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Program Report

Development of the American Economy

Claudia Goldin*

The NBER's Program on the Development of the American Economy (DAE) investigates long-run economic development and growth, with specific attention to the United States. The DAE's broad mandate means that its members work on subjects studied in all the other NBER programs combined, for example public finance, health, aging, trade, and productivity. The research of DAE members spans the full three centuries of American economic history and, for those studying comparative economic history, the temporal bounds are even wider.

Given DAE's breadth of subject matter and time periods, this report must highlight only a few areas that have engaged DAE members during the past two years. Some involve government and the economy, whereas others are related to health, nutrition, and mortality. The report ends with research on the history of the NBER and information about the NBER's historical archives.

Government and the Economy

The Impact of New Deal Spending

Was New Deal spending consistent with Roosevelt's promise of the "3 R's: Relief, Recovery, and Reform"? The answer, according to Price V. Fishback, Shawn Kantor, William C. Horace, and associates, is that some projects were highly successful whereas others were not.¹

Their reevaluation of the economic impact of the New Deal points to the importance of examining separate programs rather than aggregate spending. Expenditures on large-scale public works, including dams, roads, and major sanitation projects, were strong stimuli for local economies. An additional dollar of spending per capita on such projects raised per capita income by roughly two dollars and, not surprisingly, stimulated in-migration. Relief spending produced somewhat smaller income multipliers, contributed to increased home-ownership rates, and helped reduce infant mortality rates.² Not surprisingly, relief spending bore little relation to in-migration because of the residency requirements established by local relief administrators. Spending on crop reduction

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NBER Reporter

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through the Agricultural Adjustment Act (AAA) benefited large landowners at the expense of farm workers, had no positive effect on retail sales, and was associated with extensive out-migration.

What of the geographic distribution of New Deal funds? Were funds doled out to states and districts that would assure and solidify the Democratic majority in Congress? In a program-by-program analysis at the county level, Fishback, Kantor, and John Wallis find that although relief programs were consistent with the Roosevelt administration's high-minded motives, other programs disproportionately distributed money to high-income districts.³ In all cases though, the authors find that, at the margin, funds were used for presidential politicking. Roosevelt's re-election success in 1936 was based on developing specific programs for a wide range of constituents and delivering on stated goals, while also spending more at the margin for political advantage.

State Constitutions

In May 1776, a decade before the national government took up its constitutional form, the Continental Congress asked the states to write their constitutions. Throughout the nation's history, state constitutions have been written, rewritten, and amended. To date there have been 150 state constitutions, with more than 10,000 amendments. At the center of Wallis's project on state constitutions is the construction of an accurate, comprehensive record of these documents from 1776 to the present.

State constitutions provide an unrivaled source of historical information on state governments and state economies since the inception of the nation. The first state constitutions, for example, said nothing about how private corporations would be created. But by the 1830s it was clear that the creation of corporations on a case-by-case basis was time consuming and encouraged the creation of special privileges. Beginning in the 1840s, the relevant limits and possibilities of the corporate form were determined by the states and the framework for corporate regulation was laid out in state constitutions.

With a state constitution database one could track how corporation policy, state taxation and finance limitations, suffrage, banking regulations, resource use, and education policy, for example, differed across states and changed over time. Wallis began such a project and it is now more than halfway complete. A project web site ("States Constitutions Project" under

www.nber.org/data) enables researchers to access complete versions of state constitutions, to search and download constitutional text by article and section, and to search complete constitutional texts and amendments by keyword. Constitutional histories are now available for 12 states (that number that should rise to over 20 this summer) and full texts can be accessed for all nineteenth century constitutions. At the conclusion of the project, Wallis plans to provide a full index of all articles and sections of every state constitution.

Corruption and Reform

Edward L. Glaeser (a member of the NBER's Labor Studies Program) and I have launched a new DAE initiative on the roots of reform in America. The initiative is motivated by current concern with corruption in transition and developing economies. Corruption was rampant in late nineteenth century America and in 1900 most Americans were inured to political graft. Yet by 1940 Americans had cleaned up the most flagrant abuses of political power, even if some still remain. The question is how this turnaround was accomplished. A pre-conference on "Corruption and Reform" was held July 14, 2002 and was attended by economists, historians, and political scientists who discussed presentations by Glaeser on the regulatory state, William Novak (University of Chicago Law School) on progressivism, and DAE Program member Lee Alston on corruption in history and economic development.⁴

Health, Mortality, and Nutrition over the Long Run

DAE researchers have been piecing together the reasons for the long-run decline in mortality in the United States and their results have implications for future changes in life expectancy.

According to Haines, an urban existence in nineteenth and early twentieth century America was far less

healthy than one in the countryside.⁵ The increased urbanization that accompanied economic growth therefore meant a lower mean life expectancy in the nation as a whole. But by 1940 the tide had turned, largely because of urban public works and greater scientific knowledge about disease. With the elimination of the urban mortality penalty, city growth could proceed without the more serious tradeoffs of the past. In the nineteenth century, even within the healthier rural communities, "wealthier meant healthier," according to research by Joseph Ferrie.⁶ The ensuing urbanization of America, therefore, served to worsen already existing mortality differences by socioeconomic status.

Dora L. Costa's research has focused on adult mortality risks stemming from various conditions experienced early in an individual's life, including urban residence, infectious disease, abdominal fat, weight especially at birth, and stature.⁷ According to Costa, urban residence at young ages increased the mortality risks experienced by former Union Army soldiers later in their lives. Similarly, greater amounts of abdominal fat and various infectious diseases suffered in young adulthood increased the risk of mortality as adults. American men have increased in stature and bulk since the early twentieth century, but have less abdominal fat now than in the past (hard to believe, but true). These changes, reports Costa, can explain about three-fifths of the decline in white male mortality between 1915 and 1988. Costa's analysis predicts major further declines in older age mortality as those who experienced less infectious disease early in their lives and who are taller and heavier (but without excessive abdominal fat) reach their senior years.

Richard H. Steckel's research has extended our knowledge of health and nutrition back to the early Middle Ages.⁸ Using data from both skeletal remains and military records, Steckel finds that from around the fourteenth to the eighteenth centuries the average height of Europeans decreased by about 7.6 centimeters or approximate-

ly twice the reduction accompanying industrialization. Many factors were responsible for this deterioration, including increased trade and European colonization, both of which spread disease. But the increase in heights after the eighteenth century was also the result of trade that increased food sources in Europe. Globalization, in the past and present, has had mixed consequences.

NBER History and the NBER Historical Archives

The NBER was founded in 1920 as a "private, non-profit research organization ... devoted to objective quantitative analysis of the American economy." The idea for the NBER arose out of progressive era debates in the New York State legislature. Those in favor of the minimum wage were pitted against those who were opposed to the legislation. During the hearings of the New York State Factory Investigating Committee in 1915 it became clear to Malcolm C. Rorty, who opposed minimum wage legislation, and Nahum I. Stone, who supported it, that neither had the requisite and objective data with which to formulate policy. Rorty and Stone joined forces and raised funds to support a new organization. The organization was christened the National Bureau of Economic Research and Wesley C. Mitchell of Columbia University became its first Director of Research.

The early history of the NBER has been recounted in an engaging and informative essay by Solomon Fabricant.⁹ Portions of NBER history are included in autobiographies, such as those by Milton and Rose Friedman and Lucy Sprague Mitchell, and in various NBER volumes.¹⁰ Robert Fogel's recent essay on Simon Kuznets extends this history and concerns the life's work of one of the most important researchers in the history of the NBER.¹¹

Kuznets made numerous contributions to economics, many of which were developed when he worked at the NBER in New York City. His work on

national income accounting was, perhaps, his most important project. It was also timely. As the nation fell into its deepest depression after 1929, no one was certain how much national income had declined. The federal government lacked the machinery to produce national income statistics and, moreover, Kuznets had recently developed much of the analytical framework. In 1932, after the U.S. Senate mandated that the Department of Commerce construct estimates of national income, the federal government "borrowed" Kuznets from the NBER for two years to help formulate its system of national accounts. A decade later, at the start of U.S. involvement in World War II, Kuznets was instrumental in helping the federal government set war production targets. Kuznets was, according to Fogel, "a pivotal figure in the transformation of economics from a speculative and ideologically-riven discipline into an empirically based social science." Fogel's essay discusses the income accounting project as well as Kuznets's work on economic growth, population, and distribution, some of which he produced during his tenure at the NBER.

Robert Gallman was a graduate student of Kuznets at the University of Pennsylvania in the early 1950s and it was then that Gallman began his lifelong work on the U.S. capital stock and national income. Gallman's work on the capital stock and national income extended Kuznets's series back to 1839 and made important refinements to the existing data. Much of his work on these subjects is included in various NBER conference volumes, but he never lived to publish a book containing his latest estimates and interpretations of them.¹² Robert Gallman died at age 72 in November 1998. The DAE lost a warm, compassionate friend and the NBER lost a great researcher whose work was central to the NBER's founding mission. Gallman left an unfinished manuscript, numerous notes, and an important "underground" annual series of national income statistics. Paul W. Rhode has agreed to assemble these materials in a book-length volume, and

the first installment is a paper setting forth the "underground" series, "Gallman's Annual Output Series for the United States, 1834-1909."¹³ We are indebted to Paul Rhode for ensuring that we can all learn from the wisdom of a perfectionist's labors.

Much of the NBER's history is yet to be written. To aid future researchers and to preserve the history of the NBER, I have begun an oral (videotaped) history of researchers who worked at the NBER at some time from the 1940s to the 1960s. The videotapes, NBER Annual Reports, financial reports, the occasional papers, and all NBER books and conference volumes are stored at the Cambridge offices of the NBER in its historical archives and await researchers who want to recount the glorious history of the NBER.

¹ P. V. Fishback, W. C. Horraine, and S. Kantor, "Do Federal Programs Affect Internal Migration? The Impact of New Deal Expenditures on Mobility During the Great Depression," NBER Working Paper No. 8283, May 2001; and "The Impact of New Deal Expenditures on Local Economic Activity: An Examination of Retail Sales, 1929-1939," NBER Working Paper No. 8108, February 2001.

² P. V. Fishback, M. Haines, and S. Kantor, "Welfare of Children during the Great Depression," NBER Working Paper No. 8902, April 2002.

³ P. V. Fishback, S. Kantor, and J. J. Wallis, "Can the New Deal's Three R's Be Rehabilitated? A Program-by-Program, County-by-County Analysis," NBER Working Paper No. 8903, April 2002.

⁴ E. L. Glaeser and A. Shleifer, "The Rise of the Regulatory State," NBER Working Paper No. 8650, May 2001.

⁵ M. Haines, "The Urban Mortality Transition in the U.S., 1800-1940," NBER Historical Working Paper No. 134, July 2001.

⁶ J. P. Ferrie, "The Poor and the Dead: Socioeconomic Status and Mortality in the U.S., 1850-1860," NBER Historical Working Paper No. 135, August 2001.

⁷ D. L. Costa, "Understanding Mid-Life and Older Age Mortality Declines: Evidence from Union Army Veterans," NBER Working Paper No. 8000, November 2000; and "The Measure of Man and Older Age Mortality:

Evidence from the Gould Sample," NBER Working Paper No. 8843, March 2002.

⁸ R. H. Steckel, "Health and Nutrition in the Preindustrial Era: Insights from a Millennium of Average Heights in Northern Europe," NBER Working Paper No. 8542, October 2001.

⁹ S. Fabricant, "Toward a Firmer Basis of Economic Policy: The Founding of the National Bureau of Economic Research," 1984, at:

www.nber.org/nberhistory/sfabricant.pdf.

¹⁰ M. Friedman and R. D. Friedman, *Two Lucky People: Memoirs*, Chicago: University of Chicago Press, 1998; and L. S. Mitchell, *Two Lives: The Story of Wesley Clair Mitchell and Myself*, New York: Simon and Schuster, 1953.

¹¹ R. W. Fogel, "Simon S. Kuznets: April 30, 1901 - July 9, 1985," NBER Working Paper No. 7787, July 2000.

¹² R. E. Gallman, "Commodity Output, 1839-1899," in *Trends in the American Economy in the Nineteenth Century*, W. N. Parker, ed., *Studies in Income and Wealth*, Vol. 24, Princeton: Princeton University Press, 1960, pp. 13-67; and "Gross National Product in the United States, 1834-1909," in *Output, Employment, and Productivity in the United States after 1800*, D. S. Brady, ed., *Studies in Income and Wealth*, Vol. 30, New York: Columbia University Press, 1966, pp. 3-76; R. E. Gallman and T. Weiss, "The Service Industries in the Nineteenth Century," in *Production and Productivity in the Service Industries*, V. R. Fuchs, ed., *Studies in Income and Wealth*, Vol. 34, New York: Columbia University Press, 1969, pp. 287-381; R. E. Gallman, "The United States Capital Stock in the Nineteenth Century," in *Long-Term Factors in American Economic Growth*, S. L. Engerman and R. E. Gallman, eds., *Studies in Income and Wealth*, Vol. 51, Chicago: University of Chicago Press, 1986, pp. 165-213; Robert E. Gallman, "American Economic Growth before the Civil War: The Testimony of the Capital Stock Estimates," in *American Economic Growth and Standards of Living before the Civil War*, R. E. Gallman and J. J. Wallis, eds., Chicago: University of Chicago Press, 1992, pp. 79-115.

¹³ P. W. Rhode, "Gallman's Annual Output Series for the United States, 1834-1909," NBER Working Paper No. 8860, April 2002.

Performance Evaluation in Financial Economics

Andrew Metrick*

A mutual-fund manager earns annualized returns of 20 percent per year for a five-year period. Over the same period, the stock market as a whole earns 10 percent per year. Was this manager smart, or just lucky?

Some companies engage in a lot of merger activity. Other companies do not. A researcher finds that the former group performs less well than the latter group in the stock market. Is this difference related to the merger activity, or does it simply reflect underlying differences between the two groups of firms?

While the questions just raised may seem quite different, they can be answered using similar methods. In both cases, it is necessary to define some appropriate “benchmark” return. This benchmark return then can be compared to the actual return earned by the mutual fund manager, group of merged firms, or group of non-merged firms. The difference between the actual and benchmark returns then can be defined as an “abnormal” return. Abnormal returns then can be tested for statistical and economic significance.

These are the key steps in performance evaluation (PE), a methodology central to the investigation of many questions in financial economics. The seminal PE study, Jensen (1968), uses the classic Capital Asset Pricing Model (CAPM) as its benchmark and analyzes mutual funds¹; for the next 25 years,

most PE studies followed this same strategy. In the last ten years, though, researchers have developed many new models of benchmark returns and demonstrated their usefulness in PE studies of both investor performance and corporate finance. In this article, I illustrate some of these diverse applications with recent examples from my own work and with studies of investment newsletters, insider trading, and corporate governance. I then discuss a new approach to PE that allows fresh insights into the canonical mutual-fund topic. I conclude with a discussion of future directions for PE-based research.

Applications

Investment newsletters have been around since the early 1900s, and the current industry of over 500 active letters has about 2 million subscribers. The typical newsletter is produced by a small staff and provides a wide range of advice targeted at the retail investor. Is any of this advice useful? Using PE methodology, I analyze the performance of newsletters’ equity recommendations using a dataset of 153 newsletters that spans 17 years.² In contrast to most PE studies, this study’s data contain information about every transaction, rather than just the periodic returns earned by these transactions. Thus, I can address two questions: First, do investment newsletters have stock-selection ability? Second, can transactions data be used to improve the precision of PE?

In response to the first question, I find that newsletters do not demonstrate significant abnormal performance: average abnormal returns are

close to zero; the best performing newsletter does not seem unusual given the sample size; and the number of extreme performers is not surprising. Taken together, these results imply that the average subscriber is not getting useful stock-selection advice.

To address the second question, I compare several methods. Most PE refinements involve adding additional benchmarks and forming multifactor extensions to the regression framework of the CAPM. These methods require only periodic return data. When transactions data are available, portfolios can be compared on a day-to-day basis, with each stock matched to an appropriate benchmark.³ Using a measure of precision defined in the paper, I find that the transactions-based approach yields a median improvement of 10 percent over an analogous multifactor model, with the former approach providing more precise estimates of abnormal performance for over 80 percent of the newsletters. This compares with a median improvement of less than one percent achieved by adding factors to the CAPM.

The increased precision of transactions data is also available for the trades made by corporate insiders, a group that includes most senior officers and all members of the board of directors. By law, insiders must file monthly SEC reports about their trades in their company’s stock, and these reports are quickly made public. They have been used by many authors, with most studies focused on attempts to build profitable trading strategies for non-insiders based on the disclosed insider-trading activity.⁴ Leslie Jeng, Richard Zeckhauser, and I take a different approach and use PE meth-

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ods to compute the profits made by insiders themselves on all reported trades from 1975 to 1996.⁵ To do this, we place all insider purchases into a portfolio and hold them for exactly six months. This “purchase portfolio” is like a shadow mutual fund managed by the combination of all insiders. Similarly, we construct a “sale portfolio” comprised of all shares sold by insiders, with those shares held in the portfolio for exactly six months. The six-month holding period, while arbitrary, corresponds to the minimum time that an insider must hold a stock while still retaining profits from an off-setting transaction.⁶

We find that the purchase portfolio earns abnormal returns but that the sale portfolio does not. In raw returns, the purchase portfolio outperforms the market by 10.2 percent per year. Using several PE methods, the abnormal performance ranges between 50 and 67 basis points per month. About one quarter of these abnormal returns accrues within the first five days after the trade and one half accrues within the first month.

These results can be used to shed some light on the effectiveness of current insider-trading regulation. For example, despite the economically large abnormal returns to the purchase portfolio, non-insider counterparties have little to fear from these reported transactions, we find, because insider trades make up only a tiny portion of the market. We calculate that the expected loss to non-insiders attributable to the purchases of insiders is about 0.10 basis points over the subsequent six months. This translates into 10 cents for a \$10,000 transaction.

Studies of investment newsletters and insider trading are standard topics for PE, which traditionally has been used to analyze investor performance. The same tools, however, have also become important for corporate finance. Historically, many corporate-finance questions were analyzed using “event-study” methodology. In recent years, several authors have shown that event studies can have severe statistical problems when used to analyze long-horizon returns. One solution to these problems is a PE analysis conducted

on portfolios of event firms. Subsequently, some studies have used PE methods and, in several cases, reached conclusions differing from the event-study literature.⁷

Paul Gompers, Joy Ishii, and I take a PE approach to a corporate finance topic in a study of corporate governance.⁸ Corporate governance is defined by the set of rules, laws, and institutions that regulate the relationship between the shareholders and the managers of a corporation. Using the incidence of 24 governance rules at 1500 large firms, we construct an index to proxy for the level of shareholder rights at each firm during the 1990s. An investment strategy that bought firms in the lowest decile of the index (strongest rights) and sold firms in the highest decile of the index (weakest rights) would have earned abnormal returns of 8.5 percent per year between 1990 and 1999. Also, we find that firms with stronger shareholder rights had higher profits, higher sales growth, lower capital expenditures, and made fewer corporate acquisitions. We consider several explanations for the results, but the data do not allow strong conclusions about causality. There is some evidence, both in our sample and from other authors, that weak shareholder rights caused poor performance in the 1990s. It is also possible that the results are driven by some unobservable firm characteristic.

The abnormal returns to this investment strategy must be interpreted with care. When PE methods are used to evaluate a mutual fund manager, abnormal returns are sometimes thought to measure the investment “skill” of the manager. If a manager has skill, then one would expect abnormal returns to continue in future periods. For our governance study, the investment strategy is an artificial construct designed to isolate the relationship between governance and returns over some prior time period. We argue in the paper that there is no reason to expect that such abnormal returns would continue in future periods; rather, a more plausible explanation is that these abnormal returns reflect a slow adjustment, as investors learn about the impact of governance on

operating performance and agency costs.

Notwithstanding recent improvements in PE methodology, it is still very difficult to detect abnormal performance in most applications. For example, for typical portfolios of 100 stocks followed for ten years, the standard error for the abnormal-performance estimate would be about 25 basis points per month, or approximately 3 percent per year. In this case, a 95 percent confidence interval would include a range of abnormal performance of approximately 12 percent per year. For portfolios with fewer stocks or shorter histories, the range can be much larger. Thus, standard statistical tests often may fail to reject a null hypothesis of “no abnormal performance,” even when the true abnormal performance is economically large.

I first encountered the power limitations of PE in the investment newsletter study. There, it became clear to me that it would only be possible to make strong statements about average returns of all newsletters for the whole sample period, an analysis with a relatively low standard error for abnormal performance. In the studies of insider trading and corporate governance, the time periods were long enough and abnormal returns large enough to allow for statistical significance. But what if researchers want to provide guidance about investment strategies that have short histories and high volatility?

Consider the canonical PE topic of mutual funds. Most mutual funds are actively managed and charge fees averaging more than one percent per year. In contrast, passively managed index funds seek to replicate benchmark returns at a much lower cost. Since the seminal work of Jensen (1968), researchers have used a wide variety of PE models and datasets in hundreds of published analyses. A rough consensus of this literature is that the average actively managed mutual fund does not earn abnormal returns, and, while some funds may earn consistently positive abnormal returns, it is difficult to identify such funds, *ex ante*. But what does this mean for investors? Should investors only choose low-cost index funds?

Klaas Baks, Jessica Wachter, and I answer this question by explicitly taking an investor's perspective.⁹ We study the one-period portfolio allocation problem for an investor choosing from a riskless asset, benchmark assets (passively managed index funds), and non-benchmark assets (actively managed funds). We model the investor's decision in four steps. First, he states his belief about the distribution of investment skill in the population of all managers. (For this discussion, think of investment skill as equivalent to "expected abnormal returns of 3 percent per year.") Second, he observes and evaluates the history of returns for some group of managers. Third, he uses this history to update his beliefs about the skill of each manager in the group. Fourth, he makes an investment decision.

This "Bayesian" method of PE allows all investors to filter evidence through their own beliefs about managerial skill. Clearly, an investor who believes that no manager can possibly have skill would not choose to invest with active managers. Also, an investor with completely uninformative beliefs would lean towards investment after only a single period of good returns. We are interested in the vast middle ground; given the available statistical evidence, what prior beliefs would imply any investment in active managers? We find that an investment in active managers only requires a belief that at least one in 10,000 mutual fund managers has skill. From a frequentist statistical perspective, such beliefs are indistinguishable from a belief that "no manager has skill." We conclude that the case against investing in active managers cannot rely only on the return evidence. More generally, these results motivate the use of a Bayesian method of PE, where researchers can state the economic significance of their results as filtered through a range of plausible beliefs.

Future Directions

Innovations in PE methodology and applications to new problems are continuing at a rapid rate. In recent years, researchers have extended PE methods in several directions, including adjustments for predictable variation in benchmark expected returns, development of benchmarks that correspond to complex investment strategies used by hedge funds, and methods more closely tied to theoretical models of asset prices.¹⁰ While it will never be possible to specify a single "correct" model of benchmark expected returns, recent research demonstrates how to explicitly add model-based error into PE.¹¹ These methodological advances, when combined with the explosion of new data sources, will allow a fresh perspective on many topics in financial economics.

¹ M. C. Jensen, "The Performance of Mutual Funds in the Period 1945-1964," *The Journal of Finance*, 23 (May 1968), pp. 389-416.

² A. Metrick, "Performance Evaluation with Transactions Data: The Stock Selection of Investment Newsletters," NBER Working Paper No. 6648, July 1998, and *The Journal of Finance*, 54 (5) (October 1999), pp. 1743-75.

³ The most widely used multifactor model in PE is the four-factor model of M. Carhart, "On Persistence in Mutual Fund Performance," *The Journal of Finance*, 52 (March 1997), pp. 57-82. A transactions-based method that is its closest analogue is K. D. Daniel, M. Grinblatt, S. Titman, and R. Wermers, "Measuring Mutual Fund Performance with Characteristic Based Benchmarks," *The Journal of Finance*, 52 (August 1997), pp. 1035-58.

⁴ A thorough survey of these studies is given in H. N. Seyhun, *Investment Intelligence from Insider Trading*, Cambridge, MA: MIT Press, 1998.

⁵ L. A. Jeng, A. Metrick, and R. J. Zeckhauser, "The Profits to Insider Trading: A Performance-Evaluation Perspective," NBER Working Paper No. 6913, January 1999.

⁶ The six-month "short-swing" rule, SEC Rule 16(b), requires insiders to disgorge any profits made by offsetting transactions within a six-month window.

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Tax Systems

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All tax systems have three aspects. First, they change relative prices, and thus influence and often distort the allocation of resources in the economy. Second, they are instrumental in assigning the burden of government programs among citizens. Finally, they are vast administrative bureaucracies involved in collecting and enforcing the remittance of tax monies. These three aspects loosely correspond to the three classic criteria for evaluating tax systems: efficiency, equity, and simplicity.

Behavioral Responses to Taxation

To understand the efficiency implications of a tax system, one must assess how individuals and businesses respond to it. Two major but qualitatively different tax changes in the 1980s, plus the improved availability of tax return data including panel data, have illuminated these behavioral responses. Large tax cuts in 1981 were followed just five years later by the rate-cutting but base-broadening and revenue-neutral Tax Reform Act of 1986 (TRA86), the most sweeping postwar change in the U.S. federal income tax.¹

Real Responses

My interpretation of the lessons from the 1980s and beyond is that the response of critical real variables, such as labor supply², saving³, and invest-

ment, was much smaller than changes in the timing of taxable activity, income shifting, and other financial or “renaming” responses.⁴ There is a clear hierarchy of behavioral responses.

Although none of the key real variables responded markedly to these tax changes, there was clearly some kind of response. Most notably, after TRA86 there was a large increase in the reported taxable income of those high-income taxpayers who were subject to the largest declines in the marginal tax rate — from 50 percent in 1986 to 28 percent in 1988 when the act was fully phased in. This surge probably was not a coincidence. Although an index of the demand-side factors affecting inequality throughout the income distribution can explain much of the increase in high-income concentration until 1985, it cannot adequately explain all of the post-TRA86 spurt.⁵ The controversial question is what aspects of TRA86 induced behavioral response — the rate cuts or the base broadening? And, what kinds of behavioral response did they induce? Evidence from the top tax rate increases of 1990 and 1993 have resulted in a lowering of estimates of the response of taxable income to tax rates,⁶ as has the surge in income inequality in the mid-1990s that is clearly unrelated to any change in tax structure.⁷

Most of the post-1986 increases in the reported individual income of high-income households consisted of timing and particularly shifting of income — for example, from the corporate tax base to the individual tax base — and not from income creation attributable, for example, to additional labor supply. Much of my work has been devoted to better understanding these non-standard behavioral responses to taxation. A unifying theme is that

the tax system does much more than alter the relative prices of real variables; it also provides incentives to misreport income, restructure financial claims, time transactions differently, change the legal form of organization, and so on.

Timing

At the top of the hierarchy of behavioral response is the effect of taxes on the timing of transactions. The classic example is the realization of capital gains. Early econometric analysis of cross-sectional data obtained from individual tax returns has shown that corporate stock sales are quite sensitive to tax rates, and that the effect on the realization of capital gains is even stronger.⁸ But it left open the extent to which this was permanent or temporary elasticity. More recent evidence based on panel data clarified that the temporary response is much larger than the permanent response.⁹ Further evidence comes from analysis of the seasonal pattern in stock sales, which confirms the unusually heavy realization of capital losses in December.¹⁰

A large timing elasticity has been detected with respect to the exercise of stock options¹¹, undertaking foreign direct investment, and even with marriages and births. Indeed, examination of data from U.S. federal estate tax returns suggests that even the timing of *death* is responsive to its tax consequences. This conclusion emerges from a study of the temporal pattern of deaths around the time of changes in the estate tax system — periods when living longer, or dying sooner, could significantly affect estate tax liability. There is evidence of a small death elasticity, although to some degree this may be an elasticity of the

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reported date of death. If the 2001 tax law changes endure, this hypothesis will be tested with the ideal natural experiment, because the estate tax for 2010 will be abolished, but not for 2009 or 2011.

Income Shifting

Some of the observed behavioral response is the shifting of income across tax bases and jurisdictions in search of a lower tax rate. Analysis of the patterns of corporate rates of return and labor income receipts suggests the presence of income shifting between the corporate and personal income tax bases, affecting the interpretation of both reported corporate rates of return and changes in the concentration of personal income.¹²

Other things equal, a multinational corporation prefers its income to come under the taxing jurisdiction of a low-tax country. Cross-border income shifting, like tax evasion, is not observable directly, but it can leave empirical “tracks.” Puerto Rico is a natural place to look because, for many years, the income of Puerto Rican affiliates of U.S. corporations essentially was untaxed either by Puerto Rico or the United States. This reduced the tax penalty on investment there, but also made it attractive to shift reported taxable income from the U.S. parent corporation to the Puerto Rican affiliate. A structural econometric model of the joint decisions regarding investment and income shifting estimated using firm-level data suggests that the income shifting advantages were the predominant reason for U.S. investment in Puerto Rico.¹³

Income shifting is by no means limited to Puerto Rico. For large U.S. manufacturing firms, U.S. tax liability, as a fraction of either U.S. sales or U.S. assets, is related to the location of foreign subsidiaries in a way that is consistent with tax-motivated income shifting.¹⁴ Having a subsidiary in a tax haven, for example Ireland, or one of the “four dragon” Asian countries — all characterized by low tax rates — is associated with lower U.S. tax ratios. Having a subsidiary in a high tax region is associated with higher U.S. tax ratios.

These results suggest that U.S. manufacturing companies shift income out of high tax countries into the United States, and from the United States to low tax countries.

Evasion

Evasion is another response to the attempt to tax. The IRS has estimated that the income tax gap is about 15 percent of what should be paid. Evasion affects the efficiency, equity, and simplicity of the tax system. Moreover, most econometric analysis of the behavioral response to taxation is based on data reported to the tax authorities, and thus may reveal a combination of real and evasion responses.¹⁵

Ascertaining the determinants of evasion is hampered by the difficulty of identifying exogenous sources of variation in policy parameters. If, for example, the probability of audit is higher in one region of the United States than another, might that be because the IRS suspects that taxpayers there are less compliant? A field experiment done with the cooperation of the Minnesota Department of Revenue was designed to clarify the source of policy variation and to study the effectiveness of alternative enforcement strategies.¹⁶ One group of randomly selected Minnesota taxpayers was informed by letter that the returns they were about to file would be “closely examined.” Compared to a control group that did not receive this letter, the low and middle-income taxpayers in the treatment group increased tax payments on average compared to the previous year, indicating the presence of noncompliance. The effect was much stronger for those with more opportunity to evade, for example, those with self-employment or farm income and who paid estimated tax. Surprisingly, however, the reported tax liability of the high-income treatment group fell sharply relative to the control group, possibly because the letter signaled to them the beginning of a prolonged negotiation, of which the tax return was just the opening bid. Two letters containing different normative appeals had no significant impact on compliance behavior.¹⁷

In the last couple of years I have

been examining the estate tax, which poses the classic tradeoff between equity and efficiency in its most extreme form.¹⁸ It is the most progressive by far of the major taxes the federal government levies, because of the million dollar exemption which implies that only the largest 1 or 2 percent of estates owe anything at all. But the base of the tax is wealth accumulation, indisputably a key element in economic growth. If the estate tax deters wealth accumulation, this is a serious detriment. If it encourages avoidance, that is also a symptom of excess burden. But does it? Using data from estate tax returns for 1916 to 1996, one can investigate the impact of the estate tax on reported estates, reflecting the impact of the tax on both wealth accumulation and avoidance.¹⁹ An aggregate measure of reported estates is generally correlated negatively with summary measures of the level of estate taxation, holding constant other influences. The analysis suggests that at the current rate of tax, the richest 0.5 percent of the population reports estates 10.5 percent lower than otherwise, because of decreased wealth accumulation and increased avoidance.

Link between Real and Avoidance/Evasion

How do the opportunities for tax avoidance and evasion mitigate the real substitution response to taxation? For example, if the estate tax is avoided easily, why bother to reduce saving as well? The income and substitution effect of taxes on the real decision depend on both preferences and the avoidance technology.²⁰ The effective marginal tax rate on working and saving must be modified by the addition of an avoidance-facilitating effect, which measures how the cost of avoidance changes with higher income and wealth. Econometric analysis in general will not allow one to identify the two influences separately, unless one can specify observable determinants of the cost of avoidance.

Summary Measures

Because the elasticity of taxable income to the income tax rate captures all of the responses to taxation, it holds the promise of more accurately summarizing the marginal efficiency cost of taxation than a narrower measure of taxpayer response, such as the labor supply elasticity. The promise, though, comes with problems and caveats. It must account for shifts across tax bases and time periods, and anyone using it for policy analysis must be sensitive to the idea that it is a policy parameter itself rather than an immutable value set by preferences and production technologies.²¹

The combination of income shifting across tax bases and between individuals and companies subject to different tax rates erodes tax revenues. This is especially true for the taxation of capital income. Although the United States nominally taxes capital income, the U.S. tax system raised no more revenue in 1983 than would a modified cash flow tax, which imposes a zero marginal tax rate on new investment and saving. This suggests that, at the time, the U.S. “income” tax system on average imposed no tax on capital income, although it certainly caused distortion in capital allocation and portfolios. By 1995, this conclusion no longer applied, because of tax law changes but also because of the drop in nominal interest rates and the economy being at a different point in the business cycle. In 1995 a switch to a modified (R-base) cash flow tax would have cost \$108 billion in revenue.²²

Distribution

Incentives to shift income across time and tax bases also can affect the distributional analysis of taxation. For example, conclusions about inequality based on cross-sectional snapshots of annual income can give a misleading picture of the inequality of a more permanent notion of income, attributable to the mobility of individuals across annual income classes. However, replacing annual income with “time exposure” income, defined as

average real income over a period of several years, does not significantly reduce the measured degree of inequality in the recent past.²³

The effect of changing tax rates on revenue must be kept conceptually distinct from its effect on the measured distribution of income, particularly with respect to capital gains. When realizations increase, the resulting increase in measured income inequality does not reflect an increase in the concentration of welfare. Because of rank reversal, including capital gains as a measure of income also will bias measures of the concentration of other sources of income, such as wages.²⁴

Compliance Costs and Complexity

The resource cost of running a tax system includes the administrative cost of the IRS that appears in the budget. This seems quite low, about 0.6 percent of revenue raised. But what about the costs borne directly by the taxpayers — the compliance costs?

In a series of studies based on taxpayer surveys, I have tried to obtain reliable quantitative estimates of the size and nature of the compliance costs of the U.S. individual income tax. Overall, they suggest that the compliance costs dwarf the administrative costs, and are the dominant source of the cost of collecting taxes. The first study, done in 1982, suggested that the cost of compliance of the individual income tax system was between 5 and 7 percent of the revenue raised, including two billion hours of taxpayer time.²⁵ Some was attributable to allowing itemized deductions, the cost of which can be inferred from data reported on tax returns that suggest that many taxpayers would save money by itemizing but choose not to.²⁶ A follow-up study, done after TRA86 which had simplification as one of its main aims, indicated that tax reform did not reverse the growth in compliance costs in the 1980s.²⁷ Despite indirect evidence that tax-induced transactional complexity declined after 1986, measures of the overall compliance cost of

the individual income tax system showed a significant increase in the cost of all components of compliance.²⁸

Survey-based analysis of the compliance costs of the biggest 1,000-plus U.S. corporations in the early 1990s revealed that the average annual cost of compliance with federal and sub-federal corporate income taxes averaged over \$1.5 million.²⁹ As a fraction of revenue raised, these compliance costs are lower than the estimates for the individual income tax. The cost-to-revenue ratio is higher for state corporate tax systems than it is for the federal tax system, presumably reflecting the non-uniformity of tax systems. In particular, corporate tax officers point to the alternative minimum tax, inventory capitalization rules, and the taxation of foreign-source income as growing sources of complexity. The compliance cost of the rules surrounding foreign-source income is about 40 percent of the total tax compliance cost of large U.S. corporations, which is disproportionately higher than the aggregate share of assets sales and employment that is abroad.³⁰ It is also very high compared to the revenue raised by the United States from taxing foreign-source income, although arguably a principal purpose of this system is to protect U.S. revenues collected on domestic-source income.

Assessing the magnitude and nature of compliance costs highlights its importance, but a more important and more difficult task from a policy perspective is determining what policy changes would reduce compliance costs. One approach is to estimate an empirical model that treats the discrete choices of whether to itemize deductions and whether to hire professional tax advice, and the choice of how much time and money to spend, conditional on the discrete choices made. Simulations based on estimating this model suggest that significant resource saving could be expected from eliminating the system of itemized deductions, although no significant saving can be predicted confidently from changing to a single-rate tax structure.³¹

There are much simpler ways to

collect tax — I've estimated that the Hall-Rabushka flat tax would cut compliance costs in half — but some simplification comes at the cost of the ability to fine-tune tax liability to personal characteristics. Some of the cost of the current system comes from the inherent structural difficulties of an income tax. But replacing the income tax with a consumption tax is neither necessary nor sufficient for significant tax simplification. European experience with the VAT shows that it is not sufficient; real-life VATs are as costly to operate as a real-life income tax. Depending on what is meant by "substantial," a consumption base is not necessary for substantial simplification because a clean-base, return-free income tax system with a single rate covering most of the taxpaying population achieves a lot.³²

Why do tax systems get so complicated, and why are some more complicated than others? Analysis of U.S. state income tax forms and instructions suggests that complexity arises when revenue needs increase, and when the top rate of tax increases. There is only weak evidence that ideological or party tendencies in a state are associated with complexity. States with full-time legislatures, as measured by the salary legislators are paid, tend to have more complex tax systems, as if complexity is one of the things that more professional legislatures *do*. Finally, there is some weak evidence that a more active voting population, as measured by voter turnout, acts as a deterrent to the growth of tax complexity.³³

Optimal Tax Systems

The empirical analysis of behavioral response puts flesh on the structure of the normative theory of taxation. The modern normative theory of optimal tax progressivity, pioneered by Mirrlees³⁴, seeks to formalize the notion of a tradeoff between equity and the efficiency costs of the high marginal tax rates that progressivity requires.³⁵ Since Mirrlees, most research has focused on the optimal linear income tax, which features a demogrant and one marginal tax rate.

Of course most real-life income tax schedules feature two or more rates, and thus allow more flexibility in achieving the desired degree of progressivity. The natural next step is to investigate two-bracket piecewise linear income tax structures. When the social welfare function, utility function, and distribution of abilities are characterized as in the standard optimal linear income tax problem, the optimal second marginal tax rate is less than the first rate although progressivity, in the sense of a uniformly rising average tax rate, generally is optimal.³⁶

As of 1990, the reigning normative approach to taxation did not pay much heed to avoidance and evasion or to administrative and compliance cost considerations. An enriched normative theory, which I refer to as the theory of optimal tax systems, extends optimal taxation to consider the technology of raising taxes and recognizes that the tax system induces people and businesses not only to alter their consumption basket, but also to undertake a range of other actions that do not directly involve a change in their consumption basket.^{37,38}

Acknowledging these realities changes the answers to traditional subjects of inquiry, such as incidence, optimal progressivity, and optimal tax structure, and raises a whole new set of policy questions.

One natural new question that arises is how many resources to devote to enforcement of the tax laws. At first blush, it might appear to be a simple condition: to set marginal revenue equal to marginal costs. But this is certainly wrong. The appropriate condition is that, at the margin, the resource cost of increasing enforcement should equal the saving of excess burden attributable to the decline in exposure to risk.³⁹ The increased revenue gained from stricter enforcement does not enter the expression because it merely represents a transfer from the private to the public sector.

One important old question that must be rethought is that of optimal progressivity. According to standard theory, the optimal progressivity of the tax system depends inversely on the compensated elasticity of labor

supply or, more generally, on taxable income with respect to the marginal tax rate. But there is an important difference between the real response component and the avoidance/evasion component: the latter can be manipulated by policy. One can construct a simple example that shows that ignoring the fact that avoidance can be controlled (that the leak in Okun's bucket can be fixed) can lead to misleading implications about the optimal degree of tax rate progressivity.⁴⁰ For example, the optimal amount of progressivity given a sub-optimal level of tax enforcement may be below the globally optimal degree of progressivity. The standard model of the optimal linear income tax can be generalized to include taxpayer avoidance behavior and the ability of government to control the avoidance, but not the labor supply, response to higher marginal tax rates. Similarly, the marginal-costs-of-funds concept used to determine the optimal supply of public goods can be generalized to include avoidance, evasion, and multiple tax instruments.⁴¹

If the elasticity of taxable income is not immutable and is instead subject to manipulation, how much manipulation is optimal? In other words, what is the *optimal* elasticity of taxable income? This notion can be formalized first in a general model and then in a particular example in which the elasticity of taxable income is determined by how broad the tax base is. In the context of the example, a larger tax base implies a higher optimal degree of progressivity, and vice versa. Moreover, more egalitarian societies will have lower taxable income elasticities. This notion can help explain the pattern of income tax changes and empirical results of the past decade in the United States.⁴²

Administrative and enforcement considerations are key determinants of the structure of taxation in all countries. This is most obvious in developing countries, where presumptive taxes abound, because the theoretically desirable tax base is difficult to measure, verify, and monitor and the presumed tax base can be monitored more readily. What are *de facto* presumptive taxes also are common in developed countries, including fixed

depreciation schedules in place of asset-specific measures of decline in asset value, floors on deductible expenses, and the standard deduction.⁴³ In an important sense, all taxes are presumptive, in that the ideal tax base cannot be measured perfectly.

Trust and Deception

Recently I have been exploring two implications of abandoning the standard presumptions that taxpayers act in their self-interest and governments act in their citizens' interest. The first concerns whether people's attitudes toward, or trust in, government can influence their tax compliance behavior and in turn alter the cost of raising revenue, and whether this mechanism can clarify the causal relationship between prosperity and the size of government. Cross-country data from the 1990 wave of the World Values Survey reveal that tax cheating is lower in countries where citizens exhibit more (not-government-related) trustworthiness.⁴⁴ However, holding that constant, tax cheating becomes more acceptable as government grows, to a significant and larger degree. There is also clear evidence of a Wagner's Law relationship such that prosperity in-crases government size. Holding income constant, though, a more accepting attitude toward tax cheating does limit the size of government. All in all, there is some weak evidence that the strong positive correlation between the size of government and tax cheating masks the fact that big government induces tax cheating while, at the same time, tax cheating constrains big government.

Finally, I observe in recent work that the design of the U.S. income tax system apparently reflects the lessons about human psychology that marketing directors know well—for example, that consumers/taxpayers prefer discounts, they tend to disregard fine print, and they react more to immediate rewards.⁴⁵ Most, but not all, incumbent politicians prefer that the perceived tax burden be as low as possible, and there is circumstantial evidence that tax system design takes advantage of framing to minimize that

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⁴¹ J. B. Slemrod and S. Yitzhaki, "The Cost of Taxation and the Marginal Efficiency Cost of Funds," *International Monetary Fund Staff Papers*, 43 (1) (March 1996), pp. 172-98.

⁴² W. Kopczuk and J. B. Slemrod, "The Optimal Elasticity of Taxable Income," NBER Working Paper No. 7922, September 2000, and *Journal of Public Economics*, forthcoming.

⁴³ J. B. Slemrod and S. Yitzhaki, "Analyzing the Standard Deduction as a Presumptive Tax," *International Tax and Public Finance*, 1 (1) (May 1994), pp. 25-34.

⁴⁴ J. B. Slemrod, "Trust in Public Finance," prepared for the Richard Musgrave Festschrift conference, Munich, January 2001.

⁴⁵ A. Krishna and J. B. Slemrod, "Behavioral Public Finance: Tax Design as Price Presentation," mimeo, (May 2001).

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NBER Profile: *Richard C. Green*

Richard C. Green, the Richard M. and Margaret S. Cyert Professor of Economics and Management at Carnegie Mellon University's Graduate School of Industrial Administration, was elected to the NBER's Board of Directors in April. He will represent the American Finance Association on the NBER's Board.

Green received his B.A. in English from Pomona College and his Masters in Business and Ph.D. in Finance from the University of Wisconsin-Madison. He joined Carnegie Mellon's faculty in 1982 as an assistant professor of financial economics, was promoted to associate professor in 1987 and full

professor in 1990, and assumed his current position as a named professor in economics and management in 1999.

Green has also been a visiting professor at the Stockholm School of Economics and the University of British Columbia. He has been co-editor of the *Review of Financial Studies* and is currently editor of the *Journal of Finance*. He also served as President of the Western Finance Association and Vice President of the Society for Financial Studies. His research interests are in the areas of taxation and asset pricing.



NBER Profile: *Andrew Metrick*

Andrew Metrick is an NBER Faculty Research Fellow in the Asset Pricing Program and an Assistant Professor of Finance at the Wharton School of the University of Pennsylvania. He received a B.A. in Economics and Mathematics from Yale in 1989 and a Ph.D. in Economics from Harvard in 1994.

From 1994-9, Metrick was a junior faculty member in the Harvard economics department. His early research focused on behavioral decision theory, with papers on such "serious" topics as contestant behavior on the game show "Jeopardy!" and betting behavior in

NCAA basketball tournament pools. He enjoys discovering and exploring new datasets, and since data on game shows and betting pools is somewhat limited, his research later shifted towards financial economics and he moved to the Wharton finance department in 1999.

In his free time, Metrick likes to play chess and read books. He is happy to report that he has had far less time to do either since his wife Susie gave birth to their first child, David, in November 2001. The Metricks live in Merion, PA.

NBER Profile: *Uwe Reinhardt*

Uwe Reinhardt, the James Madison Professor of Political Economy and Professor of Economics and Public Affairs at Princeton University, was elected to the NBER's Board of Directors in April to represent that university. A native of Germany, Reinhardt has taught at Princeton since 1968, rising through the ranks from assistant professor of economics to his current position.

Reinhardt received the Bachelor of Commerce degree from the University of Saskatchewan (Canada) in 1964 and a Ph.D. in economics from Yale University in 1970. In addition to his teaching and research, he has served on a number of advisory groups in the health economics field, editorial

boards in his field, and has received many honors for his work.

Currently, he is a member of the Council on the Economic Impact of Health Reform, a privately funded group of health experts established to track the economic impact of the current revolution in health-care delivery and cost control. In 1997, he joined the Pew Health Professions Commission, which explores the implication of health systems change on the health workforce. Also in 1997, he was appointed to the External Advisory Panel for Health, Nutrition and Population of the World Bank. In 1998, he was appointed as Commissioner of the Kaiser Commission on Medicaid and the Uninsured.



Conferences

Innovation Policy and the Economy

The NBER's third annual conference on Innovation Policy and the Economy took place in Washington on April 6. The conference was organized by: NBER Research Associates Adam Jaffe, Brandeis University; Joshua Lerner, Harvard University; and Scott Stern, Northwestern University. The following papers were discussed:

Paul A. Gompers and **Joshua Lerner**, NBER and Harvard

University, "Short-Term America Revisited? Boom and Bust in the Venture Capital Industry and the Impact on Innovation"

Dennis W. Carlton and **Robert H. Gertner**, NBER and University of Chicago, "Intellectual Property, Antitrust, and Strategic Behavior"

Roger Noll, Stanford University, "Federal R&D in the Anti-Terrorist Era"

Jean O. Lanjouw, NBER and Yale University, "Intellectual Property and the Availability of Pharmaceuticals in Poor Countries"

Jeffrey D. Sachs, NBER and Harvard University, "Technological Change and Economic Development"

Gompers and **Lerner** seek to understand the implications of the recent collapse in venture activity on innovation. They argue that the situation may not be as grim as it initially appears. While there are many reasons for believing that *on average* venture capital has a powerful impact on innovation, the impact is far from uniform.

In particular, during boom periods, the prevalence of overfunding of particular sectors can lead to a sharp decline in terms of the effectiveness of venture funds. While prolonged downturns eventually may lead to good companies going unfunded, many of the dire predictions seem overstated. In their conclusion, the authors con-

sider some of the implications for the effects of public policy. They highlight the fact that many of the steps that policymakers have pursued have had the consequence of throwing "gasoline on the fire": that is, they have exacerbated the cyclical nature of venture funding. Gompers and Lerner suggest that policymakers have to view

efforts to assist young firms within the context of the changing private sector environment.

Economic growth depends in large part on technological change. Laws governing intellectual property rights protect inventors from competition in order to create incentives for them to innovate. Antitrust laws constrain how a monopolist can act in order to maintain its monopoly in an attempt to foster competition. There is a fundamental tension between these two different types of laws. Attempts to adapt static antitrust analysis to a setting of dynamic R and D competition through the use of “innovation markets” are likely to lead to error. Applying standard antitrust doctrines such as tying and exclusivity to R and D settings is likely to be complicated. Only detailed study of the industry of concern has the possibility of uncovering reliable relationships between innovation and industry behavior. One important form of competition, especially in certain network industries, is between open and closed systems. **Carlton and Gertner** present an example to illustrate how there is a tendency for systems to close even though an open system is socially more desirable. Rather than trying to use the antitrust laws to attack the maintenance of closed systems, an alternative approach would be to use intellectual property laws and regulations to promote open systems and the standard setting organizations that they require. Recognition that optimal policy toward R and D requires coordination between the antitrust and intellectual property laws is needed.

Federal R and D is extremely important — the single largest source of R and D effort in the world. **Noll** asks whether the new emphasis on combating terrorism is likely to have a substantial effect on the level and pattern of the R and D budget. Judging from the rhetoric of the President’s FY 2003 Budget, the future is primarily about the campaign against terrorism. Even the section about R and D emphasizes the importance of mobilizing scien-

tists and engineers to fight this threat. In reality, however, the effect of the events of 9/11 and the subsequent war on terrorism are minuscule: a gross expenditure of \$2.5 billion in an R and D budget of \$112 billion. The deeper questions about the R and D budget are whether the war on terrorism will serve to re-energize the old cold-war coalition that caused the federal government to support generously all types of R and D, including fundamental research and commercial projects as well as defense-related R and D. To date the answer appears to be no. The more important issue, now as in the past three decades, pertains to the wisdom of the enormous growth in biomedical research, with most other categories remaining roughly constant in real terms. Also important is whether the best use of funds is to increase R and D expenditures or to subsidize increased capacity to train students in technical disciplines. Given the low unemployment rate among scientists and engineers, the growing wage gap between those with technical education and the rest of the population, and the lack of growth in the number of places in American higher education for students who study in technical fields, rising R and D expenditures are unlikely to increase real R and D effort. Instead, they will lead primarily to increasing the cost of R and D and substituting federal R and D for other forms.

There continues to be widespread criticism of the extension of patent rights on pharmaceuticals in the developing world as required by World Trade Organization membership. **Lanjouw** examines arguments in favor of and against this strengthening of worldwide patent protection. She emphasizes that these new pharmaceutical patents promise benefits and costs that differ with the characteristics of diseases. Some diseases primarily affect poor countries. For these diseases, patents will not be sufficient to attract substantial private investment because purchasing power is low. However, globally available and well-

defined patent rights could increase the benefits derived from greater public financing of research on pharmaceutical products for the developing world. For major global diseases, the justification for extending patents in poorer countries is less clear. Thus the optimal global framework for pharmaceutical patents might require differentiating the effective protection given to products in accordance with their extremely different global markets. Lanjouw considers standard intellectual property and regulatory mechanisms that could be used to differentiate protection. All have serious drawbacks. She then describes a new mechanism that would make differentiating protection in accordance with the underlying justification of patent rights a more feasible policy option.

Sachs discusses the nature of innovation systems in poor countries or, more particularly, the lack of such systems, and why innovation and technological advance do not take place at a vigorous rate in large parts of the developing world. Until very recently, science was not considered a core part of development strategy, especially in the case of the poorest countries. In general, science has been considered to be something for rich countries, while poor countries were supposed to focus on good governance, market reforms, and so forth. This image is changing very fast. But as it changes, we’re discovering that there isn’t enough of the critically needed science base to solve a lot of the development problems in the poorest countries. Why is that? The problem may simply be one of markets not working well enough, for example, the lack of intellectual property rights protection or venture capital financing, or there may be other key barriers.

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

Firm-Level Responses to Trade Policies

An NBER/Universities Research Conference on “Firm-Level Responses to Trade Policies” took place in Cambridge on May 10 and 11. Bruce Blonigen, NBER and University of Oregon, organized this program:

Session 1: Plant-Level Studies

Chair: Andrew Bernard, NBER and Dartmouth College

Marc-Andreas Muendler,

University of California, Berkeley, “Trade, Technology, and Productivity: A Study of Brazilian Manufacturers, 1986-98”

Discussant: Marc Melitz, NBER and Harvard University

Sule Ozler, University of California, Los Angeles, and **Kamil Yilmaz**, Koc University, “Does Trade Liberalization Improve Productivity? Plant Level Evidence From Turkish Manufacturing Industry”

Discussant: James A. Levinsohn, NBER and University of Michigan

Andrew B. Bernard; **J. Bradford Jensen**, U.S. Bureau of the Census;

and **Peter K. Schott**, NBER and Yale University, “Survival of the Best Fit: Competition from Low Wage Countries and the (Uneven) Growth of U.S. Manufacturing Plants”

Discussant: Johannes Van Biesebroeck, University of Toronto

Session 2: Trade Policies and MNE Activity

Chair: Bruce Blonigen

Susan Feinberg, University of Maryland, and **Michael Keane**, Yale University, “Accounting for the Growth of MNC-based Trade Using a Structural Model of U.S. MNCs”

Discussant: Keith Head, University of British Columbia

Yongmin Chen, University of Colorado, Boulder; **Jota Ishikawa**, Hitotsubashi University; and **Zhihao Yu**, University of Nottingham, “Trade Liberalization and Strategic Outsourcing”

Discussant: John McLaren, NBER and University of Virginia

Session 3: Non-Tariff Trade Policies
Chair: Robert E. Baldwin, NBER and University of Wisconsin

Mihir Desai, NBER and Harvard University, and **James R. Hines, Jr.**, NBER and University of Michigan, “The Incidence of Export Subsidies as Revealed by Market Reactions”

Discussant: Kristin Forbes, NBER and MIT

Phillip McCalman, University of California, Santa Cruz, “International Diffusion and Intellectual Property Rights: An Empirical Analysis”

Discussant: Samuel S. Kortum, NBER and University of Minnesota

Meredith Crowley, Federal Reserve Bank of Chicago, “Do Safeguard Tariffs and Antidumping Duties Open or Close Technology Gaps?”

Discussant: Thomas J. Prusa, NBER and Rutgers University

Muendler uses Brazil’s trade liberalization between 1990 and 1993 and its partial reversal in 1995 to study how trade affects productivity. His findings suggest that the use of foreign inputs plays a minor role for productivity change, whereas foreign competition pressures firms to raise productivity markedly. Further, the shutdown probability of inefficient firms rises with competition from abroad, thus contributing positively to aggregate productivity. **Muendler** also finds that the competitive push is a salient source of immediate productivity change, while eliminating inefficient firms has an impact that unfolds slowly.

Using plant-level data for the Turkish manufacturing sector, **Ozler** and **Yilmaz** estimate production functions for 24 three-digit SIC industries over 1983-96. During periods of rapid

decline in protection rates, they find, productivity gains are largest. They also show that productivity gains are largely attributable to reshuffling of resources from less to more productive plants. The authors estimate plant-level regressions of productivity on trade orientation of the plant; plants in tradable sectors, in particular plants in import competing sectors, have higher productivity gains. They then estimate regressions of productivity on nominal protection rates. Reduced protection improves productivity in import competing sectors, but not in others. The main result, that trade liberalization leads to productivity gains, is robust to possible effects of real exchange rate movements as well as to the public sector wage hikes in the late 1980s and early 1990s.

Bernard, **Jensen**, and **Schott**

examine the relationship between import competition from low-wage countries and the growth of U.S. manufacturing plants from 1977 to 1997. Both employment and output growth are slower for plants that face higher levels of low-wage import competition in their industry. As a result, U.S. manufacturing is reallocated over time towards industries that are more skill- and capital-intensive. Differential growth is driven by a combination of increased plant failure rates and slower growth of surviving plants. Within industries, low-wage import competition has the strongest effects on the least capital- and skill- intensive plants. Surviving plants that switch industries move into more capital- and skill-intensive sectors when they face low wage competition.

Feinberg and **Keane** estimate a

structural model of multinational corporation (MNC) production and trade to gain insight into factors causing the significant observed increase in MNC-based trade in general, and intra-firm trade in particular. They find that tariffs had surprisingly little impact on intra-firm trade. By contrast, MNC's arms-length sales to unaffiliated buyers and suppliers were considerably more sensitive to tariff reductions in both the United States and Canada. Nearly all of the observed increase in intra-firm trade came from firms already organized to sell intra-firm. Technological change, rather than trade liberalization, seemed to be the driving force in the increases in intra-firm trade between U.S. MNCs and their Canadian affiliates.

Chen, Ishikawa, and Yu develop a theory of strategic outsourcing. With trade liberalization, a domestic firm may choose to purchase a key intermediate good from a more efficient foreign producer who also competes with the domestic firm in the final-good market. This could have a collusive effect on competition, resulting in higher prices for both the intermediate and final goods. Trade liberalization in intermediate goods, in contrast to that in final goods, also may increase the prices of both goods. Therefore, in the presence of strategic outsourcing, trade liberalization can either lower or raise consumer prices, depending on the relative tariff reductions for intermediate and final goods.

Desai and Hines investigate the economic impact of tax incentives for American exports by closely examin-

ing stock price reactions to a critical event in 1997. On November 18, 1997, the European Union filed a complaint before the World Trade Organization, arguing that the United States offers American exporters illegal export subsidies by permitting them to use Foreign Sales Corporations to exempt a fraction of export profits from taxation. The evidence indicates that American multinational share prices were sharply affected by that day's news of possible removal of export tax benefits. Negative abnormal returns on that day were correlated with propensity to export, net operating losses, and foreign tax rates. The magnitude of the share price response was consistent with the importance of these subsidies to multinational exporters. In particular, exporters without net operating losses that could not benefit from alternative export subsidies were affected the most adversely by the news of November 18, 1997. Finally, market structure (as proxied by firm profitability) is a significant determinant of the magnitude of the price reaction. This evidence is consistent with the arguments of strategic trade theorists that export subsidies can improve the competitive position of imperfectly competitive firms.

Traditional thinking about intellectual property rights (IPR) suggests a monotonically increasing relationship between property rights and the speed of diffusion of new products and technology. **McCalman's** analysis of data on the international release pattern of Hollywood movies suggests a

more complex story: although moderate standards of IPR encourage the spread of movies, either weaker or stronger property rights tend to decrease the speed with which American movies are released abroad. This empirical finding is consistent with a variety of specifications, including controlling for countries' self-selection of IPR standards. Overall, it appears that while some IPR recognition may encourage diffusion, very strong IPR may actually retard the speed of diffusion.

Crowley examines how antidumping duties and safeguard tariffs can affect the technology adoption decisions of both domestic import-competing and foreign exporting firms. The analysis is novel in that it carefully models an important difference between these two trade policies — their breadth of country coverage — and shows how firm-level technology adoption changes dramatically under the two policies. She shows that a country-specific antidumping duty induces both import-competing firms and foreign exporting firms to adopt a new technology earlier than they would under free trade. In contrast, a safeguard tariff can accelerate technology adoption by a domestic import-competing firm, but will slow-down technology adoption by foreign exporting firms. Because safeguard tariffs can delay the foreign firm's adoption of new technology, the worldwide welfare costs associated with using them may be larger than is generally believed.

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TAPES Conference on Income Taxation

The NBER and the U.K.'s Institute for Fiscal Studies (IFS) jointly sponsored this year's Trans-Atlantic Public Economics Seminar (TAPES). The May 15-17 conference, held at the Institute's London offices, focused on income taxation. The program, organized jointly by Richard Blundell, IFS, and Roger Gordon, NBER and the University of California, San Diego, was:

Helmuth Cremer, University of Toulouse, and **Jean-Marie Lozachmeur** and **Pierre Pestieau**, Liege University, "Social Security, Retirement, and Optimal Income Taxation"

Discussants: Antonio Rangel, NBER and Stanford University, and Orazio Attanasio, NBER and University College, London

Ravi Kanbur, Cornell University, and **Matti Tuomala**, Tampere University, "Understanding the Evolution of Inequality During Transition: The Optimal Income Taxation Framework"

Discussants: Hans-Werner Sinn, NBER and University of Munich, and James P. Ziliak, University of Oregon

Austan Goolsbee, NBER and University of Chicago, "The Impact and Inefficiency of the Corporate Income Tax: Evidence from State Organizational Form Data"

Discussants: William M. Gentry, NBER and Columbia University,

and Roger H. Gordon

Ian Preston, University College, London, and **Laura Blow**, IFS, "Deadweight Loss and Self-Employment"

Discussants: Martin Feldstein, NBER and Harvard University, and Austan Goolsbee

William M. Gentry, and **R. Glenn Hubbard**, President's Council of Economic Advisers, "Taxes and Job Search"

Discussants: Bertil Holmlund, Uppsala University, and James M. Poterba, NBER and MIT

Jan Boone and **Lans Bovenberg**, Tilburg University, "The Optimal Taxation of Unskilled Labor with Job Search and Social Assistance"

Discussants: Bruce D. Meyer, NBER and Northwestern University, and Li Gan, University of Texas, Austin

Per Engström, **Bertil Holmlund**, and **Ann-Sofie Kolm**, Uppsala University, "Optimal Taxation in Search Equilibrium with Home Production"

Discussants: Helmuth Cremer, and Ian Walker, University of Warwick

Emmanuel Saez, NBER and Harvard University, "Do Taxpayers Bunch at Kink Points?"

Discussants: Costas Meghir, IFS, and Ian Preston

Bruce D. Meyer, and **Bradley T. Heim**, Northwestern University, "Work Costs and Nonconvex in Preferences in the Estimation of Labor Supply Models"

Discussants: Richard Blundell, and Soren Blomquist, Uppsala University

Don Fullerton, NBER and University of Texas, Austin, and **Li Gan**, University of Texas, Austin, "A Simulation-Based Welfare Loss Calculation for Taxes on Labor Supply with Piecewise-Linear Budget Constraints"

Discussants: Jerry A. Hausman, NBER and MIT, and Emmanuel Saez

Mike Brewer; **Alan Duncan**, University of Nottingham; and **Maria José Suárez**, University of Oviedo; "Did the Working Families' Tax Credit Work? Analyzing Programme Participation"

Discussants: Lans A. Bovenberg and Ravi Kanbur

James P. Ziliak; **Thomas J. Knieser**, Center for Policy Research, Syracuse University; and **Douglas Holtz-Eakin**, NBER and Syracuse University, "The Effect of Income Taxation on Consumption and Labor Supply: New Implications for the Optimal Income Tax"

Discussants: Tim Besley, and Thomas E. MaCurdy, NBER and Stanford University

It is often argued that implicit taxation on continued activity of elderly workers is responsible for the widely observed trend towards early retirement. In a world of laissez-faire or of first-best efficiency, there would be no such implicit taxation. **Cremer**, **Lozachmeur**, and **Pestieau** note that when first-best redistributive instruments are not available, because some variables are not observable, the optimal policy implies a distortion of the

retirement decision. Consequently, the inducement of early retirement may be part of the optimal tax-transfer policy. The authors consider a model in which individuals differ in their productivity and their capacity to work long; workers choose both their weekly labor supply and their age of retirement. The authors characterize the optimal nonlinear tax-transfer that maximizes a utilitarian welfare function when weekly earnings and the length of active life

are observable but individuals' productivity and health status are not observable.

What explains the spectacular increases in inequality of disposable income in transitional economies of Central and Eastern Europe? There are at least two possible explanations. First, the pre-tax distribution of income became more unequal because of the shift to a market economy. Second, the degree of progressivity of

the income tax system declined. But each of these factors in turn is determined by other structural changes associated with transition — notably, the decrease in public provision of key public goods, the decrease in non-income tax revenue sources such as profits from public production, and perhaps a decline in society's inequality aversion. **Kanbur** and **Tuomala** develop a framework in which these different forces' effects on inequality can be assessed. Using a simple two-type and two-sector optimal income tax model with endogenous wages, the authors first show that a decrease in the provision of public goods indeed could lead to increasing "inherent" inequality, in other words to inequality in market incomes. They then deploy the Mirrlees model of optimal non-linear taxation to assess the relative impacts of this increase in inherent inequality, the decreasing sources of non-income tax revenue, and possible declines in inequality aversion, to get a numerical feel for their possible impacts on inequality.

By double taxing the income of corporate firms but not unincorporated firms, tax policy can play an important role in a firm's choice of organizational form. The sensitivity of such decisions to tax rates also can be used to approximate the efficiency cost of the corporate income tax. **Goolsbee** uses new cross-sectional data on organizational form across states compiled in the Census of Retail Trade to test the importance of tax rates for organizational form. His results document that there is a significant impact of the relative taxation of corporate-to-personal income on the share of economic activity that is done by corporations, including sales, employment, and the number of firms. The effects are an order of magnitude larger than found in the previous empirical literature based on time-series variation and, as a consequence, suggest a larger deadweight loss from the corporate income tax.

Recognition that deadweight loss from marginal taxation of labor income can arise from dimensions of response other than simply hours of work has become increasingly wide-

spread. Many studies use evidence from panels of tax records in periods of tax reform, but no such panel exists in the public domain for the United Kingdom. However, there are repeated cross-sectional samples of information drawn from U.K. tax records. In this paper, **Blow** and **Preston** apply a grouping estimator to such data to assess the empirical magnitude of taxable income responses in the United Kingdom. They focus on the self-employed: for employed workers, the idea that hours of work are the main dimension of response to changing rates of labor taxation seems plausible. On the other hand, the conventional labor supply model of an individual choosing work time given a fixed hourly remuneration seems a poor description of the self-employed. For such people choices can involve such considerations as effort, employment-related expenses, forms of remuneration, and openness with tax authorities. The authors further focus on group-mean responses of taxable earned income to tax rate changes across a period of reform, both in the structure and in the rates of taxation on earned income. Taxable income elasticities are shown to be determinants of a component — typically the main or exclusive component — of the deadweight loss in a wide variety of models.

Gentry and **Hubbard** ask whether the level of the income tax rate and the convexity of the income tax schedule affect job search behavior and labor market mobility. While the effect of the level of the tax rate is ambiguous, the authors predict that an increase in the convexity of the tax schedule will decrease job search activity by taxing away some of the benefits of a successful search. Using data from 1979 through 1993 from the Panel Study of Income Dynamics, they estimate that an increase in the convexity of the income tax system reduces both job search behavior and the probability that a head of household will change to a better job during the coming year.

In order to explore the optimal taxation of low-skilled labor, **Boone** and **Bovenberg** extend the standard model of optimal non-linear income taxation in the presence of quasi-linear prefer-

ences in leisure by allowing for involuntary unemployment, job search, an exogenous welfare benefit, and a non-utilitarian social welfare function. In trading off more low-skilled employment against more work effort of higher skilled workers, the government balances distortions on the search margin with those on work effort. Positive marginal tax rates at the bottom may help to encourage job search if this search is taxed on a net basis. Lower welfare benefits and search costs tend to reduce marginal tax rates throughout the skill distribution.

Engström, **Holmlund**, and **Kolm** develop a two-sector general equilibrium search model where "goods" are produced exclusively in the market and "services" are produced both in the market and within the households. They use the model to examine how unemployment and welfare are affected by labor taxes in general and sectoral tax differentiation in particular. They find that a tax cut on services reduces unemployment, whereas a tax cut on goods has no effect. A reform involving tax differentiation, with lower taxes on services, improves welfare. Numerical calibrations of the model suggest that the welfare gains from tax differentiation are larger if the government absorbs a substantial fraction of GDP.

Saez uses individual tax returns' microdata from 1960 to 1997 to analyze whether taxpayers bunch at the kink points of the U.S. income tax schedule (as generated by jumps in marginal tax rates). He finds clear evidence of bunching only at the threshold of the first tax bracket where tax liability starts. Evidence for other kink points is weak or null. Evidence of bunching is stronger for itemizers than for non-itemizers. The large jumps in marginal tax rates created by the Earned Income Tax Credit generate very little bunching except for recipients who report substantial self-employment income. In the standard microeconomic model, the amount of bunching should be proportional to the size of the compensated elasticity of earnings with respect to tax rates. Saez introduces uncertainty and rigidities in labor supply choices to account

for the empirical results. His numerical simulations show that, even in those cases, behavioral elasticities consistent with the empirical results are small.

Heim and Meyer first critique the manner in which work costs have been introduced into labor supply estimation, and note the difficulty of incorporating a realistic rendering of the costs of work. They then show that if work costs are not accounted for in the budget and time constraints in a structural labor supply model, they will be subsumed into the data generating preferences. Further, even if underlying preferences over consumption and leisure are convex, the presence of unobservable work costs can make these preferences appear nonconvex. Without strong functional form assumptions, these work costs are not identified in data commonly used for labor supply estimation. However, the authors show that even if work costs cannot be identified separately, policy relevant calculations — such as estimates of the effect of tax changes on labor supply and deadweight loss calculations — are not affected by the fact that estimated preferences incorporate work costs.

Graduated income tax rates and income transfer programs create piecewise-linear budget constraints that consist of budget segments and kink points. With any change in these tax rules, each individual may switch between a kink point and a budget segment, between two budget segments, or between two kink points. For the

welfare gain or loss from that tax change, **Fullerton and Gan** propose a simulation-based method that is easy to implement and to compute in a way that fully accounts for these possibilities: they introduce a stochastic specification into the model. Their method also provides information on changes in working hours.

In-work benefits or tax credits are motivated as a method of alleviating poverty that does not create adverse work incentives by conditioning support on labor market participation. They usually act to increase the effective marginal tax rates faced by individuals receiving them. Data suggest that not all families entitled to receive in-work benefits actually do: program participation decisions, therefore, determine the effective incentives arising from a given tax and benefit system. With micro-data from before and after a major reform to the structure and form of in-work benefits in the United Kingdom, **Brewer, Duncan,** and **Suárez** use a structural model of labor supply and program participation to show the impact of a reform to in-work benefits on both program participation and labor supply. Their estimates suggest that participating in family credit conferred a utility loss as well as a utility gain from the extra income. Preliminary results suggest this “stigma” cost may have fallen after the introduction of WFTC for lone parents, but risen for women in couples. Given the U.K. government’s commitment to increase the use of tax

credits to both encourage work and to redistribute to families with children, the analysis of program participation in tax credits will continue to have direct policy relevance.

Ziliak, Knieser, and **Holtz-Eakin** estimate a model of life-cycle consumption and labor supply. Intra-temporal preference parameters are identified by estimating the equilibrium condition governing the optimal interior consumption and hours choices, and inter-temporal preferences are estimated from the Euler equation for consumption. These estimates indicate that labor supply responds positively to aftertax wage increases, both within and across periods; and the various elasticity estimates conform to the a priori relative size ordering (Browning, 1985). In addition, the estimated Frisch elasticity of consumption with respect to wage changes is positive and suggests that households “precautionary save” by altering their optimal labor supply choices. The estimates in Table 3 of this paper suggest that net welfare is likely to be higher under the reforms the authors consider in future work, and that the relative offsetting welfare effect of a flatter tax structure via reduced consumption smoothing is relatively less (than one-third) when consumption and labor supply are considered jointly.

These papers will be published in a special issue of the *Journal of Public Economics*.

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Environmental Economics

An NBER Conference on Environmental Economics was held in Newport, Rhode Island, on May 17 and 18. NBER Research Associate Gilbert Metcalf of Tufts University organized this program:

Hilary Sigman, NBER and Rutgers University, “Trade and Pollution in Shared Resources: A Study of International Rivers”
Discussant: Scott Barrett, Johns Hopkins University

Debra Israel, Indiana State University, and **Arik Levinson**, NBER and Georgetown University, “Green Preferences: Testable Empirical Implications of the Growth and Environment Literature”
Discussant: David Bloom, NBER and Harvard University

Matthew Kahn, Tufts University,

“Has Communism’s Collapse Greened Eastern Europe’s Polluted Cities?”
Discussant: Magda Lovei, World Bank

Michael Greenstone, NBER and University of Chicago, “The Impact of the Clean Air Act Amendments on Sulfur Dioxide Concentrations”
Discussant: Alan Krupnick, Resources for the Future

Wayne Gray, NBER and Clark University, and **Ronald Shadbegian**, University of Massachusetts Dartmouth, “‘Optimal’ Pollution Abatement — Whose Benefits Matter, and How Much?”
Discussant: Eli Berman, NBER and Rice University

Sarah West, Macalester College, and **Roberton Williams III**, NBER and

University of Texas, “Estimates of a Consumer Demand System: Implications for the Incidence of Environmental Taxes”
Discussant: Kenneth Small, University of California, Irvine

Spencer Banzhaf, Resources for the Future; **Holger Sieg**, NBER and Carnegie Mellon University; **V. Kerry Smith**, North Carolina State University; and **Randy Walsh**, University of Colorado, Boulder, “Ozone Improvement and Household Adjustments: Revisiting EPA’s Prospective Analysis”
Discussant: Maureen Cropper, World Bank

John List, University of Maryland, “Substitutability, Experience, and the Value Disparity: Evidence from the Marketplace”
Discussant: Don Fullerton, NBER and University of Texas

Sigman asks whether trade relationships facilitate resolution of international environmental spillovers. Using data on water quality in international rivers from the UN’s Global Environmental Monitoring System, she specifically examines the influence of bilateral trade on pollution in rivers that cross international borders. There is some evidence of lower water pollution in rivers shared between countries with more extensive trade, especially outside the European Union, but the effect is small.

Several different theoretical models of economic growth and environmental quality generate inverse-U-shaped pollution-income paths, or “environmental Kuznets curves.” They rely on different assumptions to generate the reversal of pollution trends, with correspondingly different policy implications. While the empirical implications for pollution are indistinguishable (by design), the three models also have different implications for the pattern of people’s marginal willingness to pay

(MWTP) for environmental improvements as a function of income. **Israel** and **Levinson** demonstrate those different implications theoretically, and test for them empirically using data from the World Value Survey. They find that MWTP declines with GDP per capita in rich countries, even after they control for respondents’ individual characteristics.

Under communism, Eastern Europe’s cities were significantly more polluted than their Western European counterparts. An unintended consequence of communism’s decline is the reduction in national air emissions and the improvement in urban environmental quality. **Kahn** uses a number of new datasets to measure these gains. He investigates the incidence of improvement in the local public good and impact on urban quality of life. Finally, he estimates a city-level Environmental Kuznets Curve for three Eastern European nations.

Greenstone uses regulation categories specified by the Clean Air Act

Amendments to examine whether this legislation contributed to the dramatic decline in sulfur dioxide (SO₂) air pollution that occurred over the last 30 years. Under this legislation, the EPA annually assigns every county a nonattainment or attainment designation. Stricter regulations apply in the nonattainment counties. Two of his primary findings are that the EPA does not follow the statutory selection rule that should have determined nonattainment status and that its actual selection rule is unknown. Further, there are important observable differences between nonattainment and attainment counties, especially in the early years of regulation. These findings make the inference problem especially difficult. Overall, **Greenstone’s** results suggest that SO₂ nonattainment status is associated with modest reductions in SO₂ air pollution. However, the estimated effects on SO₂ concentrations may be statistically indistinguishable from zero.

Gray and **Shadbegian** consider

the allocation of environmental regulatory activity across U.S. pulp and paper mills, and the resulting levels of air and water pollution from those mills. They include many different factors in their tests of five different economic theories: Benefits, Coase Theorem, Environmental Justice, Collective Action, and Transboundary Externality. They test these five, non-mutually exclusive, theories using a plant-level panel data set on approximately 300 pulp and paper mills from 1985-97, and find some support for most of them. Plants with larger benefits from pollution reduction emit less pollution, as do plants located in areas with high poverty rates or low housing values, and plants near state boundaries. Many of these variables also are associated with greater regulatory activity being directed towards the plant. Of the theories tested, Collective Action is the least supported while Environmental Justice predicts effects for the nonwhite population that are the opposite of what actually occur.

West and Williams analyze the distributional effects of increasing the gasoline tax, under a range of assumptions about how the revenue is recycled and for a range of different welfare measures. They show that increasing the gasoline tax generally will be regressive, although it can become somewhat progressive if the additional revenue is used to provide a lump-sum transfer to households (the progressivity of the transfer slightly outweighs the regressivity of the tax

increase). Incorporating demand responses into their calculations results in significantly lower estimates of the tax burden on all groups, because gas consumption falls substantially in response to the increased tax. This has little effect on the relative burden on different income groups, though. Finally, the authors conclude that because cross-price elasticities affect the efficiency of a particular tax change, they can be important for distributional analysis, even though their direct effect on incidence is insignificant.

Smith, Sieg, Banzhaf, and Walsh use estimates of household preferences for housing, education, and air quality to measure the general equilibrium willingness to pay for the changes in ambient ozone in Southern California in 2000 and 2010. The scenarios correspond to the projected, spatially delineated, ozone concentrations developed by EPA for its first Prospective Analysis of the 1990 Clean Air Act Amendments (CAAA). The general equilibrium estimates are derived within a locational equilibrium model with 102 distinct communities. That framework allows for estimates of household willingness to pay after allowing for household relocation in response to changes in ozone and the associated changes in housing price. The estimates suggest that for different households, distinguished by location and income, the same policies can produce benefits that vary dramatically from \$30 to over \$2,000 (in 1990 dol-

lars) a year for ozone changes around Los Angeles that are caused by continuing the mandates implied by the CAAA. These differences suggest that the equity effects of this policy are significant and they reinforce the need to consider consistent approaches for reflecting preference heterogeneity in policy analyses.

Several experimental studies recently have provided strong evidence that the basic independence assumption, which is used in most theoretical and applied economic models to assess the operation of markets, is rarely appropriate. These results, which clearly contradict firmly held economic doctrines, have led some influential commentators to call for an entirely new economic paradigm to displace conventional neoclassical theory. **List** refutes the generality of these experimental findings by going to a well-functioning marketplace and examining more than 350 individual decisions across various incentive-compatible elicitation mechanisms. The data suggest that individuals with significant marketlike experience behave largely in accordance with neoclassical predictions. In light of these findings, List believes that we have discarded neoclassical explanations of the value disparity too quickly. More narrowly, these empirical results have important implications for stated valuation methods, such as contingent valuation.

These papers will be published in the *Journal of Environmental Economics and Management*.

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Bernanke Nominated to Federal Reserve Board

NBER Research Associate Ben S. Bernanke, Director of the NBER's Program on Monetary Economics, has been nominated by the President to a seat on the Federal Reserve Board of Governors. Bernanke, the Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs and the chair of the economics

department at Princeton University, has also been a member of the NBER's Business Cycle Dating Committee (BCDC). NBER Research Associate N. Gregory Mankiw of Harvard University will replace Bernanke as Monetary Economics Program Director and BCDC member.

Bernanke's research has focused on

monetary policy and macroeconomic history. He received his B.A. from Harvard and his Ph.D. from MIT. He has taught at Stanford Graduate School of Business, MIT, and New York University, as well as at Princeton. He has consulted for the Federal Reserve Board of Governors, the European Central Bank, and other central banks.

Social Security

The NBER's Working Group on Social Security met in Cambridge on April 4. Jeffrey Liebman, NBER and Harvard University, and Andrew Samwick, NBER and Dartmouth College, organized the meeting. The program was:

Kent Smetters, NBER and University of Pennsylvania, and **Cindy Park**, U.S. Department of the Treasury, "A Matter of Trust: Understanding Worldwide Pension Conversions"
Discussant: Jeffrey Miron, NBER and Boston University

Panel Discussion: The Bush Social Security Commission's Recommendations

Jeffrey Brown, NBER and Harvard University

Overview and Options 1 and 2

Robert Pozen, Commission Member and Harvard University
Option 3

Andrew Samwick
Critique #1

Jeffrey Liebman
Critique #2

Tito Boeri and **Guido Tabellini**, Bocconi University, and **Axel Boersch-Supan**, NBER and University of Mannheim, "Pension Reforms and the Opinions of European Citizens"
Discussant: Courtney Coile, NBER and Wellesley College

Alwyn Young, NBER and University of Chicago, "Demographic Fluctuations, Generational Welfare, and Intergenerational Transfers" (NBER Working Paper No. 8530)
Discussant: David Weil, NBER and Brown University

Laurence Ball, NBER and Johns Hopkins University, and **N. Gregory Mankiw**, NBER and Harvard University, "Intergenerational Risk Sharing in the Spirit of Arrow, Debreu, and Rawls, with Applications to Social Security Design" (NBER Working Paper No. 8270)
Discussant: Stephen Zeldes, NBER and Columbia University

Smetters and **Park** investigate the characteristics of conversions from defined benefit to defined contribution arrangements of public pensions around the world. Their main thesis is that in both developed and developing countries, the driving force behind the conversions is a lack of trust of the governments that administer the plans. In developing countries, in which existing systems have been marked by underfunding and lack of uniformity

across sectors, the defined contribution format has gained favor primarily because it allows the government's behavior to be monitored more readily. In developed countries, in contrast, the conversions (by pre-funding future benefits) are driven more by demographic shifts and the desire to accommodate aging populations. Pre-funding on this scale entails large quantities of wealth, and the lack of faith in the government to administer those funds

properly has motivated private, rather than public, defined contribution arrangements.

In the panel discussion of the recommendations of President Bush's Commission to Strengthen Social Security, **Jeffrey Brown** — who served as a staff member for the President's Commission — began by providing an overview of the Commission's objectives and of the first two of the three options recommended by the Com-

mission. Option 1 introduces voluntary personal accounts without trying to bring the traditional Social Security system into balance. Option 2 attempts to restore long-term solvency to Social Security by switching from wage indexing to price indexing of earnings in the benefit formula. It relies on a new system of voluntary personal accounts to restore retirement income levels to amounts similar to those promised under current law.

Robert Pozen then discussed the Commission's third option, of which he was a main advocate on the Commission. In contrast to Option 2, this option restores long-term solvency by indexing benefits to average life expectancy and reducing benefits for early retirement. It also introduces personal accounts.

The presentations continued with critiques of the Commission's reports by **Andrew Samwick** and **Jeff Liebman**. Samwick first argued that the Commission missed an opportunity to explain clearly why personal accounts were needed — because the amount of pre-funding involved with restoring solvency is simply too large to be managed in a central fund. Second, he suggested that the Commission rely exclusively on transparent means of reducing Social Security outlays, such as indexing the normal retirement age to life expectancy.

Liebman observed that under both plans 2 and 3, replacement rates from the traditional Social Security system go to zero in the very long run; further, plan 2 would do little to boost national saving. He also remarked that disabled workers and other workers with intermittent careers would face the largest benefit cuts under these proposals.

Most economists would subscribe to the view that the public pay-as-you-go (PAYG) pension systems in many European countries are unsustainable and in need of reform. Yet, such reforms are politically very difficult. **Boeri, Boersch-Supan, and Tabellini** report the results of a questionnaire they used in Germany and Italy in fall 2001. (Germany and Italy are particularly interesting countries in this respect because their PAYG pension systems are very generous and provide about 85 percent of the average retiree's income. Germany actually carried out a reform in 2001, in between the two waves of the authors' survey. Thus, it is also a "natural experiment" upon which to draw.) The authors find that citizens are aware of unsustainability but lack information about the cost of the PAYG system. The status quo is the majority outcome along many dimensions: most reform proposals lack a majority and reformers rarely support more than one reform option. Later retirement is the easier reform in Italy (where effective retirement age is lower), while lower pensions are more popular in Germany where the effective replacement rate is higher. Preferences over policy options seem to reflect both economic self-interest and one's normative view about the role of the state. Opposition to any reform is high, even among those aware of unsustainability. This could be either procrastination or selfishness (shifting the burden onto future generations); some answers suggest that the latter could play an important role.

Young addresses issues of generational welfare and intergenerational transfers. A planner, who maximizes

the discounted welfare of an endless stream of generations, intrinsically is biased against larger cohorts, for whom providing utility is more costly. Imperfect substitutability in production also results in a market bias against baby boomers, lowering their lifetime income. However, the market bias tends to be greater than the planner's bias; the latter provides the baby boom cohort with more favorable lifetime transfers. Intuitively, the baby boom benefits from temporarily reduced elderly dependency, allowing for more lifetime consumption relative to lifetime income. Declining population growth leads to rising elderly dependency, which the planner supports with increasing intergenerational transfers. Secularly rising social security taxes, and declining lifetime returns, with a baby boom cohort receiving more favorable treatment than their heavily burdened successors, are consistent with the wishes of a social planner in an environment with declining population growth.

Ball and Mankiw examine the optimal allocation of risk in an overlapping-generations economy. They compare the allocation of risk that the economy reaches naturally to the allocation that would be reached if generations behind a Rawlsian "veil of ignorance" could share risk with one another through complete Arrow-Debreu contingent-claims markets. They then examine how the government might implement optimal intergenerational risk sharing with a social security system. One conclusion is that the system must either hold equity claims to capital or negatively index benefits to equity returns.

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Public Economics

The NBER's Program on Public Economics, directed by James M. Poterba of MIT, met in Cambridge on April 5. The following papers were discussed:

William M. Gentry, NBER and Columbia University, and **David M. Schizer**, Columbia University Law School, "Frictions and Tax-Motivated Hedging: An Empirical Exploration of Publicly-Traded Exchangeable Debt"
Discussant: Mihir A. Desai, NBER and Harvard University

Susan Dynarski, NBER and Harvard University, "Loans, Liquidity, and the Market for Higher

Education"
Discussant: Charles T. Clotfelter, NBER and Duke University

B. Douglas Bernheim and **Antonio Rangel**, NBER and Stanford University, "Addiction, Cognition, and the Visceral Brain"
Discussant: Botond Koszegi, University of California, Berkeley

Mark Duggan, NBER and University of Chicago, "Does Contracting Out Improve the Efficiency of Government Programs? Evidence from Medicaid HMOs"
Discussant: Katherine Baicker, NBER and Dartmouth College

Alberto Alesina, NBER and Harvard University, **Ignazio Angeloni**, European Central Bank, and **Federico Etro**, Harvard University, "Institutional Rules for Federations" (NBER Working Paper No. 8646)
Discussant: Roger H. Gordon, NBER and University of California, San Diego

Daniel Bergstresser, MIT, and **James M. Poterba**, "Asset Allocation and Asset Location Decisions: Evidence from the Survey of Consumer Finances"
Discussant: Andrew Samwick, NBER and Dartmouth College

Financial innovation may undermine efforts at taxing capital income; often financial innovations take advantage of the realization-based elements of the tax code. **Gentry** and **Schizer** examine one such innovation: publicly traded exchangeable debt issued in the United States between 1992 and 2000. These debt contracts raise cash and allow the issuer to hedge much of the risk of an appreciated position but do not trigger a tax on the capital gain. The authors note that in addition to underwriting fees, typically 3 percent of gross proceeds, financial market frictions create costs of using these securities to avoid taxes. The announcement of these securities is associated with a negative 1.03 percent average abnormal return in the underlying stock. Furthermore, just prior to the execution of the transaction, the underlying stock experiences an abnormal return of negative 2.8 percent. To some extent, the underlying stock rebounds from this later price effect, but the issuer does not participate fully in this rebound because the debt has hedged the issuer from benefiting in the price movements in the underlying stock. In addition to the price effects, the issuance of these debt securities is associated with large abnormal trading volume in the underlying stock, sug-

gestive of arbitrage trading.

During the 1999-2000 school year, students borrowed \$36 billion through the federal loan program, double the volume in 1992-3. Despite the large size and rapid growth of the student loan market, it has been the subject of little economic analysis. Does the availability of government loans affect schooling decisions? Identifying the effect of loans is empirically challenging, because eligibility for federal loans is correlated with observed and unobserved determinants of schooling. **Dynarski** exploits variation in loan eligibility induced by the Higher Education Amendments of 1992, which removed home equity from the set of assets that are taxed by the federal financial aid formula. She finds that loan eligibility has a positive effect on college attendance. Loan eligibility also appears to shift students toward four-year private colleges.

Bernheim and **Rangel** develop a new model of the consumption of addictive substances. The basic premise of their theory is that environmental cues can trigger states that lead the brain to provide an incomplete characterization of the decision problem; this can lead the decisionmaker to make systematic mistakes. Importantly, cues affect behavior because they influence

how the brain characterizes the problem, not because they change the underlying preferences. The authors show that their model: can explain the basic stylized facts associated with addiction; has good foundations in neuroscience and psychology; and generates plausible consumption patterns for different substances. They also use the model to study the welfare properties of six drug policies: laissez-faire; taxation; subsidization of treatment programs; criminalization; regulated dispensation; and "behavioral policies" such as education and "shock-based" marketing campaigns.

State governments contract with health maintenance organizations (HMOs) to coordinate medical care for nearly 20 million Medicaid recipients. Identifying the causal effect of HMO enrollment on government spending and health care quality is difficult if, as is often the case, recipients have the option to enroll in a plan. To estimate the average effect of HMO enrollment, **Duggan** exploits county-level mandates introduced during the last several years in the state of California requiring most Medicaid recipients to enroll in a managed care plan. His results demonstrate that the resulting switch from fee-for-service to managed care was associated with a substantial

increase in government spending but no observable improvement in health outcomes, thus apparently reducing the efficiency of this large government program. The findings cast doubt on the hypothesis that HMO contracting has reduced the strain on government budgets.

Alesina, Angeloni, and Etro study the organization of federations — or international unions — which together decide the provision of certain public goods. The authors individuate as an optimal institutional design a form of fiscal federalism based on decentralization of expenditures and a system of subsidies and transfers between countries. Since this solution can be politically unfeasible, they also study institutional compromises between a centralized federation and a decentralized one.

“Flexible unions” and federal mandates in which both the state and federal levels are involved in providing public goods typically are superior to complete centralization and are politically feasible. Finally, the authors study the effects of a qualified majority voting rule in a centralized system: they find that it can be a useful device for correcting a bias toward “excessive” union level activism.

The rapid growth of assets in self-directed tax-deferred retirement accounts has generated a new set of financial decisions for many households. In addition to deciding which assets to hold, households with substantial assets in both taxable and tax-deferred accounts must decide where to hold their various assets. **Bergstresser** and **Poterba** use data from the 1989-

98 Surveys of Consumer Finances to assess how many households have enough assets in both taxable and tax-deferred accounts to face significant choices regarding asset location. As of 1998, 45 percent of households had at least some assets in a tax-deferred account, and more than ten million households had at least \$25,000 in their taxable as well as their tax-deferred accounts. Many households hold equities in their tax-deferred accounts, but not in their taxable accounts, while also holding taxable bonds in their taxable accounts. This contradicts the general wisdom that one should locate heavily taxed assets in the tax-deferred account. Asset allocation within tax deferred accounts is quite similar to asset allocation in taxable accounts.

Labor Studies

The NBER's Program on Labor Studies met in Cambridge on April 12. Program Director Richard B. Freeman, and Lawrence F. Katz, both of Harvard University, organized this program:

Robert A. Margo, NBER and Vanderbilt University, “The North-South Wage Gap, Before and After the Civil War”

Chinhui Juhn, NBER and University of Houston, and **Kevin M. Murphy** and **Robert H. Topel**, NBER and University of Chicago,

“U.S. Unemployment in Historical Perspective”

David Card, NBER and University of California, Berkeley, and **Lara D. Shore-Sheppard**, NBER and Williams College, “Using Discontinuous Eligibility Rules to Identify the Effects of the Federal Medicaid Expansions”

Alan B. Krueger, NBER and Princeton University, and **Alexandre Mas**, Princeton University, “Strikes, Scabs, and Tread Separations: Labor Strife and

the Production of Defective Bridgestone/Firestone Tires”

Roundtable Discussion of Policies Related to 401(K) Plans, ESOPs, and Employer-Provided Retirement Benefits:

Douglas L. Kruse, NBER and Rutgers University

David Laibson, NBER and Harvard University

Olivia S. Mitchell, NBER and University of Pennsylvania

Edward N. Wolff, NBER and New York University

Using data for a variety of occupations, **Margo** documents that the Civil War occasioned a dramatic divergence in the regional structure of wages: in particular, wages fell sharply in the South Atlantic and South Central states relative to the North after the War. The divergence was immediate, being apparent as early as 1866. It was persistent: for none of the occupations that Margo examined did the regional wage structure return to its ante-bellum configuration by century's end. The divergence cannot be explained by the changing racial composition of the

Southern wage labor force after the War but does appear consistent with a sharp drop in labor productivity in Southern agriculture. He also uses previously neglected data to argue that the South probably experienced a decline in the relative price of non-traded goods after the War.

After two decades of increase, the unemployment rates for prime-age males fell in the 1990s to low levels comparable to those of the late 1960s. Using the March Current Population Survey, **Juhn, Murphy, and Topel** examine whether trends identified dur-

ing that period of rising employment have continued or been reversed in the 1990s. They find that labor market participation declined in spite of falling unemployment, leaving the overall employment of prime-age males unchanged between the business cycle peaks of 1988-9 and 1999-2000. They also find that long jobless spells continue to be important, with average durations of both unemployment and non-employment rising in the 1990s. These trends reflect both the low real wages in the 1990s relative to historical standards and the less stringent eligi-

bility rules governing the disability insurance program. While some trends have continued, the decades-long rise in wage inequality finally has run its course and actually reversed in the 1990s. The data on joblessness broadly reflect these changing wage trends, with employment improving the most for the least skilled group.

Card and **Shore-Sheppard** exploit the discrete nature of the eligibility criteria for two major federal expansions of Medicaid to discern the effects of the expansions on Medicaid coverage, overall health insurance coverage, and coverage by private and other non-Medicaid sources. Using data from the Survey of Income and Program Participation, the authors examine the “133 percent” program, which covered children under the age of six in families with incomes up to 133 percent of the poverty line, and the “100 percent” program, which covered children in poor families born after September 30, 1983. Graphical and conventional differences-in-differences methods sug-

gest that the 100 percent program led to a 10 to 15 percentage point rise in Medicaid coverage among the targeted group, with a small decline in non-Medicaid coverage and a rise in the incidence of dual coverage. The newly covered group includes children in families further from the AFDC income cutoffs and closer to the poverty line than the traditional Medicaid caseload, and includes more children in dual-headed families. By comparison, the authors are unable to find much evidence that the 133 percent program had any effect on Medicaid coverage of children in families with incomes from 100 to 133 percent of the poverty line. This negative finding is confirmed in data from the March Current Population Survey.

Krueger and **Mas** study the effect of labor relations on product quality. They consider whether a long, contentious strike and the hiring of permanent replacement workers by Bridgestone/Firestone in the mid-1990s contributed to the production of

an excess number of defective tires. Using several independent data sources, they find that labor strife in the Decatur plant coincided closely with lower product quality. Their models based on two datasets of tire failures by plant, year, and age show significantly higher failure rates for tires produced in Decatur during the labor dispute than before or after the dispute, or than at other plants. Also, an analysis of internal Firestone engineering tests indicates that P235 tires from Decatur performed less well if they were manufactured during the labor dispute compared with those produced after the dispute, or compared with those from other, non-striking plants. Monthly data suggest that the production of defective tires was particularly high around the time wage concessions were demanded by Firestone in early 1994 and when large numbers of replacement workers and permanent workers worked side by side in 1996.

Monetary Economics

The NBER's Program on Monetary Economics met in Cambridge on April 12. NBER Research Associates Martin Eichenbaum and Lawrence Christiano, both of Northwestern University, organized this program:

Michael Woodford, NBER and Princeton University, “Imperfect Common Knowledge and the Effects of Monetary Policy” (NBER Working Paper No. 8673)
Discussant: V. V. Chari, University of Minnesota

Nobuhiro Kiyotaki, NBER and London School of Economics, and **John Moore**, MIT, “Liquidity, Business Cycles, and Monetary Policy”

Discussant: Harold Cole, University of California, Los Angeles

George W. Evans, University of Oregon, and **Seppo Honkapohja**, University of Helsinki, “Monetary Policy, Expectations, and Commitment”
Discussant: Marco Bassetto, University of Minnesota

Mark Bills, NBER and University of Rochester, and **Yongsung Chang**, University of Pennsylvania, “Welfare Costs of Sticky Wages When Effort Can Respond”
Discussant: Miles S. Kimball, NBER and University of Michigan

Fernando Alvarez, NBER and University of Chicago; **Andrew Atkeson**, NBER and University of California, Los Angeles; and **Christian Edmond**, University of California, Los Angeles, “Can a Baumol-Tobin Model Account for Short-Run Behavior of Velocity?”
Discussant: Julio J. Rotemberg, NBER and Harvard University

Harold Cole and **Lee Ohanian**, University of California, Los Angeles, and **Ron Leung**, University of Minnesota, “Deflation, Real Wages, and the International Great Depression: A Productivity Puzzle”
Discussant: Ben S. Bernanke, NBER and Princeton University

Woodford reconsiders the Phelps-Lucas hypothesis, according to which temporary real effects of purely nominal disturbances result from imperfect information. He departs from the

assumptions of Lucas (1973) in two crucial respects, though. Because of monopolistically competitive pricing, higher-order expectations are crucial for aggregate inflation dynamics, as

Phelps argued (1983). And, decision-makers' subjective perceptions of current conditions are assumed to be of imperfect precision, because of finite information processing capacity, as

Sims argued (2001). The model can explain highly persistent real effects of a monetary disturbance and a delayed effect on inflation.

Kiyotaki and **Moore** provide a simple framework for modelling differences in liquidity across assets. Their goal is to understand the interaction between asset prices and aggregate economic activity, and to explain liquidity premiums. In so doing, they examine the role of government policy, through open market operations, in changing the mix of assets held by the private sector. They also show that certain anomalies of the real economy, such as low rates of return on liquid assets, volatility of asset prices, and limited participation in asset markets, in fact are normal features of an economy where money is essential for the smooth allocation of resources.

In monetary policy, the equilibriums from full commitment are superior to those from optimal discretionary policies. A number of interest rate reaction functions and instrument rules thus have been proposed to implement or approximate full commitment policy. **Evans** and **Honkapohja** assess these optimal reaction functions and instrument rules in terms of

whether they lead to an equilibrium that is both locally determinate and stable under adaptive learning by private agents. They find that a reaction function that appropriately depends explicitly on private expectations performs best on both counts.

Bils and **Chang** examine the impact of wage stickiness when employment has an effort as well as an hours dimension. Despite wages being predetermined, the labor market clears through the effort margin. Consequently, welfare costs of wage stickiness are potentially much, much smaller.

Alvarez, **Atkeson**, and **Edmond** describe the link between money, velocity, and prices in an inventory-theoretic model of the demand for money. They then explore the extent to which such a model can account for the short-run volatility of velocity, the negative correlation of velocity, the ratio of money to consumption, and the resulting “stickiness” of the aggregate price level as measured by the relative volatility of the ratio of money to consumption and the price level. They find that an inventory-theoretic model of the demand for money is a natural framework for understanding these aspects of the behavior of velocity in

the short run.

The high-real-wage story is one of the leading hypotheses for how deflation caused the international Great Depression. Theoretically, world-wide deflation combined with incomplete nominal wage adjustment raised real wages in a number of countries. These higher real wages reduced employment as firms moved up their labor demand curves. This implies a strong negative correlation between deviations in output and real wages, while the correlation in the data is positive. The positive correlation implies the need for another shock to act as a shifter of labor demand. **Cole**, **Ohanian**, and **Leung** assume that the other shock works through productivity. They evaluate the relative contributions of productivity shocks and money shocks (operating through high real wages) to output changes for 17 countries between 1930 and 1933. They estimate that about two-thirds of output changes in the international cross section are explained by a productivity or productivity-like shock which is orthogonal to deflation, and about one-third of output changes are explained by money shocks.

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Corporate Finance

The NBER's Program on Corporate Finance, directed by Raghuram G. Rajan, Northwestern University, met in Chicago on April 19. They discussed the following papers:

Mike Burkart, Stockholm School of Economics; **Fausto Panunzi**, Università di Bologna; and **Andrei Shleifer**, NBER and Harvard University, "Family Firms" (NBER Working Paper No. 8776)
Discussant: Robert Gertner, NBER and University of Chicago

Allen N. Berger and **Nathan H. Miller**, Federal Reserve Board of Governors; **Mitchell A. Petersen**, Northwestern University; **Raghuram G. Rajan**; and **Jeremy C. Stein**, NBER and Harvard University; "Does Function Follow

Organizational Form? Evidence from the Lending Practices of Large and Small Banks"

Discussant: David S. Scharfstein, NBER and MIT

Lucian Bebchuk, NBER and Harvard University, and **Alma Cohen**, Harvard University, "Firms' Decisions Where to Incorporate"
Discussant: Roberta Romano, NBER and Yale University

B. Espen Eckbo and **Karin S. Thorburn**, Dartmouth College, "Overbidding versus Fire Sales in Bankruptcy Auctions"
Discussant: Kose John, New York University

Alexander Dyck, Harvard University, and **Luigi Zingales**,

NBER and University of Chicago, "Private Benefits of Control: An International Comparison" (NBER Working Paper No. 8711)
Discussant: Rene M. Stulz, NBER and Ohio State University

Marianne Bertrand, NBER and University of Chicago, and **Antoinette Schoar**, NBER and MIT, "Managing with Style: The Effect of Managers on Firm Policies"
Discussant: Kent D. Daniel, NBER and Northwestern University

Ivo Welch, NBER and Yale University, "Columbus's Egg: Stock Returns Are The Real Determinant of Capital Structure"
Discussant: Steven N. Kaplan, NBER and University of Chicago

Burkart, Panunzi, and Shleifer present a model of succession in a firm controlled and managed by its founder. The founder decides between hiring a professional manager or leaving management to his heir, as well as on how much, if any, of the shares to float on the stock exchange. The authors assume that a professional is a better manager than the heir, and they describe how the founder's decision is shaped by the legal environment. Specifically, they show that, in legal regimes that successfully limit the expropriation of minority shareholders, the widely held professionally managed corporation emerges as the equilibrium outcome. In legal regimes with intermediate protection, management is delegated to a professional, but the family stays on as large shareholders to monitor the manager. In legal regimes with the weakest protection, the founder designates his heir to manage and the ownership remains inside the family. This theory of separation of ownership from management includes the Anglo-Saxon and the Continental European patterns of corporate governance as special cases, and generates additional empirical predictions consis-

tent with cross-country evidence.

Theories based on incomplete contracting suggest that small organizations may do better than large organizations in activities that require the processing of soft information. **Berger, Miller, Petersen, Rajan, and Stein** explore this idea in the context of bank lending to small firms, an activity that is typically thought of as relying heavily on soft information. They find that large banks are less willing than small banks to lend to informationally "difficult" credits, such as firms that do not keep formal financial records. Moreover, controlling for the endogeneity of bank-firm matching, large banks lend at a greater distance, interact less personally with their borrowers, have shorter and less exclusive relationships, and do not alleviate credit constraints as effectively. All of this is consistent with small banks being better able to collect and act on soft information than large banks.

Bebchuk and Cohen investigate the decisions of publicly traded firms about where to incorporate. They study what makes states more or less attractive to incorporating firms and how firms determine whether they

will incorporate outside their state of location. The authors find that states that offer stronger antitakeover protections are significantly more successful in retaining in-state companies and in attracting out-of-state incorporations. Indeed, the market for incorporations has not even penalized the three states that passed severe anti-takeover statutes which have been viewed as detrimental to shareholders. The authors also find that there is a big difference between a state's ability to attract incorporations from firms located in it versus from out-of-state firms; they investigate several possible explanations for this home-state advantage. Finally, the authors find that Delaware's dominance is greater than has been recognized and that in the future Delaware's market share can be expected to increase further. These findings have significant implications for the ongoing debates on regulatory competition, takeover law, and corporate governance.

Eckbo and Thorburn analyze the bidding incentives of the main creditor (bank) in Swedish bankruptcy auctions. Without a direct mechanism for enforcing its seller-reservation price,

the bank offers financing to a potential bidder in return for a strategy that maximizes the expected profits of the bank-bidder coalition. The coalition overbids (in excess of the coalition's private valuation) by an amount that decreases with the bank's "liquidation recovery": the recovery if the bank were to receive the piecemeal liquidation value announced by the auctioneer at the start of the auction. Since both the liquidation recovery and the final going-concern auction premium can be observed, the overbidding theory can be tested. The authors perform a large-sample, cross-sectional analysis in which overbidding is pitted against asset-fire sale arguments. The latter hold that auctions tend to produce *lower* going-concern premiums when taking place during industry-wide financial distress, or when the firm is sold back to old owners or to industry outsiders. The evidence is strongly consistent with overbidding but provides little support for asset fire-sale arguments.

Dyck and **Zingales** construct a measure of the private benefits of control in 39 countries based on 412 transactions between 1990 and 2000. They find that the value of control ranges between negative 4 percent and positive 65 percent, with an average of 14 percent. In countries where private benefits of control are larger, capital

markets are less developed, ownership is more concentrated, and privatizations are less likely to take place as public offerings. The authors also analyze what institutions are most important in curbing these private benefits. A high degree of statutory protection of minority shareholders and a high degree of law enforcement are associated with lower levels of private benefits of control, but so are a high level of diffusion of the press, a high rate of tax compliance, and a high degree of product market competition. A crude test suggests that the "non-traditional" mechanisms have at least as much explanatory power as the legal ones commonly mentioned in the literature. In fact, in a multivariate analysis, newspapers' circulation and tax compliance seem to be the dominating factors. The authors advance an explanation of why this might be the case.

Bertrand and **Schoar** investigate the extent to which heterogeneity in firm policies can be explained by differences in managerial style. They use a firm-manager matched panel data set with which they can track the same managers across different firms over time. They find that manager fixed effects matter for a wide range of corporate decisions. For example, differences in capital expenditures, financial structure, dividend policies, acquisition and diversification policies, and cost-

cutting policies are explained to a significant extent by executive fixed effects. Moreover, specific patterns in managerial decisionmaking seem to indicate general differences in "style." Also, style affects performance, and this is reflected in part in managerial compensation levels. In a final step, the authors tie these findings to some observable managerial characteristics, including MBA graduation and birth cohort. They ask whether and how corporate decisions are affected by these managerial characteristics. Executives from earlier birth cohorts overall appear more financially conservative. On the other hand, managers who hold an MBA degree on average seem to follow more financially aggressive strategies.

Welch shows that the typical firm's capital structure is not caused by attempts to time the market, by attempts to minimize taxes or bankruptcy costs, or by any other attempts at firm-value maximization. Instead, firms appear to be passive. Thus, current capital structure is best predicted by (past capital structure adjusted for) intervening stock return appreciation. Consequently, one should conclude that observed U.S. capital structure is determined *defacto* primarily by external stock market influences and not by deliberate internal corporate decisionmaking.

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Behavioral Finance

The NBER's Working Group on Behavioral Finance met in Chicago on April 20. NBER Research Associates Robert J. Shiller, Yale University, and Richard H. Thaler, University of Chicago, organized this program:

Christopher K. Polk and **Paola Sapienza**, Northwestern University, "The Real Effects of Investor Sentiment"

Discussant: Jeremy C. Stein, NBER and Harvard University

Nicholas C. Barberis, NBER and University of Chicago; **Andrei Shleifer**, NBER and Harvard

University; and **Jeffrey Wurgler**, New York University, "Comovement"

Discussant: Robert J. Shiller

Sendhil Mullainathan, NBER and MIT, "Thinking Through Categories"

Discussant: Jesus Santos, NBER and University of Chicago

Tim Loughran, University of Notre Dame, and **Jay R. Ritter**, University of Florida, "Why has IPO Underpricing Increased Over Time?"

Discussant: Ivo Welch, NBER and

Yale University

Amiyatosh K. Purnanandam and **Bhaskaran Swaminathan**, Cornell University, "Are IPOs Underpriced?"
Discussant: Alon Brav, Duke University

Mark Grinblatt, NBER and University of California, Los Angeles, and **Bing Han**, University of California, Los Angeles, "The Disposition Effect and Momentum"
Discussant: Harrison Hong, Stanford University

Do inefficiencies in the capital markets have real consequences? Or, are they simply wealth transfers from noise traders to arbitrageurs? **Polk** and **Sapienza** study firm business investment and find a positive relationship between investment and each of their three measures of mispricing (after controlling for investment opportunities and financial slack.) Consistent with their predictions, they find that firms with higher research and development intensity (suggesting less transparency and longer periods of information asymmetry) have investment that is more sensitive to mispricing.

Barberis, **Shleifer**, and **Wurgler** distinguish three views of comovement among different traded securities. The traditional "fundamentals" view explains the comovement of securities through positive correlations in the rational determinants of their values, such as cash flows or discount rates. "Category-based" comovement occurs when investors classify different securities into the same asset class and then shift resources in and out of this class in correlated ways. "Habitat-based" comovement arises when a group of investors restricts its trading to a given set of securities, and then moves in and out of that set in tandem. The authors model each type of comovement, and then assess them empirically using data on stock inclu-

sions into and deletions from the S&P 500 index. Index changes are noteworthy because they change a stock's category and investor clientele (habitat), but do not change its fundamentals. The authors find that when a stock is added to the index, its beta and R-squared with respect to the index increase, while its beta with respect to stocks outside the index falls. The converse happens when a stock is deleted. These results broadly support the category and habitat views of comovement, but not the fundamentals view. More generally, these non-traditional views may help to explain other instances of comovement in the data.

Mullainathan presents a model of human inference in which people use coarse categories to make inferences. "Coarseness" means that, rather than updating continuously as suggested by the Bayesian ideal, people update or change categories only when they see enough data to suggest that an alternative category fits the data better. This simple model of inference generates a set of predictions about behavior. **Mullainathan** applies this framework to produce a simple model of financial markets which produces straightforward and testable predictions about the predictability of returns, comovement, and volume.

In the 1980s, the average first-day return on initial public offerings (IPOs)

was 7 percent. The average first-day return doubled to almost 15 percent during 1990-8, before jumping to 65 percent during the internet bubble years of 1999-2000. Part of the increase can be attributed to changes in the composition of the companies going public. **Loughran** and **Ritter** attribute much of the increase in underpricing, though, to previously latent agency problems between underwriters and issuing firms. They argue that the increase in valuations over time has caused issuers to be more complacent about leaving money on the table.

Purnanandam and **Swaminathan** study the valuation of initial public offerings (IPOs) using comparable firm multiples. In a sample of more than 2000 IPOs from 1980 to 1997, the median IPO is *overvalued at the offer* by about 50 percent relative to its industry peers, they find. In the cross-section, overvalued IPOs earn 5 percent to 7 percent higher first day returns than undervalued IPOs, but earn 20 percent to 50 percent lower returns over the next five years. Overvalued IPOs temporarily exhibit higher sales growth rates but persistently earn lower profit margins and return on assets than undervalued IPOs over the next five years. This suggests that any projected growth opportunities implicit in the initial val-

uation fail to materialize subsequently. These results are not consistent with asymmetric information models of IPO pricing and rather support behavioral theories based on investor overconfidence.

Prior research shows that many investors have a lower propensity to sell stocks on which they have a capital loss. This behavioral phenomenon, known as “the disposition effect,” has implications for equilibrium prices. **Grinblatt** and **Han** investigate the temporal pattern of stock prices in an equilibrium that aggregates the demand functions of both rational and disposition investors. The disposition effect

creates a spread between a stock’s fundamental value — the stock price that would exist in the absence of a disposition effect — and its market price. Even when a stock’s fundamental value follows a random walk, and thus is unpredictable, its equilibrium price will tend to underreact to information. Spread convergence, arising from the random evolution of fundamental values and updating of the reference prices, generates predictable equilibrium prices. This convergence implies that stocks with large past price run-ups and stocks on which most investors experienced capital gains have higher expected returns than

those that have experienced large declines and capital losses. The profitability of a momentum strategy, which makes use of this spread, depends on the path of past stock prices. The authors find that stocks with large aggregate unrealized capital gains tend to have higher expected returns than stocks with large aggregate unrealized capital losses; this capital gains “overhang” appears to be the key variable that generates the profitability of a momentum strategy. When this capital gains variable is used along with past returns and volume to predict future returns, the momentum effect disappears.

Health Care

The NBER’s Program on Health Care met in Cambridge on May 3. Program Director Alan M. Garber of Stanford University organized the meeting. These papers were discussed:

Dahlia K. Remler and **Joshua Graff Zivin**, Columbia University, and **Sherry A. Glied**, NBER and Columbia University, “Modeling Health Insurance Expansions: Effects of Alternate Approaches”

Frank R. Lichtenberg, NBER and Columbia University, “The Effect of

Changes in Drug Utilization on Labor Supply and Per Capita Output”

Jay Bhattacharya, Stanford University; **Darius Lakdawalla**, NBER and Rand Corporation; and **Michael Schoenbaum**, Rand Corporation, “Whom Does Medicare Benefit?”

Mark Duggan, NBER and University of Chicago, “Does Contracting Out Increase the Efficiency of Government Programs? Evidence from Medicaid

HMOs” (For a description of this paper, see “Public Economics” earlier in this issue)

Mark V. Pauly, NBER and University of Pennsylvania, and **Bradley J. Herring**, Yale University, “The Demand for Health Insurance in the Group Setting: Can You Always Get What You Want?”

Nancy D. Beaulieu and **David M. Cutler**, NBER and Harvard University, and **Katherine E. Ho**, Harvard University, “Why Quality is So Poor”

Remler, **Zivin**, and **Glied** categorize and describe the different methodological approaches used to predict the effects of proposals to increase health insurance coverage. Finally, they illustrate the conditions under which various modeling approaches diverge, and the quantitative extent of that divergence. All of the modeling approaches implicitly make assumptions about functional form that impose restrictions on unobservable heterogeneity. Those assumptions can dramatically affect the quantitative predictions made.

Lichtenberg examines the effect of changes in both the average *quantity* and average *vintage* (“quality”) of drugs consumed on labor supply, using lon-

gitudinal, condition-level data. First, he considers the effect of changes during 1996-8 in the average number of prescriptions consumed for a given condition on the probability of missed work days. His estimates indicate that conditions for which there were above-average increases in prescription use tended to have above-average reductions in the probability of missed work days. The estimated value to employers of the reduction in missed work days appears to exceed the employer’s increase in drug cost. Using different data, **Lichtenberg** then examines the effect of changes during 1985-96 in the average vintage of prescriptions consumed for a condition

on five different, condition-specific measures of activity limitation, including limits on ability to work. His estimates are consistent with the hypothesis that an increase in a condition’s mean drug vintage reduces the probability that people with that condition will experience activity and work limitations, and reduces their average number of restricted-activity days. The estimates imply that activity limitations decline at the rate of about one percent per year of drug vintage, and that the rate of pharmaceutical-embodied technical progress with respect to activity limitations is about 18 percent. Estimates of the cost of the increase in drug vintage necessary to

achieve reductions in activity limitations indicate that increases in drug vintage tend to be very “cost-effective.”

Bhattacharya, Lakdawalla, and Schoenbaum attempt to construct the rate of return on Medicare for various groups in the population. They focus in particular on how rates of return vary with permanent income and education. This allows them to determine whether Medicare is beneficial for the average person, the average disadvantaged person, or the average advantaged person. Implicitly, they view Medicare taxes as investments in future health benefits. Whether or not Medicare is beneficial depends on the internal rate of return on these investments. The authors find that the internal rate of return is significantly higher for the less educated. Indeed, the internal rate of return is less than the real rate of interest for the most educated groups, but well above it for the least educated. As a result, less educated individuals would willingly choose

to invest in Medicare, while more educated individuals would not. This is true in spite of the fact that less educated people do not live as long.

To what extent do health benefits obtained in the employment-based setting reflect individual preferences? **Pauly and Herring** examine this question by comparing characteristics of plans obtained in this setting to those obtained in the individual insurance market, using data from the 1996-7 Community Tracking Study’s Household Survey. They also examine the effect of unions on group choice. Their structural models of the demand for insurance using individual-level demographic characteristics indicate that plans obtained in the group setting generally reflect underlying preferences for insurance, although they do observe significantly different effects of ethnicity and unionization.

Examining quality measures for care of chronically ill patients by Health Maintenance Organizations

(HMOs) suggests that there is substantial room for improvement, as well as substantial variation among HMO plans. **Beaulieu, Cutler, and Ho** hypothesize several factors, both health plan-related and market-related, that could be associated with higher or lower performance on these chronic care measures. They then test these hypotheses in a multivariate model. They find that HMOs in markets characterized by lower competition and a greater presence of large employers score higher on the chronic care quality measures. Also, several health plan characteristics are associated positively with better performance: not-for-profit tax status; tighter physician networks; privately-held ownership; and group-model organizational form. Socio-demographic characteristics of the market in which health plans operate and the method by which health plans compensate their physicians have no significant influence on the quality of care.

Higher Education

The NBER’s Working Group on Higher Education, directed by Charles T. Clotfelter of Duke University, met in Cambridge on May 3. They discussed these papers:

Jerry G. Thursby, Emory University, and **Marie C. Thursby**, NBER and Georgia Tech, “Are Faculty Critical? Their Role in University/Industry Licensing”
Discussant: Abigail Payne, University of Illinois

Paula E. Stephan, Shiferaw Gormu, A.J. Summell, and Grant Black, Georgia State University, “Patenting and Publishing: Substitutes or Complements for

University Faculty?”
Discussant: Jerry R. Green, NBER and Harvard University

David M. Linsenmeier, Princeton University, and **Harvey S. Rosen** and **Cecilia E. Rouse**, NBER and Princeton University, “Financial Aid Packages and College Enrollment Decisions: An Econometric Case Study”
Discussant: Susan Dynarski, NBER and Harvard University

Thomas J. Kane, NBER and University of California, Los Angeles, “A Quasi-Experimental Estimate of the Impact of Financial Aid on

College-Going”
Discussant: Bridget Long, Harvard University

Jesse M. Rothstein, University of California, Berkeley, “College Performance Predictions and the SAT”
Discussant: Chris Avery, NBER and Harvard University

Randall Reback, University of Michigan, “The Impact of College Course Offerings on the Supply of Academically Talented Public School Teachers”
Discussant: Caroline M. Hoxby, NBER and Harvard University

University licensing has increased in the recent past, and this growth has not been without controversy. Recent research shows that faculty often are involved in the license process well beyond the disclosure of an invention

to their university. This involvement includes the identification of potential licensees and assistance in the further development of a licensed technology. **Thursby and Thursby** present evidence from a survey of 112 firms that

license university inventions. Their results characterize the nature of firms which actively licensed-in from universities, the nature of university technologies that were licensed-in, and the nature of faculty involvement in

licensing. One advantage of their data is that they can examine the relationship between license and sponsored-research agreements involving faculty participation and business characteristics of interest, such as “absorptive capacity” and “connectedness.” These are, respectively, a firm’s ability to utilize university research and the ability of firms to augment their internal capacity with faculty contacts. Thursby and Thursby find that absorptive capacity and connectedness play different roles depending on whether faculty participation in further development is done within the confines of a license agreement for a sponsored research agreement.

Innovative activity in the university sector generally is studied at the institutional level. **Stephan, Gurm, Sumell, and Black** refocus the lens by examining the effects of individual and institutional characteristics on the patent activity of a sample of faculty. They are particularly interested in the relationship between patenting and publishing. The crowding-out hypothesis suggests that faculty patent instead of publishing; the alternative hypothesis, suggesting complementarity between patenting and publishing, also is explored. Using data from the 1995 Survey of Doctorate Recipients, the authors estimate a zero-inflated negative binomial (ZINB model) of patenting activity for the fields of the life sciences, engineering, computer science, and the physical sciences. They choose this model because of the discrete nature of the data and the high occurrence of zeros. Their preliminary results suggest that at the individual level patenting and publishing are complementary activities.

Linsenmeier, Rosen, and Rouse study the effects of a change in financial aid policy introduced by a northeastern university in 1998. Before that time, the university’s financial aid packages for low-income students consisted of grants, loans, and campus jobs. After the change, the entire loan por-

tion of the package for low-income students was replaced with grants. The authors find that the program increased the likelihood of matriculation by low-income students by about 3 percentage points, although the effect was not statistically significant. Among low-income minority students, the effect was between 8 and 10 percentage points and statistically significant at the 10 percent level.

The Cal Grant program provided approximately \$450 million in student grant aid to California undergraduates in both 1998 and 1999. Eligibility for the program is subject to a minimum GPA and maximum level of family income and assets. For a sample of 150,000 youth in California who applied for financial aid in the spring of 1998 and 1999, **Kane** studies discontinuities in college enrollment rates. The data collection strategy is novel, identifying applicants’ enrollment decisions by matching financial aid files with a large national database of student enrollment data. Because there are multiple dimensions of eligibility and multiple thresholds to be studied, the analysis allows for specification tests, comparing any discontinuities on one dimension of eligibility for those who satisfy the other two dimensions of eligibility and for those who do not. The results suggest large effects (4 to 6 percentage points) of eligibility for the Cal Grant A award on the proportion of students enrolling in college in the subsequent year.

Previous studies of the SAT’s contribution to predictions of academic performance ignore many of the other variables that may be predictors and are consistent only under unrealistic sample-selection assumptions. **Rothstein** includes high school demographic variables as predictors and proposes a new estimator of the SAT’s contribution that is consistent under plausible assumptions. Using University of California (UC) data, he finds that the SAT’s contribution is about 75 percent lower than the usual estimates, a result

equally attributable to the two innovations. One important implication is that the SAT functions as a proxy for omitted background characteristics in sparse prediction models, and that this serves to inflate the SAT’s apparent contribution. One application in this paper evaluates the UC’s new “Four Percent Plan,” which enhances academic quality but about which the usual models are overly optimistic.

More selective postsecondary institutions are far less likely to offer teacher certification programs; those that do offer them are less likely to allow students to complete them within their four undergraduate years. Do college course offerings simply meet students’ pre-existing interest in teaching careers, or would the presence of teacher certification programs have a direct effect on undergraduates’ career choices? To examine the overall relationship between the availability of teacher certification programs and the likelihood that academically talented students enter teaching careers, **Reback** combines Barron’s ratings of college selectivity, detailed data tracking college seniors into the workforce, data on the types of teacher certification programs offered by their colleges, and data on states’ certification requirements. Then, to isolate the causal effect of program offerings, he treats as an omitted variable problem the selection issue related to students sorting into colleges based on pre-existing interest in teaching careers. Using another dataset that surveys high school seniors’ career interests and tracks them into college, he estimates an upper bound for the magnitude of the bias in the baseline coefficient estimates. The results suggest that the addition of teacher certification programs that may be completed within four undergraduate years could increase rates of entry into public school teaching by at least 50 percent among recent graduates of certain selective colleges.

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