CPI during this time period. Rather than telecommunications service prices increasing at about 1.1 percent per year, as the BLS calculated for the CPI, the correct calculation has them decreasing at about 0.8 percent per year. Differences of this magnitude are significant and likely arise from the introduction of other new goods and services, for example Internet services. Thus, the omission of new goods and services imparts a significant upward bias to the CPI, Because the CPI is used in many places in the U.S. economy and for making policy decisions, this bias distorts these decisions and gives a misleading impression of real (adjusted for inflation) magnitudes in the U.S. economy, such as changes in real income and the economic welfare of the U.S. population.

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The Economics of Crime and the Criminal Justice System

Steven D. Levitt*

My recent empirical research focuses on crime and the criminal justice system. Within this broad area, three primary themes emerge: identifying the causal link between criminal justice policies and crime rates; differentiating empirically between deterrence and incapacitation; and using nonstandard data sources to test economic theories. This synopsis of my research is organized around these themes.

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Identifying the Causal Link Between Criminal Justice Policies and Crime Rates

Differentiating between correlation and causality is critical when analyzing the impact of crime policies. For instance, Newark has a violent crime rate four times higher than that of Omaha, and it also has twice as many police per capita. A likely explanation for this relationship, however, is that high crime rates lead cities to hire more police, not that police cause crime. Similarly, when crime is rising, prison populations also tend to rise. This is not surprising: if criminals continue to be caught and punished at a constant rate, then the prison population should mechanically rise one-for-one with the crime rate. From the perspective of ideal public policy, reliance on such correlations provides no guidance. Identifying the causal link between increases in police and the number of prisoners and crime is necessary.

I have examined the impact of police on crime, using the timing of mayoral and gubernatorial elections as "instruments" for changes in the police force.[1] Indeed, the size of the police force appears to be affected by election timing. Over a 25-year period, the average increase in the size of the police force in large U.S. cities in mayoral election years was 2 percent; in gubernatorial election years it was 2.1 percent, and in non-election years there was no change. It appears that incumbent politicians attempt to bolster their re-election prospects by appearing "tough on crime." If elections do not otherwise affect crime rates (after controlling for other factors that may be influenced by elections, such as changes in the local economy), then electoral cycles may plausibly influence changes in the police force. In one set of estimates, I find a positive relationship between police and crime. But when I include elections in the analysis the sign reverses, and police appear to significantly reduce crime.

In a related paper, I consider the relationship between the number of prisoners and crime rates.[2] In this paper, I use prison overcrowding lawsuits as an indicator of change in prison populations. These lawsuits affect prison populations, but they may be otherwise unrelated to crime rates (especially because the cases often take a decade or more to be resolved). In 13 states, lawsuits brought by the American Civil Liberties Union have affected a state's entire prison system. In the three years after a final decision was handed down by the courts in those cases, prison populations fell by 14.3 percent compared to the population of the nation as a whole, whereas violent and property crime rates increased 10.2 percent and 5.5 percent respectively. Using my estimate of the elasticity of crime with respect to the prison population and previous estimates of the costs of crime from Miller, Cohen, and Rossman, I cannot reject the possibility that the marginal social cost of imprisonment equals the marginal social benefit of the reduction in crime.[3]

Deterrence, Incapacitation, and the Response of Criminals to Incentives

Becker's well-known economic model of crime is based on deterrence: potential criminals alter their behavior in response to changing incentives.[4] Empirically, however, it is often difficult to distinguish between deterrence (which is a behavioral response) and incapacitation (in which reductions in crime are attributable solely to criminals being unable to commit crimes because they are locked up). Virtually all of the empirical work that purportedly supports the economic model of crime is equally consistent with incapacitation. In some cases, such as determining the impact of policies like "three strikes and you're out" laws, the distinction is critical. If deterrence is the operative force, then "three strikes" laws are likely to be effective; if only incapacitation is at work, then "three strikes" laws will lead to a geriatric, cost-ineffective prison population. Three of my papers thus have attempted to distinguish between deterrence and incapacitation.

In one, I note that both deterrence and incapacitation predict that changes in the expected punishment for one crime (burglary, for example) will lead to a decrease in that crime.[5] Thus, this prediction cannot be used to distinguish between deterrence and incapacitation. In contrast, the two theories of crime make different predictions as to what will happen to a second crime (auto theft, for example) when the expected punishment for burglary rises. Deterrence predicts that criminals will substitute auto theft for burglary. Incapacitation, on the other hand, suggests that levels of both crimes will fall. Exploiting this insight empirically seems to show that deterrence is more important than incapacitation, particularly for property crime.

Daniel Kessler and I exploit a unique feature of sentence enhancements to isolate deterrence.[6] We look at the passage of Proposition 8 in California, which selectively institutes sentence enhancements for some crimes. Sentence enhancements are additional penalties tacked on to a base sentence (as a result of, for instance, past criminal history or use of a weapon). Since the enhancement increases the expected punishment, it will increase deterrence. Because it is added on to an existing punishment, however, it will not affect incapacitation until the base sentence expires. Thus, any immediate effect of a newly instituted sentence enhancement law must result from deterrence. We find an immediate, sharp decline in eligible crimes relative to those that are unaffected by the law, again suggesting the importance of deterrence.

Finally, I study the relationship between crime and punishment for juveniles.[7] Over the last two decades, juvenile crime has grown at a much faster rate than adult crime. During that same period, the adult prison population has grown dramatically, but the number of juveniles in custody has not. I estimate that changes in relative punishment can explain 60 percent of the differential growth rates in juvenile and adult crime over the period I examine. Moreover, sharp changes in criminal involvement with the transition from the juvenile to the adult court suggest that deterrence, rather than simply incapacitation, plays an important role.

Using Nonstandard Data Sources to Test Economic Theories

The study of crime offers many opportunities to test microeconomic models of behavior. Often, however, standard data sources are not appropriate for such tasks. Consequently, a number of projects with which I have been involved in recent years have relied on unusual data sources.

Ian Ayres and I consider what externalities are associated with potential victims taking precautions.[8] In particular, we look at Lojack, a radio transmitter device hidden inside automobiles (the Lojack company provided proprietary market share data). There is no external indication on the vehicle that Lojack is installed. Thus, Lojack provides general deterrence, even to vehicles without it. This is in stark contrast to observable devices, such as "The Club," that presumably cause crimes to shift from one vehicle to another. We find sharp decreases in auto theft in cities where Lojack becomes available. Further, car owners who install Lojack internalize only 10 percent of the total social benefit, leading to underprovision of Lojack by the market, we conclude.

Sudir Venkatesh and I use an even more unusual data source: financial records kept over a four-year period by a drug-selling street gang.[9] These include information on the price and quantity of drugs sold; wages at various levels of the organization; and expenses such as tribute, weapons, and so on. We supplement the financial information with ethnographic observations and data on arrests, deaths, and injuries. Wages appear to be surprisingly low—not much above the federal minimum wage for street-level sellers. The distribution of wages within the gang is extremely skewed, though, and there is some evidence of compensating differentials in wages. During the time period we study, the gang expands its territory, providing a number of tests of market power and pricing. Among other results, we find that gangs price below marginal cost during gang wars.

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Do We Still Need Commercial Banks?

Raghuram G. Rajan*

According to many observers, the commercial bank—the institution that accepts deposits payable on demand and originates loans—has outlived its usefulness and is in a state of terminal decline. Commercial banks' share of total financial institution assets in the United States has fallen dramatically, from more than 70 percent around the turn of the century to just around 30 percent today.[1] Bank share of corporate debt in the United States has declined from 19.6 percent in 1979 to 14.5 percent in 1994.[2] Competition on both sides of the banks' balance sheet has increased. On the banks' asset side, the growth of the commercial paper and junk bond markets has given large firms an alternative to borrowing from the bank. On the liability side, new technologies and deregulation have given customers choices. Instead of being forced to deposit at the local bank branch or make payments through a bank checking account, customers are able to use mutual funds that offer much the same services.

At the same time that banks appear to be losing business to financial markets and other institutions, they are also imposing huge costs on society. The savings and loan crisis in the United States cost taxpayers several hundred billion dollars by even the most conservative estimate. Estimates of the cost of cleaning up the Japanese banking crisis now exceed $500 billion, and few will hazard a guess as to the costs of the East Asian bank-

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ing crisis. In the face of the apparent decline in the role of banks and the large costs they can still impose on taxpayers, it is legitimate to ask whether we still need commercial banks.

Further Questions

In order to answer this, we have to ask two further questions. First, what functions do banks perform? Second, is the institutional form that carried out these functions no longer useful?

Before I go further, let me be more specific about the institutional form under investigation. The U.S. Banking Act of 1971 defines the "commercial bank" as an institution that offers demand deposits and originates loans. Therefore, a money market mutual fund is not a bank (it does not originate loans) and a finance company is also not a bank (it does not offer demandable deposits). To start with, I adopt this product-based description as my working definition of a commercial bank.

What Banks Do: Liquidity Provision

Banks essentially perform two functions. First, they provide liquidity. Every time customers withdraw money from an automated teller machine or write a check, they rely on the bank's liquidity provision function. Because this is the immediate point of contact most of us have with banks, early influential papers in banking quite naturally focused on the role of banks in meeting the liquidity needs of depositors.[3] Still, there is very little difference between a demand deposit that an investor holds and a line of credit extended to a firm. Both products require the bank to pay the client money on demand. Therefore it seems natural to conclude that the bank provides liquidity on both sides of the balance sheet — to both depositors and borrowers.

Why might a bank want to do this? A bank can achieve scale economies by using the same underlying reserve of liquid assets and the same institutional arrangements (access to the central bank's discount window and to other banks) to meet the unexpected demands of both borrowers and depositors. Also, the demands may offset each other (borrowers draw down lines of credit at different times from depositors), economizing on the need to hold low-return reserves.[4] Anil Kashyap, Jeremy Stein, and I find evidence suggesting complementarities between demand deposits and lines of credit for banks in the United States—the more a bank does of one, the more it does of the other. Moreover, our work suggests that synergies between the products arise because a bank can economize on holdings of liquid assets when the two products are jointly offered.

In summary, banks appear to provide liquidity in many ways, not just through demand deposits, and the banks' ability to take advantage of diversification is what gives them an advantage in servicing these various demands.

What Banks Do: Fund Complex Positions

The second major function banks perform is to fund complex, illiquid positions.[5] Historically, this has taken the form of making term loans to borrowers who are "difficult" credits. By virtue of their past relationships with client firms, banks know more about their future prospects, as well as about alternative uses for the firms' assets.[6] Consequently, they can lend more than other less-knowledgeable lenders.[7] Consistent with these theories, Mitchell Petersen and I find that, correcting for other effects, the availability of credit to small firms increases with the length of their banking relationship and the number of dimensions across which they interact with their bank.[8]

Also, the bank's specific lending skills and knowledge have to be brought into play when the bank wants to coax repayment. As a result, the loans are hard to sell to other potential lenders without similar skills or knowledge. Thus the bank's positions have historically been illiquid.[9]

The positions that banks enter are complex and illiquid for a variety of other reasons. In particular, many of the transactions between the bank and its borrower may be governed by an implicit understanding rather than by explicit contracts. If explicit contracts are incomplete, then implicit arrangements can be more flexible and allow for superior transactions.

Petersen and I consider the following natural experiment to test this premise[10]: The theory suggests that implicit arrangements between two parties typically are harder to sustain when competitive alternatives are open to the partners. Some areas of the United States have relatively concentrated banking markets. In these areas, implicit arrangements should be easier to sustain. Specifically, a bank can give a borrower subsidized credit when the borrower most needs it—when it is young or distressed—with the intent of recouping the subsidy when the firm is more mature or healthy. Unlike in a more competitive market, the bank can make the intertemporal cross-subsidy, confident that the firm has no alternative but to stick with the bank when mature or healthy.[11] Petersen and I find evidence consistent with this argument. Small young firms in areas in the United States where there are few banks get more credit than similar firms in areas where banking is more competitive. Moreover, firms in concentrated areas pay less than similar firms in competitive areas for their credit when young (they receive subsidized financing when most needed), and pay more when old (they repay earlier subsidies). More generally, our evidence suggests that more compli-

cated intertemporal transactions are possible within bank-firm relationships than are possible through explicit contracting.

Because of their nature, however, these implicit relationships are hard for outsiders to track or take over. Thus banking relationships add to the complexity and illiquidity of bank positions.

Finally, banks' comparative advantage in financial innovation make their positions novel and therefore illiquid in the face of a less advanced market. There are several possible reasons that banks have an advantage in innovation. New financial instruments and contracts typically are incomplete in many ways when they are first introduced. Payments or responsibilities have not been spelled out fully for many possible situations, partly because those situations have not been anticipated. There needs to be a trial period during which the contract may be tried out in real-world situations and the appropriate contractual features for dealing with initially unforeseen contingencies developed. The firms with which a bank has relationships form an ideal testing ground because the relationships allow the contract to be perfected in a nonadversarial environment. However, this ability to enter into innovative contracts that the market does not fully understand adds to the complexity of the banks' positions and their illiquidity.[12]

Why Both Functions?

These two functions, liquidity provision and funding complex positions, seem incompatible. In the first, the bank must come up with money on demand, while in the second, the bank holds investments that, because of their novelty or dependence on the bank's specific knowledge, are hard to undo or liquidate. Excessive investment in illiquid positions make the illiquid bank susceptible to inefficient runs.[13] It seems silly to tie the two functions together; hence there are increasingly strident calls from politicians and some academics to break up the bank and distance the two functions.

Yet, the widespread coexistence of these functions in the bank, both historically and across countries, should give us pause. Could there be synergies between the two functions? Douglas Diamond and I argue that, because bankers' specialized skills enable them to manage complicated positions, they have the ability to extract high rents from their investors. Bankers can commit to extracting lower rents in the future by issuing demand deposits that are a "hard" claim. More generally, by providing liquidity, a bank also can commit itself to lower compensation for managing complex positions. This reduces the bank's cost of financing those positions. Diamond and I also explain why we would not see industrial firms financing themselves with demandable deposits.[14]

Stewart Myers and I point to another source of synergy.[15] Banks have to maintain a store of very liquid assets in order to meet unexpected demand for liquidity. However, these liquid assets can be invested at short notice against the interests of financiers. The potential for opportunistic risky investment by the banker can raise the bank's cost of financing. One way for the bank to avoid opportunistic risks is for it to embed part of its value in complex illiquid positions. Because these positions are hard to unwind, they give financiers time to react to changes in the bankers' strategy. The positions are also a (limited) source of rents for bankers (discussed earlier), and they may be unwilling to jeopardize these in order to undertake short-term opportunistic investments.

In summary, the function of liquidity provision requires issuing demandable claims that have the ancillary effect of keeping in check the bank's rents from managing illiquid positions. Moreover, the bank's remaining rents and the illiquidity of its positions increase its stake in the future. As a result, the bank can commit to holding liquid assets safely without the straitjackets of rules and regulations that other institutions, such as money market mutual funds, require. Thus there are synergies flowing both ways that reduce the bank's cost of financing when it undertakes both functions together.

Is the Institutional Form Dead?

Equipped with some theory, we can ask whether the bank is dead. If the institutional form is defined in terms of its products—demand deposits and industrial loans—then the data suggest a definite decline in its importance in industrial countries. Depositors are moving away from banks to money market mutual funds and large firms are issuing public debt to meet their financing needs rather than borrowing from banks.

On the face of it, therefore, disintermediation appears rampant. However, if one looks closer, it appears that banks continue to provide their traditional functions, albeit through nontraditional products. For example, one could observe the dramatic increase in volume of commercial paper issuances relative to bank commercial loans and conclude, incorrectly, that the role of banks in providing liquidity to borrowers is declining. In fact, instead of providing liquidity directly to a large firm, a bank provides a backup line of credit that can be drawn down in case the firm's commercial paper cannot be refinanced. It is much more effective for the bank to provide such contingent guarantees than to directly fund the firm's liquidity needs: With contingent guarantees, the same unit of liquid reserves can back the needs of

multiple firms. By contrast, with direct funding, a unit of liquid reserve is fully locked up in meeting the liquidity needs of a single firm.

Since banks have begun to use their balance sheets more cleverly, old measures—such as the relative size of bank assets—are no longer useful in describing the importance of the role of banks. A more useful indicator is one that adds capitalized fee income to bank assets. By this measure, banks continue to maintain their importance.[16]

While banks are not dying out, they may be changing. With the widespread availability of information and increases in both processing capability and regulatory infrastructure, many more transactions can be handled directly in the market or by specialized institutions. This has forced banks to give up products that have become commodity-like and to refocus on products where bank value-added is still substantial. Typically, we see a cycle of innovation. Banks develop a complex new product, extract some rents for a while, and, eventually, the product becomes well understood and is offered by the market.[17] Banks then move on to new products.

This means that it is not very useful to continue associating a bank with specific products such as demand deposits and commercial loans. Such terms describe small community banks and little else today. However, if we define banks as institutions that jointly provide liquidity and complicated funding, we capture much more of the essence of what banks really do and vastly expand the set of banks for which the definition has relevance.

Do We Really Need Banks?

With this broader definition, and the evidence that, according to reasonable measures, the relative importance of banks in the financial sector has not declined, we have to conclude that it is too early to write off banks. Given the market value that most banks command today, and the University of Chicago's traditional belief in efficient markets, I could not have reached a different conclusion. However, the private valuations may be at the public expense: Banks may be so valuable partly because they can dip periodically into the public till.

Unfortunately, absent much better financial markets than those that currently exist, the theory suggests we cannot get many of the good things banks do, such as liquidity creation, credit origination, and financial innovation, without banks issuing claims susceptible to runs and thus being financially fragile. In breaking up banks into finance companies and money market funds (the so-called "narrow" bank proposals), we risk throwing the baby out with the bath water. Thus part of the Faustian bargain that we have to live with is that periodic banking disasters will occur and public money will be used.[18] Innovations in regulation and supervision can attempt to reduce the magnitude of the problem, but we should recognize that the alternative of doing away with the banks, at least in the foreseeable future, could be much worse.

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1. *See C. James and J. Houston, "Evolution or Extinction: Where Are Banks Headed?,"* Bank of America Journal of Applied Corporate Finance, *9, (1996), pp. 8–23.*

2. *See A. Berger, A.K Kashyap, and J. Scalise, "The Transformation of the U.S. Banking Industry: What a Long Strange Trip It's Been,"* Brookings Papers on Economic Activity, *2, (1995), pp. 55–217.*

3. *Liquidity provision can take place in many ways. The bank can directly pay cash on demand to depositors (see J. Bryant, "A Model of Reserves, Bank Runs, and Deposit Insurance,"* Journal of Banking and Finance, *4. [1980], pp. 335–44); D. Diamond and P. Dybvig, "Bank Runs, Deposit Insurance, and Liquidity,"* Journal of Political Economy, *91, [1983], pp. 401–19). Alternatively, it can provide a liquid medium of exchange to depositors through bank notes or check-writing facilities (see G.B. Gorton and G. Pennachi, "Financial Intermediaries and Liquidity Creation,"* Journal of Finance, *45, [1990], pp. 49–72).*

4. *See A.K Kashyap, R.G. Rajan, and J.C. Stein, "Banks as Liquidity Providers: An Explanation for the Co-Existence of Lending and Deposit Taking," mimeo, University of Chicago, 1998. Also, there could be a rationale for offering lines of credit and demand deposits even if lines of credit are normally not taken down at substantially different times than deposits. It is sufficient that liquid assets be held by the firm against the possibility of a "sun-spot" run by depositors. As there is no special reason for those who have lines to panic at the same time as the depositors, the possibility of more fully utilizing liquid assets that are held to protect against depositor runs may be reason enough to offer lines of credit. I should stress that the novel point in work that Kashyap, Rajan, and Stein (1998) have completed is the diversification across different categories of liquidity demands. Diamond and Dybvig (1983) stress that banks diversify across the liquidity demands of depositors and the fact that banks diversify across the liquidity needs of borrowing firms has been emphasized by B.R. Holmstrom and J. Tirole, "Private and Public Supply of Liquidity,"* Journal of Political Economy, *106, (1998), pp. 1–40.*

5. *Banks perform myriad functions. I focus only on the ones that are both important and serve to distinguish commercial banks from other financial institutions.*

6. *See B. Bernanke, "Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression,"* American Economic Review, *73, (1983), pp. 257–76; S.A. Sharpe, "Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationships,"* Journal of Finance, *45, (1990), pp. 1069–88; R.G. Rajan, "Insiders and Outsiders: The Choice Between Informed and Arm's Length Debt,"* Journal of Finance, *47, (1992), pp. 1367–400; D. Diamond and R.G. Rajan, "Liquidity Risk, Liquidity Creation and Financial Fragility: A Theory of Banking," mimeo, University of Chicago, 1998.*

7. *For evidence, see C. James, "Some Evidence on the Uniqueness of Bank Loans,"* Journal of Financial Economics, *19, (1987), pp. 217–35; T. Hoshi, A.K*

Kashyap, and D.S. Scharfstein, "Bank Monitoring and Investment: Evidence from the Changing Structure of Japanese Corporate Banking Relationships," in Asymmetric Information, Corporate Finance and Investment, *R.G. Hubbard, ed., Chicago: University of Chicago Press, 1990.*

8. See M. Petersen and R.G. Rajan, "The Benefits of Lending Relationships: Evidence from Small Business Data," Journal of Finance, *49, (1994), pp. 3–37.*

9. See Diamond and Rajan (1998).

10. See M. Petersen and R.G. Rajan, "The Effect of Credit Market Competition on Lending Relationships," Quarterly Journal of Economics, *110, (1995), pp. 407–43.*

11. This idea was initially proposed by C.J. Mayer, "New Issues in Corporate Finance," European Economic Review, *32, (1988), pp. 1167–89.*

12. See R.G. Rajan, "The Past and Future of Commercial Banking as Viewed Through an Incomplete Contract Lens," Journal of Money, Credit and Banking, *(1998), forthcoming.*

13. See Diamond and Dybvig (1983).

14. Once the bank has offered credit, its specific skills are used largely in effecting transfers (from borrower to depositor) rather than in creating value. As a result, demand deposits can play some disciplinary role because a bank run will render the bank ineffectual and extinguish its rents. However, in an industrial firm, the entrepreneur's (or manager's) rents accrue largely from his or her specific skills in creating value. A run will be highly inefficient, and its effects will be mitigated by renegotiation. Earlier work by Calomiris and Kahn (1991) emphasizes the monitoring role of demandable debt but does not explain why its beneficial effects would be any different for industrial firms. Hence, the fact that industrial firms rarely use demand deposits to finance is not explained by their work.

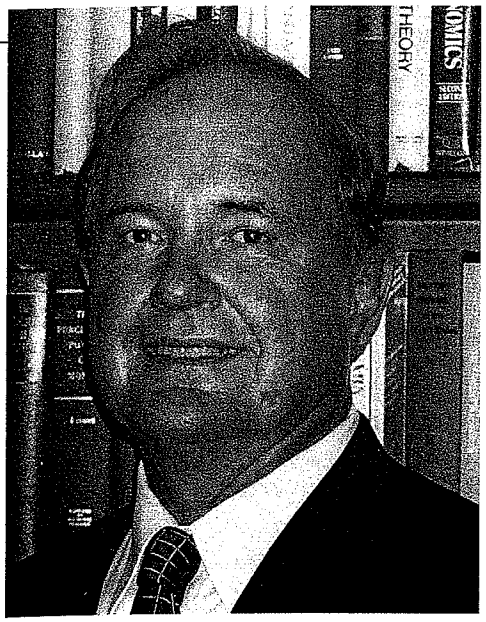
15. S.C. Myers and R.G. Rajan, "The Paradox of Liquidity," Quarterly Journal of Economics, *(1998), forthcoming.*

16. J. Boyd and M. Gertler, "Are Banks Dead? Or Are the Reports Greatly Exaggerated," Federal Reserve Bank of Minneapolis working paper, 1994.

17. See R.C. Merton, "Financial Innovation and the Management and Regulation of Financial Institutions," Journal of Banking and Finance, *19, (1995), pp. 461–82.*

18. The theories described thus far do not explain why banks have the periodic collective urge to commit suicide by making bad loans. For one attempt at an explanation, see R.G. Rajan, "Why Bank Credit Policies Fluctuate: A Theory and Some Evidence," Quarterly Journal of Economics, *109, (1994), pp. 399–442.*

NBER Profile: *Michael R. Darby*

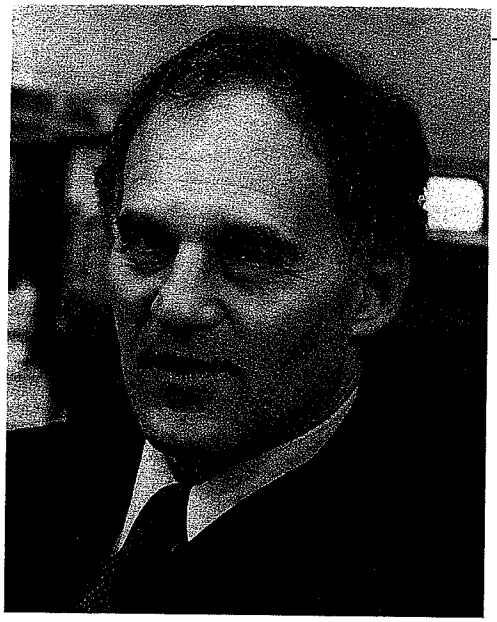


Michael R. Darby is a Research Associate in the NBER's Programs on Productivity and International Finance and Macroeconomics. He is also the Warren C. Cordner Professor of Money and Financial Markets in the John E. Anderson Graduate School of Management and the Departments of Economics and Policy Studies at the University of California, Los Angeles. Darby also directs the John M. Olin Center for Policy in the Anderson School.

Darby received his A.B. from Dartmouth College and his M.A. and Ph.D. from the University of Chicago. From 1970 through 1973, Darby was an assistant professor of economics at the Ohio State University. He joined the UCLA Economics Department in 1973 as an associate professor and was named a full professor in 1978.

Darby has written eight books and monographs and more than 100 other professional publications. From 1980 through 1986 he was Editor of the *Journal of International Money and Finance,* and he continues to serve on that Journal's Editorial Board. He also serves or served as a member of the editorial boards of the *American Economic Review, Contemporary Policy Issues, Contemporary Economic Policy,* and *International Reports*. Darby has received many honors including the Alexander Hamilton Award, the Treasury's highest honor, in 1989. He was elected Vice President and President-Elect of the Western Economic Association in 1998.

Darby and his wife, UCLA Sociology and Policy Studies Professor Lynne Zucker, have four children. They serve on the Board of Directors of the Opera Associates and pursue a variety of cultural and political interests.



NBER Profile: *Stephen Friedman*

Stephen Friedman was elected to the NBER's Board of Directors in September 1997. He is the Senior Chairman and a Limited Partner of Goldman, Sachs & Co., where he has held a number of positions since 1973.

Friedman holds a B.A. from Cornell University and an LL.B. from Columbia Law School. He is currently Chairman of the Board of Trustees of Columbia University, Chairman of the Executive Committee of the Brookings Institution, and a member of the Executive Committee of Trustees at Memorial Sloan-Kettering Cancer Center.

Friedman is a member of the Trilateral Commission and the Council on Foreign Relations. He is also a Director of Fannie Mae and Wal-Mart Stores, Inc., and a Senior Advisor to Marsh & McLennan Risk Capital Corp.

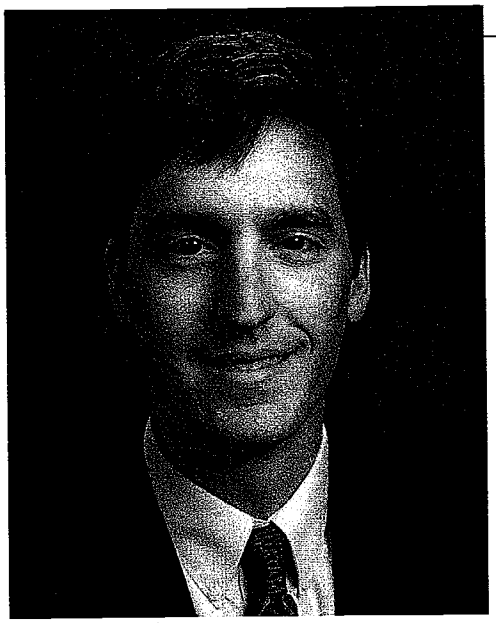
NBER Profile: *Jerry A. Hausman*

Jerry A. Hausman has been an NBER Research Associate since 1979. He is a member of the NBER Programs on Labor Studies, Public Economics, and Aging. He is also the John and Jennie S. MacDonald Professor of Economics at MIT.

Hausman received his A.B. from Brown University and his D.Phil. from Oxford University. For the last 22 years, he has taught at MIT, but he has also been a visiting professor at Harvard Business School and in Harvard University's Department of Economics.

Hausman received the John Bates Clark Award from the American Economics Association in 1985 for the most outstanding contributions to economics by an economist under age 40. He also received the Frisch Medal in 1980 from the Econometric Society. His current areas of research are econometrics (the use of statistical techniques to analyze economic data) and applied microeconomics (the study of behaviors of consumers, firms, and markets).

Hausman enjoys traveling, especially exploring the Great Barrier Reef. He has never left his West Virginia roots, he says.



NBER Profile: *Steven D. Levitt*

Steven D. Levitt is a Research Associate in the NBER's Program on Public Economics, and an associate professor in the University of Chicago's Department of Economics. He received his B.A. from Harvard University in 1989 and his Ph.D. from MIT in 1994.

Levitt is also a Research Fellow with the American Bar Foundation. He was a junior research fellow with the Harvard Society of Fellows from 1994–7 before joining the University of Chicago faculty.

Levitt's most recent publications include the forthcoming articles on "Juvenile Crime and Punishment" and "Crime, Urban Flight, and the Consequences for Cities." He recently earned the University of Chicago's Quantrell Award for outstanding undergraduate teaching.

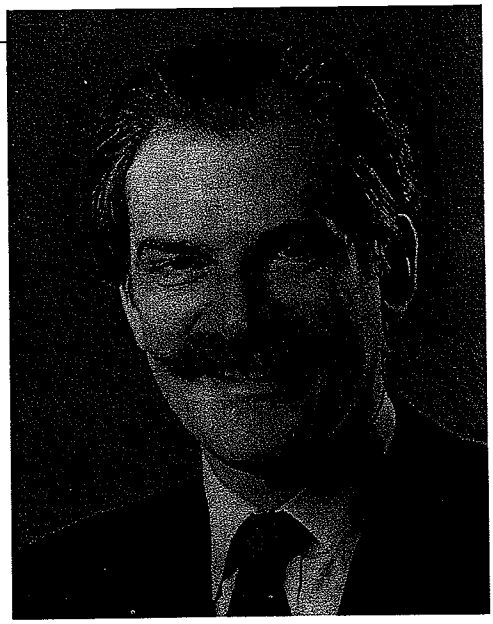
Levitt and his wife Jeannette have a son, Andrew, born in October.

NBER Profile: *John Lipsky*

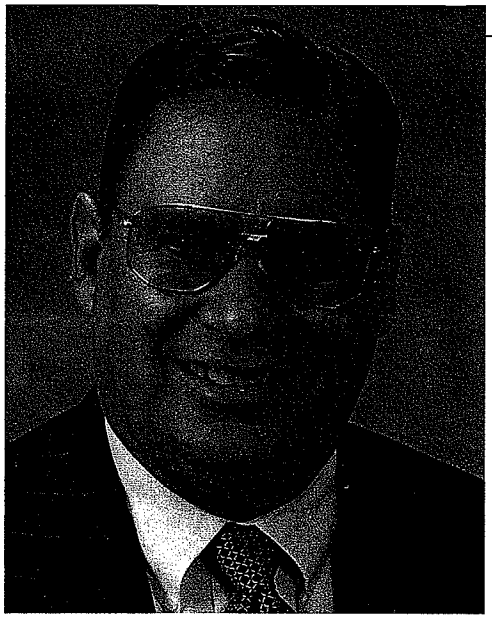
John Lipsky was elected to the NBER's Board of Directors in April 1998. He has been Chief Economist at the Chase Manhattan Bank since 1997. He also serves as the Director of Research of Chase's Global Bank.

Lipsky earned a B.A. in economics from Wesleyan University and his M.A. and Ph.D. in economics from Stanford University. He spent a decade at the International Monetary Fund, including as the Fund's Resident Representative in Chile in 1978–80. He joined Salomon Brothers in 1984, and from 1989–92 he was based in London, directing Salomon Brothers' European Group. From 1992–7, before joining Chase Manhattan, he was Chief Economist of Salomon Brothers, Inc.

Lipsky is a member of The Economic Club of New York, the Council on Foreign Relations, the Money Marketeers, and the Americas Society. He also is a member of the Advisory Board of Stanford University's Center for Economic Policy Research and the Advisory Council of New York University's Salomon Center of the Leonard N. Stern School of Business.



NBER Profile: *Robert Mednick*



Robert Mednick was elected to the NBER's Board of Directors in September. He is the retired Managing Partner—Professional and Regulatory Matters of Anderson Worldwide, one of the largest professional services organizations in the world, and served as Chairman of the firm's Worldwide Committee on Professional Standards during the past 16 years. Bob joined Anderson in 1962 upon receiving his B.S. in accounting from Roosevelt University, became a partner in 1971, and retired on August 31, 1998.

Mednick is active in a number of professional and civic organizations and currently serves on the Boards of the American Institute of Certified Public Accountants (Immediate Past Chairman), Roosevelt University (Senior Vice Chairman), the Rand Corporation Institute for Civil Justice, and the Roy Garrett Jr. Corporate and Securities Law Institute of Northwestern University Law School. He also has served as a Vice President of the Board of the American Judicature Society (a 75-year-old think tank dedicated to court reform).

Mednick has published numerous articles and spoken extensively, both within and outside the United States, on a wide range of professional and business subjects. Among his numerous awards and citations, three times his articles have been judged the best of the year by the appropriate professional journal. Next spring, he will be teaching a course on the Changing Dynamics of Professional Practice in a Global Marketplace at the Northwestern University Kellogg Graduate School of Management.

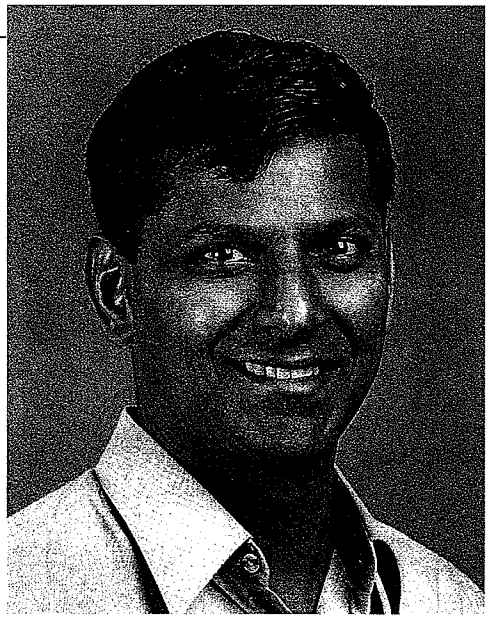
Mednick and his wife of 36 years, Susan, live in Chicago. Susan holds undergraduate degrees from Northwestern University, Loyola University, and Spertus College of Judaica, and is a freelance writer. They have three adult children (Michael, Julie, and Adam) and a recent son-in-law, Russell Simmons. In their leisure time, the Mednicks enjoy travel and collecting art, and are both active in a number of Jewish civic and charitable organizations.

NBER Profile: *Raghuram G. Rajan*

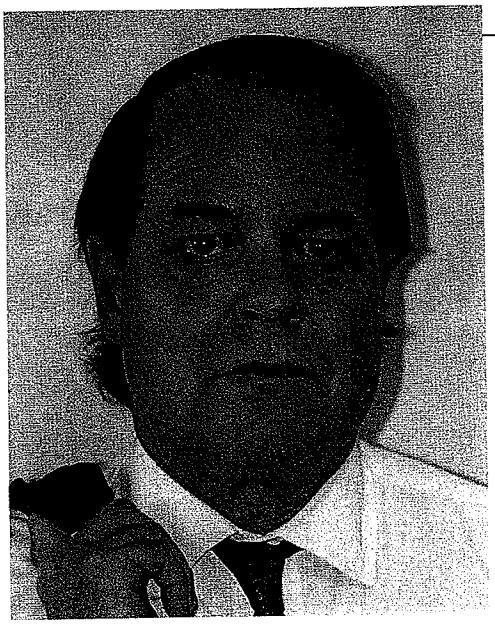
Raghuram G. Rajan has recently been appointed the Director of the NBER's Program in Corporate Finance. He is also the Joseph L. Gidwitz Professor of Finance at the University of Chicago's Graduate School of Business (GSB). He received his B.Tech in Electrical Engineering from the Indian Institute of Technology, New Delhi, in 1985, an M.B.A. from the Indian Institute of Management in 1987, and his Ph.D. from the Sloan School of Management at MIT in 1991.

Rajan has been at the University of Chicago since 1987, teaching courses on corporate finance and financial institutions. His research interests include the theory of the firm, organizational design, corporate financial policy, financial intermediation, regulation, and comparative financial systems. His articles have appeared in academic journals, books, and newspapers, and he has been a consultant for various financial institutions. He is also an associate editor of a number of leading finance and economics journals.

Rajan is married to Radhika Puri; she has a Ph.D. in Marketing from the University of Chicago and teaches at the GSB. They have a daughter, Tara, who is 4 (and going on 64). Rajan loves to play squash and tennis, and pines for a game of cricket.



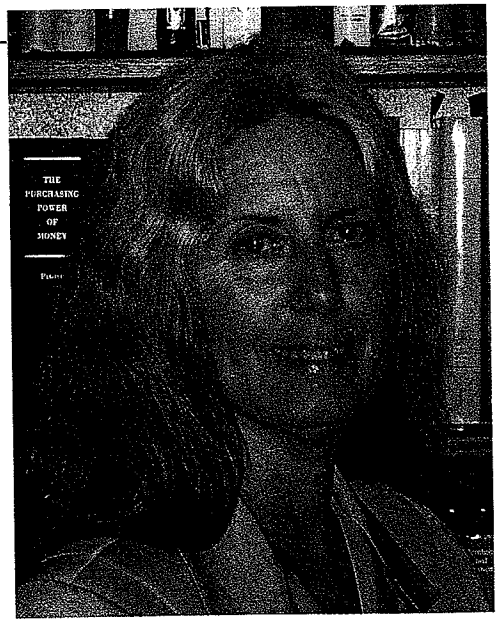
NBER Profile: *David A. Smith*



David A. Smith, director of the Public Policy Department of the AFL-CIO, was elected to the NBER's Board of Directors in September. Prior to joining the AFL-CIO, Smith served as senior deputy budget director and as commissioner of economic development for the city of New York. He spent most of the 1980s in Washington as an aide to Senator Edward M. Kennedy, and as a senior economist for the Joint Economic Committee.

Smith also has taught economics and public policy at the University of Massachusetts and the New School for Social Research, and is a senior fellow at the Twentieth Century Fund.

NBER Profile: *Lynne G. Zucker*



Lynne G. Zucker has been a Research Associate in the NBER's Program on Productivity since 1994. She is currently a Professor of Sociology and Policy Studies and Director of the Organizational Research Program at the Institute for Social Science Research, and is Director of the Center for International Science, Technology, and Cultural Policy in the School of Public Policy and Social Research at the University of California, Los Angeles.

Zucker received her A.B. in Sociology and Psychology from Wells College and her M.A. and Ph.D. from the Sociology Department of Stanford University. She has been a member of the UCLA Sociology Department faculty since 1969, and is a member of the affiliated faculty of the UCLA School of Education.

Zucker has authored four books and monographs as well as numerous journal and other articles on organizational theory, analysis, evaluation, institutional structure and process, trust production, civil service, government spending and services, unionization, science and its commercialization, and permanently failing organizations. She is currently extending her research to the area of cultural policy and the study of art and entertainment production.

Zucker and her husband, Michael R. Darby, have four children. They serve on the Board of Directors of the Opera Associates and pursue a variety of cultural and political interests.

Conferences

Trans-Atlantic Public Economics Seminar

The NBER's Trans-Atlantic Public Economics Seminar took place in Denmark this year through a collaboration with the Economic Policy Research Unit of the Copenhagen Business School. The May 21–3 conference on "Taxes, Social Insurance Policies, and the Labor Market" was organized by Roger M. Gordon, NBER and the University of Michigan, and Søren Bo Nielsen, Copenhagen Business School. The following participants presented their research:

Patricia M. Anderson, NBER and Dartmouth College, and **Bruce D. Meyer,** NBER and Northwestern University, "The Effects of Unemployment Insurance Payroll Tax on Employment and Wages: A Natural Experiment From Washington State"
Discussants: Janet Currie, NBER and University of California, Los Angeles, and Thomas Lemieux, NBER and University of Montreal

Nils Soren Blomquist and **Matias Eklöf,** Uppsala University, and **Whitney Newey,** MIT, "Tax Reform Evaluation Using Nonparametric Methods: Sweden, 1980–91"
Discussants: Richard Blundell, Institute for Fiscal Studies, and James J. Heckman, NBER and University of Chicago

Clemens Fuest and **Bernd Huber,** University of Munich, "Why Do Countries Subsidize Investment and Not Employment?"
Discussants: Ann-Sofie Kolm, University of Uppsala, and John Whalley, NBER and University of Western Ontario

David Neumark, NBER and Michigan State University, and **Elizabeth Powers,** University of Illinois, "Welfare for the Elderly: The Effects of SSI on Preretirement Labor Supply" (NBER Working Paper No. 6303)
Discussants: Patricia M. Anderson, and Axel H. Börsch-Supan, NBER and University of Mannheim

Axel H. Börsch-Supan, "Social Security and Declining Labor Force Participation: Evidence of Incentive Effects Across Europe and in Germany"
Discussants: Phillippe Bacchetta, Studienzentrum Gerzensee, and Bernd Huber

Phillip B. Levine, NBER and Wellesley College, and **David E. Card,** NBER and University of California, Berkeley, "Extended Unemployment Insurance Benefits in the State of New Jersey: The Relationship Between Maximum Benefit Duration and Spell Length" (NBER Working Paper No. 6714)
Discussants: Nils Soren Blomquist and Bruce J. Meyer

Martin Browning, McMaster University, and **Thomas F. Crossley,** York University, "Unemployment Insurance Benefit Levels and Consumption Changes"
Discussants: Costas Meghir, Institute for Fiscal Studies, and James M. Poterba, NBER and MIT

Thomas Lemieux; and **W. Bentley MacLeod,** University of Southern California, "Supply Side Hysteresis: The Case of the Canadian Unemployment Insurance System"
Discussants: Phillip B. Levine and David Neumark

Keshab Bhattarai, University of Warwick, and **John Whalley,** "The Redistributive Effects of Transfers" (NBER Working Paper No. 6281)
Discussants: Jonas Agell, Uppsala University, and W. Bentley MacLeod

A. Lans Bovenberg and **Ruud A. De Mooij,** and **Johann J. Graafland,** Central Planning Bureau, The Hague, "Tax Policies, Social Security Reform, and the Performance of the Dutch Labor Market"
Discussants: Martin Browning, and Peter Birch Sorenson, Copenhagen University

James J. Heckman; and **Christopher P. Taber,** Northwestern University, "Tax Reform and Human Capital Accumulation: Evidence From an Empirical General Equilibrium Model of Skill Formation"
Discussants: A. Lans Bovenberg and Søren Bo Nielsen

Jonas Agell; and **Mats Persson,** Institute for Economic Studies, "Tax Arbitrage and Labor Supply"
Discussants: Angel Lopez, Universitat Pompeau Fabra, and Roger M. Gordon

From 1972–84, all employers in Washington paid the same unemployment insurance (UI) tax rate. As a by-product of federal legislation, though, Washington was forced to adopt an experience-rated system in 1985. **Anderson** and **Meyer** use this natural experiment to explore the effects of tax incidence and experience rating. Based on individual-level quarterly earnings, their results show that industry average tax rates largely are passed on to workers in the form of lower earnings. However, a firm can only shift a little of the difference

between its tax rate and the industry average rate. Comparing Washington's experience before and after the 1985 change with those of other states, they find in general that experience rating provides an incentive for reducing turnover and UI claims.

Blomquist, Eklöf, and **Newey** evaluate the tax reforms carried out in Sweden from 1980–91. They study how separate components influenced hours of work, tax revenues, and income distribution. Their results indicate that the reform was underfinanced, and that the increased indirect taxation and redesigned transfer system almost eliminated the positive effects on hours of work attributable to decreased marginal taxes on labor income.

Fuest and **Huber** show that capital subsidies are far more important than policy measures in reducing the cost of labor. In their framework, an investment subsidy dominates an employment subsidy in terms of welfare, because investment subsidies alleviate the underinvestment problem and increase the number of operating firms.

Neumark and **Powers** exploit state-level variation in supplementary SSI benefits to estimate the effects of the SSI program on preretirement labor supply. They use data from the 1984, 1990, and 1991 panels of the Survey of Income and Program Participation. They find that generous SSI benefits may reduce the preretirement labor supply of men who are likely to participate in SSI after retirement as those men near the age of eligibility for SSI.

All across Europe, the labor force participation of older workers has declined dramatically during the last decades. This secular trend coincides with the aging of the population. Therefore, European social security systems face a double threat: retirees receive pensions for a longer time, and there are fewer workers per retiree to shoulder the financial burden of the pension systems. **Börsch-Supan** shows that all European pension systems provide strong incentives to retire early. These incentives and old-age labor force participation are strongly negatively correlated.

Research on unemployment insurance (UI) systems in the United States shows a strong relationship between the maximum duration of benefits and the length of an individual's unemployment spell. **Levine** and **Card** take advantage of a recent quasi-experiment in New Jersey—13 weeks of extended UI benefits available to those whose regular UI had expired between December 1995 and November 1996—to estimate the relationship between maximum benefit duration and the length of unemployment spells. Some preliminary evidence indicates that unemployment spells did become longer after New Jersey's implementation of extended benefits. The total unemployment rate fell from 6.4 percent to 6.2 percent in 1995–6, and the number of initial claims for UI fell 3 percent during that time. Yet the total number of weeks compensated by the regular UI program (not including extended benefits) rose by 4 percent.

Browning and **Crossley** use a survey of unemployed people to examine how a job loss affects household expenditures. They focus on the effect of UI as income replacement. In a subsample of respondents who are still in their first spell of unemployment after 6 months, there are large drops in consumption, averaging about 15 percent of total expenditure. The actual fall depends on a variety of factors, the most important being the pre-job-loss ratio of the respondent's income to household income. The effects of varying the replacement ratio are relatively small, and are only found for those who did not have assets at the time of the job loss. For most of the sample, small changes in the benefit level will have no effect on living standards within the household and hence on other facets of behavior, such as job search, unemployment duration, and the quality of any new job taken.

Lemieux and **MacLeod** present the results of a 1971 natural experiment: the Canadian government dramatically increased the generosity of the unemployment insurance (UI) system. They find that the propensity to collect UI increases with a first-time exposure to the system. Hence, as more individuals experience unemployment, their lifetime use of the system increases. This may explain why unemployment has increased steadily from 1972–92, even though the generosity of UI did not.

Bhattarai and **Whalley** argue that, because tax-back arrangements accompany most transfer programs, and endogenous participation decisions (regime choices) are involved, a money-metric measure of the utility generated by transfers typically will be less than the cash value of transfers. Using a conditional choice general equilibrium model of the United Kingdom with a leisure-consumption choice for households and production involving heterogeneous labor inputs, they calibrate the model to literature-based labor supply and labor demand elasticities. Their model suggests that a money-metric measure of the utility equivalent of transfers received by the bottom three deciles of U.K. households in the early 1990s may be only 50 percent of cash transfers received as a result of the conditionality in these programs.

Bovenberg, de Mooij, and **Graafland** use MIMIC, an applied general equilibrium model of the Dutch economy, to explore various tax cuts aimed at combating unemployment and raising labor supply. They develop a small aggregate model that contains the core of MIMIC, namely wage setting, job matching, labor

supply, and labor demand. In addition to illustrating the main economic mechanisms in MIMIC, their model shows the advantages of using a larger, more desegregated model that accounts for heterogeneity, institutional details, and other economic mechanisms. They find that targeting in-work benefits at the low skilled is the most effective way to cut economy-wide unemployment, but this damages the quality and quantity of labor supply. Cuts in social security contributions paid by employers and subsidies for hiring long-term unemployed reduce unskilled unemployment most substantially. Tax cuts in the higher tax brackets boost the quantity and quality of formal labor supply but are less effective in reducing unemployment and in raising unskilled employment and female labor supply.

Heckman and **Taber** estimate the magnitude of the effects of tax reform on human capital accumulation. Their model encompasses schooling and on-the-job human capital formation, is consistent with observations on modern labor markets, and can explain many features of rising wage inequality in the U.S. economy. They show that major reforms typically lead to moderate effects on human capital investment in the short run, but small effects in the long run.

Agell and **Persson** examine how tax avoidance in the form of trade in well-functioning asset markets affects the basic labor supply model. They show that tax arbitrage has dramatic implications for positive, normative, and econometric analysis of how taxes affect work incentives.

These papers may be published in a special edition of an economic journal. Watch the NBER's Web site for details of that publication.

Conference on Concentrated Ownership

The NBER held a Conference on Concentrated Ownership in Banff, Alberta, Canada on May 30-June 1. Randall K. Morck of the University of Alberta organized the conference, which featured the following presentations:

Paul A. Gompers and **Joshua Lerner,** NBER and Harvard University, "Corporate Venture Capital: Organizational Structure, Complementarities, and Success"
Discussant: Michael Weisbach, University of Arizona

Lucian A. Bebchuk, NBER and Harvard University, and **Marcel Kahan,** New York University School of Law, "The 'Lemons' Effect in Corporate Freeze-Outs"
Discussant: Paul G. Mahoney, University of Virginia

Krishna Palepu and **Tarun Khanna,** Harvard University, "The Relation Between Performance and Ownership in Emerging Markets: An Empirical Analysis of Indian Business Groups"
Discussant: Bernard Yeung, University of Michigan

Paul G. Mahoney, "Trust and Opportunism in Close Corporations"
Discussant: Larry Y. Dann, University of Oregon

Robert D. Brown, Price Waterhouse, and **Jack M. Mintz** and **Thomas A. Wilson,** University of Toronto, "Corporations and Taxation: A Private Matter"
Discussant: Daniel R. Feenberg, NBER

Randall K. Morck, David A. Stangeland, University of Manitoba, and **Bernard Yeung,** "Concentrated Ownership and the National Economy"
Discussant: David Levy, George Mason University

Clifford G. Holderness, Boston College, and **Dennis P. Sheehan,** Pennsylvania State University, "Constraints on Large-Block Shareholders"
Discussant: Mark Huson, University of Alberta

Lucian A. Bebchuk, Reinier Kraakman, Harvard University, and **George Triantis,** University of Virginia, "Stock Pyramids, Cross Ownership, Dual Class Equity, and Leverage: An Analysis of Alternative Arrangements for Separating Control from Cash Flow Rights"
Discussant: Dennis P. Sheehan

Ronald J. Daniels, University of Toronto, and **Edward M. Iacobucci,** University of Virginia, "Some of the Causes and Consequences of Corporate Ownership in Canada"
Discussant: George Triantis

Gompers and **Lerner** examine a sample of more than 30,000 transactions by corporate venture capital organizations and other venture capital groups. They find that the corporate investments in entrepreneurial firms are at least as successful (using such measures as the probability of the portfolio firm going public) as those backed by independent organizations, particularly when there is a strategic overlap between the corpo-

rate parent and the portfolio firm. Corporate programs without a strong strategic focus appear to be much less stable, frequently ceasing operations after only a few investments. This is consistent with the existence of complementarities that allow corporations to effectively select and add value to portfolio firms, but is somewhat at odds with suggestions that the structure of corporate venture capital funds limits their effectiveness.

In a corporate freeze-out, the controller is required to compensate minority shareholders for the no-freeze-out value of their shares taken from them. **Bebchuk** and **Kahan** highlight the difficulties involved in determining this no-freeze-out value when, as is often the case, the controller has private information. In particular, they show that the pre-freeze-out market price of minority shares cannot be used as a proxy for the no-freeze-out value that these shares would have in the absence of a freeze-out. The authors show that, under a regime in which frozen-out minority shareholders receive a compensation equal to the pre-freeze-out market price, pre-freeze-out market prices will be set at a level below the expected no-freeze-out value of minority shares. The reason for this is a "lemons effect" that arises when controllers use private information in deciding whether to effect a freeze-out. By showing how controllers might use private information to effect freeze-outs at terms favorable to them, the authors demonstrate that freeze-outs can provide controllers with a significant source of private benefit.

Palepu and **Khanna** investigate the monitoring of business groups, enterprises subject to a form of insider control in which a family typically controls multiple enterprises. They examine the interaction among three different types of concentrated owners in India: inside ownership held by the families that manage the firms that comprise business groups; ownership by domestic financial institutions, typically acting in concert; and ownership by foreign financial institutions. The authors find that domestic financial institutions in India are significantly less effective monitors than foreign financial institutions. Surprisingly, however, there is no evidence that monitoring is any less effective for group affiliates than for unaffiliated firms. Firm performance is correlated positively with the presence of foreign institutional ownership (and negatively with the presence of domestic institutional ownership). The authors interpret this evidence as consistent with the valuable role that foreign institutional investors play in ensuring the monitoring of firms in India.

Mahoney models the interaction between majority and minority shareholders in a closely held corporation as a trust game in which the majority is constrained by the possibility of non-legal sanctions, including family or social disapproval and loss of reputation. He applies this analysis to the long standing debate over appropriate exit rules for closed corporation shareholders. When the parties are well informed and rational and judicial valuations are unbiased, giving the minority the unconditional right to be cashed out should reduce majority opportunism without producing opportunistic behavior by the minority. Mahoney suggests that the apparent failure of closed corporation shareholders to bargain for such a right reflects the courts' success in using dissolution and fiduciary duty actions to deter majority misbehavior.

Brown, Mintz, and **Wilson** examine how taxation can influence the choice between private and public status of businesses. They show that lower taxes on the return on investment in private firms as opposed to public firms encourage greater numbers of privately held companies. However, income and wealth taxes on entrepreneurs reduce their ability to internally fund investments, thus encouraging greater public offerings of businesses. The authors review the primary differences between the U.S. and Canadian tax systems that might influence the extent to which corporations are held privately. They conclude that the Canadian tax system provides some inducement for corporations to be kept private. This results in a much greater share of Canadian corporate wealth being held in private companies than is the case with U.S. wealth in the United States.

Morck, Stangeland, and **Yeung** raise the possibility that the currently observed allocation of corporate control may be less than optimal in countries in which corporations tend to be controlled by a small number of families. They show that countries in which billionaire heirs' wealth is large relative to GDP grow more slowly than other countries at similar levels of development. Countries in which self-made entrepreneur billionaires' wealth is large relative to GDP grow more rapidly than other countries at similar levels of development. Using Canadian firm-level data, they demonstrate that heir-controlled firms underperform other firms; this suggests that the negative relationship between heirs' wealth and economic growth operates through heirs' corporate control. The authors find that the slower economic growth associated with large inherited wealth may be attributed in part to a separation of ownership from control in pyramid ownership structures, and in part to the distortions in capital allocation that this fosters.

Holderness and **Sheehan** report that corporate managers who own a majority of the common stock in their company, or who represent another firm owning such an interest, are less constrained than managers of dif-

fusely held firms. Yet their power to harm minority shareholders must be circumscribed by some organizational or legal arrangements. The authors show that boards of directors in majority-owned firms are little different from those in firms with diffuse stock ownership. Capital market activity, another source of constraint on large shareholders, also appears no different in firms with diffuse ownership. There is little evidence that new organizational mechanisms have evolved to constrain managers who own large blocks of stock. However, the frequency and associated wealth effects of reorganizations of majority shareholder firms indicate that the law constrains managerial majority shareholders, both in their day-to-day management and when they redeem the ownership interest of minority shareholders. This finding conflicts with the widely held opinion that the law does not effectively constrain large-percentage shareholders in public corporations.

Bebchuck, Kraakman, and **Triantis** explain that controlling minority shareholder (CMS) structures are pervasive in many countries outside the United States, where they often facilitate control by family groups over substantial conglomerates. Because these structures are insulated from takeovers and can radically distort controlling shareholders' incentives, they put great pressure on corporate governance mechanisms. For this reason, CMS structures have come under closer political and market scrutiny and, in several instances, are undergoing significant modification. The authors analyze the governance and incentive features of these organizations, examining the principal ways in which CMS structures arise: through dual class equity, stock pyramids, and cross-ownerships. They also address the incentive characteristics of CMS structures, and demonstrate that these structures distort a controller's incentives to select an optimal firm size, choose optimal projects, and consent to efficient transfers of control.

Can majority ownership help both to drive and to restrain the performance of potentially successful companies? **Daniels** and **Iacobucci** explore how the law may have contributed to Canada's corporate ownership structure. They examine legal issues which, as a positive matter, may have contributed to the concentrated ownership structure in Canada, and analyze the implications of these causal relationships. Their theoretical analysis suggests that some of these contributions to the corporate ownership structure in Canada were probably socially beneficial, for example the relatively liberal banking regulations. Some were probably neutral with respect to corporate ownership, including the liberal investment rules for financial intermediaries. And others, such as various types of protectionism, were probably undesirable.

Frontiers in Health Policy Research

The NBER's second annual conference on "Frontiers in Health Policy Research" was held on June 11 in Bethesda, Maryland. Health Care Program Director Alan M. Garber, of NBER and Stanford University, chose the following papers for presentation:

Frank A. Sloan, NBER and Duke University, **Gabriel Picone,** University of South Florida, and **Donald Taylor** and **Shin-Yi Chou,** Duke University, "Does Where You Are Admitted Make a Difference? An Analysis of Medicare Data"

Laurence C. Baker, NBER and Stanford University, and **Joanne Spetz,** Public Policy Institute of California, "Managed Care and Medical Technology Growth"

Daniel Kessler and **Mark B. McClellan,** NBER and Stanford University, "Does Hospital Competition Raise the Price of Hospital Services?"

Alan M. Garber, Thomas E. MaCurdy, and **Mark B. McClellan,** NBER and Stanford University, "Medical Care at the End of Life: Diseases, Treatment Patterns, and Costs"

David M. Cutler, NBER and Harvard University, and **Elizabeth Richardson,** Harvard University, "Your Money and Your Life: The Value of Health and What Affects It"

How does hospital ownership affect performance in terms of cost and quality? **Sloan, Picone, Taylor**, and **Chou** ask whether following a sudden, unanticipated adverse health event, it matters to which type of hospital a Medicare beneficiary is taken. In their study, cost is measured by actual Medicare payments, both for hospital and for nonhospital care. They use Medicare data from a nationwide sample of nearly 2,700 elderly patients in almost 1,400 hospitals. The authors also assess variations in direct measures of intensity of hospital care by ownership and other factors. In this paper, the focus is on long-term survival following initial hospital admission for a "health shock." In total, they find, government hospitals were the least expen-

sive for Medicare, with major teaching hospitals being most expensive within six months of admission after the "index event." However, survival was best in major teaching hospitals. In terms of payments subsequent to those for the initial hospitalization, Medicare spent more for patients admitted to for-profit hospitals than for those admitted to other non-teaching facilities, but had similar outcomes as measured by survival. Payments on behalf of patients treated in for-profit hospitals were higher for Medicare Part B and home health, especially during the first two months following discharge from the initial hospital stay.

Baker and **Spetz** attempt to better understand the ability of managed care to influence health care cost growth. They create an index of technology availability for each hospital in the United States and relate values of this index to levels of health maintenance organization (HMO) market share. They find that managed care might have slowed technology growth in the early and mid-1980s. But, in the early 1990s, there is little evidence that technology growth in high-HMO market share areas is any slower than growth in lower market share areas. The authors also examine evidence for some individual technologies and find that the effects of managed care on technology adoption can vary substantially from technology to technology.

Kessler and **McClellan** propose a new approach to assessing the potential social costs and benefits of competition among hospitals that addresses the shortcomings of the previous literature. They investigate how exogenous determinants of hospital choices, like travel distances, influence the competitiveness of hospital markets, and how hospital competition interacts with the influence of managed care organizations to affect medical treatment decisions, health care costs, and health care outcomes. Their methods suggest that competition among hospitals in the 1990s led on average to both substantially lower costs and substantially lower rates of adverse outcomes for elderly patients with cardiac illness: hospital competition unambiguously improved social welfare.

In recent years, the use of Medicare-covered home health care and hospice services has grown dramatically. **Garber, MaCurdy,** and **McClellan** examine linked Medicare claims files from 1988 through 1995, determining location of death, days of use of services, and expenditures for decedents. They find that hospice and home health care use among decedents grew rapidly over the period studied, especially among patients with nonacute causes of death, like lung cancer. Among the elderly with such chronic terminal illnesses, these alternatives to hospital care have displaced a portion of the use of acute hospitals near the very end of life. However, most of the growth in these services in the one or two years before death appears to involve additional Medicare-covered services. As a result, Medicare coverage of home health and hospice care has increased near the end of life, with an associated reduction in the proportion of deaths occurring in acute-care hospitals. However, the greater availability of nonhospital services has not substantially reduced the growth in Medicare expenditures at the end of life, or the intensity of end-of-life treatment for Medicare beneficiaries dying of more acute illnesses or requiring substantial supportive care because of frailty. Moreover, the decline in use of hospital services for chronically ill patients occurs largely within the final days to three months of life.

Cutler and **Richardson** discuss a fundamental question in health economics: How much is medical care worth, and how much should we be willing to pay for it? Or, would you rather have more money or more life? Following Grossman (1972), the authors develop a measure of health capital—the dollar value of health a person will have over the course of his or her remaining life. They then measure health capital empirically using data on the length of life, prevalence of adverse conditions for those alive, and quality of life, conditional on having an adverse condition. Health capital is estimated at $3 million for a newborn in 1990, and nearly $1 million for an elderly person. Comparing the change in health capital over time with the increase in medical spending, it appears that increased medical technology over the past half-century has almost certainly been worth its cost. Not all medical spending is worth it, however. These results suggest a more appropriate question to ask: How can we get more of the spending that is valuable but avoid the spending that is not valuable? Answering this question has the potential to yield lasting improvements to U.S. fiscal and physical health.

These papers and their discussions will be published by the MIT Press as *Frontiers in Health Policy Research,* Volume 2. Its availability will be announced in a future issue of the NBER *Reporter.*

Medical Care Output and Productivity

The NBER's Conference on Research in Income and Wealth held a conference on "Medical Care Output and Productivity" in Bethesda, Maryland on June 12–13. Ernst R. Berndt, NBER and MIT, and David M. Cutler, NBER and Harvard University, organized this program:

Paul Ellickson, MIT, **Scott Stern,** NBER and MIT, and **Manuel Trajtenberg,** NBER and Tel Aviv University, "Patient Welfare and Patient Compliance: An Empirical Framework for Measuring the Benefits from Pharmaceutical Innovation"

Discussant: Jonathan S. Skinner, NBER and Dartmouth College

David Meltzer, NBER and University of Chicago, "Theoretical Foundations of Cost–Benefit Analysis"

Discussant: Douglas Cocks, Eli Lilly and Co.

Ernst R. Berndt; David M. Cutler; Richard Frank, Zvi Griliches, and **Joseph P. Newhouse,** NBER and Harvard University, and **Jack E. Triplett,** The Brookings Institution, "Price Indexes for Medical Care Goods and Services: An Overview"

Discussant: Brent R. Moulton, Bureau of Economic Analysis

Ina Kay Ford and **Daniel H. Ginsburg,** Bureau of Labor Statistics (BLS), "Medical Care in the CPI"

Dennis Fixler and **Mitchell Ginsburg,** BLS, "Health Care Output and Prices in the Producer Price Index"

Discussant: Joseph P. Newhouse

Arthur Sensenig, Health Care Financing Administration, and **Ernest Wilcox,** Bureau of Economic Analysis, "Reconciling Health Care Spending Estimates: National Health Accounts and National Income and Product Accounts Estimates of Hospital Care and Physician Services"

Discussant: Haiden Huskamp, Harvard University

Sherry A. Glied, NBER and Columbia University, "The Value of Reductions in Child Injury Mortality in the United States"

Discussant: James Schuttinga, National Institutes of Health

Iain M. Cockburn, NBER and University of British Columbia, and **Aslam Anis,** St. Paul's Hospital, "Hedonic Analysis of Arthritis Drugs" (NBER Working Paper No. 6574)

Discussant: J. Steven Landefeld, Bureau of Economic Analysis

Tomas Philipson, NBER and University of Chicago, and **Darius Lakdawalla** and **Charles Mullin,** University of Chicago, "Medical Care Output and Productivity in the Nonprofit Sector"

Discussant: Richard Frank

Ernst R. Berndt; Susan Busch, Harvard University; and **Richard Frank,** "Price Indexes for Acute Phase Treatment of Depression" (NBER Working Paper No. 6417)

Discussant: Darrel Regier, National Institutes of Health

Irving Shapiro, Phillips Eye Institute; **Matthew Shapiro,** NBER and University of Michigan; and **David A. Wilcox,** U.S. Department of the Treasury, "Measuring the Value of Cataract Surgery"

Discussant: Richard Suzman, National Institute on Aging

Ellickson, Stern, and **Trajtenberg** present a framework for evaluating patients' welfare from pharmaceutical innovations. In contrast to most previous studies on such topics, theirs is concerned specifically with the relationship between the institutions of pharmaceutical decisionmaking and the choices made by patients and physicians. The authors' analysis and the proposed patient welfare function rely on patients' retention of authority over compliance with the physician's prescription. In other words, after receiving a prescription from a physician, patients choose whether to fill the prescription, to maintain the prescribed regimen once pills are purchased, and to maintain the prescription over the life of refills and follow up. The authors suggest that each type of compliance is important: overall noncompliance rates can be as high as over 75 percent, indicating that a large gulf exists between the utility of a given medication as perceived by the physician and the realized welfare of the patient.

Meltzer summarizes some recent and ongoing work that attempts to address the connection between the methods used in the most common form of medical cost-effectiveness analysis—the use of quality-adjusted life years, or QALYs—and the principles of welfare economics. He addresses two key issues: the measurement of benefits and the measurement of costs, especially future costs. In both cases, applying basic principles of economic analysis provides unique insights into areas of ongoing controversy not apparent from other approaches. For example, by relying on the economic principle of "revealed preference," it is possible to learn about the validity of QALYs as a measure of patient preferences. Similarly, by defining a lifetime utility maximization model and

deriving conditions for constrained maximization, formal models of utility maximization can provide a framework for resolving methodological issues about the inclusion of costs in medical cost-effectiveness analysis.

Berndt, Cutler, Frank, Griliches, Newhouse, and **Triplett** review the conceptual and measurement issues that underlie construction of medical care price indexes in the United States, particularly the medical care consumer price indexes (MCPIs) and the medical-related producer price indexes (MPPIs). The authors outline salient features of the medical care marketplace, including the impact of insurance, moral hazard, principal-agent relationships, technological progress, and organizational changes. The authors also discuss the implications of the failure of transactions data in this market to reveal reliable marginal valuations, and the consequent need to augment traditional transactions data with information based on cost-effectiveness and outcomes studies. They describe procedures currently used by the BLS in constructing MCPIs and MPPIs, including recent revisions. They then consider alternative notions of medical care output pricing that involve the price or cost of an episode of treatment rather than prices of fixed bundles of inputs. They also present features of a proposed new experimental price index—a medical care purchase price index—that is more suitable for evaluation and analyses of medical care cost changes than the current MCPIs and MPPIs.

The medical care component of the consumer price index (CPI) is evolving into a more comprehensive measure of household medical expense price movement in the economy. **Ford** and **Ginsburg** discuss the CPI's use of medical care expenditures, measurement approaches, and other methodological issues to obtain weights and prices. They emphasize the organization of the CPI Medical Care major group in January 1998, when a revised CPI was introduced. They go on to discuss index construction from the basic building blocks to publication. They address what expenditures the CPI considers, and they discuss how expenditure weights changed as a result of the 1998 revision. Additionally, they mention outlet selection and rotation and present information on improvements made during 1995–7. Finally, the authors describe the CPI's treatment of health insurance and present proposals for alternative measurements.

Fixler and **Ginsburg** discuss the BLS's Producer Price Index (PPI) program, which provides indexes for several health-care-related goods and services. First they briefly describe the PPI conceptual framework, focusing on the aggregation of output prices within an industry rather than on consumer or patient welfare. They then explain in detail the three main price indexes (for hospitals, physicians, and pharmaceuticals), and discuss some other health care-related indexes. Their overview includes a description of sampling issues, determination of price and output, monthly repricing, adjustments for changes in quality, and the inclusion of new goods.

Sensenig and **Wilcox** present a preliminary report on a joint project of the Health Care Financing Administration and the Bureau of Economic Analysis to reconcile the health care expenditure estimates in the National Health Accounts with those in the National Income and Product Accounts. The report covers hospital care and physician services. They detail how each agency prepares its estimates of these services and identify the major differences (conceptual or definitional) and their sources—source data, or timing of incorporation of source data. The conceptual differences are the coverage of specific services in the hospital and estimates of physician services, the valuation of expenditures by nonprofit institutions, and the treatment of nonoperating income.

One of the remarkable successes in U.S. health care over the past 30 years has been the striking decline in child injury mortality rates. These rates have declined steadily over time and across causes of death. **Glied** investigates and evaluates alternative explanations for this decline including changes in: children's living circumstances; the professional child injury knowledge base; information imparted to parents; and the regulation of childhood behavior. Using data from the National Mortality Detail Files on the number of child deaths by age, cause, and state in combination with data from the Current Population Survey on the characteristics of children and their families by state, she finds that changes in children's living circumstances explain little, if any, of the change in child health. Further, there is limited evidence that regulatory interventions intended to change behavior have been important. Substantial evidence suggests, however, that changes in the information available to parents about child health have become increasingly important, and that parents' time has become less important in producing good child health.

Cockburn and **Anis** examine the relationship between "quality" and market outcomes for a group of drugs used to treat rheumatoid arthritis. Though this is a widespread and debilitating disease with very substantial impacts on the health of patients and on the economy, the drugs currently available to treat it have limited efficacy and serious side effects. Clinical research conducted since these products were approved has resulted in substantial revisions to the body of scientific information available to physicians. The relative quality of these drugs (as captured by

efficacy and toxicity measurements reported in peer-reviewed clinical trials) has changed markedly over the past 15 years. Yet the authors' analysis of U.S. wholesale prices finds that relative prices are only weakly related to quality. The authors do find a relationship between changes in reported efficacy and toxicity and the evolution of quantity shares in this market, though.

Although the nonprofit sector is responsible for a majority of the production of health care in many countries, little is known about the economic forces contributing to differences in productivity, or so-called cost-effectiveness, between nonprofit and for-profit firms. **Philipson, Lakdawalla,** and **Mullin** analyze the productivity effects of nonprofit production of health care. They argue that firms that choose nonprofit status are as efficient as those that choose for-profit status even though the nonprofits use more inputs per output produced. Furthermore, the authors predict that nonprofits will invest more in cost-reducing and quality-enhancing R and D than for-profits will. Finally, the authors argue that although these productivity differences lead to higher average costs, nonprofit firms will drive out for-profit firms in competitive markets. These predictions are consistent with the finding that non-profit long-term care homes use 23–30 percent more labor inputs than for-profit homes of the same size. In mixed industries, too, nonprofit firms are larger, more R and D intensive, less efficient, but more numerous than for-profits.

Berndt, Busch, and **Frank** construct a new price index for the treatment of major depression. Using results from the published clinical literature and official treatment guideline standards, they first identify therapeutically similar treatment bundles. These bundles then can be linked and weighted to construct price indexes for specific forms of major depression. The CPI and PPI-type medical price indexes that the authors construct: deal with prices of treatment episodes rather than prices of discrete inputs; are based on transaction rather than list prices; take quality changes and expected outcomes into account; and employ current, time-varying expenditure weights in the aggregation computations. The authors find that regardless of which index number procedure they use, the treatment price index for the acute phase of major depression hardly changed from 1991 to 1995, remaining at 1.00 or falling slightly to around 0.97. This index grows considerably less rapidly than the various official PPIs. Thus, the inflation-adjusted price index for the treatment of the acute phase of major depression actually fell between 1991 and 1995. These results imply that given a budget for treatment of depression, more could be accomplished in 1995 than in 1991. The authors' results suggest that at least in the case of acute phase major depression, aggregate spending increases are attributable to provision of a larger number of effective treatments.

Shapiro, Shapiro, and **Wilcox** note that the surgical technique for extracting cataracts has changed substantially over the last 50 years. These changes in technique have led to a large increase in the rate of cataract extraction and have reduced the thresholds of visual impairment of patients having cataract surgery. The authors document these trends and analyze how they affect price measurement. Since the improved techniques for cataract surgery consume substantially fewer resources per operation, current procedures for price measurement when they are applied to cataract surgery must substantially overstate the rate of price increase. The authors discuss how to adjust the price of cataract extraction for quality, taking into account the durability of the benefits. They also emphasize the importance of accounting for the changing timing of cataract extraction in the course of the disease when demand for surgery increases as outcomes improve and patient burden falls.

Twenty-First Annual International Seminar on Macroeconomics

The NBER held the 21st Annual International Seminar on Macroeconomics (ISOM) in Lisbon on June 14 and 15, with joint sponsorship of the Bank of Portugal. Kenneth S. Rogoff of the NBER and Princeton University and Charles Wyplosz of Geneva's Graduate Institute of International Studies were the conference organizers. Andrew K. Rose of NBER and the University of California, Berkeley, and Charles Wyplosz serve as ISOM co-chairs. This meeting included the following presentations:

Stefan Gerlach, Bank for International Settlements, Basle, "Who Targets Inflation?"

Discussants: Vitor Gaspar, Bank of Portugal, and Nouriel Roubini, NBER and New York University

Andrés Velasco, NBER and New York University, and **Vicenzo Guzzo,** New York University, "The Case for a Populist Central Banker"

Discussants: Hans-Peter Grüner, University of Bonn, and Carl Walsh, University of California, Santa Cruz

Lucrezia Reichlin, ECARE, Brussels, and **Marco Forni,** Dipartimento di Economia Politica, Modena, "How Risk Averse Are Policymakers in Europe?"

Discussants: Franck Portier, CEPREMAP, Paris, and Mark W. Watson, NBER and Princeton University

Nouriel Roubini; Giancarlo Corsetti, Universita di Roma; and **Paolo A. Pesenti,** NBER and Princeton University, "Currency Crisis and Contagion in Asia"

Discussants: Andrew Scott, London School of Business, and Jaume Ventura, MIT

Andrew Scott; and **Harald Uhlig,** Tilburg University, "Fickle International Investors: An Impediment to Growth?"

Discussants: Michele Boldrin, Universidad Carlos III, Madrid, and Andrew K. Rose

Philip R. Lane, Trinity College, Dublin, "International Investment Positions: An Empirical Investigation"

Discussants: Paolo A. Pesenti, and Phillippe Bacchetta, Studienzentrum Gerzensee

Pierre-Olivier Gourinchas, Stanford University, "The Reallocation Effect of Exchange Rate Turbulence: Evidence from the United States, France, and the OECD"

Discussants: Robert J. Gordon, NBER and Northwestern University, and Ilian Mihov, INSEAD

Shang-Jin Wei, NBER and Harvard University, "Currency Hedging and Goods Trade"

Discussants: Giancarlo Corsetti and Lucrezia Reichlin

A number of countries recently have adopted inflation targeting (IT) as a monetary policy framework. **Gerlach** asks what factors may have led them to do so. He demonstrates that the commodity concentration and the composition of exports (which are correlated with measures of the importance of supply and external shocks) and the degree of central bank independence predict the choice of IT. Moreover, there is some weak evidence that countries with IT regimes tend to be somewhat less open than economies with other policy frameworks. Finally, Gerlach discusses the relationship among large shocks, excess inflation, and the choice of IT is discussed using a simple model in which policymakers are "recession averse."

Velasco and **Guzzo** study the joint effects of centralization of wage setting and central bank independence on economic performance. They find that in relatively centralized labor markets, employment and output are decreasing, and inflation is initially increasing and then decreasing with the degree of central bank independence. A radical-populist central banker who does not care at all about inflation (or, alternatively, who is not independent) maximizes social welfare, they conclude.

Reichlin and **Forni** measure insurable potential income risk for European countries and then compare their results with comparable measures for the United States. They also estimate the effect on output volatility of a European income tax. Finally, they distinguish between the insurance and redistribution effects of a fiscal federation. They show that potential income risk in Europe is about 40 percent. Further, an average income tax of 10 percent will smooth about 10 percent of income volatility on average. However, the redistribution effects are likely to be large, indicating that political opposition to the institution of a European fiscal federation can be expected.

Roubini, Corsetti, and **Pesenti** provide a preliminary assessment of the origins and causes of the 1997–8 Asian crisis. Their empirical analysis is cast within a theoretical framework that illustrates the links between policy inconsistencies and financial crises. They focus on the effects of government bailout guarantees on overinvestment, foreign debt accumulation, and current account deficits under a fixed exchange rate regime. They find that the fundamentals in the region have significant weaknesses. This interpretation of the Asian collapse suggests that structural factors caused a progressive and steady deterioration of economic

conditions in the crisis countries.

Events in South East Asia have once more focused attention on the merits of capital account liberalization for emerging economies. The speed with which large capital inflows become large capital outflows, and the subsequent dramatic declines in asset prices and exchange rates, and the negative real output implications, have led many to argue the need for some form of capital controls to limit the impact of fickle international investors. However, while the advantages of free capital inflows are well understood theoretically, this is not the case for understanding the adverse influence of fickle investors. **Scott** and **Uhlig** outline some channels through which fickle international investors have negative real implications which may offset the better documented positive implications of capital account liberalization. They outline two growth models; the first focuses on a trade off arising from capital inflows. At the heart of the model is a decision by agents of whether to become an entrepreneur—the higher the proportion of entrepreneurs in the economy, the higher the growth rate. Increases in capital inflows have two effects on growth: by boosting share prices they encourage entrepreneurial activity, but by increasing the volatility of share prices they have the opposite effect. In the second model, projects are also financed by capital inflows and the more projects are financed, the higher the growth rate. Assuming increasing returns to scale, there may be a low growth equilibrium with no scope for fickle investors and a high growth equilibrium which is consistent with fickle capital flows.

Lane explores some empirical properties of gross international investment positions. In a cross-section of countries, the more open countries with larger domestic financial markets tend to hold greater quantities of foreign assets and liabilities. In order to provide asset diversification, the rate of return on foreign assets should move procyclically, and the rate of return on foreign liabilities should move countercyclically. In both time-series and panel settings, these hypotheses are rejected, suggesting that gross international investment positions are not driven by risksharing considerations.

Gourinchas evaluates the impact of real exchange rate fluctuations on factor reallocation. In his model, movements in real exchange rates affect the relative profitability of each sector, as well as the pattern of entry and exit. The model predicts that entry and exit decisions are "bunched" at the peak of the appreciation episode, as less productive firms are cleansed and newcomers adopt more efficient technologies. Then, using firm-level data on gross job flows, he investigates the pattern of job creation and destruction in response to real exchange rate movements in France from 1984–92. Traded sector firms appear very responsive to real exchange rate movements in ways that are mostly consistent with his model.

One puzzle in empirical international finance is the difficulty in finding a large and negative effect of exchange rate volatility on international trade. A common explanation for this is the availability of hedging instruments. **Wei** examines the validity of this explanation using data on over 1,000 country pairs. There is no evidence in the data to support the validity of the hedging hypothesis. For country pairs with large trade potential, exchange rate volatility deters goods trade to a larger extent than what is typically documented in the literature.

These papers will be published in a forthcoming special edition of the *European Economic Review*.

NBER Organizes Meeting in Beijing

The NBER held the first of what is expected to be a series of annual meetings, organized jointly by the NBER and the China Center for Economic Research (CCER) at Peking University in Beijing on June 21–3. NBER President Martin S. Feldstein, also of Harvard University, and Wen Hai of the CCER were the co-organizers. The following topics were discussed:

Justin Lin, CCER, "Introduction to China's Economic Reforms and Development over the Past 20 Years"

Wen Hai, "China's International Trade"

Robert C. Feenstra, NBER and University of California, Davis, "One Country, Two Systems: Implications of WTO Entry for China"

Weiying Zhang, PKU, "State-Owned Enterprise Reform and Corporate Governance"

Aaron Tornell, NBER and Harvard University, "State-Owned Enterprises and Privatization"

Xingdong Chen, BNP Prime Peregrine Securities, Ltd., "Financial Reforms in China: The Legal Framework"

Raghuram Rajan, NBER and University of Chicago, "Financial Reforms"

Yaohui Zha and **James Wen,** CCER, "Social Security and Pensions in Rural China"

David A. Wise, NBER and Harvard University, "Social Security and Pensions"

The meeting drew on NBER researchers in Corporate Finance, Public Economics, Aging, and International Trade and Investment. Other NBER participants were: **Lee Branstetter,** University of California,

Davis; **Olivia Mitchell,** University of Pennsylvania; **John Shoven,** Stanford University; and **Shang-Jin Wei,** Harvard University. The NBER-CCER conference joins a series of regular NBER international meetings, including the European International Seminars on Macroeconomics, the Latin American Inter-American Seminar on Economics, the Trans-Atlantic Public Economics Seminar, the ISIT, and the EASE.

1998 Franco-American Seminar

Nearly 80 economists from eight countries met in Nice on June 22–3 for the NBER's Eleventh Annual Franco-American Seminar on "Information and Communications Technologies, Employment and Earnings". This year's seminar was co-sponsored by the Conseil Supérieur de L'emploi, des revenus et des coûts (CSERC—Higher Council for Employment, Income, and Costs) in Paris, and by the European network on the Econometrics of Innovation and Productivity. The meeting was organized by Nathalie Greenan, Centre d'Etudes de L'Emploi; Yannick L'Horty, CSERC, and Jacques Mairesse, NBER and CREST. Michel Dollé, CSERC, Jean-Luc Gaffard, University of Nice-Sophia Antipolis, Michel Gollac, Centre d'Etudes de l'Emploi, and Jean-Pierre Laffargue, University Paris I and Cepremap, were also part of the scientific committee.

The contributors were asked to summarize their past research in the field and present their reflections on the productivity paradox, the technological bias, or the policy implications of the diffusion of information and communication technologies. The following papers were presented and discussed during the three plenary sessions (about twenty papers were also presented in parallel sessions):

Jack Triplett, Brookings Institution, "The Mismeasurement Hypothesis and the Productivity Slowdown"

Erik Brynjolfsson, MIT, "Do the Effects of Information and Communications Technologies on the Organization of Firms and Market Structures Allow Us to Explain the Productivity Paradox?"

Vincenzo Spiezia, ILO, and **Marco Vivarelli,** Catholic University of Piacenza, "What Do We Know About the Effects of Information and Communications Technologies on Employment Levels?"

Lucy Chennels and **John Van Reenen,** Institute For Fiscal Studies, "Technical Change and the Structure of Employment and Wages: A Survey of the Micro-Econometric Evidence"

Kathryn Shaw, NBER and Carnegie-Mellon University, "HRM Practices, Knowledge Capital and the Changing Access to 'Good' Jobs: An Essay on the Sources of Rising Income Inequality"

Henri Sneessens, Catholic University of Louvain, "Technological Bias And Unemployment: A Macroeconomic Perspective"

Timothy F. Bresnahan, NBER and Stanford University, "Computerization and Labor Demand: Agenda for Testing and Forecast for the Future"

Michel Catinat, European Commission, "The Emergence of the Information Society and Employment, Training and Manpower Management Policies"

Does the productivity paradox merely amount to problems of statistical measurement? **Triplett** examines the mismeasurement hypothesis, suggesting that some or all of the measured productivity slowdown is explained by increased mismeasurement of output since 1973. He notes that this hypothesis requires that mismeasurement be worse after the productivity slowdown than before; that is, that price indexes be more biased upward and output measures more biased downward. Then, he reviews some explanations for the Solow computer productivity paradox, stressing the fact that computer equipment and computer services still make up a very small share of the capital stock and of the flow of total capital services to production. He also examines the "new economy view" of innovation and technical change and its implications for the slowdown. In this view, we are inundated by an unprecedented flow of innovations and new products, none of which is reflected in the productivity numbers. For these innovations to improve productivity growth, they must increase at an increasing rate. Triplett suggests that the empirical work in economic history that would confirm the increasing rate hypothesis has not been carried out. Until it is, the mismeasurement hypothesis must be evaluated by examining information about the bias in economic statistics. Finally, he reviews what is known about measurement bias in U.S. statistics, pre- and post-1973.

Even if new technologies pose important problems of statistical measurement, the origin of the productivity paradox is likely to be mainly an economic one. While initial investments in computers were directed primarily at automation of repetitive, labor intensive tasks, information and communication technology (ICT) investments today are directed disproportionately toward enabling new ways of delivering value to customers through new ways of organizing work internally as well as new approaches to interacting with customers and suppliers. **Brynjolfsson**

argues that ICT improves productivity by enabling complementary organizational innovations. Considering numerous case studies, exploring large sample statistical evidence, and examining studies that provide direct measurement of organizational complements, he concludes that, while there are strengths and weaknesses in all these individual studies, collectively they paint a very compelling picture in which organizational complements play a critical role in enhancing ICT productivity.

What do we know about the effects of information and communications technologies on employment levels? Embodied ICT process innovation seems to play an important role in determining the long-run decline in industrial employment. But **Spiezia** and **Vivarelli** focus on different indirect effects that can counterbalance that labor-saving bias. They examine positive short-run relationships between employment and growth in a number of countries in order to investigate the possible occurrence of "jobless growth" in manufacturing. The results presented in this study confirm this relationship, even though important differences emerge in the relative magnitudes of the output elasticities of employment. To explain such differences, the authors examine their possible relationship to the underlying differences in labor market conditions, wage rates, and embodied and disembodied technical progress.

Another of the major modifications caused by the spread of information and communications technologies concerns the structure of employment and disparities in wages. There is a growing concern in advanced countries that the position of less skilled workers has deteriorated either in their ability to secure jobs or their ability to earn a decent wage. Some have linked this decline to modern computing technologies. **Chennels** and **Van Reenen** survey the evidence on the effects of technical change on skills, wages, and employment by examining the microeconometric evidence at the industry, firm, plant, and individual levels. They focus on studies that use direct measures of technology rather than associating technology with an estimated time trend. After discussing methodological problems relating to endogeneity, fixed effects, and measurement, they show that there is a strong effect of technology on skills in the cross section which appears reasonably robust to various econometric problems. They also conclude that there is a strong effect on wages in the cross section, which is not robust to endogeneity and fixed effects. Finally, there is not a clear relationship between employment growth and technology.

By what means do information and communications technologies affect employment patterns and wages? **Shaw** mainly examines the employment effects. In her analysis, ICT can have either a positive or a negative skill-bias in labor demand, but the net effect is that ICT raises the demand for skilled workers relative to the demand for less-skilled workers. She uses the steel industry as an example of an industry that is undergoing considerable economic change, and one that has experienced important changes in its labor force skill composition, new organizational practices, and increasing computerization. Overall, the combined effects of ICT use and innovative human resource management (HRM) practices contribute jointly to the increasing skill-bias, requiring, on average, more advanced cognitive skills, communications skills, negotiations skills, and interpersonal skills. On balance, the data suggest that there has been an increase in employment of the more highly skilled as a result of ICT. If ICT increases the performance of all firms, it raises output and can raise the level of employment of the less-skilled as well as the skilled (the scale effect). However, there are many changes in employment demand that are not influenced by ICT; thus it is difficult to isolate the actual ICT effects.

Bresnahan narrows the focus to business information systems in organizations, namely organizational computing, and tells how computerization changes the demand for labor. The first element comes from limited substitution. Many of the tasks that clerks once performed by handling paper have been automated by computers, even if the computer rarely literally replaces the clerk (for example, the computer cannot call the customer to find out why the payment is late). While the demand for people with modest cognitive skills has declined, the demand for people with good attitudes, good communication skills, and so on—at all levels of education—has flourished. There is also a complementarity between computers and analytical management that has raised the demand for highly educated labor. The demand for cognitive skills is shifted downward for those who have modest skills and upward for those who have more training and education. The point is that existing empirical work is not detailed enough to address this theory. For example, measurement frames (firm, establishment, industry) fail to capture the fact that high-wage or low-wage workers may be shifted out of an industry into a new, specialized service that supplies an industry.

From a macroeconomic perspective, technological bias is only one explanation for the downward trend in the employment of relatively unskilled workers in Europe and the increase in disparities in wage levels on the other side of the Atlantic. To go further, we need an understanding of both "macroeconomic" and "structural" effects. **Sneessens** proposes a general and simple theoretical framework in which observed changes in the difference or the relative value of the low- and high-skilled unemployment rates may result from both macroeconomic and structural shocks. Macroeconomic

shocks have the same direct impact on skilled and unskilled workers, but structural shocks do not. Indirect effects of macroeconomic shocks may be asymmetric and change the dispersion of both unemployment and wage rates. On the other hand, assymmetric shocks can have some symmetric effects via, for example, endogenous changes in the labor force composition. In this case too, the (mis)measurement issue limits our ability to evaluate correctly the link between biased technological progress and aggregate unemployment.

For **Catinat,** economic analysis and empirical evidence reinforce each other to demonstrate the positive correlation between the spread of ICT and job creation. An information society has the potential to create many jobs, as is the case in the United States today. The qualitative effects of ICT on business organization and on working practices, however, are the main issue at stake. In order to be understood, most of the new opportunities require the firm's production organization to adapt, and life-long training practices to be introduced. Firms have the primary responsibility for such changes and for implementing new types of organization to strengthen their competitiveness and develop new activities. Public authorities also have key roles to play in reforming the framework of their employment policies.

Ninth Annual East Asian Seminar on Economics

The NBER, in cooperation with the Chung-Hua Institution for Economic Research, Hong Kong University of Science and Technology, Korea Development Institute (KDI), National University of Singapore, and the Tokyo Center for Economic Research, held its Ninth Annual East Asian Seminar on June 25–7 in Osaka, Japan. Takatoshi Ito, of NBER and Hitotsubashi University, and Anne O. Krueger, of NBER and Stanford University, organized the conference which focused on the role of foreign direct investment in economic development. The program was:

René Belderbos, Maastricht University; **Giovanni Capannelli,** Bank of Italy; and **Kyoji Fukao,** Hitotsubashi University, "Local Procurement by Japanese Electronics Firms in Asia"

Discussants: Toshihiko Hayashi, Osaka University, and Lee G. Branstetter, NBER and University of California, Davis

Shujiro Urata, Waseda University, and **Hiroki Kawai,** Keio University, "Foreign Direct Investment and International Technology Transfer in East Asia: The Case of Japanese Manufacturing Firms"

Discussants: Eiji Ogawa, Hitotsubashi University, and Hong-Tack Chun, KDI

Fukunari Kimura, Keio University, "Location and Internalization Decisions: Sector Switching in Japanese Outward Foreign Direct Investment"

Discussants: Eiji Ogawa and Ng Hock Guan, National University of Singapore

Lee G. Branstetter, "Is Foreign Direct Investment a Channel of R&D Spillovers? Evidence From Japan's FDI in the United States"

Discussants: Akiko Tamura, Hosei University, and Mariko Sakakibara, University of California, Los Angeles

Robert E. Lipsey, NBER and Queens College, "U.S. and Japanese Multinationals in Southeast Asian Production and Trade"

Discussants: Hong-Tack Chun, and Yuzo Honda, Osaka University

Kenzo Abe, Osaka University, and **Laixun Zhao,** Niigata University, "International Joint Ventures, Economic Integration, and Government Policy"

Discussants: Shin-Ichi Fukuda, University of Tokyo, and Mahani Zainal-Abidin, University of Malaysia

Leonard K. Cheng and **Yum K. Kwan,** Hong Kong University of Science and Technology, "What Are the Determinants of the Location of Foreign Direct Investment? The Chinese Experience"

Discussants: Yumiko Okamoto, Kobe University, and Shang-Jin Wei, NBER and Harvard University

Shang-Jin Wei, "Why Does China Attract So Little Foreign Direct Investment?"

Discussants: Mari Pangestu, Centre for Strategic and International Studies, and Akira Kohsaka, Osaka University

June-Dong Kim and **Sang-In Hwang,** Korea Institute for International Economic Policy, "The Productivity Effects of Foreign Direct Investment Into Korea"

Discussants: Hong-Tack Chun, and Yur Nagataki Sasaki, Takachiho University

Seungjin Kim, KDI, "Effects of Outward Foreign Direct Investment on Home Country Performance: Evidence From Korea"

Discussants: Mariko Sakakibara, and Chong-Hyun Nam, Korea University

Tain-Jy Chen, National Taiwan University, and **Ying-Hua Ku,** Chung-Hua Institution for Economic Research, "Foreign Direct Investment and Industrial Restructuring: The Case of Taiwan's Textile Industry"

Discussants: Yum K. Kwan, and Munehisa Kasuya, Kobe University

Vei-Lin Chan, Academia Sinica, "Economic Growth and Foreign Direct Investment in Taiwan's Manufacturing Industries"

Discussants: Mari Pangestu, and Masatsugu Tsuji, Osaka University

(Continued on next page)

Belderbos, Capannelli, and **Fukao** examine the determinants of one important aspect of embeddedness of foreign firms in local economies: the degree to which foreign-owned subsidiaries have established vertical linkages, as measured by the local content of manufacturing operations (local value-added and procurement of inputs from local suppliers). Using a dataset of 157 Asian subsidiaries of Japanese multinationals in the electronics industry, they find that greenfield subsidiaries and subsidiaries of R and D-intensive parents have lower local content ratios than other subsidiaries. Subsidiaries of parent companies that belong to a vertical *keiretsu* with strong intra-*keiretsu* supplier relationships also have a higher local content, in particular in ASEAN countries. Membership in a vertical *keiretsu* facilitates the achievement of higher local content through coordinated investments by the assembler and related suppliers.

Urata and **Kawai** find that technologies can be absorbed in direct relation to the educational level and experience in industrial activities of workers in host countries. To absorb technologies from foreign firms, there must be either intrafirm technology transfer (from Japanese parent firms to foreign affiliates) or technology spillovers (from foreign affiliates of Japanese firms to local firms). But the authors find that technology transfer takes time and experience. This result indicates the importance of providing a stable economic environment in which foreign firms can maintain their operations. Further, the authors find that high equity participation by parent firms in their overseas affiliates tends to promote intrafirm technology transfer but to discourage technology spillover.

Kimura concentrates on the sector switching of Japanese parent firms and foreign affiliates between manufacturing and nonmanufacturing activities, using microdata from the Japanese Ministry of International Trade and Industry (MITI)'s *Basic Survey of Business Structure and Activity.* Parent firms and affiliates are often in different industries, and multinational enterprises obviously choose internalization and location in a strategic manner. Large manufacturing parent firms tend to have both manufacturing and nonmanufacturing affiliates, the latter of which are located mainly in North America and Western Europe. Small manufacturing parent firms and firms with fewer affiliates are likely to concentrate on production activities at their affiliates, particularly in East Asia. About half of nonmanufacturing parent firms, both large and small, have at least one manufacturing affiliate located mainly in East Asia. Large nonmanufacturing parent firms, mostly general trading companies, have extensive networks of production and wholesale trade activities covering the world.

Recently much empirical work has attempted to measure the extent to which international trade fosters international spillovers of R and D. **Branstetter** uses a modified version of the econometric framework developed by Jaffe (1986) to measure international R and D spillovers at the firm level for a panel of 208 Japanese firms. He directly tests the hypothesis that firms with substantial stocks of foreign direct investment (FDI) in the United States are able to make better use of such R and D spillovers in their own innovative activity. He finds that FDI does increase the impact of R and D spillovers from the United States, but that the measured effect, though robust, is quite small.

After 1977, and in some countries starting before that, most Southeast Asian countries' export patterns in manufacturing changed from industry distributions typical of developing countries to distributions more like those of advanced countries. **Lipsey** describes how the process of change in most cases started with inward FDI to produce for export in new industries, particularly by U.S. firms in electronics and computer-related machinery. In electrical machinery Japanese multinationals followed U.S. firms. Over time, in most cases, the U.S.-owned affiliates turned more to sales in the host country markets, and their share in host country exports declined, although the host countries' specialization in the new industries continued. U.S. and Japanese firms played somewhat different roles. Investments of U.S. firms were distributed more along the lines of U.S. export comparative advantage. The distribution of Japanese investments more closely followed the direction of the host countries' comparative advantage and were less export-oriented than U.S. investments. However, Japanese investment now has become more like U.S. investment in both export orientation and industry composition.

Abe and **Zhao** model economic integration and trade policy in the presence of an international joint venture in a developing country. They show that economic integration in the form of custom unions may reduce the welfare of the developing country. However, the developing country can offset the welfare loss by introducing production subsidies. A mutually beneficial policy to both the developing and developed countries is a subsidy to the joint venture, which in practice is adopted by many developing countries to attract foreign investment.

Cheng and **Kwan** estimate the effect of a number of potential determinants of the location of FDI using data for 29 Chinese regions from 1986–95. Their model emphasizes a distinction between the agglomeration effect (that is, new FDI is attracted by the stock of past FDI) and the comparative statics effect of these

potential determinants. Their results show that both national and regional markets attract FDI, but wage cost has a negative effect on FDI. In addition, there is a strong agglomeration effect. By comparing the equilibrium and actual stocks of FDI in 1985 with those in 1995, the authors find that there was no absolute convergence in the regions' equilibrium stocks of FDI, but there was relative convergence in the deviation of actual from equilibrium FDI.

Wei explains how the absolute values of FDI into China in recent years seem very impressive, but they mask an unusual composition of source countries. A significant fraction (about 15 percent) of Hong Kong investment in China may be "round-tripping" mainland capital in disguise. This should be counted as false FDI and deleted from the statistics on FDI into China. The remaining Hong Kong investment in China should be regarded as quasi-FDI: Hong Kong has always been a special extension of China, even under British rule, and legally has been part of China since July 1, 1997. Removing these two sources of FDI would reduce the annual flows of FDI into China in recent years by half, and the stock by 60 percent. Compared with its predicted potential, China is thus a significant underachiever as a host of FDI from major source countries. China's relatively high corruption discourages a significant amount of FDI. Regulatory burden may be another important impediment that discourages investors from the major source countries from investing more in China.

Kim and **Hwang** investigate the productivity effects of FDI into Korea. Using the available annual data, they find that FDI had a significantly positive effect on the productivity of Korean manufacturing subsectors, such as textiles and clothing and electric and electronics, from 1970–96. The authors also examine whether FDI prevents bailout loans in a currency crisis. Using cross-section data from 90 developing countries, they conclude that the incidence of bailout loans from the International Monetary Fund during 1994–7 is negatively associated with the FDI stock relative to total gross domestic product.

Kim examines the characteristics of Korean outward FDI and its effects on the home country. He finds no evidence that Korean outward FDI has adverse effects on home country performance. This lack of adverse impact seems to come as a result of: the low ratio of outward FDI to gross domestic product; the high share of developing countries receiving FDI; simple strategies followed for investment; and increasing overseas financing of FDI.

Chen and **Ku** view FDI as a Schumpeterian innovation whereby an old production structure is dismantled in favor of a new one. By examining firm-level data from Taiwan's textile industry for 1992–5, they find that restructuring was indeed extensive and sweeping. The average textile firm reduced its number of product lines and increased product concentration, and some even switched main products or sectors. Nearly half of sales revenue in 1995 came from product lines introduced since 1992, which is disproportionate to revenue from expansion of existing lines.

Chan investigates the causal relationships of fixed investment, trade share, and FDI to the growth in real gross domestic product (GDP) per capita at the two-digit industry level in Taiwan's manufacturing sector. In general, his results support the causal relationships between investment and trade share. The relative importance of fixed investment, trade share, and FDI in affecting the growth of GDP is quite divergent for individual two-digit industries. In particular, FDI is the only determinant that promotes economic growth in the electric and electronic machinery industry, the leading manufacturing industry in Taiwan over the past two decades.

These papers and their discussions will be published by the University of Chicago Press as Volume 9 of the series, *NBER East-Asian Seminar on Economics*. Its availability will be announced in a future issue of the NBER *Reporter*.

Risk and Distribution Issues in Social Security Reform

During the NBER's 1998 Summer Institute, NBER President Martin S. Feldstein, also of Harvard University, organized a meeting on "Risk and Distribution Issues in Social Security Reform." The August 5 program was:

Jeffrey B. Liebman, NBER and Harvard University, "Redistribution in the Current U.S. Social Security System"

Julia Lynn Coronado, Federal Reserve Board, **Don Fullerton**, NBER and University of Texas at Austin, and **Tom Glass**, University of Texas at Austin, "Distributional Consequences of Proposed Changes to the Social Security System"

Robert J. Shiller, NBER and Yale University, "Social Security and Institutions for Intergenerational, Intragenerational, and International Risk Sharing" (NBER Working Paper No. 6641)

Martin S. Feldstein, and **Elena Ranguelova**, Harvard University, "Individual Risk and Intergenerational Risk Sharing in an Investment-Based Social Security System"

Kent Smetters, Congressional Budget Office and University of Pennsylvania, "Privatizing Versus Prefunding Social Security in a Stochastic Economy"

Andrew B. Abel, NBER and University of Pennsylvania, "The Aggregate Effects of Including Equities in the Social Security Trust Fund"

Coronado, Fullerton, and **Glass** assess the degree to which the current Social Security system redistributes income from rich to poor and estimate the impact of various proposed changes on that redistributive effect. The authors measure redistribution on a lifetime basis using estimated earnings profiles for a sample taken from the Panel Study of Income Dynamics. Their results indicate that the current Social Security system redistributes less than is generally perceived, mainly because people with higher incomes live longer and therefore draw benefits longer. They also find that many of the proposed changes to Social Security have surprisingly little effect on the redistribution inherent in the system.

Social Security's old-age insurance systems are devices for the sharing of income risks of the elderly. **Shiller** describes barriers that exist for individuals sharing their risks intergenerationally (with young people in the same country), intragenerationally (with other elderly in the same country), and internationally (with foreigners). He then considers the optimal design of government-sponsored social security systems in light of these barriers. He concludes that benefits for each retired person may be tied to that person's lifetime income without causing aggregate benefits for all existing elderly to be tied to their past aggregate income, as with the current U.S. benefits formula.

Feldstein and **Ranguelova** explore the risk aspects of a fully phased-in investment-based Social Security system. Workers would make contributions to Personal Retirement Accounts (PRAs) that invest in stocks and bonds and provide a variable annuity upon retirement. Using government demographic and labor market projections, and assuming that the market portfolio follows a random walk with the historic mean and standard deviation, the authors compare the PRA annuities to a "benchmark" benefit: the future benefit promised under the current pay-as-you-go system that would have a financing cost of 18 percent of earnings. They show that with PRA savings of 6 percent of earnings there is only a 14 percent chance that the annuity at age 65 will be less than the benchmark benefit. A government guarantee of benefits at least equal to the benchmark level would eliminate all retiree risk while imposing only a 5 percent chance that workers would have to pay as much as 4 percent of earnings.

It is well known that, without progressivity, privatizing Social Security (that is, moving to a defined-contribution system) and prefunding Social Security's existing defined-benefit structure should lead to an identical reduction in unfunded liabilities within a deterministic economy with perfect capital markets. **Smetters** shows that this equivalence no longer holds in a type of production economy with guaranteed benefits, because the intergenerational risk-sharing properties between the two policies are very different. He predicts that at the current contribution rate, prefunding the existing defined benefit will reduce ex-ante unfunded liabilities by 130 percent. By contrast, he predicts that moving to a privatized system that guarantees a minimum benefit equal to what people would have received under Social Security will reduce ex-ante unfunded liabilities by only 36 percent. This is despite the fact that the expected average benefit in the privatized system is almost a full order of magnitude larger than the minimum benefit. The stark difference between the two policies is robust to a wide range of policy designs, including the transitional mechanism and the guarantee level, as well as realistic contribution rates.

Given the fixed costs of participating in the stock market, high-income consumers will participate, but low-income consumers will not. If a fully funded Social Security system tries to exploit the equality premium by selling a dollar of bonds per capita and buying a dollar of equity per capita, then consumers who do not participate in the stock market should increase their current consumption, thereby reducing saving and capital accumulation. **Abel** finds that this policy—a one dollar per capita shift from bonds to stocks—should reduce the aggregate capital stock substantially, by 50 cents per capita or more.

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Bureau News

New Directors Elected at September Meeting

At their September 28 meeting, the NBER's Board of Directors elected Robert Mednick and David A. Smith as new members. Mednick, who represents the American Institute of Certified Public Accountants, also becomes Treasurer of the corporation, replacing Gerald A. Polansky who passed away earlier this year. Mednick is a retired partner of Arthur Anderson & Co.

Smith, the new representative of the AFL-CIO on the NBER's Board, is director of the AFL-CIO's Public Policy Department. He replaces Rudolph A. Oswald, who was elected a director at large at the September meeting.

Improved NBER Web Site to Offer New Services

The NBER's site on the World Wide Web (www.nber.org) now features "Books in Progress." Thus, readers with electronic access can now see chapters of NBER books in draft form, soon after the conferences at which they were presented take place, and well in advance of their hard-copy publication dates.

In addition, NBER Working Papers are now available in electronic form both individually and by subscription. Individual Working Papers online are $5 each; hard copies are $10 each.

Electronic access to Working Papers will be available without charge to any user at an institution with an "online subscription" and free to individuals in most countries outside of the OECD. Subscriptions to online Working Papers are also free to NBER Corporate Associates. For those who do not subscribe to the hard copy Working Paper series, a full online subscription is $530 for academic libraries and faculty members and $1310 for others. (Subscriptions to the full –paper and online– series will be $1070 and $1850 respectively.) Detailed information and order forms are available at **www.nber.org/subscribe.html.**

1998 Summer Institute: List of Papers

Over 1000 economists from universities and organizations in 20 countries attended the NBER's 20th Annual Summer Institute. This year's program was funded primarily by a grant from the Lynde and Harry Bradley Foundation, with additional support from the National Science Foundation and the National Institute on Aging. The papers presented at dozens of different sessions during the four-week summer institute covered a wide variety of topics. A list of all papers and work in progress can be obtained by writing to: Summer Institute Catalogue, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138-5398. This list is also available on the NBER's web site at **nber.org/summer-institute.**

Rajan is New Director of Corporate Finance Program

NBER Research Associate Raghuram Rajan, whose research summary and profile appear earlier in this issue, is the new director of the NBER's Program on Corporate Finance. The program concentrates on the causes and effects of financing arrangements used by corporations. Professor Rajan is a member of the faculty of the University of Chicago's Graduate School of Business. Rajan succeeds Robert W. Vishny of NBER and the University of Chicago, who has directed the Program since its creation in 1991.

Meeting on Economic Fluctuations and Growth Research

About 120 economists from all over the world—including Canada, Chile, France, Israel, Italy, Japan, Spain, and the United Kingdom—met in Cambridge on July 18 for the summer research meeting of the NBER's Program on Economic Fluctuations and Growth. In addition to academic economists, central bankers from many of the represented countries participated in the day's discussions. Organizers Olivier J. Blanchard of NBER and Harvard University and Thomas J. Sargent of NBER and Stanford University chose the following topics for discussion:

Patrick Kehoe, NBER and Federal Reserve Bank of Minneapolis and **Fabrizio Perri**, University of Pennsylvania, "International Business Cycles With Endogenous Incomplete Markets"

Discussant: Urban Jermann, NBER and University of Pennsylvania

David I. Laibson, NBER and Harvard University; **Andrea Repetto**, Universidad de Chile; and **Jeremy Tobacman**, Harvard University, "Self-Control and Retirement Savings"

Discussant: Lars P. Hansen, NBER and University of Chicago

Jason G. Cummins, New York University; **Kevin A. Hassett**, American Enterprise Institute; and **Stephen D. Oliner**, Federal Reserve Board, "Investment Behavior, Observable Expectations, and Internal Funds"

Discussant: Owen Lamont, NBER and University of Chicago

Susanto Basu, NBER and University of Michigan, and **David N. Weil**, NBER and Brown University, "Appropriate Technology and Growth" (NBER Working Paper No. 5865)

Discussant: Per Krussell, University of Rochester

Harold L. Cole and **Narayana Kocherlakota**, Federal Reserve Bank of Minneapolis, "Efficient Allocations with Hidden Income and Hidden Storage"

Discussant: Fernando Alvarez, University of Pennsylvania

Ricardo J. Caballero, NBER and MIT, and **Mohamad L. Hammour**, Capital Guidance, "Improper Churn: Social Costs and Macroeconomic Consequences"

Discussant: Robert E. Hall, NBER and Stanford University

Earlier research has shown that standard models with complete markets generate cross-country correlations of consumption that are much higher than those in the data and cross-correlations of output and factor inputs that are much lower than those in the data. **Kehoe** and **Perri** introduce a particular type of friction in the international credit market—that international loans are not perfectly enforceable, in that any country can renege on its outstanding debts and suffer the associated penalties on future borrowing—and ask whether it can help to account quantitatively for these anomalies. They find that these types of frictions, in contrast to the exogenous restriction on the asset markets, can go a long way in helping to resolve some of the outstanding anomalies in the data.

Laibson, Repetto, and **Tobacman** calibrate a model that unifies the literature on hyperbolic discounting and on buffer stocks. They show that life-cycle consumption and asset accumulation patterns are consistent with the hyperbolic model. Hyperbolic consumers will react more favorably than exponential consumers to a stylized defined-contribution pension plan. Benchmark simulations (with a coefficient of relative risk aversion of 1 and a measured elasticity of intertemporal substitution between .22 and .27) show that defined-contribution pensions with early withdrawal penalties of 10 percent to 50 percent can raise the steady state net national savings rate in an exponential economy by 53 percent to 91 percent. By contrast, the same instruments raise the steady state net national savings rate in a hyperbolic economy by at least 89 percent up to 127 percent. These results are sensitive to calibration of the coefficient of relative risk aversion.

Cummins, Hassett, and **Oliner** use earnings forecasts from securities

analysts to construct more accurate measures of the fundamentals that affect the expected returns to investment. They find that investment responds significantly—in both economic and statistical terms—to their new measures of fundamentals. With their controls for expected future profits, internal funds are uncorrelated with investment spending, even for selected subsamples of firms—those paying no dividends and those without bond ratings—that have been found to be "liquidity constrained" in previous studies.

Basu and **Weil** model growth and technology transfer in a world where technologies are specific to particular combinations of inputs. Their model does not imply that an improvement in one technique for producing a given good improves all other techniques for producing that good. Technology improvements diffuse slowly across countries, although knowledge spreads instantaneously, and there are no technology adoption costs. This model, with appropriate technology and technology diffusion, provides more realistic predictions for convergence and growth than either the standard neoclassical model or simple endogenous growth models.

Cole and **Kocherlakota** consider an environment in which individuals receive income shocks that are unobservable to others, and individuals can privately store resources. The authors provide a simple characterization of the efficient allocation of resources when the rate of return on storage is sufficiently high or, alternatively, when the worst possible outcome is sufficiently dire. They conclude that the symmetric efficient allocation can be decentralized through a competitive asset market in which individuals trade risk-free bonds among themselves.

Caballero and **Hammour** describe how a "churning" economy functions, and what disruptions are caused by transactional difficulties in labor and financial markets. Their analysis can be anchored with U.S. evidence on gross factor flows and on firm and worker rents on the margins of job creation and destruction. They calculate the average annual social loss associated with structural unemployment and low productivity that results from technological "sclerosis" and a "scrambling" of productivity rankings in entry and exit decisions. They also estimate the cumulative discounted loss of a severe recession. About one-third of this cost is the result of reduced productivity and is determined by the recession's cumulative effect on the economy's churn rate. Although a recessionary shock increases the economy's turbulence at impact, evidence from U.S. manufacturing indicates that, cumulatively, it results in a chill. This is costly in an economy that suffers from sclerosis.

Bureau Books

Frontiers in Health Policy Research, Volume 1

Frontiers in Health Policy Research, Volume 1, edited by NBER Research Associate Alan M. Garber, is the first volume in a new annual series that will present policy-relevant economic research on issues in health care and health policy. Each volume will contain approximately five papers from an annual conference held in the spring in Washington, D.C. Topics to be covered include the implications of health care policy provisions, health care organization and management, health outcomes, health care output and productivity, health-related behavior, health and aging, and health and children. The emphasis will be on less technical papers written primarily for a policy audience. In keeping with the NBER tradition, the papers will present analysis but will not advocate particular policies.

Garber, the volume editor and organizer of the annual conference, is Director of the NBER's Program on Health Care and an Associate Professor of Medicine at Stanford University. The contributors to Volume I are NBER researchers Laurence C. Baker, Alan M. Garber, Thomas E. Macurdy, and Mark B. McClellan, Stanford University; Ernst R. Berndt, MIT; and David M. Cutler and Richard J. Zeckhauser, Harvard University; Louise Sheiner of the Federal Reserve Board of Governors, was a coauthor on one of the included papers.

This volume should appeal not only to academic economists but to anyone interested in health care policy. Its price is $35.00 (cloth), or $15.00 (paperback). It may be ordered directly from the MIT Press at 5 Cambridge Center, Cambridge, MA 02142; or, by phone to (617) 253-2889; or, by email to mit-press-orders@mit.edu. (The MIT Press also has a web site: www.mitpress.mit.edu/journals.tcl).

Frontiers in the Economics of Aging

Frontiers in the Economics of Aging, the seventh in a series of volumes on aging edited by NBER Research Associate David A. Wise, is now available from the University of Chicago Press for $60.00. This volume discusses the implications of the rapid spread of personal retirement saving, various aspects of health care for the elderly, some methodological advances in the study of aging, the taxation of pensions, and related new aspects of income inequality.

This book should appeal to students and researchers in the area of gerontology and health care economics. Wise is a Research Associate in the NBER Programs on Aging, Labor Studies, and Health Care. He is also Director of the Program on Aging and the John F. Stambaugh Professor of Political Economy at the John F. Kennedy School of Government at Harvard University.

This volume may be ordered directly from the University of Chicago Press, Order Department, 11030 South Langley Avenue, Chicago, IL 60628-2215; 1-800-621-2736. Academic discounts of 10 percent for individual volumes and 20 percent for standing orders for *all* NBER books published by the University of Chicago Press are available to university faculty; orders must be sent on university stationery.

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"NBER Books, 1921–96," a catalog, is now available on-line at the NBER's web site (HTTP://www.nber.org). If you would prefer a hard copy, please request it by writing to: Book Catalog, Publications Department, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138-5398.