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Program Report

Public Economics

James M. Poterba

In the three years since the last report on the NBER's public economics program, national policy debates have drawn attention to a number of questions that are central to the research of program members. The tax policy debate of 1993 resulted in substantial increases in marginal tax rates for some households, raising new questions about the incentive effects of tax rates. The emerging debate on a flat tax or a consumption-based alternative to the federal income tax is sure to result in far-reaching discussion of both equity and efficiency issues in the design of tax policy. The recent debate on health care reform generated a host of new research questions concerning the role of government intervention in the marketplace, and the efficacy of particular social insurance policies. Current discussion of proposals to change the level and structure of federal spending on entitlement programs, including Medicare and a variety of programs for low-income, nonelderly households, is also certain to draw heavily on past research, and to stimulate further research, in public economics.

This report summarizes recent work by NBER researchers on a wide range of subjects in public economics. It begins with a survey of work that bears on some of the recent and current federal policy debates, and then proceeds to describe research on a variety of other issues.

Empirical Studies of Taxation and Individual Behavior

The substantial changes in tax rates during the last decade have provided an extraordinary research opportunity for studying the effect of taxation on individual behavior. Researchers have exploited this "natural experiment" in tax policy to analyze behavioral responses. Several widely cited studies suggest that the 1986 reductions in marginal tax rates on high-income households led to substantial increases in their reported taxable income.[1] This effect is important both because it affects revenue estimation, and because the effect of tax rates on taxable income can be an

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important determinant of the efficiency cost of the tax system.[2] While the source of tax-rate-related increases in taxable income is not yet clear, there is evidence of a significant increase in labor supply among married women who experienced large reductions in their households' marginal tax rates.[3] Other empirical studies have considered the effect of marginal tax rates on the decision to realize capital gains,[4] and on the choice between receiving income as taxable wages rather than as fringe benefits.[5] Identifying the channels through which tax rate changes affect individual behavior remains a central item on the program's research agenda.

Several NBER researchers have done related work on individual taxation that is relevant to discussions of tax reform. This includes analyzing the changing nature of the "marriage penalty" in the federal income tax;[6] developing a theory of income taxation when income cannot be measured precisely;[7] and evaluating the efficiency and distributional effects of replacing the current income tax with a value-added tax.[8]

Tax Policy and Saving

NBER researchers also have studied personal saving and how it is affected by tax rates. Several NBER affiliates participated in a project comparing personal saving rates in industrial nations, and summarizing the tax incentives and other public policies that could affect personal saving in these nations.[9]

A number of other studies have described or modeled household saving behavior. One documents the stylized patterns of saving across ages and cohorts in the United

States;[10] others focus on the precautionary motives for household saving;[11] and a third set is concerned with the effects of targeted retirement saving plans, such as Individual Retirement Accounts and 401(k) plans, on personal saving.[12]

Another strand of research on private saving has considered the implications of the ongoing demographic transition in the United States. This includes work describing the current adequacy of young households' retirement saving,[13] as well as research on the link between population aging, economy-wide rates of saving and dissaving, and the rates of return on various financial assets.[14]

Tax Policy and Corporation Behavior

One of the perennial subjects studied by researchers in the public economics program is the effect of taxation on the financial and other decisions of corporations. In the last three years, NBER researchers have addressed a range of new questions, including how liquidity constraints influence corporate start-up decisions by entrepreneurs;[15] how security transaction taxes affect financial markets and the cost of capital;[16] what role aftertax versus pretax returns play as measures of mutual fund performance;[17] and whether tax policy encourages or discourages firm spending on R and D.[18]

NBER scholars also have continued their work on traditional issues in business taxation and finance, developing new insights on the effect of taxation on firm dividend payout policy;[19] on the choice between corporate and noncorporate forms of organization for productive activity;[20] and on the general question of whether equipment investment yields social externalities that warrant special tax subsidies.[21]

International Tax Policy

One rather specialized issue in corporate tax policy that has emerged in the last decade is the role of taxation in an increasingly global economy. A number of NBER researchers have studied a range of questions about international tax policy, paying particular attention to the taxation of capital income in a global economy.[22] Research in this vein has considered the effect of international tax rules on the location of research and development activities;[23] the impact of tax rules on capital investment and the financial decisions of multinational firms;[24] the viability of capital income taxes in open economies;[25] and the effect of specialized tax rules, such as those governing U.S. firms operating in Puerto Rico, on investment behavior.[26]

A number of other studies have tackled broader questions, for example whether outbound foreign direct investment depresses domestic investment in the nation that undertakes the investment;[27] why domestic saving and investment tend to move roughly in tandem over periods of several years;[28] and the link between tax policy and trade policy in achieving government policy objectives.[29]

Social Insurance

The economic effects of social insurance programs have attracted an enormous volume of research activity during the last few years. The national health care policy debate turned the attention of researchers to a new set of problems in policy design and evaluation. Long-term demographic trends that point toward a growing share of elderly households in the U.S. population make social insurance outlays a critical component of prospective government expenditures.

NBER researchers have analyzed many aspects of social insurance programs. To highlight the range of this work, I first report on research on the effects of government policies involving health care markets, and then consider other topics. In the area of health care, Bureau researchers have asked how wages respond to mandated health insurance benefits for workers;[30] how employer-provided health insurance affects job mobility;[31] how changes from fee-for-service to prospective payment have affected the delivery of health care;[32] and how changes in Medicaid rules have affected the likelihood that newly eligible families receive medical care and experience improvements in their health status.[33] Some work on health insurance has tried to evaluate the welfare gains from alternative insurance regimes;[34] the allocative effects of the current tax subsidies on the demand for insurance;[35] and the degree to which public insurance crowds out its private sector counterpart.[36]

Another set of studies has advanced our understanding of unemployment insurance and its effects on smoothing fluctuations in consumption;[37] of how disability insurance affects labor market behavior;[38] and how programs that afford AFDC eligibility to families with two unemployed parents affect the labor supply of such parents.[39] In the area of social insurance programs primarily directed at the elderly, program members have considered the effect of rising social insurance outlays on the degree to which elderly households

are annuitized;[40] and on their labor market decisions, particularly the decision to retire.[41]

State and Local Public Finance

New interest in shifting responsibilities for programs from the federal government to states and localities has heightened Bureau researchers' attention to a new set of tax policy issues. One group of studies considers the impact of school competition on the relationship between inputs and outputs in public education.[42] These studies analyze competition between public and private schools as well as between public schools in different communities, and provide original and innovative evidence on the real effects of competition. Another line of research looks at the degree to which states and localities can affect the aftertax distribution of income by enacting progressive income tax schedules.[43] A third line of work explores the efficacy of police spending in deterring crime,[44] using the ingenious strategy of tracking crime rates around the time of elections in large cities, when the police force typically is expanding.

Other NBER researchers have investigated capital and infrastructure spending, including the effect of institutions for capital budgeting on state capital spending,[45] and the spillovers across states and localities that result from infrastructure investments.[46]

Environmental Taxes

The revenue potential and efficiency effects of taxing various goods that are perceived as imposing external costs on society have been active issues of public policy debate in the last several years. NBER researchers have considered a number of issues relating to environmental tax policy. At the most general level, there have been advances in building computable general equilibrium models used to analyze environmental taxes[47] and in the theory of tax design in the presence of externalities.[48] Specific environmental taxes singled out for analysis include those on alcohol and tobacco;[49] oil and petrochemical feedstocks;[50] and "Superfund" taxes on a variety of chemical inputs to production processes.[51]

Public Policy and Housing Markets

The effect of public policies, particularly tax and financial policies, on housing markets is central to the emerging tax reform debate, but is also of independent interest. During the last two years, Patric H. Hendershott of Ohio State University has directed an NBER Project on Public Policy and Housing Markets. Research in this project has considered the determinants of household mortgage indebtedness[52] and the impact of housing markets on the wealth accumulation patterns of younger households[53] among other topics. Many of the findings from this project were presented at an October 1994 conference, which was summarized in the Winter 1994/5 *NBER Reporter*.

Political Economy of Tax and Spending Policies

One of the newer, but rapidly growing, areas of research in public economics is the political economy of tax and expenditure policies, including: the effect on spending behavior of electoral institutions, such as term limits;[54] whether fiscal institutions and fiscal constraints affect deficit policy;[55] and general discussions of the political economy of the welfare state.[56] One intriguing line of research that has emerged from this area, and that bears directly on much of the empirical research on social insurance, involves the exogeneity of state-level changes in policy that frequently are the subject of so-called "natural experiment" studies.[57] Without a framework for evaluating why policies change, it is difficult to analyze their effects as if they were laboratory experiments, complete with "control" and "experimental" groups.

Government Service

Researchers affiliated with the NBER's Program in Public Economics have a long tradition of testing their expertise through public service. Since the last program report, Michael J. Boskin and David F. Bradford have completed their service on the Council of Economic Advisers (CEA), and Joseph E. Stiglitz has joined the Council. In addition, Faculty Research Fellow David M. Cutler has returned from his stint as a senior staff economist at the CEA. Lawrence H. Summers, formerly Chief Economist at the World Bank, became Undersecretary for International Affairs, and more recently the nominee as Deputy Secretary at the U.S. Department of the Treasury. Alan B. Krueger is currently the Chief Economist of the U.S. Department of Labor.

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Research Summaries

Measuring and Controlling Inflation

Stephen G. Cecchetti

In many ways, the monetary policy of the last 15 years has been strikingly successful: inflation has fallen dramatically, from well over 10 percent per year in the late 1970s to only about 3 percent in recent years. But this new low-inflation environment brings with it a host of questions that do not arise when inflation is at moderate or high levels. For example, is inflation being measured accurately? And, how can policymakers control the future path of inflation? These questions have guided much of my research over the past several years.

Michael F. Bryan of the Federal Reserve Bank of Cleveland and I studied the measurement of the most popular and commonly used aggregate price statistic in the United States: the Consumer Price Index (CPI). The CPI is the most prominent measure of inflation, and thus has become a focal point in the Federal Reserve's inflation fight. Broadly speaking, there are two problems associated with using the CPI to measure inflation: First, it represents month-to-month price changes that may not reflect changes in long-term trends accurately. Measured changes in the CPI often contain substantial short-run, transitory noise that does not constitute long-term inflation, and can easily mislead the monetary authorities

when making decisions. Second, there is a potential bias in the CPI that results from both the expenditure-based weighting scheme it uses and from the persistent errors associated with measuring certain prices. As a result, measured CPI inflation will not reflect the long-run trend in price changes accurately. Since the IRS code, many government expenditure programs, and numerous private contracts all use the CPI as the basis for their indexation, its proper measurement of long-term price movements is of the utmost importance.

Core Inflation

Core inflation is what remains if we can remove from our calculation of inflation changes in variables such as the weather, or movements in oil and clothing prices, and thus obtain a more reliable measure of the underlying trend in price movements. For example, food prices may rise during periods of poor weather to reflect a decrease in supply, thereby producing transitory increases in an aggregate inflation index. Because these price changes do not constitute longer-term inflation, the monetary authorities would not want to base their decisions on them.

There are numerous solutions to the problems posed by temporary movements in prices. One common technique for measuring core inflation excludes certain prices in the computation of the index, assuming that those prices are highly variable. (This is the "ex. food and energy" strategy, in which the existing index is reweighted by placing zero weights on some components.) But is it right to assume that food and energy prices contain so little valuable information about core inflation that they should be excluded completely from the index? And how can we adjust for price variability outside of the food and energy sectors?

As an alternative, Bryan and I examine the Median CPI:[1] that is, the midpoint of inflation in all of the goods and services that go into the aggregate CPI. To account for the vast differences in expenditure on some goods and services relative to others, we use the weighted median. We construct a simple model of pricesetting that captures the intuition that the types of shocks that cause problems with price measurement are infrequent, and that these shocks tend to be concentrated, at least initially, in certain sectors of the economy.

Removing these transitory elements from the aggregate index can be done easily. The problem is that a large and sudden increase in the price of one good may not be matched immediately by an equivalent decrease in the price of some other good. Instead, the offsetting adjustment will take time. Such a price shock will cause standard measures of inflation, based on the mean of inflation in the prices of individual goods, to move up following the initial shock, and down following the compensating adjustment. But these temporary movements will not be present in the median, because it eliminates the undesirable effects of temporarily high or low prices in specific sectors.

The Median CPI has a number of very desirable properties that make it useful for policymakers and macroeconomists alike. First, it is more closely correlated with past money growth, and delivers better forecasts of future inflation, than either the CPI or the CPI excluding food and energy. Moreover, unlike the CPI, the Median CPI is forecast by, but does not itself forecast, money growth.

"[T]he Median CPI stands up to many types of problems that plague the calculation of a price index. Finally, the Median CPI is calculated in a way that protects it against problems such as those caused by the energy price increases of the 1970s, without having to know which sector will next experience a large shock."

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Seasonal Fluctuations in Price Changes

Changes in the seasonal pattern of price changes are a second, but very different, source of short-run price movements. Again these are temporary movements in inflation, but they can create distinct problems for policymakers. For example, early in 1993, the *seasonally adjusted* CPI reversed course and increased at an annual rate of roughly 4.33 percent, about 1.5 percentage points above its average growth rate during the previous six-month period. But over the

next several months, the growth rate of the CPI moderated sharply, averaging less than 2.5 percent annual rate in the final six months of 1993. For the year as a whole, the seasonally adjusted CPI rose only 2.75 percent, about 0.25 percentage points *below* 1992's rate.

A popular interpretation of these events is that the inflationary scare of 1993 was a result of seasonal price increases that were not part of a more persistent inflationary process. In fact, several studies have identified a pattern of large price increases during the first several months of every year followed by a more moderate inflation performance over the balance of the year. Indeed, prior to this recent experience, there was a common belief among economists that prices contained little seasonal variation.

While monthly consumer prices are certainly volatile, there is little obvious seasonal movement in the aggregate data. However, for certain items, such as women's apparel, the seasonal pattern is distinct and very large. This has a practical implication: the practice of constructing a seasonally adjusted aggregate index from select seasonally adjusted disaggregated price indexes may not be sufficient to rid the aggregate series of its seasonal pattern. These observations raise two important questions that I have examined. Has the seasonality in prices changed substantially over the past quarter century? And, is there a better way to calculate a seasonally adjusted aggregate CPI?

In a recent paper, Bryant and I conclude that since World War II, much of the seasonal variability in aggregate prices was obscured by a dominant cyclical variability in prices.[2] Seasonal price movements have become more prominent in the relatively stable inflation environment prevailing since 1982, though.

Beyond this, it appears that seasonality in consumer prices is predominantly, although certainly not entirely, idiosyncratic in nature: that is, the vast majority of the seasonality in one set of individual prices is offset by seasonality in other individual prices, and so does not appear in the aggregate index. Together with the fact that the Bureau of Labor Statistics does not seasonally adjust all of the component price data, this explains why the seasonally adjusted aggregate CPI may still exhibit seasonality. The natural solution to this problem is to seasonally adjust the aggregate index *after* aggregation, not before.

Bias in the CPI

Is there also long-run bias in the measurement of inflation? Several extremely important policy issues revolve around that question. The first is whether a goal of zero inflation literally means zero or whether, because of various biases in the calculation of inflation, some low but nonzero rate of measured inflation is sufficient. The second concerns the effect of linking the indexation provisions in private contracts and government programs to actual CPI inflation rather than to some adjusted CPI that accounts for bias.

There are two general reasons for the long-run trend in the CPI to deviate from an ideal measure of inflation. The first is the result of the weighting scheme the CPI employs that is based on expenditures (that is, weighting bias), while the second is the result of persistent errors in measuring certain prices (that is, measurement bias). The existence of bias implies that *any* fixed-weight price index will not be a perfect long-run target for a policy aimed at aggregate price stability. But how large is the bias in the CPI?

Previous researchers have addressed the issue of bias in price statistics by performing calculations based on highly disaggregated information. This approach at best provides only a broad approximation. Moreover, the bias in the price statistics depends on the severity and origin of supply shocks, on changes in technology and tastes, and on phenomena that vary over time. So the time-invariant estimates derived from these studies are of only limited value to policymakers.

My strategy with Bryan is different.[3] Using a simple statistical framework, we compute a price index that is immune to the weighting bias inherent in the CPI. It is based on work by Stock and Watson,[4] and we label it a "dynamic factor index." Loosely speaking, dynamic factor indexes of consumer prices are constructed by weighting (in a time-varying way) commodities based on the strength of a common inflation signal. Estimates of weighting bias in the CPI are roughly 0.6 percent annually in 1967 to 1992, but the size of that bias varies substantially within subperiods. In fact, since 1981, weighting bias in the CPI as a measure of inflation has been negligible.

The dynamic factor indexes do not account for the potentially important measurement biases that arise when goods are systematically excluded, or when there is a common measurement error, such as a change in aggregate quality that is not being picked up. It is possible to gauge their severity by comparing the dynamic factor indexes computed from commodity

subsets of the data. Assuming that differences between inflation in goods prices and inflation in services prices are entirely a result of measurement bias in the latter category, the measurement bias in the CPI can be estimated. We find that it may have been as high as 0.5 percentage points per year since 1982.

Inflation Policy

Since late 1979, the goal of monetary policy in the United States, as in most industrial nations, has shifted toward the reduction of the level and the variation in inflation. Reducing the variability of inflation requires both that one be able to forecast the future path of the price level, and that one have estimates of what impact policy changes have on that path. Recently, I have examined our practical ability to do these things.[5]

Unfortunately, inflation is very difficult to forecast even at very near horizons. This is because the relationship of inflation indicators to inflation is neither very strong nor very stable. Furthermore, the relationship between monetary policy instruments, such as the Federal Funds rate, and inflation also varies substantially over time and cannot be estimated precisely.

Construction of policy rules can take these difficulties into account. Comparison of the results of price level targeting with nominal income targeting suggest that the difficulties inherent in forecasting and controlling the former provide an argument for focusing on the latter. Nominal income targeting has a type of robustness not shared by price level targeting. Focusing solely on inflation leads to substantial increases in the variability of real output, while focusing on nominal income does not increase the variance of inflation by nearly as much.

Finally, since prices take time to respond to all types of unexpected events, the object of price or nominal income stability implies responding immediately to a shock, rather than waiting for prices to rise before acting. This seems to present monetary policymakers with an unhappy dilemma. Because of long lags in the transmission of their decisions to the price level, policymakers must be forward looking and react quickly to changes in the inflation outlook. Unfortunately, the results of my work demonstrate both how murky, and how unstable, the inflation outlook generally is, and how difficult it is to reduce the variability of prices.

[1] *M. F. Bryan and S. G. Cecchetti, "Measuring Core Inflation," in* Monetary Policy, *N. G. Mankiw, ed. Chicago: University of Chicago Press, 1994, pp. 195–215.*

[2] *See M. F. Bryan and S. G. Cecchetti, "The Seasonality of Consumer Prices," NBER Working Paper, forthcoming.*

[3] *M. F. Bryan and S. G. Cecchetti, "The Consumer Price Index as a Measure of Inflation,"* Economic Review of the Federal Reserve Bank of Cleveland *29 (1993 Quarter 4), pp. 15–24.*

[4] *J. H. Stock and M. W. Watson, "A Probability Model of the Coincident Economic Indicators," in* Leading Economic Indicators: New Approaches and Forecasting Records, *K. Lahiri and G. H. Moore, eds. Cambridge, England: Cambridge University Press, 1991, pp. 63–89.*

[5] *S. G. Cecchetti, "Inflation Indicators and Inflation Policy," NBER Working Paper No. 5161, June 1995.*

The Financing Costs and Insurance Benefits of Social Insurance Programs

Jonathan Gruber

One of the most important trends in government activity over the past 30 years is the increase in the share of the government budget devoted to social insurance programs, including Social Security, Medicare, Unemployment Insurance, and Medicaid. At the federal level, spending on social insurance programs has grown from 13.5 percent of the budget in 1960 to 36.8 percent in 1993. This rapid growth in spending has been paralleled by increased economic research on the effect of social insurance programs on economic behavior. This research has focused primarily on the costs of these government interventions, through distortions to individual and firm decisionmaking. But there are two further important questions about social insurance programs that have remained relatively unexplored. First, what is the effect of different ways of financing social insurance interventions? Second, what are the benefits of these interventions? My research over the past several years has been devoted to addressing these questions.

Financing Costs

Employer Mandates

There are three primary alternatives for financing interventions designed to increase access to insurance for adverse events: providing the insurance publicly, and financing the provision through increased general taxation; subsidizing the individual purchase of the insurance;

and mandating that employers provide the insurance to their workers. The last of these approaches, employer mandates, is particularly attractive to governments as a means of financing social insurance interventions in this era of tight fiscal budget constraints. The U.S. government over the last century has mandated that employers provide workers' compensation coverage to insure workers against workplace injury, offer (unpaid) maternity leave to employees, and pay a minimum hourly wage. And the central feature of the recent Clinton health care reform proposal was employer-mandated provision of health insurance to employees.

A key question about employer mandates is whether they will raise the cost of labor, and thereby lead to layoffs and unemployment. Since workers are getting a valuable benefit at the workplace, such as health insurance, they will be willing to work for a lower wage. In the extreme case in which workers value this benefit at its cost to their employers, then they will work for the same amount of total compensation, with their wages falling to fully offset the cost of the insurance. In this case, mandates will have no effects on employment. Thus, the extent to which the cost of mandated health insurance is shifted to wages is a central question for evaluating the effects of this means of financing government interventions.

Two of my research projects have attempted to answer this question by evaluating the prior experience of the United States with large mandated employer benefits. In the first,[1] I examine the effect of several state and federal laws that mandated the provision of comprehensive coverage for childbirth in employer-provided health insurance plans. These laws raised the costs of employing women of childbearing age, as well as their husbands who covered them in their health insurance plans. I find that the increased insurance costs were shifted fully to these workers' wages, with no effect on total labor supply. As would be expected with a mandate that costs a fixed amount per worker, there was some increase in hours and reduction in employment, but the net of the two remained constant.

In the second,[2] Alan B. Krueger and I study the effects of increases in the cost of workers' compensation insurance, the oldest and largest mandated benefit in the United States. Workers' compensation costs rose dramatically in the 1980s, because of rising medical costs and increased generosity of state legislatures (which set the benefit levels); in some industries, costs rose by over 10 percent of payroll, and by 1987 were as high as 25 percent of payroll. We find, however, that almost all of these increased costs were shifted to workers' wages, and that cost increases had no significant effect on employment.

In some recent related work, I also investigate the labor market effects of the privatization of Social Security in Chile.[3] While financed by payroll taxation rather than employer mandate, the implications of Social Security financing for employment and wages are the same since this was also a program that was financed by employers and provided benefits solely to employees.[4] The dramatic shift in financing under privatization lowered the average payroll tax rate on firms by over 20 percent over several years. Using a sample of Chilean manufacturing plants, I find that this reduction in payroll taxes was fully shifted to wages, with no effect on employment. Thus, my results suggest that mandating employers to provide benefits to their workers, or taxing them to finance these benefits, results in lower employee wages but no fewer jobs.

Subsidies

An alternative to mandating that employers provide health insurance to their workers is to subsidize individual purchase of insurance. The success of any subsidy plan rests critically on the elasticity of demand for insurance (the degree of price responsiveness) by the uninsured. Unfortunately, past literature on this question has suffered from a number of methodological problems, such as the fact that those facing the highest price for insurance (that is, small businesses) may have different demand for insurance for other reasons (that is, they have young workers). James M. Poterba and I surmount these methodological problems to estimate the elasticity of demand for insurance among the self-employed.[5] We do so by using the "natural experiment" provided by a 1986 change in the federal tax code, which subsidized the purchase of insurance by self-employed individuals while holding the tax subsidy constant for employed workers. Thus, we can estimate the elasticity of demand by observing changes in demand for insurance by self-employed, relative to employed, persons. We find that insurance coverage rose dramatically for the self-employed relative to the employed, and our estimates imply that a 1 percent decline in the price of insurance will raise insurance coverage by over 1 percent.

Publicly Provided Insurance

The final alternative is publicly provided insurance, for example the National Health Insurance (NHI) plan established by Canada in the late 1960s. With this approach, the key question again is whether the financing mechanism will lead to widespread employment losses. To address this question, Maria J. Hanratty and I exploit the fact that NHI was introduced on a staggered basis across the Canadian provinces, so that we can observe how employment responded in each province as NHI was introduced.[6] We find, surprisingly, that employment actually rose as NHI was introduced. Our results suggest that the benefits of NHI in terms of improving workers' health or increasing their ability to change jobs may outweigh the costs of the higher taxes required to finance universal coverage.

Insurance Benefits

A noticeable feature of the social insurance literature is its focus on the *costs* of government interventions, in terms of distortions to individual behavior, without much consideration of the *benefits* of these interventions. I have done a number of studies that try to model these benefits explicitly for government interventions in health care and unemployment insurance.

Increased Labor Force Mobility

A distinguishing feature of the current system of health care in the United States is that insurance is linked to the workplace. As a result, individuals may be afraid to leave jobs with health insurance, because other jobs may not offer coverage, individual insurance coverage is quite expensive, and most new insurance policies come with "preexisting conditions exclusions" that limit coverage of existing illnesses. This problem is colloquially known as "job-lock." One potential benefit of government intervention in health insurance markets is that it might alleviate this important distortion to labor mobility.

"[M]andating employers to provide benefits to their workers, or taxing them to finance these benefits, results in lower employee wages but no fewer jobs."

In joint research with Brigitte C. Madrian, I have investigated this phenomenon in two contexts in which moving out of one's job may be limited by the fear of losing group coverage. The first is the decision to retire before the age of Medicare eligibility.[7] We study the effect of state and federal laws that mandated that workers be allowed to continue their health insurance coverage for some period (up to 18 months) after leaving their jobs. These "continuation of coverage" mandates stipulate that the worker pay only the average group cost of health insurance. This is substantially below the cost of insurance that is purchased individually by a 55–64-year-old, so continuation mandates mitigate the disincentive to retirement that arises from having insurance on the job but not in retirement. We find that the availability of continuation coverage dramatically increases the propensity to retire; one year of coverage raises retirement rates by 15 percent. These sizable effects suggest that there may be even larger responses of retiree health insurance coverage that is more highly subsidized or not time limited.

The second context is the mobility of younger workers.[8] Continuation mandates also provide an alleviation of job-lock for younger workers who want to switch to new jobs but have short-run medical costs that make them reticent to leave their current health insurance plan. We find large effects of continuation mandates for this population as well: providing one year of continuation coverage raises the probability of changing jobs by 10 percent. This finding has two important implications: first, job-lock is a not a trivial phenomenon; and second, much of job-lock arises from short-run concerns that can be alleviated by time-limited public policies such as continuation mandates.

Improved Health Outcomes

Another example of a potential gain from a social insurance intervention is the health benefit of providing public insurance coverage to those currently uninsured. Providing broader insurance coverage may not improve the health of the uninsured population, however, for two reasons. First, the uninsured still may not have access to providers willing to serve them: there is substantial segregation between the population of most need and physicians' offices. Second, there is surprisingly little evidence that health insurance actually is good for health. While the uninsured are generally in worse health than those with insurance, this may reflect not their lack of insurance but the other factors that lead them to be uninsured, such as low incomes. So it becomes important for designing health policy to understand the magnitude of any health

benefits from increases in publicly provided insurance.

In two recent papers, Janet Currie and I note that the United States already has experience with a substantial increase in public insurance coverage for the poor under its Medicaid program. At one time tied to receipt of cash welfare, this program is now available to all pregnant women and young children with incomes under 133 percent of the poverty line; in some states, availability has been extended to those with incomes up to twice the poverty line.[9] We first examine the effect of extended coverage for pregnant women on the health of their newborns.[10] This has the advantage that there are two precisely measured and objective indicators of health for newborns: birthweight and infant mortality. We find that increased Medicaid eligibility led to significant decreases in the incidence of low birthweight births and infant deaths. Our estimates suggest that the 20 percent increase in Medicaid eligibility for pregnant women during the 1980s led to a 7 percent fall in the infant mortality rate.[11]

We then extend this methodology to examine the medical utilization and health outcomes of children made eligible for Medicaid during 1984–92.[12] We find that making children eligible for Medicaid lowers their likelihood of going without a doctor's visit over a one-year period and increases the frequency of visits in office-based settings. We also find that expanded eligibility is associated with a drop in child mortality. Furthermore, we find an equalization effect of Medicaid: the effects are larger on black children, who start from a position of using fewer health services and being in worse health. Overall, then, our results suggest that there are substantial health benefits from increasing public insurance coverage of low-income populations.[13]

Consumption Smoothing

Unemployment insurance (UI) is a classic example of a program in which past research has documented the distortions caused by increased benefits generosity, for example an increase in the duration of spells of unemployment.[14] In the absence of private insurance markets for unemployment, though, generous UI systems yield important benefits in terms of smoothing the consumption of workers during their spells of unemployment. But there has been little emphasis on measuring these benefits.[15]

I investigate the consumption smoothing benefits of UI by modeling the change in consumption of workers who leave their jobs as a function of the generosity of their UI benefits.[16] I find that workers with more generous UI benefits reduce their consumption by much less than workers with less generous benefits. During 1968–87, the average unemployed person reduced food consumption by 7 percent upon losing his or her job. My estimates imply that this fall in consumption would have been 22 percent, or over three times as large, if there were no UI available. I also find that the benefits of the UI program in terms of smoothing consumption are concentrated on those workers for whom unemployment is a surprise, and who as a result have not otherwise prepared to maintain their consumption (with savings or other forms of "insurance").

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[1]*J. Gruber, "The Efficiency of a Group-Specific Mandated Benefit: Evidence from Health Insurance Benefits for Maternity," NBER Working Paper No. 4157, September 1992, and "The Incidence of Mandated Maternity Benefits,"* American Economic Review *(June 1994), pp. 622–641.*

[2]*J. Gruber and A. B. Krueger, "The Incidence of Mandated Employer-Provided Insurance: Lessons from Workers' Compensation Insurance," NBER Working Paper No. 3557, December 1990, and in* Tax Policy and the Economy, Volume 5, *D. F. Bradford, ed., 1991. Cambridge, MA: MIT Press, pp. 111–143.*

[3]*J. Gruber, "The Incidence of Payroll Taxation: Evidence from Chile," NBER Working Paper No. 5053, March 1995.*

[4]*This is a point of some confusion in the literature on the economics of mandates; see J. Gruber, "Payroll Taxation, Employer Mandates, and the Labor Market: Theory, Evidence, and Unanswered Questions," Mimeo, MIT, November 1994.*

[5]*J. Gruber and J. M. Poterba, "Tax Incentives and the Decision to Purchase Health Insurance: Evidence from the Self-Employed," NBER Working Paper No. 4435, August 1993, and "The Elasticity of Demand for Health Insurance: Evidence from the Self-Employed,"* Quarterly Journal of Economics *(August 1994), pp. 701–734.*

[6]*J. Gruber and M. J. Hanratty, "The Labor Market Effects of Introducing National Health Insurance: Evidence from Canada," NBER Working Paper No. 4589, December 1993, and* Journal of Business and Economics Statistics *(April 1995), pp. 163–174.*

[7]*J. Gruber and B. C. Madrian, "Health Insurance Availability and the Retirement Decision," NBER Working Paper No. 4469, September 1993, and* American Economic Review, *forthcoming.*

[8]*J. Gruber and B. C. Madrian, "Limited Insurance Portability and Job Mobility: The Effects of Public Policy on Job-Lock," NBER Working Paper No. 4479, September 1993, and "Health Insurance and Job Mobility: The Effects of Public Policy on Job-Lock,"* Industrial and Labor Relations Review *(October 1994), pp. 86–102. See also B. C. Madrian, "Employment-Based Health Insurance and Job Mobility: Is There Evidence of Job-Lock?"* Quarterly Journal of Economics *(February 1994), pp. 27–54.*

[9]*These "Medicaid expansions" are described in detail in A. S. Yelowitz, "The Medicaid Notch, Labor Supply and Wel-*

fare Participation: Evidence from Eligibility Expansions," Quarterly Journal of Economics, *forthcoming.*

[10]*J. Currie and J. Gruber, "Saving Babies: The Efficacy and Cost of Recent Expansions of Medicaid Eligibility for Pregnant Women," NBER Working Paper No. 4644, February 1994.*

[11]*At the same time, constraints on physician access do matter for health outcomes; see J. Currie, J. Gruber, and M. Fischer, "Physician Payments and Infant Mortality: Evidence From Medicaid Fee Policy," NBER Working Paper No. 4930, November 1994, and* American Economic Review, *forthcoming.*

[12]*J. Currie and J. Gruber, "Health Insurance Eligibility, Utilization of Medical Care, and Child Health," NBER Working Paper No. 5052, March 1995.*

[13]*At the same time, of course, these expansions are quite costly; for a discussion, see D. M. Cutler and J. Gruber, "Does Public Insurance Crowd Out Private Insurance?" NBER Working Paper No. 5082, April 1995.*

[14]*See, for example, B. Meyer, "Unemployment Insurance and Unemployment Spells,"* Econometrica *(1990), pp. 757–782.*

[15]*For a notable exception, see D. S. Hamermesh "Social Insurance and Consumption: An Empirical Inquiry,"* American Economic Review *(1982), pp. 101–113.*

[16]*J. Gruber, "The Consumption Smoothing Benefits of Unemployment Insurance," NBER Working Paper No. 4750, May 1994.*

Industrial R and D: Determinants and Consequences

Bronwyn H. Hall

In modern industrial economies, technical change and innovation are considered to be a major impetus behind economic growth and improvements in the standard of living. Although many "actors" are important in creating a climate in which innovation can flourish, in a market economy it is primarily private firms that deliver the benefits of scientific research and technological innovation to consumers. For this reason, I and other economists have focused on understanding and measuring the forces that determine individual firm performance in this area, and on evaluating the effectiveness and direction of industrial research.

Economic analysis of industrial R and D has led many to question whether private firms have an incentive to undertake the amount of R and D that is optimal for society as a whole.[1] This causes us to ask by how much the private returns to R and D fall below the social returns; whether our capital market and corporate governance systems do a good job of encouraging R and D investment and innovation; how effective such government policies as the R and D tax credit are; and how our performance and policies compare to those of other large developed economies. My own recent research has examined: the consequences of U.S. capital market structure and the corporate restructuring wave of the 1980s for the performance of R and D; the effectiveness of the R and D tax credit in inducing firms to increase their R and D spending; the contribution of industrial R and D both to productivity growth and to the private returns of individual firms during the recent past; and comparisons of U.S. firm performance in this area with that of France and other countries.

The Market for Corporate Capital and Industrial R and D

During the past decade many observers viewed the wave of restructuring and downsizing in the U.S. manufacturing sector as inimical to investment in R and D in that sector. Some went so far as to argue that the market for corporate control had a serious negative impact on companies' long-term investment, which in turn contributed to the decline of the United States in global competitiveness. Beginning with a study for a 1987 NBER Conference on Corporate Takeovers, I have investigated the evidence behind this argument in a series of papers, and reached the conclusion that the picture has been greatly overdrawn. Still, there is no doubt that a variety of external forces led simultaneously to an increase in leverage and a reduction in R and D investment in certain sectors.[2]

The financial restructuring of U.S. public corporations can be divided loosely into three classes of activity: ordinary merger or acquisition activity; leveraged buyout or going private transactions; and large shifts in the balance sheet toward debt without going private. During the 1980s, the relationship among these three activities and the R and D activities of the firm varied substantially, with only the third being clearly associated with declines in R and D spending. Ordinary merger activity unaccompanied by changes in leverage seems to have gone on throughout the period without having much impact on firms' R and D policies. After a merger, the typical firm had an R and D-to-sales ratio that was equal to a size-weighted average of the intensities of the two merging firms.[3] Not only does this imply that mergers are not necessarily

negative for R and D investment, but it also indicates that cost-saving on R and D was probably not the primary motive for these mergers.

Leveraged buyouts and going private transactions increased dramatically during the 1980s, but the potential impact on R and D spending was minuscule, for the simple reason that most of these took place in sectors where R and D investment historically had not been an important part of business strategy (food, textiles, auto parts, tires, fabricated metals, and miscellaneous manufacturing). In ten years, the total amount of annual R and D investment involved was less than 0.5 percent of annual industrial R and D spending during the period.

However, leveraged restructurings in which the firm was not taken private also increased during the 1980s, and these transactions often were followed by substantial declines in R and D investment throughout the period and particularly in the latter half: for example, the decline in R and D intensity for such firms was about 0.8 percent (from 3.4 to 2.6) for 1982 to 1987. The firms involved were primarily in sectors with relatively stable long-horizon technologies (petrochemical, steel, autos) that have been under pressure from foreign competition. Case study evidence does not generally support the view that these foregone investments would have been highly productive for the firms in question. The aim of these restructurings seems to have been shrinking excess capacity in these industries.[4]

Thus, rather than interpreting the corporate restructuring wave as negative for R and D and other long-term investments, it makes more sense to view the two phenomena, increases in leverage and declines in investment, as joint consequences of the higher overall cost of capital during this period and changes in the relative price of debt to equity.[5]

The Returns to R and D During the 1980s

To provide another perspective on the factors affecting changes in R and D investment strategy in U.S. manufacturing during the 1980s one needs to take a closer look at the ex ante and ex post returns to these investments. Ex ante, the stock market signals its expectations of the future profitability of investment in particular firms and sectors via the discrepancy between the market value of existing capital and the book value of the underlying assets (albeit with considerable random error). During the 1980s, the ratio between the market value of ordinary capital and the book value of that capital for the average firm rose from somewhat less than one toward one in most manufacturing sectors.[6] The implication of this finding is that the wave of restructuring and downsizing that we experienced during the period had the effect of removing less productive firms and capital from the sector.

In contrast, changes in the ratio between the market value and the book value of capitalized R and D expenditure varied widely across sectors in ways consistent with the restructuring scenario: in the traditional medium technology sectors of nonpharmaceutical chemicals and petrochemicals, metals, transportation equipment, and machinery, the value of R and D rose from below one to close to one during the period, as the sectors shrank. In pharmaceuticals it has remained above unity throughout most of the past 20 years (through 1991). However, in the electrical, scientific instruments, electronics, and computing sectors, the value of capitalized R and D fell precipitously, becoming close to zero at the end of the 1980s in the electronics and computing sectors. This result admits of two (related) interpretations: either the expected return to future investments in these industries is very low, or the past investments have experienced a much faster depreciation of economic returns than the rate at which they are traditionally capitalized (15 percent).

Ex post results on the contribution of R and D investment to firm revenue support this interpretation. They show that the contribution of R and D to sales growth was low during the 1970s and the first half of the 1980s but has increased recently, except in the electrical industry and in the large-firm part of the computing, machinery, metals, and motor vehicle industries. The overall explanation for these findings is that the very substantial restructuring of the manufacturing sector during the 1980s raised the valuation of ordinary capital (and of R and D capital in the medium-technology sectors). At the same time entry by smaller firms and new technology coupled with a speedup in product cycles eroded the profits in the electrical and computing sectors, leading to a substantial decline in the valuation of their investments.[7] It is noteworthy that although the private returns in these sectors have been low, the benefits that have spilled over to consumers have been large: almost all of the productivity gains in the computing and electronics sectors have gone to the purchasers of their products rather than to the industry itself. This is another piece of evidence of the

gap between the private and social returns to R and D.[8]

Market Myopia Toward R and D

The argument that a liquid market for corporate capital such as the United States experienced during the 1980s is not a market that encourages investment in innovation often goes hand-in-hand with complaints about short-termism in U.S. equity markets. That is, analysts are focused on short-term earnings rather than on the potential payoff from long-term investments, and this discourages firms from undertaking them. One way to examine this claim is to measure the discount rate that investors implicitly are applying to the cash dividend streams they expect to receive from holding the shares in a company. Do they penalize firms that have low current earnings and high R and D investment rates?

The answer to this question is no.[9] Although it is perfectly true that the average discount rate that investors apply to the future cash dividends of firms is somewhat higher than the rate at which they discount Treasury bills and bonds (as earlier researchers have found), it is lower than average for firms with either higher R and D investment or higher capital spending, and higher than average for firms with high current earnings.[10] In addition, this discount rate seems to have fallen somewhat during the 1980s, suggesting that investors have become less myopic, if anything. In some respects, this finding is the mirror image of the findings discussed earlier: if anything, investors in the late 1970s and early 1980s were overly optimistic about the future profits to be earned from R and D investments in some sectors, leading to a tendency to discount such investments at a low rate.

R and D Tax Policy and the Cost of Capital

The potential for market failure in the allocation of resources for industrial research has led to a desire for further understanding of the cost of capital faced by firms undertaking R and D and of the effects of corporate tax provisions on that cost of capital. Recent research has addressed both these questions. In addition to the normal considerations that apply to the cost of any type of investment, two features of R and D require special consideration: first, the very fact that it typically creates an intangible, highly idiosyncratic and risky asset will tend to increase the effective cost faced by firms. Second, the U.S. tax system contains several features intended to reduce this cost for R and D-performing firms, among them the expensing of most R and D, the rules on the allocation of R and D spending to foreign source income, and most importantly, the incremental Research and Experimentation Tax Credit.[11]

The asset created by R and D is to a great extent intangible knowledge, embodied only in scientists and engineers. Its value is typically difficult to signal to the market ex ante (even if it is known). Therefore we might expect firms to find internal funds much cheaper than external, and equity cheaper than debt (because of the lack of a securable asset) when financing this investment. Whether or not this is true matters, both because many innovative firms find it difficult to generate the earnings necessary for investment and because our tax system has an implicit subsidy for debt financing relative to equity.

It is easy to find evidence for the preference of R and D-intensive firms for equity over debt, but somewhat more difficult to evaluate the importance of the "liquidity" constraint for these firms.[12] There are two reasons for this difficulty: first, in general, finding that investment of any kind is sensitive to cash flow always admits of two interpretations. Either the firm is responding to positive or negative demand shocks that appear as changes in cash flow, or the firm indeed finds internal funds a cheaper source of capital, and so it increases investments when these increase. Second, for R and D investment in particular, adjustment costs are high, and firms have incentives to smooth their investment paths. This fact will moderate any year-to-year responsiveness to liquidity, although at the same time it implies that firms will underinvest even more.[13] In spite of these problems, a series of studies has documented the importance of liquidity constraints for R and D investment by U.S. firms.[14]

Evidence that firms are not able to capture all the returns to R and D investments, in spite of the legal mechanisms available, including patenting and trade secret protection, implies that society as a whole would be better off if we could induce firms to perform more R and D. The R and D tax credit, which has been a feature of the U.S. tax system since 1981, is the most prominent and wide-ranging of the government policies designed for this purpose.[15] Before 1985, most researchers found relatively weak evidence that firms responded to the tax credit by increasing their R and D spending.[16] Most attributed this to the fact that the effective tax credit faced by most firms amounted to a reduction of 5 percent in the marginal

cost of R and D, rather than the statutory rate of 25 percent.

New results suggest that by 1990 the tax credit has become more effective, in that the amount of additional R and D spending induced by the credit has been greater than the cost in foregone tax revenue.[17] This has occurred in spite of the fact that the effective credit rate is small, because the average tax price elasticity for R and D spending is around one in the short run, and also because it has taken firms some time to adjust to the continuing presence of the tax credit in our corporate tax system.[18]

International Comparisons

Many questions about the role of the government and institutional environment in promoting innovation are difficult to answer by studying the experience of a single country. The conclusion that U.S. firms probably were investing and disinvesting "correctly" on average during the 1980s, given the behavior of the stock market, real interest rates, and other macroeconomic factors does not really answer the question of whether other environments might elicit a more socially productive level of investment. To explore such questions as these, we have begun a collaboration with colleagues in several European countries that differ in various ways from the United States.

The initial results of this project are described in a comparative study using about 1000 manufacturing firms each from France and the United States.[19] We find that the contribution of R and D to sales productivity growth declined during the 1980s in France as well as in the United States. The simultaneity among sales growth and both R and D and ordinary investment is somewhat higher in the United States than in France, possibly reflecting the greater importance of liquidity constraints for investment in the United States. Future work will incorporate comparisons to the United Kingdom, Germany, and Japan.

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[1]*See R. R. Nelson, "The Simple Economics of Basic Scientific Research,"* Journal of Political Economy *(1959), pp. 297–306; and K. Arrow, "Economic Welfare and the Allocation of Resources for Invention," in* The Rate and Direction of Inventive Activity, *R. R. Nelson, ed. Princeton: Princeton University Press, 1962, pp. 609–625. Empirical evidence on the topic has been surveyed by Z. Griliches, "The Search for R and D Spillovers," NBER Reprint No. 1758, November 1992, and* Scandinavian Journal of Economics, *(1992).*

[2]*See B. H. Hall, "The Effect of Takeover Activity on Corporate Research and Development," NBER Reprint No. 1091, December 1988, and in* The Economic Effects of Takeover Activity, *A. J. Auerbach, ed. Chicago: University of Chicago Press, 1988; and "The Impact of Corporate Restructuring on Industrial Research and Development,"* Brookings Papers on Economic Activity *(1990:1), pp. 85–136; and "Corporate Restructuring and Investment Horizons,"* Business History Review *68 (Spring 1994), pp. 110–143.*

[3]*See B. H. Hall, "The Effect of Takeover Activity . . ." and "The Impact of Corporate Restructuring . . . ," ops. cit.*

[4]*See the evidence reviewed in B. H. Hall, "Corporate Restructuring . . . ," op. cit. For a different way of looking at the same phenomenon, see M. C. Jensen, "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems,"* Journal of Finance *48 (1993), pp. 831–850.*

[5]*This point also has been made by M. M. Blair and R. E. Litan, "Corporate Leverage and Leveraged Buyouts in the Eighties," in* Debt, Taxes, and Corporate Restructuring, *J. B. Shoven and J. Waldfogel, eds. Washington, DC: Brookings Institution, 1990.*

[6]*See B. H. Hall, "Industrial Research During the 1980s: Did the Rate of Return Fall?" NBER Reprint No. 1858, March 1994, and* Brookings Papers on Economic Activity: Microeconomics *2 (1993), pp. 289–344; and "The Stock Market Valuation of Research and Development Investment During the 1980s,"* American Economic Review *83 (May 1993), pp. 259–264, for the evidence discussed here.*

[7]*See B. H. Hall, "The Stock Market Valuation . . . ," op. cit.*

[8]*See B. H. Hall, "The Private and Social Returns to Research and Development: What Have We Learned?" paper presented to the American Enterprise Institute/Brookings Institution Conference on the Contributions of Research to Economic Growth and Society, Washington, DC, October 1994 (forthcoming in the conference volume); and Z. Griliches, "Productivity and the Data Constraint,"* American Economic Review *84 (1994), pp. 1–43 for more detailed discussion.*

[9]*See B. H. Hall and R. E. Hall, "The Value and Performance of U.S. Corporations,"* Brookings Papers on Economic Activity *(1993:1), pp. 1–50.*

[10]*See, for example, R. Mehra and E. C. Prescott, "The Equity Premium: A Puzzle,"* Journal of Monetary Economics *19 (1985), pp. 145–161.*

[11]*For a review of the foreign source income allocation rules for R and D intensity in the cross section, see J. R. Hines, Jr., "International Taxation,"* NBER Reporter, *Fall 1994, pp. 10–15.*

[12]*For evidence that leverage is inversely correlated with R and D intensity in the cross section, see M. S. Long and I. B. Malitz, "Investment Patterns and Financial Leverage," in* Corporate Capital Structures in the United States, *B. M. Friedman, ed. Chicago: University of Chicago Press, 1985; and B. H. Hall, "Research and Development Investment at the Firm Level: Does the Source of Financing Matter?" NBER Working Paper No. 4096, June 1992.*

[13]*See B. H. Hall and F. Hayashi, "Research and Development as an Investment," NBER Working Paper No. 2973, May 1989; Z. Griliches, B. H. Hall, and A. Pakes, "R&D, Patents, and Market Value Revisited: Is There a Second (Technological Opportunity) Factor?"* Economics of Innovation and New Technology *1 (1991), pp. 183–202; S. Lach and M. Schankerman, "Dynamics of R&D and Investment in the Scientific*

Sector," Journal of Political Economy *97 (1988), pp. 880–904; and J. L. Bernstein and M. I. Nadiri, "Financing and Investment in Plant and Equipment and Research and Development," in* Prices, Competition, and Equilibrium, *M. H. Peston and R. E. Quandt, eds. Oxford, England: Philip Allan, 1986, pp. 233–248, for evidence that R and D spending is relatively smooth within firms and displays high adjustment costs.*

[14]*See B. H. Hall, "Research and Development Investment at the Firm Level . . . ," op. cit., and C. P. Himmelberg and B. C. Peterson, "R&D and Internal Finance: A Panel Study of Small Firms in High Tech Industries,"* Review of Economics and Statistics *(1994), pp. 38–51.*

[15]*Many countries have similar measures, including Canada, France, and Japan among the G-7 countries.*

[16]*See R. Altshuler, "A Dynamic Analysis of the Research and Experimentation Credit,"* National Tax Journal *41 (1988), pp. 453–466; R. Eisner, S. H. Albert, and M. A. Sullivan, "The New Incremental Tax Credit for R&D: Incentive or Disincentive?"* National Tax Journal *37 (1984), pp. 171–183; and E. Mansfield, "The R&D Tax Credit and Other Technology Policy Issues,"* American Economic Review *76, pp. 190–194.*

[17]*See B. H. Hall, "R and D Tax Policy During the Eighties: Success or Failure?" in* Tax Policy and the Economy, Volume 7, *J. M. Poterba, ed., Cambridge: MIT Press, 1993, pp. 1–36; M. N. Baily and R. Z. Lawrence, "Tax Incentives for R&D: What Do the Data Tell Us?" study commissioned by the Council on Research and Technology, Washington, DC (1992); and "Fiscal Policy Towards R&D in the United States: Recent Experience," paper presented to the OECD Meeting on Fiscal Policy and Innovation, Paris, France, January 19, 1995, Paris: OECD, forthcoming.*

[18]*See B. H. Hall, "R and D Tax Policy During the Eighties . . . ," op. cit., and J. R. Hines, Jr., "On the Sensitivity of R and D to Delicate Tax Changes: The Case of U.S. Multinationals," in* International Taxation, *A. Giovannini, R. G. Hubbard, and J. B. Slemrod, eds., Chicago: University of Chicago Press, 1994. For estimation of an R and D price elasticity that does not rely on the tax treatment, see J. I. Bernstein and M. I. Nadiri, "Interindustry R&D Spillovers, Rates of Return, and Production in High Tech Industries,"* American Economic Review *78 (1988), pp. 429–434.*

[19]*See B. H. Hall and J. Mairesse, "Exploring the Relationship Between R and D and Productivity in French Manufacturing Firms," NBER Reprint No. 1962, April 1995, and* Journal of Econometrics *65 (1995), pp. 263–293; and "Estimating the Productivity of Research and Development: An Exploration of GMM Methods Using Data on French and United States Manufacturing Firms," in* International Productivity Comparisons, *Wagner, Karin, and van Ark, eds., Amsterdam: Elsevier-North Holland, forthcoming.*

Incomplete Contracts

Oliver D. Hart

Economists have a very well-established theory of market trading, and are on the way to a similarly well-developed theory of contractual transactions. However, the economic analysis of institutions is in a much more rudimentary state. This article discusses a recent literature that tries to provide a framework for thinking about economic institutions such as firms. The basic idea is that firms arise in situations in which people cannot write good contracts, and in which the allocation of power or control is therefore important.[1]

The starting point of this recent literature—which is sometimes called the "incomplete contracting" approach—is that it is prohibitively expensive for parties to write a contract governing their economic relationship that is all-inclusive, that is, that anticipates all the many things that may happen. Instead, parties will write a contract that is incomplete, and that will be revised and renegotiated as the future unfolds. The contract they write can be seen as a backdrop or starting point for such renegotiations, rather than a specification of the final outcome. Thus, the parties look for a contract that will ensure that, whatever happens, each side has some protection, both against opportunistic behavior by the other party and against bad luck.[2]

In a world of incomplete contracts, the ex post allocation of power (or control) matters. Here power refers roughly to the position of each party if the other party does not perform (for example, if the other party behaves opportunistically). These two ideas—contractual incompleteness and power—can be used to understand a number of economic institutions and arrangements. I discuss some of these in the remainder of this article.

The Meaning of Ownership

Economists have written a great deal about why property rights are important, and in particular why it matters, for example, whether a machine is privately owned or is common property. However, they have been less successful in explaining why it matters who owns a piece of private property. To understand the difficulty, consider a situation in which I want to use a machine that you own. I can buy the machine from you or rent the machine from you. If there are no contracting costs, then we can sign a rental agreement that is as effec-

tive as a change in ownership. In particular, the rental contract can specify exactly what I can do with the machine; when I can have access to it; what happens if the machine breaks down; what rights you have to use the machine; and so on. Given this, however, it is unclear why changes in asset ownership ever need to take place.

In a world with contracting costs, though, renting and owning are no longer the same. If contracts are incomplete, not all the uses of the machine will be specified in all possible eventualities. The question then arises; who chooses the unspecified uses? A reasonable view is that the owner of the machine has this right; that is, the owner has residual rights of control over the machine, or residual powers. For example, if the machine breaks down or requires modification and the contract is silent about this, then the owner can decide how and when it is repaired or modified.

Now it is possible to understand why it might make sense for me to buy the machine from you, rather than to rent it. If I own the machine, I will have more power in our economic relationship, since I will have all the residual rights of control. To put it another way, if the machine breaks down or needs to be modified, I can ensure that it is repaired or modified quickly, so that I can continue to use it productively. Knowing this, I will have a greater incentive to look after the machine, to learn to operate it, to acquire other machines that create a synergy with this machine, and so on.

The Boundaries of Firms

A long-standing issue in organization theory concerns the determinants of the boundaries of firms. Why does it matter if a particular transaction is carried out inside a firm, or through the market, or via a long-term contract? To put it another way, given any two firms (A and B), what difference does it make if the firms transact through an arms-length contract, or merge and become a single firm?

It is difficult to answer these questions using standard theory for the same reason that it is hard to explain why asset ownership matters. If there are no contracting costs, then the two firms can write a contract governing their relationship that specifies the obligations of all parties in all eventualities. Since the contract is all-inclusive, it is unclear what further aspects of their relationship could be controlled through a merger. This is true whether firm A is buying an input from firm B, or firms A and B sell complementary products and want to save on some duplicative production costs.

But since contracts are incomplete, it is possible to explain why a merger might be desirable. Consider the well-known example of Fisher Body, which for many years supplied car bodies to General Motors (GM). For a long time, Fisher Body and GM were separate firms linked by a long-term contract. However, in the 1920s, GM's demand for car bodies increased substantially. After Fisher Body refused to revise the formula for determining price, GM bought Fisher out.[3]

Why did GM and Fisher Body not simply write a better contract? Arguably, GM recognized that, however good a contract it wrote with Fisher Body, situations similar to the one it had just experienced might arise again; that is, contingencies might occur that no contract could allow for. GM wanted to be sure that next time around it would be in a stronger bargaining position; in particular, it would be able to insist on extra supplies, without having to pay a great deal for them. It is reasonable to suppose that ownership of Fisher Body would provide GM with this extra power by giving it residual control rights over Fisher Body's assets. At an extreme, GM could dismiss the managers of Fisher Body if they refused to accede to GM's requests.[4]

Of course, although the acquisition increased GM's power and made GM more secure in its relationship with Fisher Body, it arguably had the opposite effect on Fisher Body. That is, Fisher Body may have had more to worry about after the merger. For example, if Fisher Body's costs fall, GM is now in a stronger position to force a reduction in the (transfer) price of car bodies, hence reducing the return to Fisher managers. Anticipating this, Fisher managers may have less incentive to figure out how to reduce costs. Thus, there are both costs and benefits from a merger.[5]

Together with Sanford J. Grossman and John Moore, I have developed a theory of the firm based on the idea that firm boundaries are chosen to allocate power optimally among the various parties to a transaction.[6] This work argues that power is a scarce resource that never should be wasted. One implication of the theory is that a merger between firms with highly complementary assets enhances value, and a merger between firms with independent assets reduces value. If two highly complementary firms have different owners, then neither has real power, since neither can do anything without the other. It is then better to give all the power to one of the owners through a merger. On the other

hand, if two firms with independent assets merge, then the acquiring firm's owner gains little useful power, since the acquired firm's assets do not enhance their activities. The acquired firm's owners lose useful power, though, since they no longer have authority over the assets they work with. In this case, it is better to divide the power between the owners by keeping the firms separate.

Financial Securities

A. Debt

Suppose you have an interesting idea for a business venture, but do not have the capital to finance it. You go to a bank to get a loan. In deciding whether to finance the project, the bank is very likely to consider not only the return stream from the project, but also the resale value of any assets you have or will acquire using the bank's funds; in other words, the bank will be interested in the potential collateral for the loan. In addition, the durability of your assets and how quickly the returns come in are likely to determine the maturity structure of the loan. The bank will be more willing to lend long-term if the loan is supported by assets such as property or machines than if it is supported by inventory, and if the returns arrive in the distant future rather than right away.

These observations fit in well with the ideas of incomplete contracts and power. The bank wants some protection against worst-case scenarios. If there is very little collateral underlying the loan, then the bank will worry that you will use its money unwisely or, in an extreme case, disappear with the money altogether. Similarly, if the collateral depreciates rapidly or the returns come in quickly, then the bank would be unhappy with a long-term loan: it would have little protection against your behaving opportunistically when the collateral was no longer worth much, or after the project returns had been realized (and "consumed"). Basically, the bank wants to ensure a rough balance between the value of the debt outstanding and the value remaining in the project, including the value of the collateral, at all times.

Moore and I have developed a theory of debt finance based on these ideas, and derived results about the kinds of projects that will be financed.[7]

B. Equity

Investors who finance business ventures sometimes take equity in the venture rather than debt. Unlike debt, equity does not have a fixed set of repayments associated with it, with nonpayment triggering default. Rather, equity-holders receive dividends if and when the firm chooses to pay them. This potentially puts equity-holders at the mercy of those running the firm, who may choose to use the firm's profits to pay salaries or to reinvest rather than to pay out dividends. Thus equity-holders need some protection. Typically, they get it in the form of votes. If things become bad enough, equity-holders have the power to remove those running the firm (the board of directors) and replace them with someone else.

However, giving outside equity-holders voting power brings costs as well as benefits. Equity-holders can use their power to take actions that ignore the (valid) interests of insiders. For example, they might close down an established, family-run business or force the business to terminate long-standing employees. Philippe Aghion and Patrick Bolton have analyzed the optimal allocation of power between insiders and outsiders.[8]

Dispersed Power

So far I have supposed that those with power wield it. That is, I have assumed that owners will exercise their residual control rights over assets; for example, equity-holders will use their votes to replace a bad manager. However, if many people hold power, then no one of them may have an incentive to be active in exercising this power. Then it is important that there be automatic mechanisms for achieving what those with power are unable or unwilling to do by themselves.

A leading example of dispersed power is the case of a public company with many small shareholders. Shareholders cannot run the company themselves on a day-to-day basis, so they delegate power to a board of directors and to managers. This creates a free-rider problem: an individual shareholder does not have an incentive to monitor management, since the gains from improved management are enjoyed by all shareholders, whereas the costs are borne only by those who are active. Because of this free-rider problem, the managers of a public company have a fairly free hand to pursue their own goals: these might include empire-building, or the enjoyment of perquisites.

Two "automatic" mechanisms can improve the performance of management: debt (in combination with bankruptcy) and takeovers. Debt constrains managers. If a company has a significant amount of debt, then management is faced

with a simple choice: reduce slack—that is, cut back on empire-building and perquisites—or go bankrupt. If there is a significant chance that managers will lose their jobs in bankruptcy, then they are likely to choose the first option.

Takeovers provide a potential way to overcome problems involving collective action among shareholders. If a company is badly managed, then there is an incentive for someone to acquire a large stake in the company, improve performance, and make a gain on the shares or votes purchased. The threat of such action can persuade management to act in the interest of shareholders.

The view of debt as a kind of constraint can explain the types of debt that a company issues (for example, how senior the debt is, or whether it can be postponed).[9] The possibility of takeovers can explain why many companies bundle votes and dividend claims together—that is, why they adopt a one share–one vote rule. One share–one vote protects shareholder property rights: it maximizes the chance that a control contest will be won by a management team that provides high value for shareholders, rather than high private benefits for itself.[10]

Bankruptcy

Of course, if a company takes on debt, then there is always the chance that it will go bankrupt. If there were no contracting costs, then there would be no need for a formal bankruptcy procedure, because every contract would specify what should happen if some party could not meet its debt obligations. However, in a world of incomplete contracts, there is a role for bankruptcy procedure. A bankruptcy procedure should have two main goals: First, a bankrupt company's assets should be placed in their highest-value use. Second, bankruptcy should be accompanied by a loss of power for management, to ensure that management has the right incentive to avoid bankruptcy. Aghion, Moore, and I have been working on a procedure that tries to meet these goals, and at the same time avoids some of the inefficiencies of existing U.S. and U.K. procedures.[11]

Our basic idea of the procedure is that a bankrupt company's debts are canceled and the company is put up for auction (the auction would be supervised by a judge, say). However, in contrast to a standard auction, noncash bids are permitted. A noncash bid allows existing management, or any other management team for that matter, to propose a reorganization plan. As an example of a noncash bid, incumbent management might offer former claimants shares in a new (debt-free) company managed by the old management team. Alternatively, managers might offer former claimants a combination of shares and bonds in the post-bankruptcy company.

At the same time that bids are being made for the company, an automatic debt–equity swap takes place. Senior creditors of the company receive equity in the new (post-bankruptcy) company, while junior creditors and former shareholders receive options to buy equity (the exercise price of the options issued to each class is set equal to the amount owed to classes senior to that class).[12] After the bids come in—three months might be allowed for this—another month or so is allowed for option-holders to exercise their options. The final step in the process is that the company's equity-holders (that is, those people who hold equity in the company at the end of the fourth month) vote on which of the various cash and noncash bids to select. Once the vote is completed, the winning bid is implemented and the firm emerges from the bankruptcy process.

This procedure has the advantage relative to Chapter 7 of the U.S. Bankruptcy Code that it allows for the firm to be restructured as a going concern if this is efficient. It has the advantage relative to Chapter 11 of the U.S. Bankruptcy Code that bargaining between different claimant groups with possibly conflicting interests is avoided: instead the firm's future is decided by a simple vote by a homogeneous class of shareholders.

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[1]*For a more extensive discussion of this literature, see O. D. Hart,* Firms, Contracts, and Financial Structure, *Oxford, England: Oxford University Press, forthcoming in late 1995. This article is based on the introduction to this book.*

[2]*The incomplete contracting approach borrows a great deal from the earlier transaction cost literature. See, in particular, R. H. Coase, "The Nature of the Firm,"* Economica *4 (1937), pp. 386–405; B. Klein, R. Crawford, and A. Alchian, "Vertical Intergration, Appropriable Rents, and the Competitive Contracting Process,"* Journal of Law and Economics *21/2 (1978), pp. 297–326; and O. Williamson,* The Economic Institutions of Capitalism, *New York: Free Press, 1985.*

[3]*For interesting and informative discussions of the GM–Fisher Body relationship, see Klein, Crawford, and Alchian, op. cit.; and B. Klein, "Vertical Integration as Organizational Ownership: The Fisher Body–General Motors Relationship Revisited,"* Journal of Law, Economics and Organization *4/1 (1988). pp. 199–213.*

[4]*There has been some debate about whether GM did in fact increase its*

power over Fisher Body by buying Fisher Body out. See R. H. Coase, "The Nature of the Firm: Influence," Journal of Law, Economics and Organization, 4/1 (1988) p. 45.

[5]Sometimes the costs of a merger will exceed the benefits. This may explain why GM did not merge with A. O. Smith, which has supplied a significant fraction of its automobile frames for many years. For a discussion of the A. O. Smith case, see Coase, "The Nature of the Firm: Influence," op. cit.; and Klein, "Vertical Integration as Organizational Ownership . . . ," op. cit.

[6]See S. J. Grossman and O. D. Hart, "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," Journal of Political Economy 94 (1986), pp. 691–719; and O. D. Hart and J. Moore, "Property Rights and the Nature of the Firm," Journal of Political Economy 98 (1990), pp. 1119–1158. See also Hart, Firms, Contracts, and Financial Structure, op. cit., Chapters 2-4.

[7]O. D. Hart and J. Moore, "A Theory of Debt Based on the Inalienability of Human Capital," NBER Reprint No. 1963, April 1995, and Quarterly Journal of Economics 109 (1994), pp. 841–879; and "Default and Renegotiation: A Dynamic Model of Debt," MIT Working Paper No. 520, 1989. For related work, see P. Aghion and P. Bolton, "An 'Incomplete Contracts' Approach to Financial Contracting," Review of Economic Studies 59 (1992), pp. 473–494; and P. Bolton and D. Scharfstein, "A Theory of Predation Based on Agency Problems in Financial Contracting," American Economic Review 80 (1990), pp. 94–106.

[8]See Aghion and Bolton, "An 'Incomplete Contracts' Approach. . . ," op. cit.

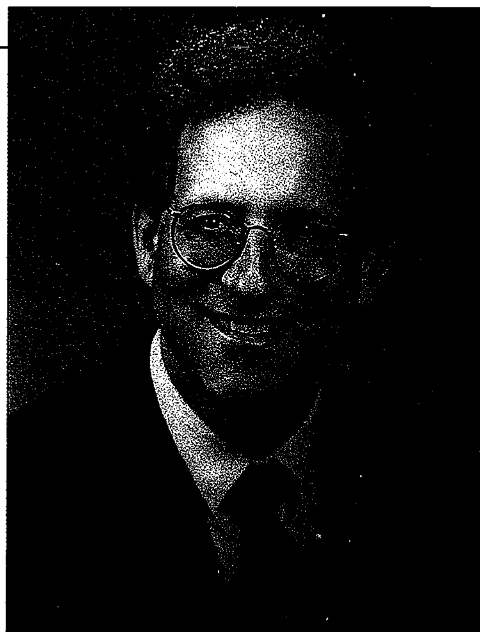
[9]O. D Hart and J. Moore, "Debt and Seniority: An Analysis of the Role of Hard Claims in Constraining Management," NBER Working Paper No. 4886, October 1994, and American Economic Review, (June 1995), pp. 567–585; and O. D. Hart, "Theories of Optimal Capital Structure: A Managerial Discretion Perspective," NBER Reprint No. 1806, September 1993, and in The Deal Decade: What Takeovers and Leveraged Buyouts Mean for Corporate Governance, M. Blair, ed. Washington, DC: The Brookings Institution, 1993, pp. 19–43. See also M. Jensen, "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers," American Economic Review 76 (1986), pp. 323–329.

[10]S. J. Grossman and O. D. Hart, "One Share–One Vote and the Market for Corporate Control," Journal of Financial Economics 20 (1988), pp. 175–202. See also M. Harris and A. Raviv, "Corporate Governance: Voting Rights and Majority Rules," Journal of Financial Economics 20 (1988), pp. 203–235.

[11]P. Aghion, O. D. Hart, and J. Moore, "The Economics of Bankruptcy Reform," in The Transition in Eastern Europe, O. J. Blanchard, K. A. Froot, and J. D. Sachs, eds. Chicago: University of Chicago Press, 1994; "Improving Bankruptcy Procedure," Washington University Law Quarterly 72 (1994), pp. 849–872; and "Insolvency Reform in the United Kingdom: A Revised Proposal," Insolvency Law and Practice 11/3 (1995), pp. 4–11.

[12]The use of options in the debt–equity swap is based on an idea of Lucian Bebchuk. See A. L. Bebchuk, "A New Approach to Corporate Reorganizations," Harvard Law Review 101 (1988), pp. 775–804.

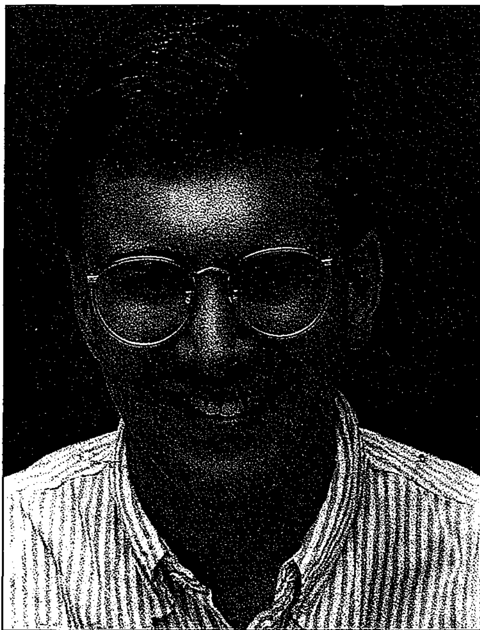
NBER Profile: *Stephen G. Cecchetti*



Stephen G. Cecchetti is a research associate in the NBER's Programs in Monetary Economics and Asset Pricing and a professor of economics at Ohio State University. He received an S.B. in Economics from MIT in 1977, and a Ph.D. in economics from the University of California at Berkeley in 1982. From 1982 to 1987 he served on the faculty of the New York University Graduate School of Business. He also has been a visiting professor of economics at Princeton University and Boston College.

Over the past ten years, Cecchetti has published over 30 articles in scholarly journals, covering specific aspects of banking, securities markets, financial economics, inflation and price measurement, monetary policy, macroeconomic theory, and resource economics. He also serves as the editor of the *Journal of Money, Credit, and Banking.*

Cecchetti's wife, Ruth Charney, is a professor of mathematics at Ohio State University. They have two sons: Daniel, 8, and Ethan, 4. Cecchetti often can be seen pitching at Little League games, or chasing Daniel down ski slopes in northern New England.



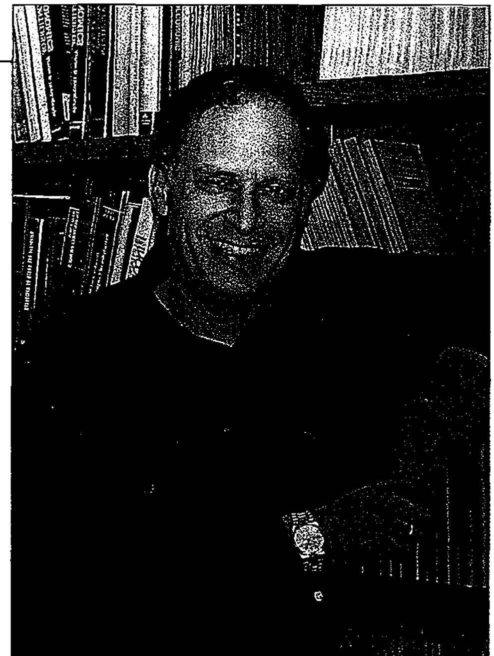
NBER Profile: *Jonathan Gruber*

Jonathan Gruber is a faculty research fellow in the NBER's Programs in Public Economics and Health Care and an associate professor of economics at MIT. He received his B.S. in economics from MIT in 1987 and his Ph.D. from Harvard University in 1992.

Gruber teaches public economics. His current research interests include the interaction between health insurance and the labor market, the public provision of health insurance for low-income individuals, and the role of social insurance in maintaining consumption during difficult times, such as periods of unemployment.

Gruber's wife, Andrea, holds a Masters of Divinity from Harvard University. She is currently working at home, caring for their infant son, Samuel. Jon and Andrea enjoy the theater and spectator sports, and used to like to travel.

NBER Profile: *Oliver D. Hart*



Oliver D. Hart is an NBER research associate in corporate finance and, since 1993, a professor of economics at Harvard University. A British citizen, Hart received his B.A. in mathematics from King's College (Cambridge University), his M.A. in economics from Warwick University, and his Ph.D. in economics from Princeton University.

He taught at Cambridge University (in England) from 1975–81; was a professor of economics at the London School of Economics from 1981–5; and was a professor of economics at MIT from 1985–93. He also has been a visiting professor at the Wharton School and Harvard Business School, and a visiting scholar at Harvard Law School.

Hart's research interests include economic theory, mathematical economics, theory of the firm, and law and economics. He is a fellow of the Econometric Society and the American Academy of Arts and Sciences, and his work has been published in a number of prominent journals.

Hart is married to Rita Goldberg, who teaches in the literature concentration and the extension school at Harvard, and who is a contributing writer at the *Boston Book Review.* They have two sons, Daniel (18), who will be a freshman in communications at the University of Miami (Florida) next year, and Benjamin (12), who is at the Clarke Middle School in Lexington, MA. Hart enjoys swimming, playing tennis, and going to the theater.

Conferences

Health and Welfare During Industrialization*

Participants from the Americas, Europe, and the Pacific Rim convened in Cambridge on April 21–22 for an NBER Conference on Health and Welfare During Industrialization. The overall project responsible for this gathering seeks to answer one of the longest-lived and most important questions in economic history: how does industrialization affect the health and welfare of a population? The question, originating in the 19th-century standard of living debate over the lives of the working class during England's Industrial Revolution, is being addressed in the project using evidence from eight countries and a vast array of data ranging from records on nutrition and stature to statistics on morbidity and mortality. NBER Research Associates Richard H. Steckel, Ohio State University, and Roderick Floud, London Guildhall University, organized this program:

Stanley L. Engerman, NBER and University of Rochester, "The Standard of Living Debate in International Perspective"
Discussant:
Robert E. Gallman, NBER and University of North Carolina

Dora Costa, NBER and MIT, and **Richard H. Steckel,** "Long-Term Trends in Health, Welfare, and Economic Growth in the United States"
Discussant:
Clayne L. Pope, NBER and Brigham Young University

Roderick Floud, and **Bernard Harris,** University of Southampton, "British Industrialisation and Changing Stature, 1750–1990"
Discussant:
Peter Temin, NBER and MIT

Lars Sandberg, Ohio State University, and **Richard H. Steckel,** "Was Industrialization Hazardous to Your Health? Not in Sweden!"
Discussant:
Timothy Guinnane, Yale University

David Weir, University of Chicago and National Opinion Research Center, "Economic Welfare and Physical Well-Being in France, 1750–1990"
Discussant:
Robert A. Margo, NBER and Vanderbilt University

Stephen Nicholas, University of Melbourne, and **Paul Johnson,** London School of Economics, "Health and Welfare of Women in the United Kingdom, 1790–1920"
Discussant:
Jane Humphries, Cambridge University

Gail A. M. Honda, University of Chicago, "Differential Structure, Differential Health: Industrialization in Japan, 1868–1946"
Discussant:
Peter Timmer, Harvard University

Sophia Twarog, United Nations, Geneva, "Heights and Living Standards in Germany, 1850–1940"
Discussant:
John Brown, Clark University

J. W. Drukker and **Vincent Tassenaar,** University of Groningen, "Heights and Health in the Netherlands"
Discussant:
Joel Mokyr, Northwestern University

Christine de Souza, Monash University, and **Stephen Nicholas** and **Greg Whitwell,** University of Melbourne, "Height, Health, and Economic Growth in Australia, 1860–1940"
Discussant:
Michael R. Haines, NBER and Colgate University

Engerman opened the conference with a sweeping analysis of standard of living indicators in historical perspective from the 17th century to the present. Beginning at least as far back as William Petty's estimates of national income in 1665, economists and historians have wrestled with various measures of economic and social progress. Population, used as a proxy for economic growth and living standards in the 18th century, was followed by mortality, life expectation, real wages, literacy, occupational structure, per capita income, and the Human Development Index (HDI). Over the past two de-

cades, height has risen to prominence as a measure of standard of living. Height at specific ages, Engerman explained, is evolving into an important measure because of the relative ease of access to data, the generally high correlation between height and income, and the physiological relationships among nutrition, disease, and height. He then posed the foremost question of the conference and its 400-year historiographical precedent: Can one measure be fully satisfactory in capturing the standard of living? Engerman concluded by suggesting that perhaps the best strategy is to accept the specific contribution of each indicator while maintaining an awareness of its inherent complexities and difficulties.

Costa and **Steckel**'s work on long-term trends in economic growth and health in the United States synthesized previous evidence on stature and mortality in the 19th and 20th centuries and new evidence on body mass index (BMI), lean body mass, waist–hip ratio (WHR), and prevalence of chronic conditions. Regarding previous evidence, perhaps the most perplexing problem of secular trends in height in the United States concerns the decline in average height of white, native-born soldiers in the 19th century during what was considered to be a period of economic prosperity. Many theories for this 19th-century decline in health have been proposed, such as greater exposure to infectious diseases, greater inequality in distribution of income, and deterioration in diet. To date, there has been no strong consensus. Costa discussed BMI—defined as weight in kilograms divided by the square of height in meters—which may turn out to be an even stronger determinant of productivity, morbidity, and mortality than height. She then introduced WHR, a measure of abdominal body fat, which has been shown to be a good indicator of risk of death, especially risk of fatal heart disease. All of these measures have been shown to be related to chronic conditions: improvements in these measures have been accompanied by a decline in chronic conditions over the past century.

Floud and **Harris** discussed changes in height, health, and welfare in Britain over the past 250 years. Harris elucidated three main topics on British health: general debates over indicators of the standard of living, secular trends in adult male heights, and the impact of exogenous events on children's heights. Much of the standard of living controversy has focused on the measurement of real wages, the rate of decline in mortality, the opportunities for education, and levels of literacy in industrializing Britain. Out of this debate has emerged an interest in heights. Given the controversial nature of British economic historiography, it is not surprising that much of the original work on 18th- and 19th-century adult male heights has been challenged on both data quality and methodology. Harris showed that although World War I had little impact on children's heights, there were definite improvements in children's height during World War II. He concluded by demonstrating that the HDI for Britain exhibited slow and steady improvement over the past 250 years.

Sandberg and **Steckel** note that the case of Sweden provides an interesting contrast to those of the United States and Great Britain. Industrialization in Sweden was late, rapid, and remained largely semirural. After 1870, improvement in health accelerated and continued with industrialization, with the exceptions of downturns during World War I and the Spanish influenza pandemic. Sandberg argues that this relatively smooth upward trend was caused largely by the spread of industrialization to rural and semirural areas. Thanks to limited urbanization, the short stature and poor health of inhabitants witnessed in the "veritable pest-hole" of Stockholm in the mid-19th century did not become a national phenomenon. Moreover, the disparities in health between the North, whose population was taller than the national average, and Stockholm began to disappear by the late 19th century. By the 1930s regional and class differences in height had vanished, because of better nutrition, better medical care, and government-financed public health measures.

Weir delineated characteristics of France's economic development that set it apart from other European countries. Slow population growth caused by restrained marital fertility and a wider distribution of property ownership led to an overall gradual transformation of the economy, although there were significant regional differentials. As an example, Weir points to the striking urban–rural differences in meat consumption per capita throughout the 19th century; the decided advantage was in urban areas, especially in Paris. He attributes this to nonwage income spent in cities, as well as to the urban advantage in human capital and industrial wealth. During the 19th century, heights of conscripts into the French army improved slowly and steadily, whereas declines in mortality slowed considerably. In the 20th century, all indicators exhibited accelerated progress. It is

most difficult to assess human welfare of the French for 1780–1820, according to Weir, because of the complexity introduced by the Revolution, legal reform, war, and the Continental Blockade.

Nicholas and **Johnson** focus on the welfare of women in the United Kingdom. The data they use comprise detailed records of women either accused or found guilty of criminal offenses in the United Kingdom between 1817 and 1874. These data represent the working class as a whole, since the women were not hardened criminals, but rather ordinary working people who occasionally "supplemented their incomes by theft." In 1785 to 1815, female living standards as measured by height deteriorated relative to those of males, because fewer household resources were allocated to female infants and children. After 1815, female and male heights exhibited roughly the same trajectories of decline followed by improvement. These parallel patterns were largely the result of factors exogenous to the household, such as decreasing real wages and improved public works.

Honda began by outlining the salient features of Japan's prewar industrialization, 1868–1940. She investigates how heavy militarization and the differential structure of the economy—a widening gap in productivity and real wages between the traditional and modern sectors—affected the health of the Japanese people. She argues that frequent military aggression and heavy investment in defense kept government investment in public welfare low and resulted in minimal improvement in health during this period: life expectancy stagnated, infant mortality rates remained high, and millions succumbed to new diseases ushered in by contact with foreign environments. Furthermore, the differential structure of the economy was reflected in a "differential structure of health." Over time, industrial prefectures exhibited greater average heights and lower mortality and fertility rates, but higher stillbirth rates than agricultural prefectures. Honda concludes that Japan today is a model of health, with the highest life expectancy and lowest infant mortality rates in the world. These postwar health gains are equally if not more astonishing than postwar improvements in the economy.

Twarog's paper describes health and living standards in Wurttemberg. Wurttemberg was representative of the "average" German industrialization experience, lagging behind the early and heavy industrialization of the Ruhr, but more industrialized than such areas as lower Bavaria and East Prussia, which remained largely agricultural through 1940. The regional differentiation of Germany's industrialization also led to regional differences in heights. Unlike other European countries, however, those born in urban areas were taller than those born in rural areas. The urban advantage was attributed to good public health infrastructures, higher income, and better medical care. Regions exhibiting the shortest recruits and highest infant mortality were associated with lack of breastfeeding practices, or unusual ones, whereby the infant would not be given the breast if it was crying.

Drukker and **Tassenaar** presented a short sketch of three major geographical and socioeconomic regions in the Netherlands: the modern urban region of Noord-Holland and Zuid-Holland; the modern agricultural provinces of Zeeland, Groningen, and Friesland; and the remaining traditional rural regions of the east and southeast. There were significant differentials in mortality among regions beginning in 1800, with traditional rural regions exhibiting the lowest rates, modern urban regions the highest, and differentials converging over time beginning in the mid-19th century. In average height, tallest conscripts were from the traditional rural regions, and the shortest from modern urban areas, with differentials roughly increasing over time. These results have important implications for the hotly debated question of "retarded industrialization" in the 19th century. The striking differentials in welfare among the people indicate that the inequality in wealth and the nature of poverty were significantly different during this period, when compared with conditions during the "Golden Age" (1600–75) and the "Golden Age of Managed Capitalism" (1960s).

The final paper of the conference, by **de Souza, Nicholas**, and **Whitwell,** sheds new light on Australia's historical standard of living debate. It is commonly thought that the "golden age" of 1860–90 was followed by a period of economic decline through 1940. Whitwell demonstrates that these assumptions must be reassessed, using new evidence on heights of men and women enlisting in the Australian Army in the Boer War and in World Wars I and II. The drop in average conscript height in the 1870s and 1880s suggests that the decline in living standards began at least a decade before 1890. Furthermore, the stable height levels from 1890 to 1919 indicate sustained living standards during the three decades prior to World War I, although average height in 1919 had not recovered to levels observed 50 years earlier. In studies

of regional differences in the heights of schoolchildren during the early 20th century, it was found that "the more Australian the child is, the better the specimen." That is, the native-born child of Australian parents was on average taller and heavier than the native-born child of immigrant parents and the immigrant child.

The complete proceedings of this conference will be published as an NBER volume by the University of Chicago Press. Its availability will be announced in a future issue of the *NBER Reporter.*

**This report was prepared by Gail A. M. Honda, University of Chicago. An expanded version of it will appear in* The Newsletter of the Cliometric Society *10/2 (July 1995).*

URC: Financial Risk Assessment and Management

Nearly 60 economists met in Cambridge on May 8 and 9 for an NBER–Universities Research Conference on Financial Risk Assessment and Management. Kenneth J. Singleton, NBER and Stanford University, organized this program:

Christopher Géczy, University of Chicago;
Bernadette Minton, Ohio State University; and
Catherine Schrand, University of Pennsylvania, "Why Firms Hedge: Distinguishing Among Existing Theories"
Discussants:
Sheridan Titman, Boston College, and
David S. Scharfstein, NBER and MIT

Jacob Boudoukh,
Matthew Richardson, and
Robert F. Whitelaw, New York University; and
Richard Stanton, University of California, Berkeley, "Pricing Mortgage-Backed Securities in a Multifactor Interest Rate Environment: A Multivariate Density Estimation Approach" *and* "A New Strategy for Dynamically Hedging Mortgage-Backed Securities"
Discussants:
Yacine Ait-Sahalia, NBER and University of Chicago, and
Stanley E. Zin, NBER and Carnegie–Mellon University

Dilip Madan and
Haluk Unal, University of Maryland, "Pricing the Risks of Default"
Discussants:
Ehud Ronn, University of Texas, Austin, and
George M. Constantinides, NBER and University of Chicago

Mark Grinblatt, University of California, Los Angeles, "An Analytic Solution for Interest Rate Swap Spreads"
Discussants:
Robert Litzenberger, Goldman Sachs, and
Chi-Fu Huang, Long-Term Capital

Andrew Karolyi, Ohio State University, and
René M. Stulz, NBER and Ohio State University, "Why Do Markets Move Together? An Investigation of U.S.–Japan Stock Return Comovements Using ADRs"
Discussants:
Robert F. Stambaugh, NBER and University of Pennsylvania, and
John H. Cochrane, NBER and University of Chicago

Harold Y. Kim, Princeton University, and
Jianping Mei, New York University, "What Makes the Stock Market Jump? An Analysis of Political Risk on Stock Returns"
Discussants:
Kenneth R. French, NBER and Yale University, and
Joseph Cherian, Boston University

Jesus Saá-Requejo, University of Chicago, "The Dynamics of the Term Structure of Risk Premia in Foreign Exchange Markets"
Discussants:
Robert J. Hodrick, NBER and Northwestern University, and
David K. Backus, NBER and New York University

Yaacov Z. Bergman, Hebrew University, Jerusalem;
Bruce D. Grundy and
Zvi Wiener, University of Pennsylvania, "Theory of Rational Option Pricing: II"
Discussants:
Kaushik Amin, Lehman Brothers, and
Steve Grenadier, Stanford University

Robert F. Engle, NBER and University of California, San Diego, and
Joshua Rosenberg, University of California, San Diego, "Hedging Options in a GARCH Environment"
Discussants:
Jose Lopez, University of Pennsylvania, and
Torben Andersen, Northwestern University

Using data on the *Fortune* 500, **Géczy, Minton,** and **Schrand** test the implications of theories of hedging behavior. They view corporate decisions about hedging in a two-part framework: 1) recognizing the potential maximization of value that comes from reducing variance; and 2) identifying the most cost-effective product for reducing variance. They find that firms' hedging decisions are related positively to R and D expenditures, debt-to-equity ratios, and analyst following, and negatively to short-term liquidity and inventory turnover. Also, conditional on the decision to hedge, firms with higher debt-to-equity ratios and lower book-to-market values are more likely to choose interest rate derivative instruments than currency- or commodity-based products.

Boudoukh, Richardson, Stanton, and **Whitelaw** develop an approach to the pricing of mortgage-backed securities (MBS) based on the relationship between MBS prices and interest rates. They find that weekly MBS prices from January 1987 to May 1994 are a function of the level and slope of the term structure. As a test, they then use this estimated relationship to hedge the interest rate risk of MBSs. Their hedging results compare favorably with other commonly used hedging methods.

Madan and **Unal** model the risk of default as composed of arrival and magnitude risks. Using monthly data for rates on certificates of deposits offered by S&Ls during 1987–91, they show that market expectations of lower payouts conditional on default after 1989 were reasonable. The arrival risks of default reflect spreads that are related negatively to equity values and positively to the volatility of equity returns.

Grinblatt argues that liquidity differences between government securities and short-term Eurodollar borrowings explain the spreads on interest rate swaps. He finds that the interest rate swap spread for a particular maturity is the annuitized equivalent of the value of liquidity. He also estimates his model using weekly data from January 1988 through February 1992 on the "term structure of swap spreads."

Karolyi and **Stulz** explore the factors that influence intraday and overnight covariances of stock returns across countries. Using data from the Institute for Study of Securities Markets for 1988 to 1992, they construct the returns for a portfolio of Japanese stocks and a matched sample portfolio of U.S. stocks. They find that announcements of U.S. macroeconomic news, shocks to the yen/dollar exchange rate and Treasury-bill returns, and industry effects have no measurable influence on the correlations between U.S. and Japanese returns. However, large shocks to broad-based market indexes (for example, the Nikkei Stock Average and Standard & Poor's 500 Stock Index) positively affect both the magnitude and the persistence of the return correlations.

Kim and **Mei** investigate the possible market impact of political risk. They focus on the equity market in Hong Kong for two reasons: the political situation is fluid, unpredictable, and characterized by definitive events; and the market movements are volatile. They find that political developments in Hong Kong have a significant impact on its market volatility and return.

Saá-Requejo develops a model that characterizes the dynamics, the term structure, and the predictability at various horizons of risk premiums in foreign exchange and bond markets, and the interrelations between the risk premiums of these markets. The model also characterizes the random processes followed by the exchange rate, the term structure of interest rates earned in the two currencies, and the interdependencies between these processes. Finally, he shows that there may be cross-sectional restrictions on the term structure of forward risk premiums.

Bergman, Grundy, and **Wiener** study the properties of option prices. Although an upward shift in the term structure of interest rates always will increase the value of a call, a decline in the present value of the exercise price can be associated with a decline in the call price. The authors provide a new bound on the values of calls on dividend-paying assets.

Engle and **Rosenberg** analyze models of S&P 500 index volatility in terms of their ability to hedge options positions that are sensitive to the term structure of volatility. They find that the most effective hedge is a Black–Scholes (BS) delta–gamma hedge, while the BS delta–vega hedge is the least effective. The most successful volatility hedge is GARCH components delta–gamma, suggesting that the GARCH components estimate of the term structure of volatility is most accurate. The success of the BS delta–gamma hedge may be caused by mispricing in the options market over the sample period.

The Economics of Aging

An NBER Conference on "The Economics of Aging," organized by Program Director David A. Wise, also of Harvard University, took place on May 12 and 13. The program was:

Matthew Eichner, MIT;
Mark B. McClellan, NBER and Harvard University; and
David A. Wise, "Insurance or Self-Insurance? Variation, Persistence, and Individual Health Accounts"
Discussant:
Jonathan Gruber, NBER and MIT

Alan M. Garber and
Thomas E. MaCurdy, NBER and Stanford University, "Cause-Specific Mortality Among Medicare Enrollees"
Discussant:
Angus S. Deaton, NBER and Princeton University

David M. Cutler, NBER and Harvard University, and
Mark McClellan, "Determinants of Technology Change in Medical Practice"
Discussant:
Jonathan Gruber

Michael D. Hurd, NBER and State University of New York, Stony Brook, and
Daniel L. McFadden, NBER and University of California, Berkeley, "Subjective Beliefs and Saving"
Discussant:
Axel H. Börsch-Supan, NBER and University of Mannheim

James M. Poterba, NBER and MIT;
Steven F. Venti, NBER and Dartmouth College; and
David A. Wise, "Lump-Sum Distributions from Retirement Savings Plans: Receipt and Utilization"
Discussant:
John B. Shoven, NBER and Stanford University

Angus S. Deaton and
Christina Paxson, NBER and Princeton University, "Measuring Poverty Among the Elderly in India and the United States"
Discussant:
B. Douglas Bernheim, NBER and Stanford University

Hilary W. Hoynes, NBER and University of California, Berkeley, and
Michael D. Hurd, "Imputed Wealth, Subjective Survival Probabilities, and Social Security Wealth"
Discussant:
James Smith, RAND

Burton H. Singer, NBER and Princeton University, and
Carol D. Ryff, University of Wisconsin, Madison, "Social Hierarchies and Health: Pathways to Diverse Outcomes"
Discussant:
Axel Börsch-Supan

Douglas O. Staiger, NBER and Harvard University, "The Covariance Structure of Mortality Rates in Hospitals"
Discussant:
David Meltzer, NBER and Brigham and Women's Hospital

Kathleen M. McGarry, NBER and University of California, Los Angeles, "Inter Vivos Transfers in the HRS and AHEAD: A Comparison Across Surveys"
Discussant:
James Smith

Brigitte C. Madrian, NBER and Harvard University, "Health Insurance and Retirement Behavior"
Discussant:
James H. Stock, NBER and Harvard University

Eichner, McClellan, and **Wise** explore the feasibility of catastrophic health insurance established in conjunction with individual health accounts (IHAs). Under this plan, the employer establishes both a high-deductible health insurance plan and an IHA. Employee health care costs below the deductible then are paid out of the IHA; costs above the deductible are paid by the insurance plan. Assets remaining in the account when the employee retires are available for other purposes. The authors conclude that such a plan is feasible. Further, they believe that such a plan could be structured to increase retirement savings.

Garber and **MaCurdy** describe a method for developing cause-specific mortality rates, and apply it to data on Medicare eligibility and claims filed. They find that overall mortality rates calculated this way closely approximate mortality rates from "Vital Statistics." They also attempt to develop life tables for elderly individuals who have one or more chronic diseases.

Using panel data on all elderly heart attack patients in the United States from 1984 to 1991, **Cutler** and **McClellan** find that real spending per heart attack patient rose by 4 percent annually. Essentially all of that expenditure growth was associated with the diffusion of intensive cardiac technologies: catheterization, bypass surgery, and angioplasty. The prices paid for a given intensity of treatment actually

have declined. The authors also show that some cities and hospitals are technological "leaders," using all of these technologies more frequently, while others appear to be "followers." When a hospital acquires a new technology, its use increases dramatically. This increasing intensity includes both a one-time shift within two years of adoption, and a long-term increase in intensity growth.

Hurd and **McFadden** use the Asset and Health Dynamics (AHEAD) survey to analyze survival probabilities. The average responses correspond well to standard life tables, and vary as expected with known risk factors. However, the individual responses show considerable dispersion, and there are many extreme responses. The authors then test personal survival curves in terms of their ability to add to standard life table information and to explain savings behavior.

Poterba, Venti, and **Wise** use data from the Employee Benefits Supplement to the 1993 Current Population Survey and the first wave of the Health and Retirement Survey to summarize the incidence and disposition of lump-sum distributions from pension plans. They find that while less than half of all lump-sum distributions are rolled over into IRAs or other retirement saving plans, large distributions are substantially more likely to be saved than smaller ones. Consequently, more than half of the dollars paid out as lump-sum distributions are reinvested.

Deaton and **Paxson** explore the sensitivity of poverty counts to variations in assumptions about child costs and economies of scale, using data from the United States and from six large Indian states. The authors argue that the official poverty counts in the United States are compromised by unrealistically high costs of children and by unrealistically high economies of scale. They discuss how economies of scale and child costs can be estimated from the data, using identifying assumptions that label private goods and adult goods, and they make calculations based on the 1990 Consumer Expenditure Survey.

Hoynes and **Hurd** report on the results of imputing asset values in the AHEAD data. Their methods increase the dispersion and mean of nonhousing assets, yet have little effect on the median. One explanation for this is that the nonrespondents are a mixture of less-well-to-do people who do not know the value of their assets, and well-off people who do not want to disclose the value. Housing wealth is reduced by the authors' methods, because the former type of nonresponse dominates.

Singer and **Ryff** put forth a theoretical and empirical framework based on life histories, dynamics of people within and between multiple social hierarchies, and a structure linking socioeconomic stratification to psychosocial dynamics and their physiological underpinnings that result in disease and death. The authors then analyze the onset of severe depression, focusing on the features of life histories that provide the basis for a resilience that leads to recovery and subsequent psychological well-being.

Staiger uses annual data from 1974–87 for 492 large hospitals on standardized mortality rates for Medicare admissions in both specific diagnoses and in the aggregate. He finds that 75 to 90 percent (depending on the diagnosis) of the variance in mortality is entirely transitory. The remaining nontransitory component of mortality is fairly persistent, though. Measured mortality appears to be a product of: 1) measurement error; 2) a fairly transitory diagnosis-specific component; and 3) a very permanent hospital component that is common across diagnosis. Finally, although these mortality measures have changed over time (particularly during the 1970s), there is no obvious evidence that they tended to converge or diverge across hospitals, or that they changed in any interesting way during the 1980s.

McGarry uses data from AHEAD to document the current use of home health care among the population aged 70 and over. She explores the role of financial compensation from parents to children as one method of encouraging children to provide care, and controls for factors such as income and wealth that may affect access to services. She finds that the provision of time to help elderly parents probably is not related to the opportunity cost of the child's time. Nor is such care exchanged for financial transfers from the parent to the child. Rather, the provision of care stems largely from the type of care required by the parents and the gender of their children. Children provide help with housekeeping chores, but are less likely to help with personal care needs, such as dressing and bathing. Sons provide care to parents if they have no sisters, but the presence of even one sister drastically reduces the probability that a son will supply his time to help. Children who live with their elderly parents provide help at a much greater rate, and supply many more hours on average, than those who do not.

Medicare is provided only to individuals and not to their dependents. Thus, if individuals have dependents, they will still face a health insurance cost associated

with retiring at age 65. Comparing the retirement behavior of individuals whose spouses are also eligible for Medicare with the retirement behavior of individuals whose spouses are not eligible for Medicare, **Madrian** finds that (conditional on the age difference between spouses) men with Medicare-eligible spouses are much more likely to retire than men without Medicare-eligible spouses. This is true even among men whose wives have never worked and who therefore would not be affected by the financial incentives associated with a wife's retirement or by joint retirement considerations.

Also attending this conference were: Robin L. Lumsdaine, NBER and Princeton University; Richard Suzman, National Institute on Aging; and Richard Woodbury, NBER. These papers and their discussion will be published by the University of Chicago Press. The availability of the volume will be announced in a future issue of the *NBER Reporter.*

Geography and Ownership as Bases for Economic Accounting

The NBER's Conference on Research in Income and Wealth sponsored a meeting on "Geography and Ownership as Bases for Economic Accounting" in Washington on May 19–20. Robert E. Baldwin, NBER and University of Wisconsin; Robert E. Lipsey, NBER and Queens College; and J. David Richardson, NBER and Syracuse University, organized this program:

Robert E. Baldwin, and **Fukunari Kimura,** Keio University, "Measuring U.S. International Goods and Services Transactions"
Discussant:
Guy V. G. Stevens, Federal Reserve Board

Fukunari Kimura and **Robert E. Baldwin,** "Supplementing the Cross-Border Trade Account Framework: Transactions Between Japanese and Foreigners"
Discussant:
Michael Plummer, Brandeis University

Linda Low, National University of Singapore; **Eric D. Ramstetter,** Kansai University; and **Henry Yeung,** University of Manchester, "Accounting for Outward Direct Investment from Hong Kong and Singapore: Who Controls What?"
Discussant:
Rachel McCulloch, Brandeis University

K. C. Fung, University of California, Santa Cruz, "Accounting for Chinese Trade: Some National and Regional Considerations"
Discussant:
Marcus Noland, Institute for International Economics

Eric Fisher, Ohio State University, "A Generational Measure of the Current Account Related to the Well-Being of Japan"
Discussant:
Jon Haveman, Purdue University

Magnus Blomström, NBER and Stockholm School of Economics; **Robert E. Lipsey;** and **Eric D. Ramstetter,** "Multinational Firms in World Production"
Discussant:
Raymond J. Mataloni, U.S. Bureau of Economic Analysis

David Greytak, Syracuse University; **J. David Richardson;** and **Pamela J. Smith,** University of Delaware, "Intranational, Interregional Trade Data: What Can We Learn from the United States in 1963?"
Discussant:
Cletus Coughlin, Federal Reserve Bank of St. Louis

Deborah L. Swenson, NBER and University of California, Davis, "The Effect of U.S. State Tax and Investment Promotion Policy on the Distribution of Inward Direct Investment"
Discussant:
Michael Wasylenko, Syracuse University

John B. Mutti, Grinnell College, and **Harry Grubert,** U.S. Department of the Treasury, "The Significance of International Tax Rules for Sourcing of Income: The Relationship Between Income Taxes and Trade Taxes"
Discussant:
Kristen Willard, Columbia University

Mark Doms and **J. Bradford Jensen,** U.S. Bureau of the Census, "A Comparison Between OperatingCharacteristics of Domestic and Foreign-Owned Manufacturing Establishments in

the United States"
Discussant:
Keith Head, University of British Columbia

William J. Zeile, U.S. Bureau of Economic Analysis, "Imported Inputs and the Domestic Content of Production by Foreign-Owned Manufacturing Affiliates in the United States"
Discussant:
David Hummels, University of Michigan

Baldwin and **Kimura** discuss two ways to supplement the standard balance-of-payments framework for portraying U.S. international transactions. Both proposals focus on the ownership (U.S. versus foreign) of those firms undertaking international trade and transactions through foreign affiliates. One measures these activities in terms of the volume of sales and purchases, while the other measures them in terms of their value-added component.

The second paper, by **Kimura** and **Baldwin,** estimates net sales by the Japanese to foreigners at both macroeconomic and sectoral levels. The estimated figures confirm the often-claimed asymmetry between inward and outward foreign direct investment (FDI) by Japan. In addition, the authors show that the activities of commercial affiliates of Japanese firms abroad, particularly those of the foreign branches of general trading companies, play an important role in Japanese international transactions.

Low, Ramstetter, and **Yeung** survey information on outward investment from Hong Kong and Singapore, hoping to show the implications of accounting for FDI by geographical source as opposed to by country of ultimate beneficial owner. A very large portion of the FDI from these economies comes from foreign-controlled firms; thus, accounting for FDI by country of ultimate beneficial owner would result in much smaller estimates of FDI from these countries than using geographical source. Although there are a number of foreign-controlled investors in Hong Kong and Singapore who have the ability to act quite autonomously, they do not constitute a majority of the foreign-controlled investors in those economies. This suggests that there is little economic rationale for *not* accounting for FDI from these two economies by country of ultimate beneficial owner.

Fung describes China's trade as characterized by three features: high incidence of re-exports via Hong Kong; high incidence of trade related to foreign investment; and high incidence of "illegal" trade, most notably with Taiwan. In 1993, 67 percent of China's exports were re-exported via Hong Kong; 34 percent of China's imports were re-exported via Hong Kong from the rest of the world. If re-exports and re-export markups are taken into account, then the bilateral U.S.–China trade deficits have to be adjusted downward by about 40 percent on average. Further, 74 percent of China's imports from Hong Kong in 1993 are related to outward processing. Finally, Fung finds that illegal direct exports from Taiwan to Mainland China were about 60 percent of legal indirect exports in 1992.

Fisher applies his 1995 concept of the aggregate generational current account to data from Japan for the last two decades. A generation's net foreign assets are the present value of its expected net transfers from abroad; the aggregate generational current account is the annual change in the sum of these accounts across all current and future generations. Fisher shows that the present value of Japan's net foreign assets has risen markedly in the last two decades. Also, he examines the deleterious effects for Japan of continued strength in the yen or higher world interest rates.

With many firms now involved in production outside of their home countries, measuring production by ownership can yield quite different figures from measuring by location (geography). **Blomström, Lipsey,** and **Ramstetter** compare both types of measures for the United States, Japan, Sweden, Germany, and other countries receiving direct investment. They find, among other things, that both ownership- and geography-based shares for Japan have been increasing, but the former much more rapidly than the latter, as Japanese firms have begun to expand their overseas production rapidly. Both the outward and the inward investment data point to some growth over the 1970s and 1980s in the share of world output accounted for by multinational firms. But most of their output is still in their home countries; internationalized, or overseas output is almost certainly well below 10 percent of total world output.

Using data for regions of U.S. states in 1963, **Greytak, Richardson,** and **Smith** provisionally conclude that such data provide insights into the structure of trade among "free trade" areas (that is, the degree of "home market bias").

These data can be valuable for exploring the determinants and adjustment of nations to freer trade.

Swenson examines the change in the geographic distribution of foreign employment across U.S. states between 1980 and 1992 to determine the effects of wage differences, or differences in the tax and promotion environment. She finds that overall foreign employment is not affected measurably by taxes, while foreign *manufacturing* employment is concentrated in regions with lower tax rates. The distribution of manufacturing employment among states within a region also appears to be influenced by taxes. The differential responsiveness of total versus manufacturing foreign employment suggests that investment distinctions determine the geographical distribution of employment.

Mutti and **Grubert** ask how rules for determining the source of income alter the form in which taxable income is reported, and the location of production internationally. The effect of these policies is less transparent than for statutory rates, but they have become increasingly important because of the decline in the U.S. corporate tax rate in 1986, and the larger share of firms that have excess foreign tax credits. For such firms, the sales source rules provide a significant benefit by treating a portion of export income as foreign source. Treating royalties as foreign-source income may create an even more important incentive, favoring affiliate production by high technology firms with excess foreign tax credits: the affiliate can pay royalties that reduce its foreign tax burden and let the parent claim a larger foreign tax credit.

Doms and **Jensen** use newly available plant-level data on foreign-owned U.S. manufacturing establishments in 1987 to compare the operating characteristics of foreign- and domestic-owned plants. They show that foreign-owned establishments are larger, pay higher wages, and are more capital and technology intensive than the average U.S.-owned firm. When other observable plant characteristics are included, the differences decrease but remain statistically significant. The authors further decompose domestic-owned plants into those owned by U.S. multinationals, those owned by large U.S. firms with low foreign-asset-to-total-asset ratios, and those owned by small U.S. firms. Plants owned by U.S. multinationals pay the most, are the most capital and technology intensive, and the most productive, followed by foreign-owned plants, plants owned by large domestic-oriented firms, and plants of small domestic firms. This suggests that multinationals possess firm-specific advantages allowing them to overcome the costs of FDI.

Zeile uses new data from the Bureau of Economic Analysis's 1992 benchmark survey of FDI in the United States to measure the domestic content and sourcing behavior of foreign-owned U.S. manufacturing affiliates, together with comparable measures for domestically owned U.S. companies. He finds that affiliates with owners in Japan or Germany have significantly lower domestic content, and significantly higher imports in their purchased intermediate inputs, than domestically owned companies in comparable industries. The difference is particularly pronounced in machinery-type industries. In contrast, the average domestic content for British-owned affiliates is barely distinguishable from that of domestically owned companies in comparable industries. Further, Japanese-owned affiliates display a high tendency, whereas British- and French-owned affiliates display a low tendency, to source their intermediate inputs from their respective home countries. Intrafirm imports account for a very large share of the imported inputs of Swiss- and Japanese-owned affiliates.

These papers and their discussion will be published by the University of Chicago Press. The availability of the volume will be announced in a future issue of the *NBER Reporter.*

International Seminar on Macroeconomics

The NBER's 18th annual International Seminar on Macroeconomics took place at the Deutsche Bundesbank in Frankfurt on June 19 and 20. Co-chair Jeffrey A. Frankel, of the NBER and Institute for International Economics, along with organizers Kenneth S. Rogoff, of the NBER and Princeton University, and Charles Wyplosz, Institut Européen d'Administration des Affaires (INSEAD), set the general theme of "Wages, Politics, Saving, and International Income Correlations." The two-day program was:

Peter Boone, London School of Economics, "Politics and the Effectiveness of Foreign Aid"

Discussants:

Barry Eichengreen, NBER and University of California, Berkeley, and
Eric van Wincoop, Boston University

Christina H. Paxson, NBER and Princeton University, "Saving and Growth: Evidence from Microdata"
Discussant:
Orazio Attanasio, NBER and Università di Bologna

Andrew Scott, Oxford University, "Consumption, Credit, and Interest Rates in the United Kingdom"
Discussants:
Ben S. Bernanke, NBER and Princeton University, and
Heinz Herrmann, Deutsche Bundesbank

Stephen G. Cecchetti, NBER and Boston College, and
Anil K. Kashyap, NBER and University of Chicago, "The Interaction of Seasonal and Business Cycle Factors: Evidence from International Data"
Discussants:
Paul Soderlind, University of Stockholm, and
James H. Stock, NBER and Harvard University

Graham Elliott, University of California, San Diego, and
Antonio Fatás, INSEAD, "The Dynamics of the Current Account"
Discussants:
Philippe Bacchetta, Studienzentrum Genzensee, and
Stephen G. Cecchetti

Laura Bottazzi, Bocconi University;
Paolo Pesenti, Princeton University; and
Eric van Wincoop, "Wages, Profits, and the International Portfolio Puzzle"
Discussants:
Jean-Pierre Danthine, University of Lausanne, and
Linda Tesar, NBER and University of California, Santa Barbara

Alessandra Casella, NBER and Columbia University, "Voting and Power Sharing in the European Union"
Discussants:
Giorgio Basevi, University of Bologna, and
Torsten Persson, NBER and Institute for International Economic Studies

Christopher M. Schmidt and
Klaus F. Zimmerman, University of Munich, "The Labor Market Impacts of Immigration: A European Perspective"
Discussants:
Michael Burda, INSEAD, and
Juan Dolado, CEMFI

Boone analyzes the effectiveness of foreign aid programs, by estimating how three stylized political/economic regimes—labeled populist, rent-seeking, and laissez-faire—would use foreign aid. Using data on flows of nonmilitary aid to 96 countries, he finds that models of rent-seeking political regimes best predict the impact of foreign aid. Aid does not significantly increase investment and growth, nor benefit the poor, as measured by improvements in indicators of human development, but it does increase the size of government. Boone also finds that the impact of aid does not vary according to whether recipient governments are liberal democratic or highly repressive. But liberal political regimes and democracies have 30 percent lower infant mortality on average than the least free regimes. One implication of this is that short-term aid targeted to support new liberal regimes *may* be a more successful means of reducing poverty than current programs.

There is a positive correlation between rates of economic growth and rates of saving across countries. Standard growth models often imply that saving drives growth, while life-cycle models and models of consumption with habit formation imply the reverse: that higher growth results in higher saving rates. **Paxson** uses data from the United States, Britain, Taiwan, and Thailand to try to explain the cross-country correlation between saving and growth. She finds some support for life-cycle and habit-formation models, but estimates that increases in growth produce only small increases in aggregate saving rates. The explanation for a large chunk of the correlation between saving and growth lies elsewhere, she concludes.

Scott examines how capital market imperfections influence consumption, and then uses his model to assess cyclical and structural changes in loan supply. U.K. data offer some support for his view of loan market imperfection; the model accounts for many of the rejections of the Permanent Income Hypothesis. In particular, only modestly sloped interest schedules are necessary for consumption to display a close relationship with income. Between 1979 and 1988, there was an 83 percent reduction in capital market imperfections in the United Kingdom. Strong consumption growth in the 1980s ap-

pears to have been caused more by income growth than by financial liberalization. Also, after financial innovation, economies with more perfect capital markets experience: 1) a smoother decline in consumption when the economy moves into recession; 2) a slower consumption recovery; and 3) a larger cumulative consumption loss.

Cecchetti and **Kashyap** study 20 years of monthly production data for 11 industries and 19 countries, and uncover eight recurring patterns of international business and seasonal cycles: 1) A tremendous amount of volatility in production in explained by seasonal shifts. In France and Italy, for example, output falls steeply in the vacation month of August. 2) Seasonal shifts are not very highly correlated across countries. 3) The country-level differences are larger than the industry-level patterns in seasonality. 4) There are considerable differences in the timing and magnitude of business cycles across countries. 5) Except for textiles, transportation equipment, and to a lesser extent, chemicals, the seasonal cycle in production is significantly less volatile during a business cycle boom than during a contraction. 6) There are significant cyclical/seasonal interactions common to all industries in a given country for about one-third of the countries. 7) In relative terms, the estimated interactions that are common to countries are larger than those common to industries. 8) The reallocation of production from high-output months to low-output months, which typically occurs in moving from a business cycle trough to a peak, sometimes is quite large.

Elliott and **Fatás** analyze the transmission of shocks across countries, and how investment and the current account respond differently depending on the degree of propagation of shocks. The authors estimate a structural model for the Japanese, German, and U.S. economies in which productivity shocks propagate through trade. They find that shocks to the United States propagate quickly to the other two economies, while German and Japanese shocks have little impact on other countries' productivity. Further, productivity increases lead to booms in domestic investment and current account deficits. However, foreign investment tends to react positively to productivity shocks, even when the shock is purely national. The authors also find quantitative differences among the three countries in the response of their current account and investment growth rates to changes in domestic productivity. They interpret this as evidence of different degrees of capital mobility among the countries.

Bottazzi, Pesenti, and **van Wincoop** investigate the impact of fluctuations in the return to human capital on the composition of international asset portfolios. Their model applied to a large set of OECD countries accounts for an average bias of 30 to 35 percentage points toward domestic securities. The results are quantitatively similar when a "fundamentals" approach is adopted to compute the returns to domestic capital from data on aggregate operating surpluses; when data on equity returns are used directly; and when data on stock returns, long-term government bond yields, and short-term deposit rates are combined to evaluate the overall payoff of a claim on a country's productive resources.

The recent enlargement of the European Union has been accompanied by an intense public debate on the gains and losses accruing to each of the old member countries, and the reallocation of power and transfers that would countervail the direct economic effect. **Casella** asks whether countries of different sizes participating in a trade bloc gain differently from the entry of new members. She theorizes that gains will be distributed disproportionately in favor of small countries, because the enlargement of a trade bloc diminishes the importance of the domestic market, and thus the advantage enjoyed by large countries. Her empirical analysis of trade flows toward Spain and Portugal after their 1986 entry into the European Community confirms that: with the unexplained exception of Italy, the largest increase in trade, and thus the largest welfare gains, were experienced by the small EC countries.

Throughout postwar history, immigration to Western Europe has been numerically significant, and it is projected to gain in importance in years to come. The key to the integration of immigrants is the labor market; native and migrant workers have disparate skills. In the absence of a countervailing immigration policy, migrants primarily will compete directly with manual laborers. In Europe, manual and nonmanual laborers face distinctively different mechanisms of wage and employment determination. Generally, unions act as the agent for manual workers in this process, although there are a number of different institutional arrangements. **Schmidt** and **Zimmerman** analyze how the relative labor market outcomes of manual workers in Europe are affected by immigration, and how the explicit setup of wage determination influences these effects.

Also participating in this conference were: Lorenzo Bini-Smaghi and Wolfgang Schill, European Monetary Institute; Bernhard Felderer, Institüt für Höhere Studien; Martin Feldstein, NBER and Harvard University; Klaus Friedrich, Dresdner Bank; Francesco Giavazzi, Bocconi University; Robert J. Gordon, NBER and Northwestern University; Otmar Issing, Deutsche Bundesbank; and Guido Tabellini, Innocenzo Gasparini Institute for Economic Research.

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

Additional Paper

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"Budgets as Dynamic Gatekeepers," by **Harold Pollack** and **Richard J. Zeckhauser**

Bureau News

Public Economics Program Meeting

Fifty members and guests of the NBER's Program on Public Economics met at the Bureau's Cambridge office on April 6 and 7. Program Director James M. Poterba, also of MIT, organized this program:

A. Lans Bovenberg, Tilburg University, and
Lawrence H. Goulder, NBER and Stanford University, "Optimal Environmental Taxation in the Presence of Other Taxes: General Equilibrium Analyses" (NBER Working Paper No. 4897)
Discussant:
Don Fullerton, NBER and University of Texas

Steven D. Levitt, NBER and Harvard University, "The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation" (NBER Working Paper No. 5118)
Discussant:
Joel Waldfogel, NBER and Yale University

Florencio López-de-Silanes, Harvard University;
Andrei Shleifer, NBER and Harvard University; and
Robert W. Vishny, NBER and University of Chicago, "Privatization in the United States" (NBER Working Paper No. 5113)
Discussant:
James M. Poterba

Patricia M. Anderson, NBER and Dartmouth College, and
Bruce D. Meyer, NBER and Northwestern University, "The Effects of Unemployment Insurance Taxes and Benefits on Layoffs Using Firm and Individual Data" (NBER Working Paper No. 4960)
Discussant:
Hilary W. Hoynes, NBER and University of California, Berkeley

Roger H. Gordon and
Jeffrey K. MacKie-Mason, NBER and University of Michigan, "Why Is There Corporate Taxation in a Small Open Economy? The Role of Transfer Pricing and Income Shifting" (NBER Working Paper No. 4690)
Discussant:
James R. Hines, Jr., NBER and Harvard University

Martin Feldstein, NBER and Harvard University, "Tax Avoidance and the Deadweight Loss of the Income Tax" (NBER Working Paper No. 5055)
Discussant:
Alan J. Auerbach, NBER and University of California, Berkeley

Bovenberg and **Goulder** ask what the optimal rate of environmental taxes would be in an economy with other distortionary taxes. They find that the optimal environmental tax rate will be lower as the distortions posed by other taxes increase. Their numerical results suggest that previous studies may have overstated the optimal carbon tax seriously by disregarding preexisting taxes.

Levitt uses the status of prison overcrowding litigation in a state as a proxy for changes in the prison population. Overcrowding litiga-

tion has a negative effect on prison populations, but is unlikely to be related to fluctuations in the crime rate, except through that effect. Levitt estimates that for each reduction in the prison population brought about by prison overcrowding litigation, the total number of crimes committed increases by approximately 15 per year. The estimated social benefit from eliminating those 15 crimes is approximately $45,000 per year, substantially above the costs of incarceration. His estimates imply that the socially optimal prison population is roughly 15 percent (or 200,000 prisoners) above the current figure.

In the United States, the two principal modes of producing local government services are inhouse provision by government employees and contracting out to private suppliers, also known as privatization. **López-de-Silanes, Shleifer,** and **Vishny** empirically examine how U.S. counties choose the mode of providing services. They find that state clean government laws and state laws restricting county spending encourage privatization, whereas strong public unions discourage it. This is inconsistent with the view that efficiency considerations alone govern provision, and points to the important roles of political patronage and taxpayer resistance to government spending.

Anderson and **Meyer** examine the effects of unemployment insurance experience rating on layoffs. They find that incomplete experience rating is responsible for over 20 percent of temporary layoffs. They also confirm the correlation found in past studies between proxies for experience rating and layoffs.

Gordon and **MacKie-Mason** study the role of income shifting, both domestic (between the personal and corporate tax bases) and cross border (through transfer pricing). Countries need cash-flow corporate taxes as a backstop to labor taxes in order to discourage individuals from converting their labor income into otherwise untaxed corporate income. The authors explore how these taxes can best be modified to deal with cross-border shifting as well.

Feldstein's analysis of the deadweight loss of the income tax emphasizes the induced change in taxable income (including the effects of deductions and exclusions) instead of the traditional emphasis on changes in labor force participation and hours. Using the NBER's TAXSIM model calibrated to 1994, he finds that a marginal increase in tax revenue achieved by a proportional rise in all personal income tax rates involves a deadweight loss of nearly $2 per incremental dollar of revenue. Repealing the 1993 increase in tax rates for high income taxpayers would reduce the deadweight loss of the tax system by $24 billion while actually increasing tax revenue, he concludes.

Productivity Meeting

The NBER's Program on Productivity held its spring meeting at the Bureau's Cambridge office on April 21. Ernst R. Berndt, NBER and MIT, and Robert H. McGuckin, U.S. Bureau of the Census, organized this program:

Douglas Dwyer, Columbia University, "Whittling Away at Productivity Dispersion"

Mark Roberts, Pennsylvania State University, and **Dylan Supina,** Stanford University, "The Magnitude and Persistence of Output Price Dispersion for U.S. Manufactured Products"

Ron Jarmin, U.S. Bureau of the Census, Progress Report on Innovations Survey

Robert H. McGuckin, Progress Report on Extension of LRD to Nonmanufacturing and New Survey of Manufacturing Technology

Mark Doms and **Kenneth Troske,** U.S. Bureau of the Census, and **Timothy Dunne,** University of Oklahoma, "Workers, Wages, and Technology"

Sanghamitra Das, NBER and Indiana University; **Steven Olley,** NBER and New York University; and **Ariel Pakes,** NBER and Yale University, "Evolution of Brand Qualities of Televisions in the United States"

Wayne B. Gray, NBER and Clark University, and **Ron Shadbegian,** University of Massachusetts, "Do Different Pollution Abatement Costs Affect Factor Productivity Differently?"

Dwyer finds that skill differences between plants, which are measured by wage differences, can account for approximately 15 percent of the dispersion in plant productivity levels in the textile industry. As much as half of the observed dispersion in plant productivity levels is transitory, which suggests that much of this dispersion could be the result of reporting error. Nevertheless, a portion of the dispersion reflects real quality differences across plants; plants that are measured as being more productive expand faster and are less likely to exit.

Roberts and **Supina** use panel data from the U.S. Census of Manufactures to study the pattern of output prices at the plant level for 13 products. They find that price dispersion varies across products but changes relatively little over time for a given product. Output prices are correlated negatively with plant size and positively with estimates of a plant's marginal cost for virtually every product. Cost shocks common to all producers of a product—for example, increases in raw material prices experienced by gasoline refiners, newsprint manufacturers, and coffee roasters—are reflected almost fully in output prices while plant-level cost shocks are not. This is consistent with competitive output markets, combined with persistent differences among producers in quality of product.

Doms, Dunne, and **Troske** use a number of data sources to examine the plant-level patterns of worker skills and technology. With detailed information on over 34,000 employees working in 358 manufacturing plants, and data on over 3300 plants spanning 1977–92, the authors conclude that technologically advanced plants rely more on educated workers, and generally use a higher fraction of workers in skilled occupations. Technologically advanced plants also pay higher wages to production workers and to technical/clerical/sales workers. The most technologically intensive plants shifted their employment toward more skilled workers between 1977 and 1992. However, the most technologically advanced plants experienced the smallest increase in the wages of nonproduction workers relative to production workers over this period.

Das, Olley, and **Pakes** estimate the quality of U.S. televisions using price and market share data from 1978–88. They hope to provide a partial answer to why U.S. firms exited the TV industry even though it was not declining; as a consequence, foreign firms penetrated the industry through imports as well as via direct foreign investment. During the quota restrictions or Orderly Market Agreement period, U.S. quality was relatively high as compared to after that period. Low prices and relatively higher-quality brands from the Far East seem to have wiped out low-price, lower-quality U.S. brands. Dutch brands, although of high quality per dollar, had a restricted market share because of their high prices.

Gray and **Shadbegian** use plant-level Census data for the paper, oil, and steel industries to see how pollution abatement costs affect productivity. Large, capital-intensive plants are affected more by regulation, spending a larger share of their total costs on pollution abatement than smaller plants in the same industry. The authors find that plants that spent more on pollution abatement had lower levels of productivity, but that the approach to pollution control was important. That is, plants that redesigned their production processes did better than those that relied on traditional "end-of-pipe" abatement methods.

Stiglitz Is Named to Lead Economic Advisers

President Clinton recently named Joseph E. Stiglitz chairman of his Council of Economic Advisers. Already a member of the council, Stiglitz is on leave from Stanford University and the NBER, where he was a research associate in the Programs in Public Economics and Economic Fluctuations.

Monetary Economists Meet at NBER

The NBER's Program on Monetary Economics held its spring meeting at the Bureau's Cambridge office on April 28. Anil K. Kashyap, NBER and University of Chicago, and David N. Weil, NBER and Brown University, organized this program:

Joe Peek, Boston College, and **Eric Rosengren,** Federal Reserve Bank of Boston, "Banks and the Availability of Small Business Loans"
Discussant:
Frederic S. Mishkin, Federal Reserve Bank of New York

René Garcia, Université de Montréal, and **Huntley Schaller,** Princeton University, "Are the Effects of Monetary Policy Asymmetric?"
Discussant:

N. Gregory Mankiw, NBER and Harvard University

Glenn Rudebusch, Federal Reserve Bank of San Francisco, "Federal Reserve Interest Rate Targeting, Rational Expectations, and the Term Structure"

Discussant:
John Y. Campbell, NBER and Harvard University

A discussion with

Mervyn A. King, Chief Economist and Executive Director, Bank of England

V. V. Chari, University of Minnesota;
Lawrence J. Christiano, NBER and Northwestern University; and
Patrick Kehoe, University of Minnesota, "Principles of Optimal Fiscal and Monetary Policy: A Primer"

Discussant:
Robert E. Lucas, Jr., NBER and University of Chicago

Ben S. Bernanke, NBER and Princeton University, and
Ilian Mihov, Princeton University, "Measuring Monetary Policy"

Discussant:
Mark W. Watson, NBER and Northwestern University

Peek and **Rosengren** examine formal regulatory actions and clearly identify a supply shock that caused an abrupt decline in bank lending not attributable to demand. Further, they find that this decreased lending occurred at institutions (and in lending categories) that serve the type of firm most likely to be dependent on bank financing. This decline in lending to small businesses was probably a contributing factor to the unprecedented increase in business failures in New England.

Garcia and **Schaller** ask whether monetary policy has the same effect regardless of the current phase of the business cycle. For example, if the economy is in a recession, do declining interest rates increase the probability of an expansion? They find that changes in interest rates have larger effects during recessions. Interest rates also have substantial effects on the probability of a switch from recession to expansion, or vice-versa.

The amount of information in the yield curve for forecasting future changes in short rates varies with the maturity of the rates involved. Spreads between certain long and short rates appear to be unrelated to future changes in the short rate. **Rudebusch** estimates a daily model of Federal Reserve interest rate targeting; when accompanied by the rational expectations hypothesis, it explains the varying predictive ability of the yield curve, and elucidates the link between Fed policy and the term structure.

Chari, Christiano, and **Kehoe** focus on three operating characteristics of optimal policy suggested by the literature on Ramsey taxation in stochastic neoclassical growth models. Under the optimal policies, labor tax rates are constant, nominal debt absorbs shocks to the government budget constraint, and nominal interest rates are low and constant.

Bernanke and **Mihov** develop an approach to extracting information about monetary policy from data on bank reserves and the federal funds rate. Their methodology can be used to compare and evaluate existing indicators of monetary policy and to develop an "optimal" measure. Their new measure of policy stance conforms well to qualitative indicators of policy; innovations to their measure lead to reasonable and precisely estimated dynamic responses by variables including real GDP and the GDP deflator.

The Well-Being of Children

Over 50 members and guests of the NBER's Project on the Well-Being of Children met at the Bureau's Cambridge office on May 11. Lawrence F. Katz, NBER and Harvard University, organized this program:

Eric Hanushek, University of Rochester;
Steven Rivkin, Amherst College; and
Lori Taylor, Federal Reserve Bank of Dallas, "Aggregation and the Estimated Effects of School Resources"

Thomas J. Kane, NBER and Harvard University, "Rising Public College Tuition and College Entry: How Well Do Public Subsidies Promote Access to College?"

Joshua D. Angrist, NBER and MIT, and
William N. Evans, NBER and University of Maryland, "Instrumental Variables Estimates of the Effect of Teen Childbearing on Mother's Schooling and Earnings"

Philip Levine, Wellesley College;
David Zimmerman, Williams College; and
Amy Trainor, Hewitt Associates, "The Effect of Medicaid Abortion Funding Restrictions on Abortions, Pregnancies, and Birth" (NBER Working Paper No. 5066)

Hanushek, Rivkin, and **Taylor** use a new method to investigate the effectiveness of school resources in raising student performance. They find that studies using aggregate data are much more likely than other types of studies to find positive effects of school resources on achievement, and to magnify those effects. These results provide strong evidence against the view that additional expenditures alone are likely to improve student outcomes.

Kane asks how sensitive young people are to the price of schooling, especially college. He finds that cost has a large impact on enrollment, particularly for low-income students and for those attending two-year colleges. However, the evidence of enrollment responses to targeted aid is fairly weak. For example, after a federal means-tested grant program was established in 1973, there was no disproportionate increase in college enrollment by low-income youth.

Angrist and **Evans** analyze the causal link between teen motherhood and the teens' social and economic prospects. They focus on women born in 1949–59 and use data from the 1980 and 1990 Censuses. Results from the 1980 Census show a significant association between exposure to a liberalized abortion environment and a reduction in teen childbearing; these effects are largest for black women. Further, abortion reform is associated with a reduction in teen marriage rates. Other estimates show that teen fertility has an adverse impact on schooling for black women born in 1949–54, and for white women born in 1954–59. However, estimates based on the 1990 Census are inconclusive.

Levine, Zimmerman, and **Trainor** ask how state restrictions on Medicaid abortion funding affect the likelihood of getting pregnant, having an abortion, and bearing a child. They find that Medicaid funding restrictions are associated with a reduction in the number of both abortions and pregnancies, resulting in either no change or a reduction in births

Program Meeting on Labor Studies

Nearly 40 members and guests of the NBER's Program on Labor Studies gathered in Cambridge on May 12 to discuss their research. The program, organized by Lawrence F. Katz, of NBER and Harvard University, was:

Caroline Minter Hoxby, NBER and Harvard University, "Teachers' Unions and the Effectiveness of Policies Designed to Improve School Quality"

Joseph G. Altonji, NBER and Northwestern University, and **Nicolas Williams,** University of Cincinnati, "Do Wages Rise with Job Seniority? A Reassessment"

John Bound, NBER and University of Michigan, and **Harry J. Holzer,** Michigan State University, "Structural Changes, Employment Outcomes, and Population Adjustments Among Whites and Blacks: 1980–90"

David M. Cutler and **Edward L. Glaeser,** NBER and Harvard University, "Are Ghettos Good or Bad?"

David Neumark, NBER and Michigan State University; **Roy J. Bank** and **Kyle D. Van Nort,** Michigan State University, "Sex Discrimination in Restaurant Hiring: An Audit Study" (NBER Working Paper No. 5024)

Hoxby estimates the effect of teachers' unions on the level and productivity of school "inputs": the student–teacher ratio, per-pupil spending, and teacher salaries. Using panel data on all U.S. school districts, she finds that teachers' unions lower student–teacher ratios, raise per-pupil spending, and raise teacher salaries. Moreover, she finds that increased school inputs attributable to unionization have less effect on student performance than inputs not associated with unions. For instance, a decrease of ten students per teacher *not brought about by unionization* raises students' wages as adults by 2 percent. This effect is modest, but it contrasts sharply with the complete lack of student improvement associated with a ten-student decrease brought about by union influence.

Altonji and **Williams** reexamine the evidence on the effects of job seniority on earnings. An earlier study by Altonji and Robert Shakotko found only a small return to seniority. A subsequent study by Robert Topel found that the returns were large. The results reported here for a more recent period suggest that the return to seniority lies somewhere between the two earlier estimates.

In the 1980s, earnings and employment deteriorated most for young, less-educated, and/or black males. Among blacks, the most severe deterioration occurred in the North-Central regions. According to

Bound and **Holzer**, the causes of such regional and demographic variations include shifts in demand away from these groups and areas, and the greater relative impacts of such shifts on the earnings and employment of certain demographic groups. Shifts in relative supply also contributed somewhat to the observed changes in employment. But younger and less-educated workers, especially blacks, adjusted substantially less to the changes than other workers and did not migrate in response to shifts in demand. Nor did their education levels improve during this decade.

Cutler and **Glaeser** examine the effects of segregation on African-Americans in terms of schooling, employment, and single parenthood. They find that African-Americans in more segregated areas do significantly worse, particularly if they live in central cities. Some, but never more than 37 percent of this effect, stems from lack of role models and from long commuting times.

Neumark, Bank, and **Van Nort** investigate sex discrimination in restaurant hiring. After sending out comparably matched pairs of men and women to apply for jobs as waiters and waitresses at 65 restaurants in Philadelphia, they uncover discrimination against women in the high-price restaurants. The women were less likely to receive a job offer or an interview than the men. These hiring patterns have implications for sex differences in earnings, since informal survey evidence indicates that earnings are higher in the high-price restaurants.

NBER Working Group on Japan Initiated

Members of the NBER's Working Group on Japan held their first meeting in Cambridge on May 19. The program, organized by NBER Project Director Anil K. Kashyap, also of University of Chicago, was:

Jun-Koo Kang, University of Rhode Island, and
René M. Stulz, NBER and Ohio State University, "How Different Is Japanese Corporate Finance? An Investigation of the Information Content of New Security Issues"
Discussant:
Kenneth J. Singleton, NBER and Stanford University

Michael M. Knetter, NBER and Dartmouth College, "Why Are Retail Prices in Japan So High? Evidence from German Export Prices" (NBER Working Paper No. 4894)
Discussant:
Kenneth A. Froot, NBER and Harvard University

Kazuo Ueda, University of Tokyo, and
Yuri Nagataki, Hitotsubashi University, "The Import Behavior of Japanese Corporate Groups: Evidence from Micro Survey Data"
Discussant:
Robert Z. Lawrence, NBER and Harvard University

Charles Y. Horioka, NBER and Osaka University, "Is Japan's Household Saving Rate Really High?"
Discussant:
Robert Dekle, Boston University

Takatoshi Ito, International Monetary Fund, and
Tokuo Iwaisako, Harvard University, "Explaining Asset Bubbles in Japan"
Discussant:
Kenneth D. West, NBER and University of Wisconsin

Kang and **Stulz** study the wealth effects associated with 875 new security issues in Japan from January 1, 1985 to May 31, 1991. They find that the announcement of convertible debt issues has a significant positive abnormal return of 1.05 percent. At the announcement of equity issues, there is an abnormal return of 0.45 percent that is offset by an abnormal return of 1.01 percent on the issue day. Abnormal returns are related negatively to firm size, so large Japanese firms have abnormal returns more like those of large U.S. firms than those of small Japanese firms. Japanese managers decide to issue shares based on different considerations than American managers, though.

Retail prices in Japan are higher than in other countries for similar products. **Knetter** finds that, for the vast majority of the 37 seven-digit German export industries he studies, prices on shipments to Japan are significantly higher than prices on shipments to the United States, the United Kingdom, and Canada. He notes that this implies that it is monopoly practices in Japan and not distribution costs that keep Japanese prices so high.

Using a sample of 527 Japanese manufacturing firms, **Ueda** and **Nagataki** ask whether the Keiretsu affiliation of these firms affects their import behavior. After controlling for the effects of other economic determinants of imports, they find that Keiretsu firms import as much as non-Keiretsu firms do.

Horioka finds that Japan's

seemingly high household saving rate is biased because it: excludes capital transfers and real capital gains; values depreciation at historical cost rather than at replacement cost; uses a residual measure of financial saving rather than data from the Flow-of-Funds Accounts; and treats expenditures on consumer durables as consumption rather than as saving. But to a considerable extent these biases are offsetting. Household saving in Japan consists primarily of financial saving (net lending), meaning that most of it is available to finance investment in other sectors of the economy and/or abroad.

Ito and **Iwaisako** consider the boom and bust in Japanese stock and real estate markets in the second half of the 1980s, paying considerable attention to the linkage of the two markets and to the effects of monetary policy. They find that the initial seed of bubbles is sown by a sharp increase in bank lending to real estate. There is considerable comovement between stock and land prices, consistent with the collateral value of land for firms constrained by cash flow problems. Asset price increases from mid-1987 to mid-1989 are consistent with movement in fundamentals. Finally, the stock price increase in the second half of 1989, and the land price increase in 1990, are not explained by any model of fundamentals or rational bubbles.

Also participating in this meeting were: Jennifer Corbett, Oxford University; and NBER associates Michael R. Darby and Lynne G. Zucker, University of California, Los Angeles; Kathryn M. E. Dominguez and Martin Feldstein, Harvard University; Michael P. Dooley, University of California, Santa Cruz; Jeffrey A. Frankel, University of California, Berkeley; Herschel I. Grossman, Brown University; and Steven N. Kaplan, University of Chicago.

Economic Fluctuations Research Meeting

Over 70 members and guests of the NBER's Program on Economic Fluctuations met in Cambridge on July 15. Steven J. Davis, NBER and University of Chicago, and Matthew D. Shapiro, NBER and University of Michigan, organized this program:

Jonathan Eaton and **Samuel S. Kortum,** NBER and Boston University, "Trade in Ideas: Patenting and Productivity in the OECD"
Discussant:
Alan C. Stockman, NBER and University of Rochester

John Driscoll, Brown University, "Does Bank Lending Affect Output? Evidence from the U.S. States"
Discussant:
Anil K. Kashyap, NBER and University of Chicago

Michael Horvath, Stanford University, "Cyclicality and Sectoral Linkages: Aggregate Fluctuations from Independent Sectoral Shocks"
Discussant:
Robert King, NBER and University of Virginia

Martin Weitzman, Harvard University, "Recombinant Growth"
Discussant:
Paul M. Romer, NBER and University of California, Berkeley

Mark Bils, NBER and University of Rochester, and **Peter Klenow,** University of Chicago, "Uncovering Curvature—Tests of Competing Business Cycle Models"
Discussant:
Valerie A. Ramey, NBER and University of California, San Diego

Jagadeesh Gokhale, Federal Reserve Bank of Cleveland; **Laurence J. Kotlikoff,** NBER and Boston University; and **John Sabelhaus,** Urban Institute, "Understanding the Postwar Decline in United States Saving: A Cohort Analysis"
Discussant:
Orazio Attanasio, NBER and Università di Bologna

Eaton and **Kortum** develop a model of technological innovation and its contribution to growth at home and abroad. They use international patents to indicate the source and use of innovations. They assume that countries grow at a common steady-state rate, and that a country's relative productivity depends on its capacity to absorb technology. They estimate that, except for the United States, OECD countries derive almost all of their productivity growth from abroad.

Do changes in bank lending cause subsequent changes in income? Using a panel dataset with 27 years of annual observations on the U.S. states, **Driscoll** finds that shocks to money demand have effects on loans. However, shocks to the supply of loans have no effect on output. These results imply that

banks are not an important propagation method for aggregate shocks, and that monetary policy does not operate through the market for bank loans.

Horvath presents a multisector dynamic general equilibrium model of business cycles with a distinctive feature: aggregate fluctuations are driven by independent sectoral shocks. The shocks in the model are magnified by sectoral interaction, so that more than half of the volatility of aggregate output is explained by them. The chief virtue of this model is that implausible aggregate shocks are not necessary to capture the qualitative features of macroeconomic fluctuations.

Weitzman introduces a production function for new knowledge that uses as an input old knowledge reconfigured with itself in new ways. He models the development of new ideas as analogous to an experimental agricultural station's hybridization of existing plant varieties to obtain new and improved strains. The core concept, "recombinant innovation," derives from the notion that many basic ideas are essentially combinations of other basic ideas. Weitzman shows that recombinant expansion has the power to offset most forms of diminishing returns.

The production and sale of luxuries and durable goods should be more cyclical than that of necessities and nondurable goods. **Bils** and **Klenow** study 57 luxury and durable consumer goods to quantify just how much more cyclical they are. They find that: 1) productivity is more procyclical for luxuries and durables than for necessities and nondurables; 2) relative prices are acyclical; and 3) relative quantities are steeply dampened.

Gokhale, Kotlikoff, and **Sabelhaus** study the decline in U.S. national saving. They find that the decline in U.S. saving can be traced to one major factor: the redistribution of resources from young and unborn generations that consume little or nothing to older generations that consume a lot. Most of the redistribution to the elderly reflects the growth in Social Security, Medicare, and Medicaid benefits.

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Taxing Multinational Corporations

Taxing Multinational Corporations, edited by Martin Feldstein, James R. Hines, Jr., and R. Glenn Hubbard, is now available from the University of Chicago Press for $17.95.

The essays in this volume, written for a nontechnical audience, discuss the impact of outbound foreign investment by U.S. firms on both the United States and foreign economies. They document the channels through which tax policy in the United States and abroad affects investment in plant and equipment, spending on research and development, the cost of debt and equity finance, and dividend repatriations by U.S. subsidiaries.

These essays will be of immediate value to practitioners, and of long-term value to scholars and policymakers as they debate reforms of international tax rules worldwide. The appendix to this volume will be especially useful to nonspecialists, as it summarizes current U.S. rules for taxing international income.

All three editors are members of the NBER's Program in Public Economics. Feldstein is also President and CEO of the NBER, and the George F. Baker Professor of Economics at Harvard University. Hines is an associate professor of public policy at the Kennedy School of Government; Hubbard is the Russell L. Carson Professor of Economics at Columbia University's Graduate School of Business.

The Effects of Taxation on Multinational Corporations

The Effects of Taxation on Multinational Corporations, edited by Martin Feldstein, James R. Hines, Jr., and R. Glenn Hubbard, will be available from the University of Chicago Press in August. Its price is $50.00.

The ten essays in this volume analyze the interaction between international tax rules and the investment decisions of multinational enterprises. The essays fall into three groups: 1) assessing the role played by multinational firms and their foreign direct investment (FDI) in the U.S. economy, and the design of international tax rules for multinational investment; 2) analyzing channels through which international tax rules affect the costs of international business activities such as FDI; and 3) examining ways in which international tax rules affect financing decisions of multinational firms.

This volume will be of interest to researchers in public finance and international economics, and to policymakers concerned with tax policy and international investment issues.

Differences and Changes in Wage Structures

Differences and Changes in Wage Structures, edited by Richard B. Freeman and Lawrence F. Katz, will be available from the University of Chicago Press in September for $55.00.

The 12 essays in this volume explore whether recent trends in U.S. relative wages are unique, or part of a general pattern of increasing inequality throughout the advanced nations. The papers compare patterns of earnings inequality and pay differentials in the United States, Australia, Korea, Japan, Western Europe, and the changing economies of Eastern Europe. They examine such issues as managerial compensation, gender differences in earnings, and the relationship between pay and regional unemployment.

This book casts important light on the evolution of wage structures and the growth of inequality in the United States and abroad. It will be of interest to researchers, policymakers, and scholars in business and economics alike.

Richard B. Freeman holds the Herbert Ascherman Chair in Economics at Harvard University, and is Program Director in labor studies at the National Bureau of Economic Research. He is also the executive programme director for comparative labour market institutions at the Centre for Economic Performance, London School of Economics. Lawrence F. Katz is a professor of economics at Harvard University and a research associate of the National Bureau of Economic Research.

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Erratum

The first sentence of the abstract of NBER Working Paper No. 5043 should read: "This review of Preston Miller's *The Rational Expectations Revolution, Readings from the Front Line* focuses on the impact of this research on macroeconomic policymaking."

NBER Working Papers

The Distributional Effects of the Tax Treatment of Child Care Expenses

William M. Gentry and Alison P. Hagy

NBER Working Paper No. 5088
April 1995
Public Economics

The Child Care Tax Credit and the Dependent Care Assistance Plans are the largest U.S. federal government programs aimed at helping fam-

ilies with child care by providing tax relief. Using both the National Child Care Survey and tax return data, we examine the distributional effects of these policies among families with children. We find that among families that use tax relief, the benefits average 1.24 percent of family income. Benefits as a percent of family income vary systematically over the income distribution.

Despite being regressive at low-income levels (mainly because the tax credit is nonrefundable), tax relief is distributed progressively over most of the income distribution. The ratio of benefits to income falls above the bottom quintile of the income distribution. The benefits of tax relief also vary among families with the same income depending on a family's structure and its labor market and child care choices.

The Annuitization of Americans' Resources: A Cohort Analysis

Alan J. Auerbach, Jagadeesh Gokhale, Laurence J. Kotlikoff, John Sabelhaus, and David N. Weil

NBER Working Paper No. 5089
April 1995
JEL No. E20
Public Economics

This paper constructs a unique cohort dataset to study the changes since 1960 in the share of Americans' resources that are annuitized. Understanding these changes is important because the larger this share, the more cohorts are likely to consume, and the less they are likely to bequeath. Hence, the degree of annuitization affects national saving as well as the transmission of inequality over time.

Our findings are striking. Although the annuitized share of resources of younger Americans declined slightly between 1960 and 1990, it increased dramatically for older Americans. It doubled for older men and quadrupled for older women. Since the elderly have much higher mortality probabilities than the young do, their degree of annuitization is much more important for aggregate bequests and saving. According to our estimates, aggregate U.S. bequests would now be 66 percent larger if the post-1960 increase in annuitization had not occurred. In addition, U.S. national saving likely would be substantially larger than it is now.

Generational Accounting in General Equilibrium

Hans Fehr and Laurence J. Kotlikoff

NBER Working Paper No. 5090
April 1995
JEL No. H22
Public Economics

This paper shows how changes in generational accounts relate to the generational incidence of fiscal policy. To illustrate the relationship, we use the Auerbach–Kotlikoff Dynamic Life-Cycle Simulation Model and compare policy-induced changes in generational accounts with actual changes in generations' utilities. We consider a wide range of policies in closed and small open economies, as well as in economies with and without capital adjustment costs.

In general, changes in generational accounts appear to provide fairly good approximations of generations' actual changes in utilities. The approximations are better for living generations. They are worse for policies that involve significant changes in the degree of tax progressivity, and for economies with sizable capital adjustment costs.

Finally, generational accounting needs to be modified in the case of small open economies to take account of the fact that the incidence of corporate taxation is on labor. The method of adjustment is simply to allocate changes in corporate tax revenues to generations in proportion to their changes in labor supply.

Optimal Investment with Costly Reversibility

Andrew B. Abel and Janice C. Eberly

NBER Working Paper No. 5091
April 1995
Economic Fluctuations

Investment is characterized by costly reversibility when a firm can purchase capital at a given price and sell it at a lower price. In this paper, we derive an explicit analytic solution for optimal investment by a firm that faces costly reversibility. We also derive a local approximation to the solution that highlights the effects of the parameters of the problem on the triggers for investment. More generally, we extend the Jorgensonian concept of the user cost of capital to the case of uncertainty, and define c_U and c_L as the user costs of capital associated with the purchase and sale of capital, respectively. Optimality requires the firm to purchase and sell capital as needed to keep the marginal revenue product of capital in the closed interval $[c_U, c_L]$. This prescription encompasses the case of irreversible investment as well as the standard neoclassical case of costlessly reversible investment. Finally, quantitative analysis suggests that even when the difference between the purchase and sale prices of capital is small, the user costs associated with purchasing and selling capital are closer to those applicable under complete irreversibility than to those applicable under costless reversibility.

The Effects of Minimum Wages on Teenage Employment and Enrollment: Evidence from Matched CPS Surveys

David Neumark and William Wascher

NBER Working Paper No. 5092
April 1995
JEL Nos. J31, J15, J18
Labor Studies

The recent debate over minimum wages raises two questions. First, should policymakers no longer believe that minimum wages entail negative consequences for teenagers? Second, should economists discard the competitive labor market model? Our evidence for teenagers, using matched CPS surveys, suggests that the answer to both of these questions is no. We find that although increases in minimum wages have small net effects on overall teen employment rates, such increases raise the probability that more-skilled teenagers leave school and displace lower-skilled workers from their jobs. These findings are consistent with the predictions of a competitive labor market model that recognizes skill differences among workers. In addition, we find that the displaced lower-skilled workers are more likely to end up nonenrolled and nonemployed. Thus, despite the small net disemployment effects for teenagers as a group, there are significant enrollment and employment shifts associated with minimum wage changes that should be of concern to policymakers.

Labor Market Institutions and the Distribution of Wages, 1973–92: A Semiparametric Approach

John DiNardo, Nicole M. Fortin, and Thomas Lemieux

NBER Working Paper No. 5093
April 1995
JEL Nos. C14, J31
Labor Studies

This paper presents a semiparametric procedure to analyze the effects of institutional and labor market factors on recent changes in the U.S. distribution of wages. We estimate the effects of these factors by applying kernel density methods to appropriately "reweighted" samples. The procedure provides a visually clear representation of where in the density of wages these various factors exert the greatest impact. Using data from the Current Population Survey, we find, as in previous research, that deunionization and supply and demand shocks were important factors in explaining the rise in wage inequality from 1979 to 1988. We also find compelling visual and quantitative evidence that the decline in the real value of the minimum wage explains a substantial proportion of this increase in wage inequality, particularly for women. We conclude that labor market institutions are as important as supply and demand considerations in explaining changes in the U.S. distribution of wages from 1979 to 1988.

Sectoral Growth Across U.S. States: Factor Content, Linkages, and Trade

J. David Richardson and Pamela J. Smith

NBER Working Paper No. 5094
April 1995
JEL Nos. F1, R1
International Trade and Investment

Using a "factor-content" model that relates sectoral growth to regional factor endowments, we find: 1) that U.S. state factor endowments are reasonably strong correlates of cross-state sectoral growth in value added, with patterns that accord well with intuition; 2) that intersectoral differences in productivity change are marked—estimates range from negative to annual rates over 10 percent; 3) little evidence of unusual growth linkages, either from sector to sector or from state to state, as might be expected from recent discussions of externalities; and 4) no correlation between unusually strong sectoral growth and unusual levels of export dependence, another putative channel of externalities.

Our principal dataset is a 1987–9 panel of sector-by-sector, state-by-state value-added and international exports, as well as state endowments of patents, structural capital, and six types of labor. "Unusual" growth and exports are defined as the residual growth and international exports left unexplained by endowments.

World Income Components: Measuring and Exploiting International Risksharing Opportunities

Robert J. Shiller and Stefano Athanasoulis

NBER Working Paper No. 5095
April 1995
JEL No. G1
Asset Pricing

We provide methods of decomposing the variance of world national incomes into components so as to indicate the most important risksharing opportunities and, therefore, the most important missing international risk markets to establish. One method uses a total variance reduction criterion, and identifies risksharing opportunities in terms of eigenvectors of a variance matrix of residuals produced when country incomes are regressed on world income. Another method

uses a mean-variance utility-maximizing criterion, and identifies risk-sharing opportunities in terms of eigenvectors of a variance matrix of deviations of country incomes from their respective contract-year shares of world income.

We apply the two methods using Summers–Heston (1991) data on national incomes for large countries 1950–90, each using two different methods of estimating variances. While these data are not sufficient to provide accurate estimates of the requisite variance matrixes of (transformed) national incomes, the results are suggestive of important new markets that actually could be created, and show that there may be large welfare gains to creating some of these markets.

Financial Innovation and the Management and Regulation of Financial Institutions

Robert C. Merton

NBER Working Paper No. 5096
April 1995
Asset Pricing, Corporate Finance, International Finance and Macroeconomics, Monetary Economics

New security designs, improvements in computer telecommunications technology, and advances in the theory of finance have led to revolutionary changes in the structure of financial markets and institutions. This paper provides a functional perspective on the dynamics of institutional change, and uses a series of examples to illustrate the breadth and depth of institutional change that is likely to occur. These examples emphasize the role of hedging versus equity capital in managing risk, the need for risk accounting, and changes in methods for implementing both regulatory and stabilization public policy.

Why Are Saving Rates So Different Across Countries? An International Comparative Analysis

Sebastian Edwards

NBER Working Paper No. 5097
April 1995
JEL Nos. E2, F4, D9
International Finance and Macroeconomics, International Trade and Investment

This paper analyzes the determinants of savings in the world economy, and discusses why saving ratios have been so uneven across countries. I distinguish between private and government savings, using panel data for 36 countries from 1970 to 1992. In particular, I assume that government savings are not completely exogenous, and respond to both economic and political (strategic) determinants, along the lines of the recent literature on the political economy of macroeconomic policy.

Using instrumental variables estimation methods, I find that per capita growth is one of the most important determinants of both private and public savings. These results indicate that government-run social security systems negatively affect private savings. In addition, the results provide some support for the political economy perspective on government finances, which shows that a different underlying process determines public savings.

Public savings tend to be lower in countries with higher political instability. Higher government savings crowd out private savings, but in a less-than-proportional fashion. Higher levels of foreign savings—that is, reductions in the current account balance—are associated with lower domestic (both private and public) saving rates, although the degree of offset is also less than proportional. The degree of financial development turns out to be another important determinant of private savings. The results are mixed on the role of borrowing constraints, a topic that deserves additional research.

Globalization and the Inequality of Nations

Paul R. Krugman and Anthony J. Venables

NBER Working Paper No. 5098
April 1995
International Trade and Investment, International Finance and Macroeconomics

A monopolistically competitive manufacturing sector produces goods that are used for final consumption as well as intermediate goods. Intermediate usage creates cost and demand linkages between firms and a tendency for manufacturing agglomeration. How does globalization affect the location of manufacturing and the gains from trade? At high transport costs, all countries have some manufacturing; but when transport costs fall below a critical value, a core-periphery pattern forms spontaneously, and nations that find themselves in the periphery suffer a decline in real income. At still lower transport costs, there is convergence of real incomes, in which peripheral nations gain and core nations may lose.

Transfer Behavior Within the Family: Results from the Asset and Health Dynamics Survey

Kathleen McGarry and Robert F. Schoeni

NBER Working Paper No. 5099
April 1995
JEL No. D1
Aging

If an individual falls on hard times, can he rely on his family for financial support? In view of proposed reductions in public assistance programs, it is important to understand the mechanisms through which families provide support for their members. We show that intrafamily transfers are compensatory, directed disproportionally to less well-off members. These results hold both for the incidence of transfers and for the amounts.

Within a given year, adult children in the lowest income category are 6 percentage points more likely to receive a financial transfer from their parents; on average, they receive over $300 more than siblings in the highest income category. The data used in this study, the new Asset and Health Dynamics Survey, contain information on all children in the family. Thus we are able to estimate models that control for unobserved differences across families. Our results are robust to these specifications, Additionally, we do not find that parents provide financial assistance to their children in exchange for caregiving.

Banks and Derivatives

Gary Gorton and Richard Rosen

NBER Working Paper No. 5100
April 1995
Asset Pricing, Corporate Finance

In the last 10 to 15 years, financial derivative securities have become an important, and controversial, product for commercial banks. The controversy concerns whether the size, complexity, and risks associated with these securities; the difficulties with accurately reporting timely information concerning the value of firms' derivative positions; and the concentration of activity in a small number of firms, have increased substantially the risk of collapse of the world banking system. Despite the widespread attention to derivatives, there has been little systematic analysis. We estimate market values and interest rate sensitivities of interest rate swap positions of U.S. commercial banks to address empirically the question of whether swap contracts have increased or decreased systematic risk in the U.S. banking system. We find that the banking system as a whole faces little net interest rate risk from swap portfolios.

Internal Capital Markets and the Competition for Corporate Resources

Jeremy C. Stein

NBER Working Paper No. 5101
May 1995
Corporate Finance

This paper examines the role of corporate headquarters in allocating scarce resources to competing projects in an internal capital market. Unlike a bank lender, headquarters has control rights that give it both the authority and the incentive to engage in "winner picking": the practice of actively shifting funds from one project to another. By doing a good job in winner picking, headquarters can create value even when its own relationship with the outside capital market is fraught with agency problems, and therefore it cannot help to relax overall firmwide credit constraints. One implication of the model developed here is that internal capital markets may function more efficiently when companies choose relatively focused strategies.

Wages and Foreign Ownership: A Comparative Study of Mexico, Venezuela, and the United States

Brian Aitken, Ann Harrison, and Robert E. Lipsey

NBER Working Paper No. 5102
May 1995
JEL Nos. F23, J31
International Trade and Investment

This paper explores the relationship between wages and foreign investment in Mexico, Venezuela, and the United States. Despite very different economic conditions and levels of development, one fact holds for all three countries: higher levels of foreign investment are associated with higher wages. In Mexico and Venezuela, foreign investment is associated with higher wages only for foreign-owned firms; there is no evidence of wage spillovers leading to higher wages for domestic firms. In the United States there is evidence of wage spillovers. The lack of spillovers in Mexico and Venezuela is consistent with significant wage differentials between foreign and domestic enterprises. In the United States, wage differentials are smaller.

Price and Volume Measures in the System of National Accounts

W. Erwin Diewert

NBER Working Paper No. 5103
May 1995
JEL Nos. C43, E31, O47
Productivity

This paper reviews in detail Chapter 16 in the *System of National Accounts, 1993* by Peter Hill. It explains the basic principles for measuring price and quantity change in the national accounts. It also presents some new material on the consistency of superlative indexes with indexes that are additive in their components. There also is some new material on the treatment of quality change, indicating that traditional statistical agency treatments of this issue will lead to upward bias in price indexes. Finally, there is a review of the

literature on sources of bias in consumer price indexes.

Axiomatic and Economic Approaches to Elementary Price Indexes

W. Erwin Diewert

NBER Working Paper No. 5104
May 1995
JEL Nos. C43, C81, E31, O47
Productivity

In a 1993 paper, Marshall Reinsdorf finds that the CPI components for food and gasoline were biased upward by about 2 percent and 1 percent per year respectively during the 1980s. He attributes this result to outlet substitution bias. The more recent paper by Reinsdorf and Moulton (1994) presents an alternative explanation for Reinsdorf's earlier results: when the BLS moved to probability sampling of prices in 1978, the micro price quotations were aggregated together using an index number formula that generates an upward bias. I further explore the central theoretical issue raised by the Reinsdorf–Moulton paper: the choice of an index number formula to aggregate prices at the finest level of disaggregation. I examine this issue from both axiomatic and economic perspectives. I also review the empirical literature on alternative elementary price indexes, and the recent literature on sources of bias in consumer price indexes. In conjunction with the empirical work of Reinsdorf and Moulton, my findings yield a number of recommendations for statistical agencies that I outline in the final section.

The Effect of Collective Bargaining Legislation on Strikes and Wages

Peter C. Cramton, Joseph S. Tracy, and Morley Gunderson

NBER Working Paper No. 5105
May 1995
JEL No. J52
Labor Studies

Using Canadian data on large, private sector contract negotiations from January 1967 to March 1993, we find that wages and strikes are influenced substantially by labor policy. In particular, we find that prohibiting the use of replacement workers during strikes is associated with significantly higher wages, and more frequent and longer strikes. This is consistent with private information theories of bargaining. We estimate the welfare consequences of a ban on replacement workers, as well as other labor policies. Despite the higher dispute costs, union workers are better off with a ban on replacement workers. The higher wage more than compensates for the more frequent and longer strikes.

The Use of Replacement Workers in Union Contract Negotiations: The U.S. Experience, 1980–9

Peter C. Cramton and Joseph S. Tracy

NBER Working Paper No. 5106
May 1995
JEL No. J52
Labor Studies

It is argued in many circles that a structural change occurred in U.S. collective bargaining in the 1980s. We investigate the extent to which the hiring of replacement workers can account for this change. For a sample of over 300 major strikes since 1980, we estimate the likelihood of replacements being hired. We find that the risk of replacement declines during tight labor markets, and is lower for bargaining units with more experienced workers. We use the predicted replacement risk as an explanatory variable in a model of the union's choice between the strike and holdout threat. We find that strike usage decreases significantly as the predicted replacement risk increases. We estimate that a ban on the use of replacement workers would have increased strike incidence from 1982–9 by 3 percentage points, a 30 percent increase.

Technological Change and the Skill Acquisition of Young Workers

Ann P. Bartel and Nachum Sicherman

NBER Working Paper No. 5107
May 1995
JEL Nos. J24, O33
Labor Studies

Using the National Longitudinal Survey of Youth and six proxies for industry rates of technological change, we study the impact of technological change on skill accumulation among young male workers in the manufacturing sector during 1987 through 1992. Production workers in manufacturing industries with higher rates of technological change are more likely to receive formal company training, but not other types of training. One important finding is that, while more educated workers are more likely to receive formal company training, the training gap between the highly educated and the less educated narrows, on average, as the rate of technological change increases. The positive effect of technological change on hours of training is caused largely by an increase in the incidence of training, not in the number of hours per training spell.

Fixed Versus Flexible Exchange Rates: Which Provides More Fiscal Discipline?

Aaron Tornell and Andres Velasco

NBER Working Paper No. 5108
May 1995
JEL No. F31
International Finance and Macroeconomics

In recent years the conventional wisdom has held that fixed rates provide more fiscal discipline than flexible rates do. In this paper, we show that this wisdom need not hold in a standard model in which fiscal policy is determined endogenously by a maximizing fiscal authority. The claim that fixed rates induce more discipline stresses that sustained adoption of lax fiscal policies eventually must lead to an exhaustion of reserves, and thus to a politically costly collapse of the peg. Hence, under fixed rates bad behavior today leads to punishment tomorrow. Under flexible rates bad behavior has costs as well. The difference is in the intertemporal distribution of these costs: flexible rates allow the effects of unsound fiscal policies to manifest themselves immediately through movements in the exchange rate. Hence, bad behavior today leads to punishment today. If fiscal authorities are impatient, flexible rates—by forcing the costs to be paid upfront—provide more fiscal discipline and higher welfare for the representative private agent. The recent experience of sub-Saharan countries supplies some preliminary evidence that matches the predictions of our model.

American Fiscal Policy in the 1990s

Herschel I. Grossman

NBER Working Paper No. 5109
May 1995
JEL Nos. H62, H63
Economic Fluctuations, Monetary Economics

This essay analyzes current fiscal policy in the United States within a historical context. Its objective is to clarify why recent developments in the United States are troubling, but also to understand why the United States, in contrast to other countries such as Italy, has avoided the path to fiscal disaster so far. The discussion suggests that perhaps the American public understands, at least implicitly, that unless fiscal policy limits the growth of the public debt, the government's credit is sure to run out at some unpredictable future time, as happened in Italy, with the consequent need for drastic and painful fiscal adjustments.

Trade, Technology, and Wage Inequality

Gordon H. Hanson and Ann Harrison

NBER Working Paper No. 5110
May 1995
JEL Nos. F14, F15
International Trade and Investment

In Mexico during the 1980s, the wages of more educated, more experienced workers rose relative to those of less educated, less experienced workers. We assess the extent to which the increase in the skilled–unskilled wage gap was associated with Mexico's recent trade reform. In particular, we examine whether trade reform has shifted employment toward industries that are relatively intensive in the use of skilled labor (that is, whether there are Stolper–Samuelson-type effects). Our results suggest that the rising wage gap is associated with changes internal to industries, and even internal to plants, that cannot be explained by Stolper–Samuelson-type effects. We also find that other characteristics associated with globalization—such as foreign investment and export orientation—do matter. Exporting firms and joint ventures pay higher wages to skilled workers and demand more skilled labor than other firms.

What Is the Value Added for Large U.S. Banks in Offering Mutual Funds?

Edward J. Kane

NBER Working Paper No. 5111
May 1995
Corporate Finance

This paper argues that an implicit deposit insurance credit enhancement is extended to any nondeposit savings vehicle offered by a very large bank. This unpriced credit enhancement helps to explain the preference of very large U.S. banks for offering mutual funds rather than developing index-linked deposit products. It also explains why large banks have been more eager than small banks to offer mutual funds, and why bank mutual funds could be priced to grow at a time when bank deposits were being priced to shrink.

Open Economy Forces and Late Nineteenth-Century Scandinavian Catchup

Kevin O'Rourke and Jeffrey G. Williamson

NBER Working Paper No. 5112
May 1995
Development of the American Economy

Scandinavia recorded very high growth rates between 1870 and 1914, catching up with the world's growth leaders. This paper estimates that about two-thirds of Scandinavia's catching up with Britain was the result of the open economy forces of global factor

and commodity market integration. All of Scandinavia's catching up with America was caused by the same open economy forces.

The question for the economist is: why does the new growth theory spend so little time dealing with these open economy forces? The question for the economic historian is: can the breakdown of global factor and commodity markets after 1914 explain a large share of the cessation of convergence up to 1950? Further, can the spectacular OECD convergence achieved after 1950 be explained by the resumption of the pre-1914 open economy conditions that contributed so much to the Scandinavian catchup?

Privatization in the United States

Florencio López-de-Silanes, Andrei Shleifer, and Robert W. Vishny

NBER Working Paper No. 5113
May 1995
Corporate Finance, Public Economics

In the United States, the two principal modes of producing local government services are inhouse provision by government employees and contracting out to private suppliers, also known as privatization. We empirically examine how U.S. counties choose their mode of providing services. Our evidence indicates that state clean government laws and state laws that restrict county spending encourage privatization, whereas strong public unions discourage it. This evidence is inconsistent with the view that efficiency considerations alone govern the mode of provision, and points to the important roles played by political patronage and taxpayer resistance to government spending in the privatization decision.

A Heckscher–Ohlin View of Sweden Competing in the Global Marketplace

Edward E. Leamer and Per Lundberg

NBER Working Paper No. 5114
May 1995
International Trade and Investment

We explore the hypothesis that the Swedish malaise comes from the *interaction* of the Swedish welfare state with changes in the global marketplace. External commerce can expose Swedish workers in exporting and in import-competing industries to a kind of competition from low-wage foreign workers that is incompatible with an extensive welfare system. Incompatibilities between the external marketplace and the welfare state can be amplified over time if the welfare system discourages investments in human and physical capital, thus causing a shift in the product mix toward more labor-intensive goods that are produced outside the Swedish borders by lower-wage workers.

The Heckscher–Ohlin theory, which is the theoretical foundation of this paper, allows a high-wage equilibrium without government intervention even though there is increasing competition from low-wage suppliers, if capital is abundant and if production is concentrated on the most capital-intensive products. Then the unskilled workers can be employed at high wages either in the tradables sector or the nontradables sector. On the contrary, however, Swedish investment rates have not been high enough to maintain the unique position that Sweden had a couple of decades ago. We express this in the form of the Heckscher–Ohlin Crowding Hypothesis: Swedish difficulties in its interactions with the international marketplace come from its eroding lead in abundance of capital.

Although losing its distinctiveness in capital abundance, Sweden remains unusually well supplied with softwood forests. These forest resources can be a mixed blessing. Although contributing substantially to gross domestic product, forest resources also can imply lower wages for unskilled workers, and consequently greater income inequality. A country with abundant forest resources and also very abundant capital can produce capital-intensive manufactures in addition to pulp and paper, but a country with more moderate supplies of capital can find much of its capital deployed in pulp and paper, and end up with a mix of tradables that includes some relatively labor-intensive products. This product mix may dictate relatively low wages for unskilled workers, since the marginal unskilled worker may be employed in sectors that globally award low wages.

A Provincial View of Capital Mobility

Tamim Bayoumi and Michael W. Klein

NBER Working Paper No. 5115
May 1995
JEL No. F32
International Finance and Macroeconomics

We develop a method of testing for zones of financial integration based upon intertemporal considerations and apply it to data on Canadian provincial trade. In a financially integrated region, individuals smooth consumption with respect to movements in aggregate income. Consumption in that region follows income in that region if individuals use only regional capital markets; consumption follows movements in income in broader regions (for example, national in-

come or world income) if individuals have access to and use capital markets in those broader regions (for example, the national or global capital markets, respectively). We derive a specification that measures the impact of differential levels of access to capital markets—different zones of capital mobility—on the relationship between regional trade balance and regional, national, and global income. We test this empirical specification using data on trade balances across Canadian provinces. The results indicate full capital mobility within Canada, but only partial capital mobility between Canada and the rest of the world.

Economics of the Generation and Management of Municipal Solid Waste

David N. Beede and David E. Bloom

NBER Working Paper No. 5116
May 1995
JEL No. Q2
Health Care

We estimate that the global burden of municipal solid waste (MSW) was 1.3 billion metric tons in 1990, or 0.67 kilograms of waste per person per day. Industrial countries account for a disproportionate share of the world's MSW relative to their share of world population; developing countries account for a disproportionate share of the world's MSW relative to their share of world income. Both cross-country and time-series analyses reveal that MSW generation is associated positively but inelastically with per capita income, and positively with unit elasticity with respect to population size.

Practices for collecting, processing, and disposing of MSW vary widely across countries, generally in accord with the nature of the waste stream and with key features of the environmental and economic context. However, the least efficient practices tend to be in developing countries, where MSW poses serious threats to local environmental quality and public health.

Although the generation and management of MSW likely is sensitive to income and price variables, natural incentives to overuse common property and the presence of intergenerational externalities suggest that private economic behavior alone will not yield socially optimal outcomes in this area. Community intervention, which may take a variety of forms, thus may promote the social good. The evidence now accumulating favors arrangements involving the participation of private firms.

The average cost of MSW management will grow faster than urbanization if urbanization outpaces the development of transportation infrastructures. Our calculations also suggest that current improvements in the handling of hazardous MSW will be far less expensive (in discounted terms) than undoing the damage to be caused by current handling practices. Addressing these issues from a rational societal perspective will become increasingly urgent in the future, especially in developing countries, where urbanization is accelerating and where MSW is projected to increase at an annual rate of 2.7 percent through the year 2010.

Costs of Environmentally Motivated Taxes in the Presence of Other Taxes: General Equilibrium Analyses

A. Lans Bovenberg and Lawrence H. Goulder

NBER Working Paper No. 5117
May 1995
JEL Nos. E62, H21, H22
Public Economics

There has been keen interest in recent years in environmentally motivated, or "green," tax reforms. This paper uses analytical and numerical general equilibrium models to investigate the costs of such reforms, concentrating on whether these costs can be eliminated if revenues from new environmental taxes are devoted to cuts in marginal income tax rates. A distinguishing feature of our model is its attention to preexisting inefficiencies in the tax treatment of labor and capital, and the associated role of tax shifting. We show how an environmental tax reform can have zero or negative cost if it shifts the tax burden toward the less efficient (undertaxed) factor.

Our results indicate that the revenue-neutral substitution of BTU or gasoline taxes for typical income taxes usually entails positive costs to the economy. In the case of the gasoline tax, a significant tax shifting effect lowers the costs of the policy. This explains why the gasoline tax has lower gross costs than the BTU tax. Under neither policy will there be enough tax shifting to eliminate the overall gross costs.

Effects of Air Quality Regulation

Vernon Henderson

NBER Working Paper No. 5118
May 1995
JEL Nos. H00, Q28, R38
Public Economics

This paper investigates the effects of local regulations on ground level ozone air quality and on industrial location. Local regulatory effort varies by annual air quality attainment status and by state attitudes toward the environment. A

switch from attainment to nonattainment status induces greater regulatory effort in a county, leading to an improvement in air quality. Air quality readings for ground level ozone improve by 3–8 percent depending on the exact air quality measure, after a switch to nonattainment status. Pro-environment states, which ceteris paribus spend relatively more on pollution abatement, also have cleaner air. A 1 percent increase in typical annual state pollution abatement expenditures leads to about a 0.04 percent improvement in ground level ozone readings. Heavily polluting industries tend to move to counties with a record of clean air, where they are less likely to be hassled. A county switching to a three-year record of attainment experiences a 7–9 percent growth in the number of heavily polluting establishments. This implies that polluting industries are spreading out geographically from nonattainment (polluted) areas to attainment (initially less polluted) areas. Finally, in terms of ozone, localities may improve the annual hourly extreme value reading used to officially measure local air quality without improving measures (mean, medians, medians of daily maximum) of more typical ozone conditions. This occurs by spreading out economic activity over the day to dampen peaks of ozone-inducing activity and subsequent daily ozone peaks.

The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation

Steven D. Levitt

NBER Working Paper No. 5119
May 1995
JEL Nos. K42, H72, D61
Public Economics

Previous studies of the impact of changes in prisoner populations on crime rates have failed to control adequately for the simultaneity between those two variables. While increases in the number of prisoners are likely to reduce crime, rising crime rates also translate into larger prison populations. To break that simultaneity, this paper uses the status of prison overcrowding litigation in a state as an instrument for changes in the prison population. Overcrowding litigation is shown to have a negative impact on prison populations, but is unlikely to be related to fluctuations in the crime rate, except through its effect on prison populations. This methodology results in estimates of the elasticity of crime with respect to the number of prisoners that are two to three times greater than those of previous studies. The results are robust across all of the crime categories I examine. For each prisoner reduction induced by overcrowding litigation, the total number of crimes committed increases by approximately 15 per year. The social benefit from eliminating those 15 crimes is approximately $45,000; the annual per-prisoner costs of incarceration are roughly $30,000.

Capital Mobility, Fiscal Policy, and Growth Under Self-Financing of Human Capital Formation

Willem H. Buiter and Kenneth M. Kletzer

NBER Working Paper No. 5120
May 1995
JEL Nos. F21, E62, F43
International Finance and Macroeconomics

This paper considers the effects of fiscal and financial policy on economic growth in open and closed economies, when human capital formation by young households is constrained by the illiquidity of human wealth. We analyze both endogenous and exogenous growth versions of the basic OLG model. We find that intergenerational redistribution policies that discourage physical capital formation may encourage human capital formation. Despite common technologies and perfect international mobility of financial capital, the fact that human capital is not traded and the illiquidity of human wealth make for persistent differences in productivity growth rates (in the endogenous growth version of the model), or in their levels (in the exogenous growth version). We also consider the effects on productivity growth (or levels) of public spending on education and of the distortionary taxation of financial asset income.

Foreign Investment, Outsourcing, and Relative Wages

Robert C. Feenstra and Gordon H. Hanson

NBER Working Paper No. 5121
May 1995
JEL Nos. F14, F21
International Trade and Investment, Labor Studies

We examine the reduction in the relative employment and wages of unskilled workers in the United States during the 1980s. We argue that a contributing factor to this decline was rising imports reflecting the outsourcing of production activities. In a theoretical model, we show that any increase in the southern capital stock relative to that of the North, or neutral technological progress in the South, will increase the relative wage of skilled workers in *both* countries caused by a shift in production activities to the South. Corresponding to this change

in the relative wage is an increase in the price index of northern activities within each industry, relative to that of the South. We confirm that this change in relative prices occurred for the United States and other industrialized countries relative to their trading partners. We also estimate that 15–33 percent of the increase in the relative wage of nonproduction (or skilled) workers in the United States during the 1980s is explained by rising imports.

Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras

Robert C. Feenstra and Gordon H. Hanson

NBER Working Paper No. 5122
May 1995
JEL Nos. F14, F21
Growth, International Trade and Investment, Labor Studies

We examine the increase in the relative wages of skilled workers in Mexico during the 1980s. We argue that rising wage inequality in Mexico is linked to capital inflows from abroad. The effect of these capital inflows, which correspond to an increase in outsourcing by multinationals from the United States and other northern countries, is to shift production in Mexico toward relatively skill-intensive goods, thereby increasing the relative demand for skilled labor.

We study the impact of foreign direct investment (FDI) on the share of skilled labor in total wages in Mexico using state-level data on two-digit industries from the *Industrial Census* for 1975 to 1988. We measure the state-level growth in FDI using data on the regional activities of foreign-owned assembly plants. We find that growth in FDI is positively correlated with the relative demand for skilled labor. In the regions where FDI has been most concentrated, growth in FDI can account for over 50 percent of the increase in the skilled labor share of total wages that occurred during the late 1980s.

Employment, Unemployment, and Problem Drinking

John Mullahy and Jody L. Sindelar

NBER Working Paper No. 5123
May 1995
Health Economics, Labor Studies

The misuse of alcoholic beverages ("problem drinking") results in enormous economic costs; most of these costs reduce productivity in the labor market. This paper presents sound structural estimates of the relationship between various measures of problem drinking and employment and unemployment. The sample of approximately 15,000 observations is drawn from the 1988 Alcohol Survey of the National Health Interview Survey, the first dataset that enables nationally representative estimates of alcohol abuse and dependence consistent with generally accepted medical criteria. The structural estimates of the effects of problem drinking on employment and labor market participation are obtained using methods proposed by Amemiya, and by Heckman and MaCurdy.

For our sample of males aged 25 to 59, we find that the negative impact of problem drinking on employment is even greater using instrumental variables (IV) than was estimated using ordinary least squares (OLS). Interestingly, the IV estimates on the samples of females change the sign on the impact of problem drinking on employment from positive to negative. Thus, although the conclusions drawn from raw data comparisons and OLS regressions differ by gender, the IV estimates are very similar for men and women. For women, the unobserved heterogeneity masks the negative impact of problem drinking on employment when using OLS estimation methods.

The Role of Premarket Factors in Black–White Wage Differences

Derek A. Neal and William R. Johnson

NBER Working Paper No. 5124
May 1995
JEL Nos. J31, J71
Labor Studies

Many attempts to measure the wage effects of current labor market discrimination against minorities include controls for worker productivity that: 1) themselves could be affected by market discrimination; and 2) are very imprecise measures of worker skill. The resulting estimates of residual wage gaps may be biased. Our approach is a parsimoniously specified wage equation that controls for skill by using the score on a test administered as teenagers prepared to leave high school and embark on work careers or post-secondary education. Independent evidence shows that this test score is a racially unbiased measure of the skills and abilities these teenagers were about to bring to the labor market.

We find that this one test score explains all of the black–white wage gap for young women and much of the gap for young men. For today's young adults, the black–white wage gap primarily reflects a skill gap, which in turn can be traced, at least in part, to observable differences in the family backgrounds and school environments of black and white children.

While our results provide some

evidence of current labor market discrimination, skill gaps play such a large role that we believe future research should focus on the obstacles that black children face in acquiring productive skills.

Capital Utilization and Returns to Scale

Craig Burnside, Martin Eichenbaum, and Sergio T. Rebelo

NBER Working Paper No. 5125
May 1995
JEL No. E32
Economic Fluctuations

This paper studies the implications of procyclical rates of capital utilization for cyclical movements in labor productivity and returns to scale. Using a measure of capital services based on electricity consumption, we organize our investigation around five questions: 1) Are near or actual short-run increasing returns to labor an artifact of the failure to accurately measure capital utilization rates? 2) Can we find a significant role for capital services in aggregate and industry-level production technologies? 3) Is there evidence against the hypothesis of constant returns to scale? 4) Can we reject the notion that the residuals in our estimated production functions represent technology shocks? 5) How does correcting for cyclical variations in capital services affect the statistical properties of estimated aggregate technology shocks? The answer to the first two questions is yes; the answer to the third and fourth questions is no. The answer to the fifth question is "a lot."

Differential Mortality and Wealth Accumulation

Orazio P. Attanasio and Hilary W. Hoynes

NBER Working Paper No. 5126
May 1995
JEL Nos. D1, E2, H0
Aging, Economic Fluctuations, Public Economics

The issue of asset accumulation and decumulation is central to the life-cycle theory of consumer behavior and to many policy questions. One of the main implications of the life-cycle model is that assets are spent down in the last part of life. Most empirical studies in this area use cross-sectional data of estimated mean or median wealth–age profiles. But using cross sections to estimate the age profile of assets is full of pitfalls. For example, if wealth and mortality are related, in that poorer individuals die younger, then using cross-sectional data overestimates the last part of the wealth–age profile because means (or other measures of location) are taken over a population that becomes "richer" as it ages.

This paper examines the effect of differential mortality on cross-sectional estimates of wealth–age profiles. Our approach is to quantify the dependence of mortality rates on wealth, and to use these estimates to "correct" wealth–age profiles for sample selection caused by differential mortality. We estimate mortality rates as a function of wealth and age for a sample of married couples drawn from the Survey of Income and Program Participation. Our results show that accounting for differential mortality produces wealth profiles with significantly more dissaving among the elderly.

Are Lots of College Graduates Taking High School Jobs? A Reconsideration of the Evidence

John Tyler, Richard J. Murnane, and Frank Levy

NBER Working Paper No. 5127
May 1995
JEL No. J24
Labor Studies

Several recent published papers have asserted that a growing proportion of workers with college degrees are either unemployed or employed in jobs requiring only high school-level skills. Using data from the 1980 and 1990 Censuses of Population and Housing, we show that this assertion does not reflect labor market trends accurately for young (25–34-year-old) male or female college graduates, or for older (45–54-year-old) female college graduates. For all of these groups, real earnings increased during the 1980s, and the percentage in "high school jobs" declined. The assertion is valid only for older male college graduates. Young college graduates improved their labor market position during the 1980s by increasingly obtaining degrees in fields that had high earnings at the beginning of the decade, and had the highest earnings growth over the decade.

GARCH Gamma

Robert F. Engle and Joshua V. Rosenberg

NBER Working Paper No. 5128
May 1995
Asset Pricing

This paper addresses the issue of hedging option positions when the underlying asset exhibits stochastic volatility. By parameterizing the volatility process as GARCH, and using risk-neutral valuation, we estimate hedging parameters (delta and gamma) using Monte Carlo simulation. We estimate hedging parameters for options on the Standard & Poor's 500 index, a bond futures index, a weighted foreign exchange rate index, and an oil futures index.

We find that Black–Scholes (B–S) and GARCH deltas are similar for all the options considered, while GARCH gammas are significantly higher than B–S gammas for all options. For near-the-money options, GARCH gamma hedge ratios are higher than B–S hedge ratios when hedging a long-term option with a short-term option. Away from the money, GARCH gamma hedge ratios are lower than B–S.

Testing Option Pricing Models
David S. Bates

NBER Working Paper No. 5129
May 1995
JEL No. G13
Asset Pricing

This paper discusses the commonly used methods for testing option pricing models, including Black–Scholes, constant elasticity of variance, stochastic volatility, and jump-diffusion models. Since options are derivative assets, the central empirical issue is whether the distributions implicit in option prices are consistent with the time-series properties of the underlying asset prices. I discuss three relevant aspects of consistency, corresponding to whether time-series-based inferences and option prices agree with respect to volatility, *changes* in volatility, and higher moments. I also survey the extensive empirical literature on stock options, options on stock indexes and stock index futures, and options on currencies and currency futures.

Financial Intermediation and the Great Depression: A Multiple Equilibrium Interpretation
Russell Cooper and João Ejarque

NBER Working Paper No. 5130
May 1995
JEL Nos. E32, E44, N12
Economic Fluctuations

This paper explores the behavior of the U.S. economy during the interwar period from the perspective of a model in which nonconvexities in the intermediation process give rise to multiple equilibriums. The resulting indeterminancy is resolved with a sunspot process that leads to endogenous fluctuations in aggregate economic activity. From this perspective, the Depression is a regime shift associated with a financial crisis.

Our model economy has properties that are broadly consistent with observations over the interwar period. Contrary to observation, though, the model predicts a negative correlation of consumption and investment, as well as a highly volatile capital stock. Our model of financial crisis reproduces many aspects of the Great Depression, although the model predicts a much sharper fall in investment than is observed in the data. Modifications to our model (for example, adding durable goods and a capacity utilization choice) do not overcome these deficiencies.

Sovereign Debt
Jonathan Eaton and Raquel Fernandez

NBER Working Paper No. 5131
May 1995
JEL No. F34
International Trade and Investment, International Finance and Macroeconomics

We review the literature on sovereign debt, organizing our survey around three central questions: 1) Why do sovereign debtors ever repay their debts? 2) What burdens, in the form of distortions and inefficiencies, does sovereign debt impose? 3) How might debt be restructured to reduce these burdens? In grappling with the first question, the literature has pointed to and argued about the roles of reputation, punishments, rewards, and renegotiation. In addressing the second, the literature has asked whether sovereign debtors tend to borrow too much or too little, and how debt can distort the domestic economy. Answers to the third question include measures by creditors, by debtors, and by public institutions to reduce debt burdens.

The Law of One Price over 700 Years
Kenneth A. Froot, Michael Kim, and Kenneth Rogoff

NBER Working Paper No. 5132
May 1995
JEL No. F30
International Trade and Investment, International Finance and Macroeconomics

This paper examines annual commodity price data from England and Holland over a span of seven centuries. Our dataset incorporates transactions prices on eight commodities: barley, butter, cheese, eggs, oats, peas, silver, and wheat. We also have pound/shilling nominal exchange rates going back, in some cases, to 1273. We find that the volatility and persistence of deviations from the law of one price have been remarkably stable over time. These deviations are highly correlated across commodities (especially at annual horizons) and, for most pairwise comparisons in most centuries, at least as volatile as relative prices across different goods within the same country. Our analysis challenges the conventional view that the modern floating exchange rate experience is exceptional in terms of the be-

havior of relative (exchange rate adjusted) prices across countries.

Measuring Gross Worker and Job Flows

Steven J. Davis and John C. Haltiwanger

NBER Working Paper No. 5133
May 1995
JEL Nos. J63, C81
Labor Studies

We combine information from several different studies and datasets to assemble a fuller, more accurate picture of job flows and worker flows in U.S. labor markets. Our picture characterizes the magnitudes of job and worker flows, the connections between them, their cyclical behavior, differences among identifiable groups of workers and employers, the spatial concentration of job flows, and other aspects of labor market dynamics. We also assess the relative strengths and weaknesses of the U.S. datasets that are currently available for measuring labor market flows. We also clarify the relationships among various measures of labor market flow that appear in the literature. Finally, we discuss prospects for using administrative records maintained by U.S. government agencies to develop new longitudinal datasets that would permit timely, detailed, and comprehensive measures of gross job and worker flows.

The Relationship Between State and Federal Tax Audits

James Alm, Brian Erard, and Jonathan S. Feinstein

NBER Working Paper No. 5134
May 1995
Public Economics

We present an econometric analysis of state and federal tax audits. Using a survey of state tax administrators, we find that most state tax audit programs are small and rely extensively on information provided by the IRS, although some of them are large and sophisticated. Then we present results from a detailed econometric analysis of state and federal tax returns and tax audits from Oregon for tax year 1987.

We conclude first that Oregon state and IRS selection criteria are similar, but not identical. This suggests that both tax agencies might benefit from greater sharing of information, especially in some audit classes. Second, Oregon state and IRS audit assessments are strongly positively correlated, as expected. Third, the shadow values associated with providing additional audit resources to the Oregon Department of Revenue and the IRS in various audit classes range from two to five dollars for the IRS and from one to three dollars for Oregon.

Factor Mobility and Income Growth: Two Convergence Hypotheses

Assaf Razin and Chi-Wa Yuen

NBER Working Paper No. 5135
May 1995
JEL No. F0
Growth, International Finance and Macroeconomics

While technologies and policy fundamentals presumably are different internationally, thus inducing differences in growth rates, capital mobility is a powerful force in achieving complete equalization of growth *rates* across countries. We provide evidence in support of this effect, showing that restrictions on capital flows tend to make growth rates for individual countries more divergent. In the context of regional growth, however, labor mobility is capable of generating equalization of income *level* across regions in the presence of knowledge spillovers. There is some supporting evidence for this effect, showing that restrictions on labor flows tend to make individual region/country per capita income more divergent.

How Does Privatization Work? Evidence from the Russian Shops

Nicholas Barberis, Maxim Boycko, Andrei Shleifer, and Natalia Tsukanova

NBER Working Paper No. 5136
May 1995
Corporate Finance, Labor Studies, Public Economics

We use a survey of 452 Russian shops, most of which were privatized between 1992 and 1993, to measure the importance of alternative channels through which privatization promotes restructuring. Restructuring is measured as capital renovation, change in suppliers, increase in hours that stores stay open, and layoffs. There is strong evidence that the presence of new owners and new managers raises the likelihood of restructuring. In contrast, there is no evidence that equity incentives for old managers promote restructuring. New human capital appears to play a critical role in economic transformation.

Do Labor Rents Justify Strategic Trade and Industrial Policy?

William T. Dickens

NBER Working Paper No. 5137
May 1995
JEL Nos. H21, J41, F13
International Trade and Investment, Labor Studies

Several efficiency-wage theories of wage determination assume that identical workers are more productive in high-wage industries, and that the promotion of employment

in high-wage industries can increase GDP (and some measures of welfare). I argue that while policies to favor high-wage industries may increase productivity, their effects in developed economies are likely to be very small. This is mainly because the workers who fill the high-wage vacancies come from fairly high-wage jobs.

How Much Better Is Bigger, Faster, and Cheaper? Buyer Benefits from Innovation in Mainframe Computers in the 1980s

Kenneth H. Brown and Shane M. Greenstein

NBER Working Paper No. 5138
May 1995
JEL Nos. H57, L63, C50
Productivity

This paper develops and estimates cost-of-living indexes (for example, Fisher and Griliches, 1995) for measuring the buyer benefits from technical change in the commercial mainframe computer industry in the 1980s. We use a microeconometric model of demand for product characteristics that are embodied in a computer system. The model highlights buyers' benefits from technical change when innovation either increases the price of characteristics or increases the range of available characteristics. (This is in the spirit of Trajtenberg, 1989.)

We find that our utility-based cost-of-living index declines rapidly: approximately 10–15 percent per year. By historical standards for innovation, this is quite a rapid rate. Second, our estimates contrast with the rate of change in quality-adjusted prices in mainframe computers, approximately 25–30 percent per year. Third, while large declines in price have induced increases in purchasing, most buyers began the 1980s with a "small" mainframe system and still bought a small system at the end of the decade, despite rapidly declining mainframe prices and large extensions in computing capacity. The experience of the majority outweighs the benefits received by a few (with elastic demand) who took advantage of lower prices and extensions in the product space.

Investment, Pass-Through, and Exchange Rates: A Cross-Country Comparison

Jose Campa and Linda S. Goldberg

NBER Working Paper No. 5139
June 1995
International Trade and Investment, International Finance and Macroeconomics

Although large changes in real exchange rates have occurred during the past decades, we do not know the real implications of these movements. Using detailed data from the United States, Canada, the United Kingdom, and Japan, we examine the implications of exchange rates for sectoral investment over time. We show both theoretically and empirically that the responsiveness of investment to exchange rates varies over time, positively in relation to sectoral reliance on export share, and negatively with respect to imported inputs into production. The quantitative importance of each of these channels of exposure is a function of a set of exchange rate pass-through and demand elasticities. There are important differences in the endogeneity of investment across high- and low-markup sectors: investment in low-markup sectors is significantly more responsive to exchange rates. Unlike pass-through elasticities, which are viewed as industry-specific, investment endogeneity to exchange rates is a country-specific phenomenon.

A Center-Periphery Model of Monetary Coordination and Exchange Rate Crises

Willem H. Buiter, Giancarlo Corsetti, and Paolo A. Pesenti

NBER Working Paper No. 5140
June 1995
JEL Nos. F31, F33, F41
International Finance and Macroeconomics, Monetary Economics

We analyze the modalities and consequences of a breakdown in cooperation among the monetary authorities of inflation-prone "Periphery Countries" that use an exchange rate peg as an anti-inflationary device when an aggregate demand shock hits the "Center." Cooperation in the periphery is constrained to be symmetric: costs and benefits must be equal for all. Our model suggests that there are at least two ways in which a generalized crisis of the exchange rate system may emerge:

1) When the constrained cooperative response of the periphery is a moderate common devaluation, while the noncooperative equilibrium has large devaluations by a few countries, an exchange rate crisis will emerge if periphery countries give in to their individual incentives to renege on the cooperative agreement. 2) If the center shock is not large enough to trigger a general devaluation in the constrained cooperative equilibrium, yet some of the periphery countries would devalue in the Nash equilibrium, making the monetary stance in the system more expansionary, then reversion to Nash is collectively rational. We offer this model as a useful parable for interpreting the collapse of the European Monetary Regime in 1992–3.

Economic Implications of Changing Share Ownership

Benjamin M. Friedman

NBER Working Paper No. 5141
June 1995
JEL No. G1
Asset Pricing, Monetary Economics

Institutional investors, including especially pension funds and mutual funds, are steadily replacing individuals as owners of equity shares in the United States. Forty years ago individual investors owned 90 percent of all equity shares outstanding. Today the individually owned share is just 50 percent.

The arguments and evidence surveyed in this paper suggest four ways in which this shift in share ownership could affect the functioning of the equity market: 1) Increasing institutional ownership could either enhance or impair the market's ability to provide equity financing for emerging growth companies. 2) Increasing institutional ownership, especially in the form of open-end mutual funds, probably has increased the market's volatility in the context of occasional large price movements. 3) The increasing prevalence of defined-contribution (as opposed to defined-benefit) pension plans, and especially of 401(k) plans, probably has resulted in an increased market price of risk. 4) Increasing institutional ownership has facilitated a greater role for shareholders in the governance of U.S. corporate business, and correspondingly reduced the independence of corporate managements.

The Collapse of the Mexican Peso: What Have We Learned?

Jeffrey D. Sachs, Aaron Tornell, and Andrés Velasco

NBER Working Paper No. 5142
June 1995
International Finance and Macroeconomics

In the first quarter of 1995 Mexico found itself in the grip of an intense financial panic. Foreign investors fled Mexico despite very high interest rates on Mexican securities, an undervalued currency, and financial indicators that pointed to long-term solvency. The fundamental conditions of the Mexican economy cannot account for the entire crisis. The crisis was caused by unexpected shocks that occurred in 1994, and the inadequate policy response to those shocks. In the aftermath of the March assassination, the exchange rate experienced a nominal devaluation of around 10 percent, and interest rates increased by around 7 percentage points. However, the capital outflow continued. In response, policymakers maintained the exchange rate rule, and to prevent further increases in interest rates, expanded domestic credit and converted short-term peso-denominated government liabilities (Cetes) falling due into dollar-denominated bonds (Tesobonos). The result was a fall in international reserves and an increase in short-term dollar-denominated debt. The government simply ended up illiquid, and therefore financially vulnerable. Illiquidity exposed Mexico to a self-fulfilling panic.

The Paradox of Liquidity

Stewart C. Myers and Raghuram G. Rajan

NBER Working Paper No. 5143
June 1995
JEL Nos. G20, G32, G33
Corporate Finance

The more liquid a company's assets are, the greater their value in a short-notice liquidation. Liquid assets generally are viewed as increasing debt capacity, other things being equal. This paper focuses on the dark side of liquidity: greater liquidity reduces the ability of borrowers to commit to a specific course of action. We examine the effects of differences in asset liquidity on debt capacity, and suggest an alternative theory of financial intermediation and disintermediation.

Intraschool Variation in Class Size: Patterns and Implications

Michael Boozer and Cecilia Rouse

NBER Working Paper No. 5144
June 1995
JEL No. J0
Labor Studies

Economists attempting to explain the widening black–white wage gap of the late 1970s in terms of differences in school quality have been faced with a problem: using a variety of measures, recent data reveal virtually no gap in the quality of schools attended by blacks and whites. In this paper, we reexamine racial differences in school quality using the pupil–teacher ratio, rather than the school's average class size, in an education production function. We then consider the importance of using actual class size rather than school-level measures of class size.

We find that while the pupil–teacher ratio and average class size are correlated, the pupil–teacher ratio is systematically less than or equal to average class size. Mathematically, part of the difference is caused by the intraschool allocation of teachers to classes. As a result, while the pupil–teacher ratio suggests no black–white differences in class size, measures of the school's average class size suggest that blacks are in larger classes.

Further, the two measures result in different estimates of the importance of class size in an education production function.

We also conclude that school level measures may obscure important variation in class size within schools caused by the smaller compensatory education classes. Since black students are more likely to be assigned to these classes, a kind of aggregation bias results. Blacks are not only in schools with larger average class sizes, but they also are in larger classes within schools, conditional on the type of class. The class size patterns within schools suggest that using within-school variation in education production functions is not a perfect solution to aggregation problems: students are not randomly assigned to classes of differing sizes. However, once the selection problem has been addressed, it appears that smaller classes at the eighth grade lead to larger gains in test scores from eighth to tenth grade. Differences in class size also can explain approximately 15 percent of the black–white difference in educational achievement.

Measuring Monetary Policy

Ben S. Bernanke and Ilian Mihov

NBER Working Paper No. 5145
June 1995
JEL No. E52
Monetary Economics

Extending the approach of Bernanke and Blinder (1992), Strongin (1992), and Christiano, Eichenbaum, and Evans (1994), we develop and apply a vector autoregression (VAR)-based methodology for measuring the stance of monetary policy. More specifically, we develop a "semi-structural" VAR approach, which extracts information about monetary policy from data on bank reserves and the federal funds rate, but leaves the relationships among the macroeconomic variables in the system unrestricted. The methodology nests earlier VAR-based measures, and can be used to compare and evaluate these indicators. It also can be used to construct measures of the stance of policy that optimally incorporate estimates of the Fed's operating procedure for any given period.

Among existing approaches, we find that innovations to the federal funds rate (Bernanke–Blinder) are a good measure of policy innovations during 1965–79 and 1988–94. For 1979–94 as a whole, innovations to the component of nonborrowed reserves that is orthogonal to total reserves (Strongin) seems to be the best choice. We develop a new measure of policy stance that conforms well to qualitative indicators of policy, such as the Boschen–Mills (1991) index. Innovations to our measure lead to reasonable and precisely estimated dynamic responses by variables such as real GDP and the GDP deflator.

Inside the Black Box: The Credit Channel of Monetary Policy Transmission

Ben S. Bernanke and Mark Gertler

NBER Working Paper No. 5146
June 1995
JEL Nos. E44, E51
Economic Fluctuations, Monetary Economics

The "credit channel" theory of monetary policy transmission holds that informational frictions in credit markets worsen during periods of tight money. The resulting increase in the external finance premium—the difference in cost between internal and external funds—enhances the effects of monetary policy on the real economy. We document the responses of GDP and its components to monetary policy shocks and describe how the credit channel helps explain the facts. We then discuss two main components of this mechanism: the balance-sheet channel and the bank-lending channel. We argue that forecasting exercises using credit aggregates are not valid tests of this theory.

Tax Subsidies to Employer-Provided Health Insurance

Jonathan Gruber and James M. Poterba

NBER Working Paper No. 5147
June 1995
JEL Nos. H24, H51, I11
Aging, Health Care, Public Economics

This paper investigates the current tax subsidy to employer-provided health insurance, and presents new evidence on the economic effects of various tax reforms. We argue that previous analyses have overstated the tax subsidy to employer-provided insurance by neglecting the substantial and growing importance of aftertax employee payments for employer-provided insurance, as well as the tax subsidy for extreme medical expenses, which discourages the purchase of insurance. Even after considering these factors, however, the net tax subsidy to employer-provided insurance is substantial, with tax factors generating an average reduction of approximately 30 percent in the price of this insurance. Reducing the tax subsidy, either by capping the value of employer-provided health insurance that could be excluded from taxation, or eliminating the exclusion entirely, would have

substantial effects on the level of employer-provided insurance and on tax revenues.

Does the AIDS Epidemic Really Threaten Economic Growth?

David E. Bloom and Ajay S. Mahal

NBER Working Paper No. 5148
June 1995
JEL Nos. I1, O1
Health Care, Labor Studies

This study examines the claim that the AIDS epidemic will slow the pace of economic growth. For 51 developing and industrial countries for which we were able to assemble data, we examine the association between changes in the prevalence of AIDS and the rate of growth of GDP per capita. We use well-established empirical growth models to control for a variety of factors possibly correlated with the prevalence of AIDS that might also influence growth. We also account for possible simultaneity in the relationship between AIDS and economic growth.

Our main finding is that the AIDS epidemic has not had a significant effect on the growth rate of per capita income, nor is there evidence of reverse causality. We also find that the insignificant effect of AIDS on income per capita is qualitatively similar to the insignificant effect on wages of the Black Death in England and France during the Middle Ages, and the insignficant effect on output per capita of influenza in India during 1918–9.

Does Welfare Play Any Role in Female Headship Decisions?

Hilary Williamson Hoynes

NBER Working Paper No. 5149
June 1995
Public Economics

During the last 30 years, the composition of white and black families in the United States has changed dramatically. In 1960, less than 10 percent of families with children were headed by a single mother, while in 1990 more than 20 percent of families with children were headed by a female.

A large body of research has focused on the role of the U.S. welfare system, and in particular the Aid to Families with Dependent Children (AFDC) program, in contributing to these dramatic changes in family structure. Most studies use cross-sectional data, and identify the effect of welfare on female headship through interstate variation in the AFDC program. But recent research finds that controlling for state effects has a large impact on the estimated effect of welfare.

This paper examines why state effects matter by examining the importance of individual effects and policy endogeneity. One explanation for why state effects matter is that the composition of the population across states differs, and is related to the generosity of the state's welfare program. If that is true, then controlling for individual effects should have the same result as controlling for state effects. Second, I examine the endogeneity of AFDC policy by including controls that represent the determinants of state welfare generosity. My results show that after controlling for individual effects, there is no evidence that welfare contributes to increasing propensities to form female-headed households, either for whites or blacks. Further, my results suggest that migration among blacks induced by welfare leads to an upward bias in the estimated welfare effect found in previous studies.

Would Reducing Tenure Probabilities Increase Faculty Salaries?

Ronald G. Ehrenberg, Paul J. Pieper, and Rachel A. Willis

NBER Working Paper No. 5150
June 1995
JEL No. J44
Labor Studies

The simplest competitive labor market model asserts that if tenure is a desirable job characteristic for professors, then they should be willing to pay for it by accepting lower salaries. Conversely, if an institution unilaterally reduces the probability that its assistant professors receive tenure, then it will have to pay higher salaries to attract new faculty.

Our paper tests this theory. We use data on salary offers accepted by new assistant professors at economics departments in the United States between 1974–5 and 1980–1, along with data on the proportion of new Ph.D.s hired by each department between 1970 and 1980 who ultimately received tenure in the department, or at a comparable or higher-quality department. We find that a trade-off did exist. Equally important, departments that offer low probabilities of tenure to assistant professors also pay higher salaries to their tenured faculty. We attribute this to their need to pay higher salaries to attract tenured faculty from the external market.

Technological Diffusion, Convergence, and Growth

Robert J. Barro and Xavier Sala-i-Martin

NBER Working Paper No. 5151
June 1995
JEL Nos. O40, O14
Growth, Economic Fluctuations

We construct a model that com-

bines elements of endogenous growth with the convergence implications of the neoclassical growth model. In the long run, the world growth rate is driven by discoveries in the technologically leading economies. Followers converge toward the leaders, because copying is cheaper than innovation over some range. A tendency for the costs of copying to increase reduces the growth rate of followers, and thereby generates a pattern of conditional convergence. We discuss how countries are selected to be technological leaders, and we assess the welfare implications. Poorly defined intellectual property rights imply that leaders have insufficient incentive to invent, and followers have excessive incentive to copy.

Habit and Heterogeneity in the Youthful Demand for Alcohol

Michael J. Moore and Philip J. Cook

NBER Working Paper No. 5152
June 1995
JEL Nos. O12, I12, I18
Health Care

Observed patterns of youthful drinking indicate substantial persistence; this paper analyzes how much of that persistence reflects the actual development of a habit, and how much is caused by unobserved aspects of the individual and the environment. We also explore the role of restrictions on the availability of alcohol, both in the current period and in adolescence. We find that much of the observed persistence represents habit formation, and not unobserved characteristics. Consequently, restrictions on the availability of alcohol, particularly at an early age, alter subsequent patterns of alcohol consumption and abuse.

Death and Tobacco Taxes

Michael J. Moore

NBER Working Paper No. 5153
June 1995
JEL Nos. H23, I12, I18
Health Care

This study analyzes the effects of changes in the tobacco excise tax on mortality attributable to heart disease, cancer, and asthma. Reduced-form regressions of mortality rates on tax data for 1954–88, with controls for state, year, income, and unobserved persistence, indicate that tax increases lead to statistically significant decreases in mortality. A 10 percent increase in the tax is projected to save approximately 5200 lives a year.

Identifying the Output Effects of Monetary Policy

John H. Cochrane

NBER Working Paper No. 5154
June 1995
Economic Fluctuations,
Monetary Economics

What are the relative effects of anticipated versus unanticipated monetary policy? I examine the effect of an identifying assumption on vector autoregression estimates of the output response to money, assuming that anticipated monetary policy can have *some* effect on output in much shorter and smaller estimates of output response, estimates closer to the predictions of most monetary models.

The Taxation of Two-Earner Families

Martin Feldstein and Daniel R. Feenberg

NBER Working Paper No. 5155
June 1995
JEL Nos. H24, H21
Public Economics

This paper examines the efficiency and revenue effects of several alternative tax treatments of two-earner families, using estimates of the compensated elasticities of the labor supply of married women based on the experience with the 1986 tax rate reductions. The analysis of alternative options relies on the NBER TAXSIM model, which has been modified to incorporate separate estimates of the earnings of husbands and wives. The marginal tax rates explicitly incorporate Social Security payroll taxes, net of the present actuarial value of future retirement benefits.

Three general conclusions emerge from the simulations of the various options: First, the high existing marginal tax rates on married women cause substantial deadweight losses that could be reduced by alternative tax rules that would lower their marginal rates. Second, behavioral responses to lower marginal tax rates induce additional tax payments that offset large fractions of the "static" revenue losses. Third, there are substantial differences in cost effectiveness, that is, in the revenue cost per dollar of reduced deadweight loss, among these options. Several of the options are cost effective enough that they probably could be combined with other ways of raising revenue to produce a net reduction in the deadweight loss of the tax system as a whole.

However, we are aware that the current framework is very restrictive in three important ways. First, it ignores the response of the primary earner in the couple to any change in tax rates on spousal income. Second, it defines the labor supply response very narrowly in terms of participation and hours, excluding such important dimensions of labor supply as choice of occupation and of particular job,

effort, location, travel requirements, riskbearing, assumption of responsibility, and so forth. More generally, taxes not only affect the labor supply of men and women but also change taxable income by changing excluded income (fringe benefits, and so forth) and taxpayer deductions. These changes in taxable income are the key to influencing tax revenue and the deadweight loss of alternative tax rules. We plan to extend the current work to merge evidence on the effects of taxes on the hours and participation of married women with the more general evidence on the sensitivity of taxable income to marginal tax rates.

Liberalized Portfolio Capital Inflows in Emerging Markets: Sterilization, Expectations, and the Incompleteness of Interest Rate Convergence

Jeffrey A. Frankel and Chudozie Okongwu

NBER Working Paper No. 5156
June 1995
International Finance and Macroeconomics, Monetary Economics

This paper examines interest rates in nine Latin American and East Asian countries during 1987–94. Our goal is to discover why interest rates have remained high, failing to converge to U.S. levels, despite capital market liberalization and a resurgence of portfolio capital inflows during the second half of this sample period. Related questions are whether portfolio capital flows are strong enough to equalize expected returns between these "emerging markets" and the United States, and whether there is any scope left for the authorities to sterilize inflows. We conclude that the largest single component of the gap in interest rates is expectations of depreciation of the local currencies against the dollar. Key to the analysis is the use of survey data on exchange rate forecasts by market participants. Indicative of integrated financial markets, there is also a big effect of U.S. interest rates on local interest rates, and a highly significant degree of capital flow offset to monetary policy.

Consumer Product Safety Regulation in the United States and the United Kingdom: The Case of Bicycles

Wesley A. Magat and Michael J. Moore

NBER Working Paper No. 5157
June 1995
JEL Nos. I18, I12
Health Care, Industrial Organization

We study the effects of U.S and U.K. bicycle safety regulations on bicycle accident rates for various age groups in the population. We find small, statistically significant decreases in accident rate as more bicycles come into compliance with the regulations. This result is independent of country, season, and trend effects, and holds across a range of age groups. The results run counter to those of similar studies. This appears to reflect our focus on a specific standard, rather than on broad enabling legislation, and our reliance on the longer time series available.

Labor Supply Response to the Earned Income Tax Credit

Nada Eissa and Jeffrey B. Liebman

NBER Working Paper No. 5158
June 1995
JEL Nos. H2, I3, J2
Public Economics

In a series of major expansions starting in 1987, the earned income tax credit (EITC) has become a central part of the federal government's anti-poverty strategy. In this paper, we examine the impact of the Tax Reform Act of 1986 (TRA86), which included an expansion of the EITC, on labor force participation and hours of work. The expansion of the credit affected an easily identifiable group, single women with children, but is predicted to have had no effect on another group, single women without children. Other features of TRA86, such as the increase in the value of dependent exemptions and the large increase in the standard deduction for head-of-household filers, are predicted by economic theory to have reinforced the impact of the EITC on the relative labor supply outcomes of single women with and without children. Therefore we compare the change in labor supply of single women with children to the change in labor supply of single women without children.

We find that between 1984–6 and 1988–9 single women with children increased their participation in the labor force by 1.4 percentage points (from a base of 73.1 percent) relative to single women without children. We explore a number of possible explanations for this finding and conclude that the 1987 expansion of the EITC and the other provisions of TRA86 are the most likely explanations. We find no effect of the EITC expansion on the hours of work of single women with children who were already in the labor force. Compared to other elements of the welfare system, the EITC appears to produce little distortion of work incentives.

Race and Education Differences in Disability Status and Labor Force Attachment

John Bound, Michael Schoenbaum, and Timothy Waidmann

NBER Working Paper No. 5159
June 1995
JEL Nos. J26, J14, J15
Aging, Labor Studies

The labor force participation rates of older, working age black men and of men with relatively low levels of education historically have been significantly lower than those of white men and/or men with more education. This paper uses data from the new Health and Retirement Survey to examine the extent to which variation in health and job characteristics can account for these differences. Our analysis suggests that race and education differences in the health status of middle-aged men can explain a substantial fraction of black/white differences in labor force attachment, and essentially all of the gap among men with different levels of education.

Why Is There Multilateral Lending?

Dani Rodrik

NBER Working Paper No. 5160
June 1995
JEL Nos. F21, F34, F35
International Trade and Investment, International Finance and Macroeconomics

Why should multilateral lending exist in a world where private capital markets are well developed and governments have their own bilateral aid programs? If lending by the World Bank, IMF, and regional development banks has an independent rationale, it must be related to the advantages generated by the multilateral nature of these institutions. In principle there are two such advantages. First, since information on the quality of investment environments in different countries in many ways is a collective good, multilateral agencies are in a better position to internalize the externalities that may arise from it. This creates a rationale for multilateral lending in terms of *information provision,* particularly in terms of monitoring government policies in recipient countries.

Second, as long as multilateral agencies retain some degree of autonomy from the governments that own them, their interaction with recipient countries, although official in nature, can remain less politicized than intergovernmental links. This in turn endows multilateral agencies with an advantage in the exercise of *conditionality* (that is, in lending that is conditional on changes in government policies). Neither of these two potential advantages has much to do with lending per se. However, multilateral lending may be required to make these agencies' tasks compatible in terms of incentives. I find little evidence that multilateral lending has acted as a catalyst for private capital flows.

Inflation Indicators and Inflation Policy

Stephen G. Cecchetti

NBER Working Paper No. 5161
June 1995
JEL Nos. E31, E37, E52
Monetary Economics

In recent years, central bankers throughout the world have advocated a shift in monetary policy toward inflation targeting. Recent actions in the United States serve to highlight the desire of the Federal Reserve to keep inflation low and stable, while downplaying the likely consequences for output and employment. But control of inflation requires that one be able to forecast the future path of the price level and estimate what impact changes in policy have on that path. Unfortunately, inflation is very difficult to forecast even at very near horizons. This is because the relationship between potential indicators of inflation and inflation itself is neither very strong nor very stable. Beyond this, the relationship between monetary policy instruments, including the Federal Funds rate, and inflation also varies substantially over time, and cannot be estimated precisely.

Policy rules can take these difficulties into account. I examine several such rules, and find that they have the following interesting properties: First, since prices take time to respond to all types of impulses, the object of price stability implies raising the Federal Funds rate immediately following a shock, rather than waiting for prices to rise before acting. Second, comparison of the results of price level targeting with nominal income targeting suggests that the difficulties inherent in forecasting and controlling the former provide an argument for focusing on the latter.

Cyclical Versus Secular Movements in Employment Creation and Destruction

Edward Montgomery and Randall W. Eberts

NBER Working Paper No. 5162
June 1995
JEL Nos. J63, E24, R1
Labor Studies

This paper offers an analysis of cyclical and secular patterns in job turnover based on establishment-level data. We provide evidence from multiple datasets showing

that the job turnover process is markedly different over time and across regions. Over time, employment fluctuations are associated primarily with job destruction. Across regions, employment differences are associated more with job creation. Differences exist between the cyclical (within) and secular (across state) responses in job creation and destruction to output shocks. Movements in job creation and destruction also are related to the types of human capital externalities or technological spillovers used to explain long-run differences in regional or national growth rates.

Are Ghettos Good or Bad?

David M. Cutler and Edward L. Glaeser

NBER Working Paper No. 5163
June 1995
JEL Nos. H70, I30, J70
Public Economics, Growth

Theory suggests that spatial separation of racial and ethnic groups can have both positive and negative effects on the economic performance of minorities. Racial segregation may be damaging because it curtails informational connections with the larger community, or because concentrations of poverty deter human capital accumulation and encourage crime. Alternatively, racial segregation might ensure that minorities have middle-class role models, and thus it may promote good outcomes. We examine the effects of segregation on African-Americans in terms of schooling, employment, and single parenthood. We find that African-Americans in more segregated areas do significantly worse, particularly in central cities. We control for the endogeneity of location choice using instruments based on political factors, topographical features of cities, and residence before adulthood. Some, but never more than 40 percent of this effect, stems from lack of role models and long commuting times.

Historical Factors in Long-Run Growth

Peopling the Pampa: On the Impact of Mass Migration to the River Plate, 1870–1914

Alan M. Taylor

NBER Historical Paper No. 68
May 1995
JEL Nos. N16, N36, N56

The Argentine economy was transformed in the late nineteenth century by the mass migration of millions of Europeans. Various ideas have surfaced concerning the likely impact of this labor inflow; that it: favored the wheat revolution on the pampas, promoted urbanization and the rapid growth of Buenos Aires, paved the way for Argentine industrialization, and caused slack in the labor markets, thus lowering wages. This paper analyzes the impact of migration on the scale and structure of the Argentine economy, and attempts to resolve various competing hypotheses. I present a new social accounting matrix for Argentina, and use it to calibrate a CGE model. Both tools show promise for further exploration of growth and structural change during and after the *Belle Époque*.

Irregular Production and Time Out of Work in American Manufacturing Industry in 1870 and 1880: Some Preliminary Estimates

Jeremy Atack and Fred Bateman

NBER Historical Paper No. 69
June 1995
JEL Nos. J64, N31, N61

This paper uses previously untabulated data from the Censuses of Manufacturing for 1870 and 1880 to investigate the extent to which firms operated at less than their full capacity year round in those census years. Thus we provide some evidence of the extent to which workers may have faced temporary or permanent layoff. We conclude that firms nationwide operated for the equivalent of 254 days (out of perhaps 309 possible working days) during the 1870 census year from the end of May 1869 to the beginning of June 1870, and for 261 days during the 1880 census year from the beginning of June 1879 to the end of May 1880. Workers put in slightly more days of work in each of these years in their customary industrial employment, because larger firms were more likely to operate for more days per year. However, there were significant regional and industry differences. Although our estimates are broadly consistent with independent estimates and are generally in accord with expectations, they raise important questions about economic performance in the late nineteenth century that remain unanswered here.

Technical Papers

Dynamic Equilibrium Economies: A Framework for Comparing Models and Data

Francis X. Diebold, Lee E. Ohanian, and Jeremy Berkowitz

NBER Technical Paper No. 174
February 1995
JEL Nos. C1, E1, E3
Economic Fluctuations

We propose a constructive, multivariate framework for assessing agreement between (generally misspecified) dynamic equilibrium models and data. The framework enables a complete second-order comparison of the dynamic properties of models and data in both graphical and numerical ("goodness-of-fit") form. We propose bootstrap algorithms to evaluate the significance of deviations between models and data. We use the goodness-of-fit criteria to produce estimators that optimize economically relevant loss functions, and again approximate finite-sample properties using bootstrap procedures. We provide a detailed illustrative application to modeling the U.S. cattle cycle.

Investment Under Alternative Return Assumptions: Comparing Random Walks and Mean Reversion

Gilbert E. Metcalf and Kevin Hassett

NBER Technical Paper No. 175
March 1995
JEL Nos. C6, E2
Public Economics

Many recent theoretical papers have come under attack for modeling prices as Geometric Brownian Motion. This process can diverge over time, implying that firms facing this price process can earn infinite profits. We explore the significance of this attack, and contrast investment under Geometric Brownian Motion with investment assuming mean reversion. While analytically more complex, mean reversion in many cases is a more plausible assumption, allowing for supply responses to increasing prices. We show that cumulative investment is generally unaffected by the use of a mean reversion process rather than Geometric Brownian Motion, and provide an explanation for this result.

A Comparison of Alternative Instrumental Variables Estimators of a Dynamic Linear Model

Kenneth D. West and David W. Wilcox

NBER Technical Paper No. 176
March 1995
JEL Nos. C13, C15, C32
Economic Fluctuations

Using a dynamic linear equation that has a conditionally homoskedastic moving average disturbance, we compare two parameterizations of a commonly used instrumental variables estimator [Hansen (1982)] to one that is asymptotically optimal in a class of estimators that includes the conventional one [Hansen (1985)]. We find that for some plausible data generating processes, the optimal estimator is distinctly more efficient asymptotically. Simulations indicate that in samples of typical size, asymptotic theory describes the distribution of the parameter estimates reasonably well, but that test statistics are sometimes poorly sized.

Small Sample Properties of GMM for Business Cycle Analysis

Lawrence J. Christiano and Wouter J. den Haan

NBER Technical Paper No. 177
March 1995
JEL Nos. C12, C15, E32
Economic Fluctuations

Using Monte Carlo methods, we investigate the finite sample properties of GMM procedures for conducting inference about statistics that are of interest in the business cycle literature. These statistics include the second moments of data filtered using the first difference and Hodrick–Prescott filters, and they include statistics for evaluating model fit. Our results indicate that, for the procedures considered, the existing asymptotic theory is not a good guide in a sample the size of quarterly postwar U.S. data.

Nonparametric Demand Analysis with an Application to the Demand for Fish

Joshua D. Angrist, Kathryn Graddy, and Guido W. Imbens

NBER Technical Paper No. 178
April 1995
JEL Nos. C30, L66, Q11
Labor Studies

Instrumental variables (IV) estimation of a demand equation using time-series data produces a weighted average derivative of heterogeneous potential demand functions. This result adapts recent work on the causal interpretation of two-stage least squares estimates to the simultaneous equations context, and generalizes earlier research on average derivative estimation to models with endogenous regressors. We also show how to compute the weights underlying IV estimates of average derivatives in a simultaneous equations model. We illustrate these ideas using data from the Fulton Fish Market in New York City and estimating an average elasticity of wholesale demand for fresh fish. We graph and interpret the weighting function underlying IV estimates of the demand equation. Our empirical example illustrates the essentially local and context-specific nature of IV estimates of structural parameters in simultaneous equations models.

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1050 Massachusetts Avenue
Cambridge, Massachusetts 02138-5398
(617) 868-3900

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