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NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH

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Program Report

The NBER Project on Industrial Technology and Productivity

Adam B. Jaffe,*
Project Coordinator

The NBER Project on Industrial Technology and Productivity was begun in 1994 with funding from the Alfred P. Sloan Foundation. Under the overall direction of NBER President Martin Feldstein, the project has three intertwined objectives. First, we seek to foster research on the fundamental determinants of productivity improvement, including the development and diffusion of new technology, investment in new plant and equipment, managerial and organizational innovation, and changes in employee relationships. Second, the project encourages economists studying these issues to supplement their traditional theoretical and empirical research methods with direct observation of business firms and conversations with managers and workers. Finally, the project provides a framework for communication among economists interested in productivity issues, researchers from other academic disciplines, and policymakers responsible for science and technology policy. We hope that this communication will allow policy to be informed by current research of social scientists, and allow researchers' agendas to be influenced by the priorities of the policy process.

The project to date has encompassed several different kinds of activity. First, we have commissioned a series of specific research projects, in which NBER researchers are investigating aspects of productivity, using plant visits or other forms of conversation with managers inside firms to help formulate and interpret their hypotheses and results. Second, we have organized meetings to present and discuss ongoing work that combines traditional research methods with site visits and other conversations with managers. Third, we have visited a number of firms, at which researchers interested in different aspects of productivity have heard from

**Adam B. Jaffe is an associate professor of economics at Brandeis University and a research associate in the NBER's Program on Productivity and Technological Change.*

NBER Reporter

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managers about the productivity issues within their firms. Finally, we have begun a regular biannual meeting of a Science and Technology Policy Research Group, at which economists, other social scientists, and government officials discuss current policy problems, current research, and the relationship between the two.

Individual Research Projects

Currently, 39 researchers are engaged in 25 distinct research projects on many different issues related to productivity improvement. The projects can be grouped into five broad areas: modeling technology and productivity in manufacturing processes; investment and the adoption of new technology; the effect of organizations and organizational change; the effect of employee relations and compensation; and, the innovation process and the generation of new technology. Briefly I will discuss examples of projects in each of these areas to give a flavor for the kinds of research being pursued. In addition, Steven N. Kaplan is organizing a conference on the productivity impacts of mergers and other changes in corporate control.

Productivity and Technology in Manufacturing Processes

Wayne B. Gray is measuring the impact of environmental regulation on productivity, focusing on the paper industry. Simultaneously he is pursuing statistical analysis of the entire industry, using data on productivity and regulatory compliance costs from the U.S. Bureau of the Census, and detailed case studies

of particular papermaking plants in New England. His statistical analysis indicates large negative effects on productivity relative to actual compliance expenditures, so the plant visits are designed to understand the relationship between the compliance cost information reported to the government and the actual costs of control technologies and process changes, as well as the overall interactions between compliance efforts and plant performance.

Samuel S. Kortum, Steven T. Berry, and Ariel Pakes are examining how product characteristics affect productivity in the automobile industry. Combining plant-level data from the Census of Manufactures and trade data on the production of particular models, they estimate a "hedonic cost function" for automobile production. Discussion with plant managers and examination of the production processes at particular plants will allow them to refine this model and to interpret the resulting parameters.

Investment and the Adoption of New Technology

Susan Helper is examining the sources of sustained cost reduction in manufacturing by focusing on the auto-parts supply industry.¹ In particular, she is interested in why these manufacturers seem to be able to reduce costs continuously even on mature products. Her research is based on a detailed survey of automakers and their suppliers in the United States and Canada, along with visits to specific parts plants in Massachusetts, Ohio, and Michigan, and discussions with auto company engineers who are in charge of cost-reduction programs for specific components.

Timothy F. Bresnahan and Shane

M. Greenstein² are investigating the process by which large, data-intensive corporate users of computers have migrated from mainframes to client/server technologies. In particular, they are trying to understand the extent to which users seem to base their investment decisions on forward-looking evaluations of technologies' potential, and the extent to which transitions are slowed by users being "locked in" to existing hardware or software. Their research combines statistical analysis of a large dataset describing the computer hardware in place over time at central corporate computer facilities, combined with detailed interviews of information systems managers at companies in the retail, health care, accounting, and manufacturing sectors.

Organizations and Organizational Change

Ann P. Bartel is examining the sources of productivity improvement in the retail sector by looking at retail banking. She has made an arrangement with a large Canadian bank under which she will have access to systematic data on the performance and efficiency of all of the bank's branches. She will explore statistically the role of environmental and management factors in determining performance. This statistical analysis will be structured on the basis of her insights from a series of site visits in which she will interview managers and employees at "turnaround" branches, that is, branches that the company has identified as having changed from underperforming to overperforming.

Severin Borenstein and Joseph Farrell are investigating the extent to which manufacturing companies carry significant "fat" or inefficiency

during prosperous times, which is then "lost" via explicit cost-cutting drives during hard times. Using a formal model of how equity markets value companies that are operating inefficiently, they are able to infer statistically the extent to which specific oil-refining companies carried "fat" at different times during the 1980s. They are testing these implications through discussions with specific managers involved in refining operations, in order to understand how decisions are made that costs need to be reduced, and what the consequences of these decisions are for the organizations.

Employee Relations and Incentives

Richard B. Freeman and Morris M. Kleiner are examining the effects of different kinds of "employee involvement" programs on productivity in specific companies. They have undertaken detailed analysis of the results of employee involvement initiatives at 20 plants in the aerospace, automotive, brewing, electronics, machine tool, and other industries. Each case study documents the nature of the employee involvement implemented, the preconditions and technology in place, the management and union input/effort to the process, and its degree of success. These case studies will form the basis for a larger survey of establishments that then will be used for statistical analysis of the determinants of success.

Edward P. Lazear is undertaking a detailed analysis of the productivity impact of employee compensation at the Safelite Company, a maker of auto glass. Safelite has switched its "dealer associates" around the country from salary-based compensation to "variable

pay," tied directly and explicitly to sales performance. Using data from Safelite's database on employee performance over time, Lazear will be able to track closely the extent to which the change in the approach to compensation changes the performance of individuals and the organization as a whole.

Innovation and New Technology

Lynne G. Zucker and Michael R. Darby are studying the role of university scientists in biotech firms, and the pathways by which new scientific developments contribute to the commercial development of biotechnology firms.³ Their research combines a variety of quantitative data on the publication records of university scientists, their links to biotechnology firms, and the performance of biotechnology firms, with case studies of particular firms whose principals have been interviewed in depth.

James D. Adams, Michael S. Fogarty, and I are examining the flow of commercial technology out of federal labs. This project uses data on patents granted to federal labs (both intramural and contractor-operated), and the citations to those patents, to measure the extent, timing, and geographic location of the technological impact of government research. In order to illustrate and validate the use of patent citation information to measure technological impact, we are undertaking a detailed case study of the patenting and citation of a NASA lab in Cleveland that has a number of key inventions relating to the creation of new materials and modifications of the surface of those materials with ion beam techniques. Based on discussions with key NASA scientists, and sci-

entists at firms that have used these technologies and/or cited the NASA patents in their own patents, we will document the pathways by which federally developed technology gets into the private sector, and the extent to which patent citations can be used to measure this diffusion process.

"Pin Factory" Visits

In honor of Adam Smith, we have dubbed our more generalized plant tours "pin factory visits." In each case, we have visited a manufacturing plant in the Boston area. Plant management has made a presentation on how they measure productivity, what they are doing to try to increase it, and what changes in their production process or organization have had the largest impacts on productivity in recent years. After these presentations, we tour the facilities, and conclude with additional questions and discussions with management. These visits have been extremely useful for highlighting generic issues that either affect many research projects or suggest topics that merit detailed research. Just a few examples of observations from such visits:

- even in old-fashioned, mainline manufacturing, the fraction of labor and costs directly involved in production of goods is low, so that significant productivity improvements often must come from "overhead" functions such as engineering, marketing, and office operations.
- specific targets for yearly cost reduction, on the order of 3 percent per year (nominal), are common, and companies are often quite sophisticated in their monitoring and measurement; for example, dealing with the problem of changing product

mix in ways similar to standard index number methods.

- the concepts of "capital" and "R and D" as we use them are clearly problematic. Equipment on the shop floor may be owned by customers; extensive technology-creating activities may not be called R and D.

Science and Technology Policy Working Group

This group has met twice, with another meeting expected this summer. Each one-day meeting has combined presentation of specific research results with discussions of current policy issues, and the research needs generated by policy concerns. Specific issues that have been addressed so far include: methods for evaluation of government funding of technology development; changing patterns of university research support; measuring the output of academic research; and the labor market for science and engineering Ph.D.s.

The Future Course of the Project

We continue to accept proposals for new individual research projects, and we expect that some of the researchers currently involved will begin new projects when those underway are completed. Currently we are evaluating how to proceed with pin-factory visits, including ideas for non-Boston area visits and possible combinations of research meetings with plant tours. The Science and Technology Policy Group will continue to meet on a regular basis.

Altogether, 60 or so economists have been involved in various as-

pects of this project. In addition to facilitating new research on an interesting and important set of problems, we hope that this effort will improve the quality and persuasiveness of economic research generally, by broadening and deepening the profession's base of general knowledge about economic institutions.

¹S. Helper, "Supplier Relations and Adoption of New Technology: Results of Survey Research in the U.S. Auto Industry," NBER Working Paper No. 5278, September 1995.

²T. F. Bresnahan and S. M. Greenstein, "The Competitive Crash in Large-Scale Commercial Computing," NBER Working Paper No. 4901, October 1994.

³L. G. Zucker and M. R. Darby, "Virtu-

ous Circles of Productivity: Star Bioscientists and the Institutional Transformation of Industry," NBER Working Paper No. 5342, November 1995, and "Present at the Revolution: Transformation of Technical Identity for a Large Incumbent Pharmaceutical Firm After the Biotechnological Breakthrough," NBER Working Paper No. 5243, August 1995.

Research Summaries

Higher Education¹

Charles T. Clotfelter*

Higher education in the United States is a costly enterprise. Measured by aggregate statistics, the expenditures by all of the 3400 colleges and universities amounted to some \$164 billion in academic year 1992 (1991/2), or about 2.9 percent of the gross domestic product.

From the perspective of a family sending a child to college, it is no longer uncommon for the financial burden of a four-year program to reach six digits, making college the second biggest lifetime expense for many families, after the purchase of a house. Beginning around 1980 these costs, measured in real, inflation-adjusted dollars, began to rise rapidly, especially at private institutions. Between 1980 and 1990 general educational spending per student in all colleges and universities grew at an annual real rate of 2.4

percent above inflation, and at a 3.4 percent rate in private institutions alone.

Tuitions rose sharply as well during the 1980s, with especially steep increases in the private sector. Between 1960 and 1980 the average real tuition and fees rose at a scant 0.3 percent average annual rate in public universities and a 1.3 percent rate in the private ones. But after 1980 the growth rate for the public universities increased to 2.8 percent; among the private universities it jumped even more, to 4.5 percent a year. Even after accounting for growth in financial aid, the rates of growth in tuition and fees were high, about 2.7 percent annual real growth in the public sector and 3.9 percent in the private sector. For private universities between 1976 and 1992, the net-of-aid cost to students exceeded not only the overall rate of inflation but also the much-heralded inflation in medical costs.

The rapid rise in costs and tuitions during the 1980s became a flash point that intensified an ongoing debate over the direction of higher education itself, serving for

critics as evidence of the inefficiency, misdirection, and even greed of those institutions. Some critics viewed the run-up in costs as a direct result of an increasing emphasis on research at the expense of teaching. Others pointed to what they saw as excessive spending on frills and bloated bureaucracies. One very visible group of private institutions came in for particular attention: the handful of nationally known private "elite" research universities and liberal arts colleges. The Justice Department's antitrust case against several groups of institutions also focused on the elite institutions.

The Skyrocketing Costs

From the early 1980s to the early 1990s, internally funded expenditures grew at a 5.4 percent real annual rate at Harvard, 5.7 percent at Carleton, 6.6 percent at Chicago, and 6.8 percent at Duke. Faculty salaries, which accounted for a large portion of arts and sciences spending, grew in real terms, although less rapidly than total

*Charles T. Clotfelter is the Z. Smith Reynolds Professor of Public Policy Studies and Professor of Economics at Duke University, and a research associate in the NBER's Program in Public Economics. A brief biographical story about him appears in the Profiles Section of this issue.

spending. Average faculty salaries rose fastest at Duke, which during this period followed a policy emphasizing the recruitment of senior scholars from outside the university. Expenditures on faculty also rose in part because the numbers of faculty increased at these institutions. The categories of compensation showing the biggest growth rates, however, were nonregular faculty and professional staff.

Besides compensation, the types of expenditures experiencing the most rapid growth were financial aid—a big gainer at all four institutions—and, at more than one institution, computers and other capital expenditures. Although not one of the largest budget items, computers rapidly became more important, as mainframe machines waned in significance and personal and minicomputers gained. At all the research universities there was heightened concern over startup costs, the up-front commitments that became a necessary part of the offers made to scientists and scholars in certain fields.

In assessing the various explanations for rising costs, it is useful to step back and attempt to attach an order of magnitude to each. Using simple calculations for all four of the sample institutions, I attempted to break out the effects of five sets of changes. The calculations do not analyze behavior or the reasons for the increases, but rather associate parts of the increases with changes in quantities or shares.

The first source of cost escalation, the rise in real input prices, including the average cost of faculty, was a significant but not large contributor to the overall increase, accounting for no more than 15 percent of the total increase in any institution. A second source of cost escalation was any increase in fac-

ulty size or relative compensation compared to the market. Although the number of regular faculty increased at all four of the sample institutions over the period of study, and relative faculty salaries jumped markedly at one institution, these increases accounted for no more than a tenth of any institution's total cost increase. A third component, one often mentioned as an important trend in higher education, was the increase in nonregular faculty. This factor accounted for about 5 percent of the total growth at two institutions but very little at the other two.

The fourth component of cost escalation, financial aid, accounted for a much larger share of the total increase than any other. This increase reflects the combination of the growth in graduate students, increases in the average award to graduate students, and the increase in average aid to undergraduates, the last of these largely attributable to the interaction between disproportionate tuition increases and the formula underlying the need-based aid. Taken together, the contribution of these increases in aid ranged from 14 to 34 percent of the total increase.

The last source of cost increase examined is administrative expenditures. Its importance is suggested by the fact that, in the case of all four institutions, the percentage of total arts and sciences spending devoted to administration increased over the period of observation. To determine the portion of the overall cost increase that one might attribute to the increase in administration costs, I calculated how much higher administrative spending in the base year would have been if the 1992 percentage of total spending on administration had applied, rather than the actual per-

centage. For Duke and Harvard, the shares of the total increase so attributed were almost 5 percent each. For Chicago and Carleton, the portion was less than 1 percent.

The literal bottom line of this decomposition shows a substantial unexplained residual, ranging from 44 to 64 percent of the total increase in arts and sciences spending. In other words, after attributing all of the increases to changes in other known quantities or shares, a large portion of the growth is still unexplained. The unavoidable conclusion is that a sizable portion of the increase was related to higher quality or new functions, or to increased waste. One partial explanation consistent with these facts is that universities responded to the deceleration of federal spending by paying for activities previously supported by government. But more broadly, such expenditure growth is consistent with across-the-board commitments to quality improvement and service enhancements.

Changes in Teaching and Staffing

The study also examines changes in faculty teaching and administrative staffing. One general trend over the period of study was a decline in measured classroom teaching loads. Based on data for three departments in each of the four institutions from 1976/7 to 1991/2, the unweighted average classroom teaching load fell by 12 percent in the representative humanities department, 26 percent in the natural science department, and 28 percent in the social sciences department. These declines definitely contributed to higher spending, although as the earlier calculations show, this factor explains only a small part of the overall increase.

Analysis of staffing patterns showed increases in administrative staffs, reflecting in part an expanded portfolio of functions offered by colleges and universities. Especially prominent among the added employees were technical, professional, and administrative staff, whose growth generally exceeded that of clerical workers or regular faculty. Computers had a large hand in transforming patterns of work in universities, but their effect on budgets was largely to increase rather than decrease expenditures.

Causes of Change

Why did expenditures rise so rapidly? Although it is impossible to assign responsibility unambiguously, four major causes deserve attention. The first basic precondition is the university's institutional imperative for excellence. As an organizational type, the university features weak central control, a remarkable degree of freedom accorded to its faculty, and strong traditions of collegiality in governance, all of which make it difficult to generate support for cuts or even selective enhancements.

A second precondition was the nature of competition that exists among elite institutions. These institutions competed actively for students and faculty, and they were keenly aware of each other's tuitions, salary levels, and admissions success. At the same time they operated under an implicit compact whereby each promised to award financial aid on the basis of a common formula based on financial need. This aid formula, added to the tendency of consumers to equate price with quality, made those consumers relatively insensitive to price in making their college enrollment decisions.

These two preconditions might never have been given the chance to contribute to a rise in spending were it not for a push from a force outside of higher education. That push came principally from a surge in the demand for the kind of high-quality undergraduate training offered by the most selective colleges and universities, spurred by the dramatic increase in the economic payoff to college and the rapidly advancing affluence of the affluent. Applications to Ivy League and other selective institutions rose steadily at the same time that their enrollments remained virtually constant.

Although an increase in demand against a fixed supply is sure to push up the equilibrium price in almost any other unregulated market, it is a distinctive feature of the market for higher education: the supplying firms made it a practice not to charge what the market might bear, choosing instead to ration demand by electing talented and diverse student bodies who would best fit their institutional objectives. At the same time, however, the trustees and administrators of these favored institutions knew that their admissions offices were being besieged by eager applicants, and that unusually large tuition increases would not cool the ardor of prospective students. And, tuition increases would be safer still if competing institutions were to increase their tuitions by comparable amounts. Thus the strong demand from consumers enabled the selective institutions—as a group—to increase tuitions faster than inflation. Individual colleges and universities, for whom such actions would be suicide if pursued alone, were protected from adverse consequences in their admissions by staying safely within the pack.

A fourth influence in the rising

costs of the 1980s was a collection of exogenous factors, including the worldwide increase in the relative earnings of highly educated professionals, the technological revolution in computers, and the slowing of federal support for higher education.

I believe that an assessment of the increases in costs during the 1980s will be an important step in evaluating the prospects for moderating the costs of higher education in the coming decade.

*¹For the past four years I have been studying the shape and origin of cost increases in higher education, focusing especially on private selective universities. My findings are described in *Buying the Best: Cost Escalation in Elite Higher Education*, published by Princeton University Press (see "Bureau Books" later in this issue). For the period spanning the 1976/7 to the 1991/2 academic years, the book examines three private research universities—the University of Chicago, Duke University, and Harvard University—and one private liberal arts college, Carleton College.*

As a means of overcoming differences among institutions in function, quality, and structure, the book focuses primarily on changes over time in quantities for given institutions. When I analyze expenditures, my primary attention is on internally financed expenditures, those funded from unrestricted revenues, and endowment income. In using these most fungible sources of revenue, institutions show their highest level of commitment to the activities so funded. Increases in spending on these activities have important implications for the continued well-being of the institutions.

Welfare and the Well-Being of Children

Janet Currie*

There is broad public consensus that welfare programs should benefit poor children. Yet we know remarkably little about whether they actually do. Most research on welfare programs, as well as much of the debate about welfare reform, has focused on the way that parents respond to the incentives created by the system, rather than on the effects of these programs on children. My recent research begins to fill this gap.

The fundamental question is whether any of these programs benefit children. If it can be shown that they do, a second question is: which types of programs are most effective? For example, do cash or in-kind programs produce bigger benefits for children? Finally, do welfare programs have differential effects on different groups, and if so, why?

Cash Versus In-Kind?

The oldest and most important program providing cash benefits to single mothers with children is Aid to Families with Dependent Children (AFDC). This program has been attacked by critics who argue that participation in AFDC promotes maternal behaviors that are bad for children. Nancy Cole and I investigated this claim, using the birthweight of infants born to mothers who participated in AFDC during pregnancy as a marker for child well-being.¹ We found that

**Janet Currie is a professor of economics at UCLA, and a research associate in the NBER's Program in Health Economics. A brief biographical story about her appears in the Profiles Section of this issue.*

AFDC mothers were indeed more likely to delay obtaining prenatal care, to smoke, to drink, and ultimately to have low-birthweight babies than other mothers. However, when we used either fixed effects or instrumental variables methods to control for unobserved as well as observed characteristics of the mothers, we found that there was no statistically significant association between birthweight and participation. Thus, AFDC does not seem to induce negative behaviors associated with low birthweight; however, *conditional on income*, participation in the program does not improve birth outcomes either.

I address the larger question of whether increases in income per se improve child outcomes in a study with Duncan Thomas. We show that maternal income is related significantly to children's test scores, which in turn are significant predictors of schooling attainment, even after controlling for maternal test scores.² However, analysis of individual maternal achievement tests shows that those skills that are most highly rewarded in the labor market are not always the same skills that are associated with improved child outcomes.

Finally, in two studies I show that although the available evidence is incomplete, it suggests that in-kind programs that target benefits directly to children have much larger measurable effects on specific outcomes than do equivalent cash transfers.³ Thus, if the public has in mind that there are certain specific services such as basic medical care and high-quality childcare that every child should receive, then in-kind programs designed to provide those services are likely to be more cost-effective

than traditional income support programs. This finding provides an economic rationale for the fact that over the past 20 years an increasing proportion of total welfare dollars has been allocated to such programs.

Still, even these programs do not always have the intended effects on all groups of children, a point that can be illustrated using recent research about two important programs: Medicaid and Head Start.

Differential Effects of Medicaid

Medicaid is the main system of public health insurance for poor women and children. In further work with Thomas,⁴ I use panel data that follow a single child over time, and show that children covered by Medicaid are more likely to have had *any* doctor visits in the past six months than other children. Moreover, the effect of being covered by Medicaid is larger than the effect of being covered by private health insurance, which probably reflects the fact that Medicaid has no copayments or deductibles. This effect is the same for black and white children. However, white children also receive more visits for illness when they are covered by Medicaid than when they are uninsured, and this is not true for blacks. Thus, equivalent coverage does not guarantee equal care.

In two studies with Jonathan Gruber, I look at the effect of becoming *eligible* for Medicaid on the utilization of medical care and on child health.⁵ We identify the effects of Medicaid eligibility using recent, dramatic, federally mandat-

ed expansions of the Medicaid program to pregnant women and children who were not covered previously. We construct an index of the generosity of Medicaid in each state that depends only on state rules.⁶ We then impute eligibility to each woman or child in our sample, and use this index as an instrument for our imputed eligibility measure.

We find that expansions of eligibility to pregnant women increased the fraction of women eligible for Medicaid from 12 percent to 43 percent. This increase was associated with an 8.5 percent decline in the infant mortality rate. However, we calculate that the early extensions of Medicaid eligibility to very poor women who were already income-eligible for other welfare programs were much more cost effective than later expansions to higher-income women. That is because the higher-income women were less likely to become covered. Hence, they did not take advantage of the provision of free preventive prenatal care. But once they arrived at the hospital to deliver, the hospital enrolled them in the Medicaid program, so that costly services received by unhealthy newborns were paid for by the program.

We use the same methodology to look at the effects of extending eligibility to additional groups of low-income children. We find that, although many newly eligible children did not take up coverage, becoming eligible for Medicaid reduced the probability that a child went without a doctor's visit in the past year, and also improved the quality of care as measured by the fraction of these visits that took place in doctor's offices rather than in hospital outpatient clinics or emergency rooms. These changes

were linked to significant reductions in child mortality from internal causes, and had no effect on mortality from external causes (such as accidents).

I explore the complex relationship between formal takeup and benefits received in a study that focuses on differences between children of immigrants and children of the native born.⁷ I show that recent expansions of Medicaid eligibility had negligible effects on coverage among immigrant children, but increased the utilization of basic services more for immigrants than for nonimmigrants. Moreover, many immigrants in border states appear to have dropped private health insurance coverage for their children when they became eligible for Medicaid coverage, leading to an increase in the fraction uninsured among this group.

Together, these results are consistent with evidence from other countries showing that extensions of insurance coverage alone will not eliminate socioeconomic differences in health care utilization or health.⁸ They suggest that outreach programs designed to improve takeup could increase the cost-effectiveness of the Medicaid extensions to pregnant women, although at the risk of increasing the extent to which private insurance is "crowded out."⁹ On the other hand, lack of information cannot explain the observed differences in patterns of takeup and utilization between black and white children, or between immigrants and nonimmigrants. Cultural explanations that posit that blacks or immigrants value medical care less than other parents also are difficult to reconcile with evidence showing that they are as likely as other parents to bring their children in for free

preventive care when they become eligible for Medicaid.

The results for pregnant women indicate that it is important to analyze the effects of social insurance programs on the incentives of providers. One additional factor that may be important in explaining differential utilization of care among those eligible for Medicaid is the difference in availability of physicians willing to accept Medicaid payments. With Gruber and Michael Fischer, and using state-level data, I show that increases in Medicaid fee ratios for obstetrician/gynecologists are associated with significant declines in infant mortality, presumably because of increases either in effective physician supply or in the quality of services provided.¹⁰

Medicaid fee policy also can have an impact on the availability of clinics providing some types of services. In work with Lucia Nixon and Nancy Cole, I show that while restrictions on the Medicaid funding of abortion have no direct effect on birthweights (that is, there is no evidence that pregnancies that would result in unhealthy babies are disproportionately likely to be aborted), the availability of abortion services does affect birthweight.¹¹ Restrictions on the Medicaid funding of abortion therefore may have an indirect effect on infant health by reducing the number of abortion providers.

Differential Effects of Head Start

Head Start is a federal-local matching grant program that aims to improve the skills of poor preschoolers so that they can begin schooling on an equal footing with their more advantaged peers. Unlike Medicaid, it is not an entitle-

ment program, and only about one-third of eligible children are served. Head Start has enjoyed widespread bipartisan support over a long period, although the evidence that the program has long-term effects is inconclusive. Experimental studies that focus primarily on inner-city black children typically find an initial positive effect on children's cognitive achievement that fades out in two or three years. Supporters of the program argue that a narrow focus on cognitive test scores is inappropriate, given that Head Start is intended to affect a range of outcomes.

In work with Thomas, I find that siblings who were in Head Start have higher test scores at the end of the program than either stay-at-home siblings, or siblings who went to other preschools.¹² The effects are of the same magnitude for both black and white children, and indicate that Head Start closes one-third of the gap between these children and others. But consistent with the experimental studies, we find that the effects on black children fade out rapidly. In contrast, the effects on the test scores of white children do not fade out. Moreover, white children age 10 and above are significantly less likely to have repeated a grade if they attended Head Start, and are thus less likely to have experienced the age/grade delay that often leads to not completing high school. Both black and white children who attended Head Start were more likely to be immunized than stay-at-home siblings, although we found no effect on height-for-age, a measure of long-term nutritional status.

In related work, we find that Head Start has large and lasting effects on the test scores of Latino students.¹³ The effects are greatest

on the test scores for which the greatest gap exists between the average Latino student and the average non-Latino student. A closer inspection of the data reveals that these positive effects are confined to children of native-born mothers: on average, children of foreign-born mothers do not experience any changes in test scores when they attend Head Start. Even among children with foreign-born mothers, there are significant differences in the effects of Head Start, which are related to family structure and maternal test scores: children of foreign-born mothers with relatively high scores, and those in households with grandparents present, are better off at home than in Head Start. Children without grandparents present or whose mothers have relatively low scores, gain from participation in the program.

¹J. Currie and N. Cole, "Welfare and Child Health: The Link Between AFDC Participation and Birthweight," *American Economic Review* (September 1993).

²J. Currie and D. Thomas, "Nature Versus Nurture? The Bell Curve and Children's Cognitive Achievement," NBER Working Paper No. 5240, August 1995.

³J. Currie, "Welfare and the Well-Being of Children: The Relative Effectiveness of Cash Versus In-Kind Transfer," in *Tax Policy and the Economy*, Volume 8, J. M. Poterba, ed. Cambridge, MA: MIT Press, 1994. See also J. Currie, *Welfare and Well-Being of Children*, Chur, Switzerland: Harwood Academic Publishers, 1995.

⁴J. Currie and D. Thomas, "Medical Care for Children: Public Insurance, Private Insurance, and Racial Differences in Utilization," *Journal of Human Resources* (Winter 1995).

⁵J. 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; and "Health Insurance Eligibility, Utiliza-

tion of Medical Care, and Child Health," NBER Working Paper No. 5052, March 1995, and *Quarterly Journal of Economics*, forthcoming.

⁶For a detailed description of these expansions, see A. Yelowitz, "The Medicaid Notch, Labor Supply, and Welfare Participation: Evidence from Eligibility Expansions," *Quarterly Journal of Economics*, forthcoming.

⁷J. Currie, "Do Children of Immigrants Make Differential Use of Public Health Insurance?" NBER Working Paper No. 5388, December 1995.

⁸J. Currie, "Socioeconomic Status and Health: Does Universal Eligibility for Health Care Reduce the Gaps?" *Scandinavian Journal of Economics* 4 (1995).

⁹For a detailed discussion of crowdout, see D. Cutler and J. Gruber, "Does Public Insurance Crowd Out Private Insurance?" NBER Working Paper No. 5082, April 1995, and *Quarterly Journal of Economics*, forthcoming.

¹⁰J. Currie, M. Fischer, and J. Gruber, "Physician Payments and Infant Mortality: Evidence from Medicaid Fee Policy," NBER Working Paper No. 4930, November 1994, and *American Economic Review* (May 1995).

¹¹J. Currie, L. Nixon, and N. Cole, "Restrictions on Medicaid Funding of Abortion: Effects on Pregnancy Resolutions and Birthweight," *Journal of Human Resources*, forthcoming.

¹²J. Currie and D. Thomas, "Does Head Start Make a Difference?" *American Economic Review* (June 1995).

¹³J. Currie and D. Thomas, "Head Start and Cognition Among Latino Children: Interactions with Language and Culture," mimeo, February 1996.

The Effect of Budget Rules on Fiscal Policy

James M. Poterba*

Theories of what affects the size and persistence of government budget deficits have been advanced for centuries, surely since the beginning of government debt finance. Two recent developments in fiscal policy have generated renewed interest in the political economy of deficit determination, and in the impact of budget rules on fiscal policy outcomes. First, substantial, sustained, peacetime U.S. federal budget deficits have risen in the early 1980s. On the basis of national income and product accounts, federal deficits averaged 0.8 percent of gross domestic product (GDP) during 1960–79, compared with 3.3 percent of GDP in 1980–94. Second, there is substantial international dispersion in deficit experiences. Countries that appear to be similar in terms of standards of living, demographic composition, and other observable attributes may differ substantially in their ratio of deficit-to-GDP. This time-series and cross-national variation in deficits has led both researchers and policymakers to seek to understand the factors that contribute to deficit experiences.

As a reaction to chronic U.S. federal budget deficits, there has been debate about the structure of budget rules and whether they should be changed in an effort to alter budget outcomes. The 1986 Gramm–Rudman–Hollings antideficit bill and the 1990 Budget Enforcement Act are examples of recent federal legislation that has altered the budget process. The frequently dis-

cussed Balanced Budget Amendment, which would place explicit limits on fiscal policy outcomes, is a more extreme example of such an institutional reform. These actual and proposed reforms alter the way in which the participants in the budget process interact, and the rules under which they are expected to reach agreement. The maintained assumption underlying such proposals is that budget process rules matter for fiscal policy outcomes, and that changing these rules can affect fiscal deficits.

While a substantial body of largely theoretical research in political science supports the notion that legislative rules have real effects on policy outcomes, there is limited empirical evidence to support this view. Moreover, much of the empirical research in public economics that has considered the determinants of taxes and government spending proceeds as if budget institutions are simply veils, through which voters and elected officials see, and which have no impact on ultimate policy outcomes. For example, studies of spending determination in the “median voter” tradition usually maintain the hypothesis of institutional irrelevance by omitting these variables from analysis.

During the last several years, I have carried out a series of empirical research projects designed to analyze the impact of budget institutions on fiscal policy outcomes. These studies have taken various forms, but all have relied on cross-state variation in budget institutions in the U.S. states. My work has touched on a variety of topics, including the effect of balanced budget rules on state deficits, the impact of capital budgeting institu-

tions on the level and mix of capital and noncapital spending, and the consequences of tax and expenditure limits for public sector wages and employment. I conclude that fiscal institutions are not veils, but are significant determinants of policy outcomes. This research complements a broader body of work by many others, which includes both international comparisons of budget rules and deficit outcomes and time-series studies of the U.S. federal experience with budget deficits. This work also suggests that institutional differences are correlated with differences in policy outcomes.¹

State Budget Rules and Deficit Outcomes

The variation in budget practices *across states* within the United States provides a valuable source of information on the potential effects of different fiscal institutions. The presence of balanced budget rules in virtually all states sometimes is cited as evidence that such rules could be applied to the federal government as well. My recent work has explored the nature of balanced budget requirements in the U.S. states, and considered what lessons, if any, the state-level experience holds for discussions of a federal balanced budget amendment.²

Most state balanced budget requirements are substantially different from those currently being discussed at the federal level. In particular, virtually all states allow some types of borrowing to be used to balance the budget, at least for a single fiscal year. Vermont is the only state without a balanced budget requirement of some type.

*James M. Poterba is a professor of economics at MIT and director of the NBER's Program in Public Economics.

The other 49 states have three broad types of balanced budget rules. In some states, the governor must submit a balanced budget, but there are no restrictions on subsequent budget deliberations. In other states, the legislature must enact a balanced budget. Finally, in the 24 states with the most stringent balanced budget rules, the legislature must enact a balanced budget, and there are limits on deficit carry-forward. Most states apply balanced budget rules to only part of their budget, and there are virtually no formal provisions for enforcing state balanced budget rules. While these features imply that state budget rules cannot provide direct evidence on the effects of the particular rules currently under discussion at the federal level, the evidence from the states is relevant for assessing the broader question of whether fiscal institutions affect fiscal policy outcomes.

I recently considered³ how state balanced budget rules affect the way that state fiscal policies respond to unexpected deficits or surpluses. I studied both adjustment within the fiscal year and adjustment in the next fiscal year. My focus was the correlation between a measure of the strictness of state antideficit rules and state reactions to fiscal shocks. My results suggest that states with weak antideficit rules reduce spending less in response to unexpected deficits than their counterparts with strict antideficit rules do. On average, a \$100 deficit overrun leads to only a \$17 expenditure cut in a state with a weak antideficit law, while it leads to a \$44 cut in states with stricter antideficit rules.

Antideficit rules do not seem to affect the magnitude of tax changes in response to unexpected deficits, either in the current or the

next fiscal year. But states with another budgetary constraint, a tax limitation law, enact smaller tax increases in response to unexpected deficits than states without such limits do.

Capital Budgeting and the Spending Mix

A second aspect of budget policy that can be studied empirically is the effect of budget rules on the composition of public spending. Certain budget rules may affect some programs more than others. For example, the line item veto often is suggested as a mechanism for reining in pork-barrel spending in appropriation bills.⁴ Capital budgets with separate accounts for current spending versus capital projects sometimes have been suggested as a way to avoid a budgetary bias against long-term projects with large onetime costs. The current federal budget combines capital and operating expenditures into a single budgetary total, although the Office of Management and Budget does prepare supplementary materials that indicate the magnitude of federal capital outlays. Today, most states have separate budgetary accounts for capital and operating spending, but this was not always the case. In the early part of the postwar period, there was substantial divergence in capital budgeting practices across states.

My research on the correlation between capital budgeting rules and fiscal policy outcomes uses data from a careful survey of state budget practices in the early 1960s.⁵ I compare the level of per capita spending on capital projects and on noncapital state outlays, in states with and without capital budgets. My results suggest essentially no difference in the noncapital

spending of states with and without capital budgets, but approximately a 10 percent greater level of capital spending in capital budget states. These results are consistent with the view that unified budget rules make it politically more difficult to appropriate funds for "lumpy" capital projects.

The Effect of Tax and Expenditure Limits

The final aspect of state and local government budget policy that I have considered is the impact of tax and expenditure limitations on spending outcomes. The taxpayer revolt of the late 1970s led to the enactment of a wide range of fiscal limits on state and local governments. Since 1976, voters in 32 states have enacted or strengthened statewide limits on the growth of local property tax revenues. Propositions 13 in California (1978) and 2¹/₂ in Massachusetts (1980) are examples of this recent movement. Proposition 13 limits property taxes to 1 percent of assessed value plus interest payments on local debt, while Proposition 2¹/₂ limits the property tax rate to 2.5 percent of assessed value, and prohibits total property tax collections from rising by more than 2.5 percent per year.

A substantial number of states also have adopted limits on taxes or expenditures at the state level. The limits on state and local taxes and expenditures vary widely. Some limits restrict total spending or revenues, while others constrain the growth rate of the government sector. Some limits are very likely to operate as binding constraints on state or local government growth; others are likely to bind only during economic downturns; and others are flexible enough to impose relatively little constraint on state or local government.

In a pair of recent papers, Kim Rueben and I have analyzed the effect of various fiscal limits on the wages and employment of state and local government workers.⁶ We focus on compensation costs because of their importance in state and local government budgets. In 1993, for example, employee compensation represented 68.5 percent of total state and local government purchases of goods and services. This share is higher for cities and other local governments than for states.

Our analysis draws on data from the Current Population Survey to estimate the wages that state and local government workers would have earned if they were employed in the private sector. We first calculate a pay premium (or penalty) associated with public sector work, and then study the changes in this pay premium during 1979–91 in states with and without binding tax and expenditure limits.

Our results suggest that binding property tax limitation laws substantially slow wage growth for local public sector employees; the results on state-level tax and expenditure limits are less clear. For men working in the local public sector, wages grew 6.8 percent slower between 1979 and 1991 in states with binding local property tax limits than in states without such limits. For women, the analogous effect was 3.7 percent. The decline in the relative local public sector wage was greater for both men and women employed in the educational sector than for those in other parts of local government. We also have considered the impact of tax and expenditure limitation laws on employment in the state and local public sector, but we have not found substantively important effects. Thus it appears that the brunt

of expenditure restriction associated with such limits has been reflected in lower relative wages for public sector workers, rather than in reduced employment in this sector.

Conclusion and the Research Challenge

Budget rules are determined in the same political process that determines taxes and expenditures, so interstate differences in budget rules do not provide a firm basis for statistical analysis. Differences in budget policy may reflect differences in voter tastes for budget deficits and other outcomes. Convincing evidence on the effect of budget institutions on fiscal policy outcomes thus requires some attention to the source of variations in budget rules. At least some of the variation in state fiscal institutions is the result of historical accident. Many states adopted antideficit rules as part of their constitutions, and these rules typically are difficult to modify. There are substantial differences across states in the difficulty of enacting legislation to cap property taxes or limit state spending, so again some of the difference in policy rules may be exogenous. Further work should focus more carefully on these exogenous sources of variation in budget rules, and what lessons they imply for the impact of fiscal policy.

While the potential endogeneity of budget institutions must temper any conclusions from the research just described, the available evidence supports the view that changes in budget processes and in the rules affecting the dynamics of taxes and expenditures can affect fiscal policy outcomes. The view that these fiscal institutions are simply a veil, pierced by voters and their elected representatives, appears to

be dominated by the richer "political economy" view, suggesting that fiscal institutions mediate the link between voter tastes and policy outcomes.

¹Leading examples of this research include cross-national analysis by A. Alesina and R. Perotti, "Budget Deficits and Budget Institutions," and analysis of the U.S. time series by A. J. Auerbach, "The U.S. Fiscal Problem: Where We Are, How We Got Here, and Where We Are Going," in NBER Macroeconomics Annual 1994, S. Fischer and J. J. Rotemberg, eds. Cambridge, MA: MIT Press, 1994. For a more comprehensive review of recent work on budget institutions, with many other references, see J. M. Poterba, "Do Budget Rules Work?" NBER Working Paper, forthcoming.

²This work is summarized in J. M. Poterba, "Budget Institutions and Fiscal Policy in the U.S. States," NBER Working Paper No. 5449, February 1996, and American Economic Review, forthcoming.

³J. M. Poterba, "State Responses to Fiscal Crises: The Effects of Budgetary Institutions and Politics," NBER Reprint No. 1988, August 1995, and Journal of Political Economy 102 (August 1994), pp. 799–821.

⁴For empirical evidence on the effect of line item veto provisions in the U.S. states, see D. Holtz-Eakin, "The Line Item Veto and Public Sector Budgets: Evidence from the States," Journal of Public Economics 36 (1988), pp. 269–292.

⁵J. M. Poterba, "Capital Budgets, Borrowing Rules, and State Capital Spending," Journal of Public Economics 56 (January 1995), pp. 165–187.

⁶J. M. Poterba and K. Rueben, "The Effect of Property Tax Limits on Wages and Employment in the Local Public Sector," American Economic Review 85 (May 1995), pp. 384–389, and "Fiscal Institutions and Public Sector Labor Markets," NBER Working Paper, forthcoming.

NBER Profile: *Charles T. Clotfelter*

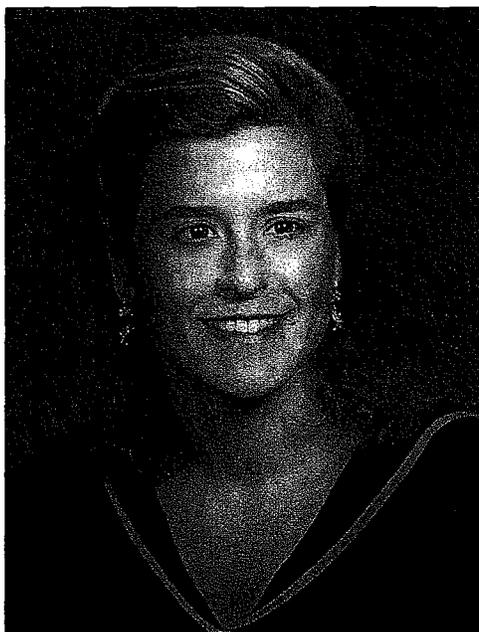
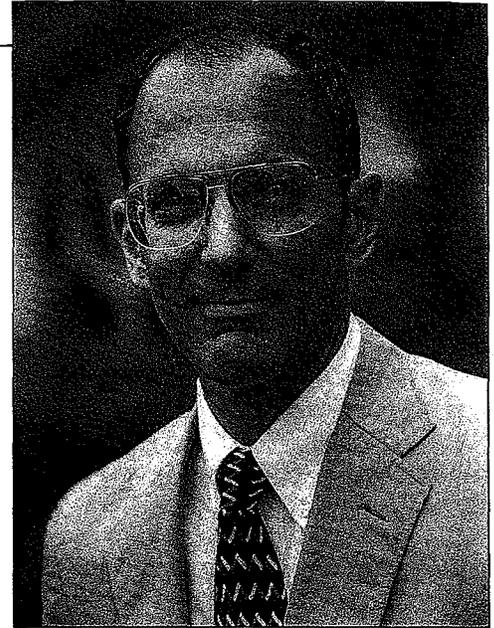
Charles T. Clotfelter has been an NBER research associate in public economics since 1982, and is the Z. Smith Reynolds Professor of Public Policy Studies and Professor of Economics at Duke University. He received his B.A. in history from Duke, and his M.A. and Ph.D. in economics from Harvard.

Clotfelter was an assistant professor at the University of Maryland from 1974–9 before joining the Duke faculty. He was an associate professor of public policy studies and economics from 1979–84, became a full professor in 1984, and took his current position at Duke in 1995. Clotfelter was also Duke's vice provost for academic policy and planning in 1983–5, vice chancellor from 1985–8, and vice pro-

vost for academic programs in 1993–4.

Clotfelter's fields of interest are public finance, tax policy, and the economics of education. Prior to his most recent book, described in the "Bureau Books" section later in this issue, he was one of four authors of a 1991 NBER volume entitled *Economic Challenges in Higher Education*, and was coauthor of the 1989 *Selling Hope: State Lotteries in America*.

Clotfelter enjoys playing squash and tennis, attending local theater productions, making desserts, walking, and, like any North Carolinian, keeping up with college basketball. He has one son in college majoring in theater, and one in middle school learning to play bass guitar.



NBER Profile: *Janet Currie*

Janet Currie has been a faculty research fellow in the NBER's Program in Labor Studies since 1991, and also participates in meetings of the Bureau's public economics and health programs. She received her B.A. and M.A. in economics from the University of Toronto, and her Ph.D. from Princeton in 1988. After spending three years at the University of California, Los Angeles, and two years at MIT as an assistant professor, she returned to the University of California, Los Angeles as a tenured associate professor in the fall of 1993. She has just been promoted to full professor.

Currie also was an NBER Olin

Fellow during academic year 1992–3. At that time she began her current research on federal programs affecting children. She hopes eventually to integrate insights from fields such as medicine and developmental psychology into an economic analysis of program effects.

Currie will be married in May to fellow economist Bentley MacLeod, who lives in Boston. Consequently, she has reached platinum status in her frequent flyer program. When they are not working or commuting, they enjoy exploring Los Angeles and Boston, hiking and camping, and dreaming of travel to exotic locales.

NBER Profile: *William C. Dunkelberg*

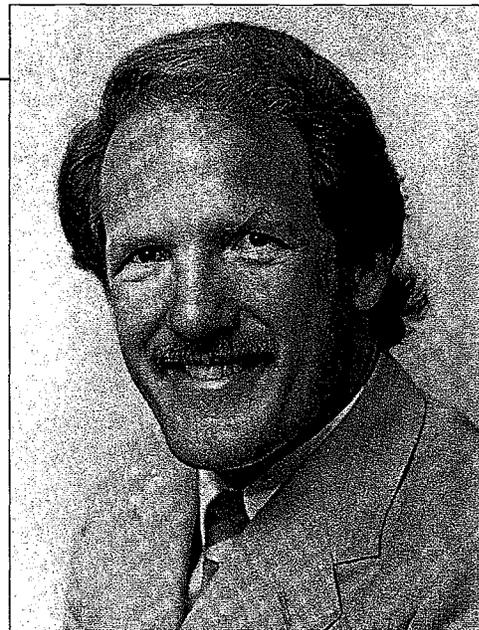
William C. Dunkelberg represents the National Association of Business Economists (NABE) on the NBER's Board of Directors. He is a professor of economics and director of the Center for Entrepreneurship at Temple University, where he served as dean of the School of Business and Management from 1987-94.

Dunkelberg received his B.A., M.A., and Ph.D. from the University of Michigan, where he was affiliated with the Survey Research Center. From 1969-75 he served as assistant and associate professor of business economics at the Graduate School of Business at Stanford University. After a year as visiting associate professor of management and economics at Purdue University, he was named to the faculty of Purdue's Krannert Graduate School

of Management, and associate director of the Credit Research Center.

Dunkelberg has served as the chief economist for the National Federation of Independent Business (over 600,000 member firms) since 1971, establishing their research program and their monthly business surveys. He was the president of NABE in 1993-4, and served on its board of directors in 1986-8 and from 1993-6. He is an elected member of the Conference of Business Economists and the National Business Economics Issues Council.

Dunkelberg has three children (ages 25, 24, and 16). He enjoys racquet sports and fishing with his boys, and reading science fiction. He frequently travels on speaking engagements, often in the company of his daughter, who has "seen the



world." He serves on a number of business and nonprofit boards of directors, and raises funds to support the Economics and Entrepreneurship Education (E3) program for inner-city youths in Philadelphia.

Conferences

Eighth Annual Inter-American Seminar on Economics

The NBER's eighth annual Inter-American Seminar on Economics was held in Bogota, Colombia on November 16-18 and was sponsored jointly by the NBER and the Foundation for Higher Education and Development (FEDESARROLLO). Sebastian Edwards, NBER and the World Bank, and Mauricio Cárdenas, FEDESARROLLO, organized this program.

Guillermo Calvo, University of Maryland, "Varieties of Capital-

Market Crises"

Discussant:

Albert Fishlow, Council on Foreign Relations

Ernesto Talvi, Inter-American Development Bank, "Exchange-Rate-Based Stabilization with Endogenous Fiscal Response"

Discussant:

Rodrigo Suescún, Banco de la República, Colombia

Mauricio Cárdenas, and

Felipe Barrera, University of Chicago, "On the Effectiveness of

Capital Controls in Colombia"

Discussant:

Roberto Junguito, Banco de la República, Colombia

Alberto Carrasquilla, Banco de la República, Colombia, "Coordination 'Failure' or Budget Constraints? Notes on Inflation Under Central Bank Independence"

Discussant:

Andrés Velasco, NBER and New York University

Continued on page 16

Gustavo M. Gonzaga and **Maria Cristina T. Terra**, Pontifícia Universidade Católica do Rio de Janeiro, "Stabilization, Volatility, and the Equilibrium Real Exchange Rate"

Discussant:

Felipe Jaramillo, FEDESARROLLO

José Campa, New York University, and

Linda S. Goldberg, Federal Reserve Bank of New York, "Investment, Pass-Through, and Exchange Rates: A Cross-Country Comparison" (NBER Working Paper No. 5139)

Discussant:

José de Gregorio, Ministry of Finance, Chile

Alejandro Hernández D. and **Fernando Zapatero**, Instituto Tecnológico de México, "Interest Rates in Target Zone Regimes"

Discussant:

José Dario Uribe, Banco de la

República, Colombia

Andrés Velasco, "When Are Fixed Exchange Rates Really Fixed?"

Discussant:

Ricardo Hausman, Inter-American Development Bank

Robert P. Flood, International Monetary Fund, and

Nancy P. Marion, Dartmouth College, "The Size and Timing of Devaluations in Capital-Controlled Economies" (NBER Working Paper No. 4957)

Discussant:

Vittorio Corbo, Universidad Católica de Chile

Chris Canavan, Boston College, and

Mariano Tomassi, Universidad de San Andrés, Argentina, "On the Credibility of Alternate Exchange Rate Regimes"

Discussant:

Juan Luis Londono, The World Bank

José de Gregorio, and **Federico Sturzenegger**, NBER and University of California, Los Angeles, "Financial Markets and Inflation Under Imperfect Information" (NBER Additional Paper, November 1994)

Discussant:

Edward E. Leamer, NBER and University of California, Los Angeles

Edward E. Leamer, "Central America and the North American Free Trade Agreement"

Discussant:

Nora Lustig, Brookings Institution

Anne O. Krueger, NBER and Stanford University, "Free Trade Agreements Versus Customs Unions" (NBER Working Paper No. 5084)

Discussant:

Ernesto May, The World Bank

Calvo explores two scenarios for capital market crises, depending upon whether the crisis results from: fiscal imbalances, or capital-market shocks. The latter scenario shows that, as diversification opportunities increase, investors become more sensitive to "rumors" and more disinclined to gather information. He also studies a self-fulfilling prophecy model with short-term bonds.

Talvi studies the effects of announcing a fixed exchange rate program without making any fiscal adjustment to ensure that the exchange rate policy is sustainable in the long run. The perception that exchange rate policy is temporary will lead to an initial expansion in consumption, and to an endogenous increase in tax revenues large enough to eliminate the ex ante fis-

cal deficit. Therefore, ex ante, an inconsistent stabilization program displays, ex post, all the features of a fiscally consistent one: that is, a fixed exchange rate and no fiscal deficit. The program is discontinued because of unsustainable growth in private sector external debt.

Cárdenas and **Barrera** analyze the effectiveness of capital controls in Colombia. Their evidence points toward a relative inability of the measures adopted to reduce the *level* of capital inflows. Nonetheless, nonremunerated deposits apparently have been successful in inducing a recomposition of foreign liabilities in favor of long-term maturities. This is probably a positive result, as it has made the country less vulnerable to a reversal in capital flows. In this sense, controls may be viewed as an effective way

of internalizing the negative externality imposed by short-term maturities.

Granting central banks (CBs) a greater degree of independence from the government has been a prominent part of the recent reform process in Latin America and elsewhere. **Carrasquilla** addresses two issues: first, the gradual nature of disinflation under CB independence; second, the coordination problem, which has become an important element of discussion in policymaking circles. His model assumes that government expenditure generates a positive externality in production, and that it is financed by distortionary conventional taxation and by inflation. This, in turn, reduces financial sector vulnerability, which is of concern to the CB. Incomplete disinflation is the result of the joint occur-

rence of CB concern for financial sector stability and the government externality.

Gonzaga and **Terra** show that the value of the equilibrium real exchange rate is affected by its own volatility. Risk-averse exporters, who make their exporting decisions before observing the real exchange rate, will export less if the rate is more volatile. Therefore, the trade balance and the variance of the real exchange rate are related negatively. An increase in the volatility of the real exchange rate will cause the trade balance to deteriorate; to restore equilibrium, a depreciation of the real exchange rate must take place. **Gonzaga** and **Terra** describe real exchange rate volatility in Brazil, Argentina, and Mexico, and suggest an association with those countries' stabilization plans and changes in their exchange rate regimes.

Using detailed data from the United States, Canada, the United Kingdom, and Japan, **Campa** and **Goldberg** examine the implications of exchange rates for sectoral investment. They show 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 elasticities of exchange rate pass-through and demand. There are important differences in investment endogeneity across high- and low-markup sectors, with investment in low-markup sectors 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.

Hernández and **Zapatero** develop a model of exchange rate determination for a small open economy based on capital flows where ex ante interest rate parity does not hold. They then concentrate on a target zone regime and study the relationship among capital flows, exchange rates, and interest rates. Their model allows them to study different types of central bank interventions. In particular, they compare the effects of interest rates on the dynamics of foreign reserves within a sterilized and a nonsterilized intervention.

Velasco attempts to explain why long-lasting and successful currency pegs are so rare in exchange rate regimes. He finds that the sustainability of the fixed exchange rate depends on the inherited level of debt. For any given distribution of the random shocks that affect the relevant budget constraint, the farther the stock of debt is below the threshold, the safer the fixed exchange rate is. There also can be multiple equilibriums. Further, reducing debt not only saves on interest payments (the standard reason for government saving) but also reduces future expectations of devaluation. Expectations of devaluation depend not just on reputation (the "better" the reputation, the lower the expectations), but also on the stock of inherited debt (the larger the debt, the higher the expectations). Finally, if there are multiple equilibriums for a particular range of debt, then the government may choose to accumulate debt so that it enters that range, but only as long as it deems it relatively unlikely that pessimistic expectations, and therefore the "bad" outcome, will materialize.

Flood and **Marion** consider a policymaker who pegs the nominal exchange rate, and adjusts the peg

periodically so as to minimize the flow cost of real exchange rate misalignment and the fixed cost of peg readjustment. Their framework illustrates how changes in the stochastic environment affect both the size and the timing of devaluation. When the size and timing of devaluations are jointly determined, higher variance increases the amount of devaluation the policymaker is willing to undertake at the end of the peg, and so may delay the actual devaluation time. These insights provide guidance about the determinants of devaluation episodes.

A preponderance of anti-inflation plans have used the nominal exchange rate as an anchor, even though many other variables can play this role. The conventional wisdom is that a nominal exchange rate commitment ensures more fiscal and monetary discipline than other kinds of targets. However, economic theory does not yet give any clear reason for this. **Canavan** and **Tommasi** provide an explanation based on the premise that the public can monitor the nominal exchange rate more easily than it can other variables. They show that serious stabilizers will prefer more visible targets, such as the nominal exchange rate, and in some circumstances will choose to fix the exchange rate, even when fixed rates have some costs, including less ability to respond to external shocks.

De Gregorio and **Sturzenegger** study the effects of inflation on the operation of financial markets, and show how the ability of financial intermediaries to distinguish among heterogeneous firms declines as inflation rises. They illustrate this point by presenting a simple model in which inflation affects firms' productivity. In particular, productivity differentials narrow as inflation in-

creases. This effect creates incentives for risky and less productive firms to behave like high productivity firms. At high rates of inflation, this may result in financial intermediaries being unable to differentiate among customers.

Leamer suggests that the future of Central America seems to rest in extremely critical ways on competing effectively in North America in the markets for labor-intensive manufactures. Success in that regard is determined by five key drivers: 1) economic liberalization, which is sweeping the globe and adding enormously to the size of the labor force that competes in the internationally integrated economic system; 2) real exchange rate uncertainty; 3) distance, which gives Central America a great loca-

tional advantage over Asia in serving the North American marketplace; 4) savings—Central America can attract investments from the United States, but is more likely to be very dependent on internally generated savings; and 5) the North American Free Trade Agreement—if Mexico is big “enough” and if Central America and other countries can access the Mexican marketplace without facing substantial trade barriers, then the lowering of U.S. barriers to Mexican products actually may make Central America better off.

Until NAFTA, analyses of preferential trading arrangements began by assuming a customs union with a common external tariff; the differences between customs unions and free trade agreements (FTAs)

have not been analyzed much. **Krueger** points to some of the differences between FTAs and customs unions, and shows that a customs union is always superior to an FTA on welfare grounds. Moreover, the political economy of FTAs will lead to more opposition to further multilateral trade liberalization than customs unions will.

The proceedings of this conference will be published in the *Journal of Development Economics*.

Economic Agglomeration

The NBER, Centre for Economic Policy Research (CEPR), and Tokyo Center for Economic Research (TCER) jointly sponsored a conference on “Economic Agglomeration” in Tokyo on January 11 and 12. Takatoshi Ito, NBER and International Monetary Fund; Motoshige Itoh, University of Tokyo; and Tetsushi Sonobe, Tokyo Metropolitan University, organized this program.

Yoshitsugu Kanemoto, TCER and University of Tokyo, and **Toru Ohkawara** and **Tautomu Suzuki**, TCER and Central Research Institute of Electric Power Industry, “Urban Agglomeration-Economies and a Test for Efficiency of City Size in Japan”
Discussants:

Takaaki Takahashi, University of Tokyo, and Jacques-François Thisse, CEPR and Université de Paris I-Sorbonne
Kiminori Matsuyama, NBER and Northwestern University, “Why Are There Rich and Poor Countries? Symmetry Breaking in the World Economy”

Discussants:
Hiroshi Fujiki, Bank of Japan, and Tetsushi Sonobe

Anthony J. Venables and **Diego Puga**, CEPR and London School of Economics, “The Spread of Industrialization”

Discussants:
Motoshige Itoh, and Noriyuki Yanagawa, Keio University
Paul R. Krugman, NBER and Stanford University, “Confronting

the Mystery of Urban Hierarchy”
Discussants:

Anthony J. Venables, and Masahisa Fujita, TCER and Kyoto University

Masahisa Fujita, and **Tomokazu Arita**, TCER and Kyoto University, “Local Agglomeration and Global Networks: A Comparative Study on the Spatial Organization of U.S. and Japanese Semiconductor Firms”

Discussants:
Tatsuo Hata, Osaka University, and Toru Ohkawara

Masahisa Fujita and **Jacques-François Thisse**, “Economics of Agglomeration”

Discussants:
Tetsushi Sonobe and Toru Ohkawara

Kanemoto, Ohkawara, and Suzuki first estimate an aggregate production function for metropolitan areas in Japan, in order to derive the magnitudes of agglomeration economies. Then they use the estimates of agglomeration economies to test whether Japanese cities, and in particular Tokyo, are too large.

The economics of coordination failures typically explain cross-country differences in economic performance with a closed economy model and multiple equilibriums. Poor countries are presumed to have an inferior equilibrium to rich countries. According to **Matsuyama**, a more satisfactory approach would be to show how the world economy may be separated into the rich and the poor regions, that is, to explain the coexistence of the rich and poor as an inevitable aspect of the world trading system. The symmetry breaking of the world economy occurs because international trade causes agglomeration of different economic activities.

Venables and Puga demonstrate how industry may spread from country to country in a series of waves. The input-output structure, establishing the strength of forward and backward linkages between industries, determines which

industries move first, and the speed of the process. The results suggest that the first industries to move are those that are labor intensive, and/or engaged in upstream activities. Stronger linkages and higher transport costs postpone the spread of industrialization, and cause it to happen in a more abrupt manner.

Krugman poses three questions about the urban system: 1) Why is there no typical city size? 2) Why are the sizes of large cities so well described by a power law? Power laws are pervasive in natural systems, so perhaps it should not be too surprising that we find one for cities as well, but it is hard to see how to reconcile the types of model that might explain a power law with the urban system models that are otherwise so pervasive. 3) Why is the exponent very close to one in the power law on city sizes? A power law with an exponent of one is degenerate—it implies a population of infinite size, or would, except for the “quantum” requirement that excludes fractional cities. The failure of existing models to explain a striking empirical regularity—one of the most overwhelming empirical regularities in economics—indicates that despite considerable recent progress

in the modeling of urban systems, we are still missing something extremely important.

Fujita and Arita examine the global location behavior of U.S. and Japanese semiconductor firms. Because of the difference in their national industrial systems, there are clear differences in their location behavior. For example, all Japanese firms maintain most of their assembly plants close to their wafer plants in Japan, while U.S. firms have been conducting most of their assembly processes in Asia.

Fujita and Thisse ask why economic activities agglomerate in a small number of places. They analyze the main reasons for the formation of economic clusters involving firms and/or households: externalities under perfect competition; increasing returns under monopolistic competition; and spatial competition under strategic interaction. They review what has been accomplished in these three domains, and identify a few general principles governing the organization of economic space.

The proceedings of this conference will be published in a forthcoming issue of the *Journal of the Japanese and International Economies*.



Monetary Policy and Low Inflation

The NBER's Program in Monetary Economics sponsored a conference on "Monetary Policy and Low Inflation" on January 11-13. Christina D. Romer and David H. Romer, NBER and University of California, Berkeley, organized this program.

J. Bradford De Long, NBER and University of California, Berkeley, "America's Only Peacetime Inflation: The 1970s"

Discussant:

John B. Taylor, NBER and Stanford University

Marta Campillo, Boston University, and

Jeffrey A. Miron, NBER and Boston University, "Why Does Inflation Differ Across Countries?"

Discussant:

Maurice Obstfeld, NBER and University of California, Berkeley

Richard H. Clarida, NBER and Columbia University, and

Mark Gertler, NBER and New York University, "How the

Bundesbank Conducts Monetary Policy"

Discussant:

Rudiger W. Dornbusch, NBER and MIT

Christina D. Romer and **David H. Romer**, "Institutions for Monetary Stability"

Discussant:

Benjamin M. Friedman, NBER and Harvard University

Robert J. Shiller, NBER and Yale University, "Why Do People Dislike Inflation?"

Discussant:

N. Gregory Mankiw, NBER and Harvard University

Martin Feldstein, NBER and Harvard University, "The Costs and Benefits of Going from Low Inflation to Price Stability" (NBER Working Paper No. 5469)

Discussant:

Andrew B. Abel, NBER and University of Pennsylvania

David Card, NBER and Princeton University, and

Dean Hyslop, University of

California, Los Angeles, "Does Inflation 'Grease the Wheels' of the Labor Market?"

Discussant:

John Shea, NBER and University of Wisconsin

Douglas O. Staiger and **James H. Stock**, NBER and Harvard University, and **Mark W. Watson**, NBER and Princeton University, "How

Precise Are Estimates of the Natural Rate of Unemployment?" (NBER Working Paper No. 5477)

Discussant:

Alan B. Krueger, NBER and Princeton University

Owen Lamont, NBER and University of Chicago, "Do 'Shortages' Cause Inflation?" (NBER Working Paper No. 5402)

Discussant:

Matthew D. Shapiro, NBER and University of Michigan

Laurence M. Ball, NBER and Johns Hopkins University, "Disinflation and the NAIRU" (NBER Working Paper No. 5520)

Discussant:

Olivier J. Blanchard, NBER and MIT

The 1970s were America's only peacetime inflation: the total increase in the price level in the 1970s that resulted from the sustained spurt in inflation to 5 to 10 percent per year was as large as the jumps in the price level that resulted from the major wars in this century. According to **De Long**, the truest cause of the 1970s inflation was the shadow of the Great Depression: the memory of the Depression created a predisposition on the left and the center of political opinion that any unemployment rate was too high, and eliminated whatever mandate the Feder-

al Reserve might have had for controlling inflation. The Federal Reserve gained a mandate to control inflation only as a result of the discontent and anxiety produced by the experience of the 1970s. But the Federal Reserve probably could not have acquired such freedom of action in the absence of such an unpleasant object lesson. Thus the memory of the Great Depression meant that the United States was highly likely to suffer an inflationary episode like that of the 1970s in the post-World War II period—maybe not as long, and maybe not exactly when it occurred, but nev-

ertheless a similar episode.

Campillo and **Miron** attempt to explain the differences in inflation performance across countries. They consider the distaste for inflation, optimal tax considerations, time consistency issues, distortionary noninflation policies, and other factors that might be empirically important determinants of inflation performance. Overall, the results suggest that institutional arrangements—central bank independence or exchange rate mechanisms—are relatively unimportant determinants of inflation performance, while economic fundamentals—openness and

optimal tax considerations—are relatively important determinants.

Clarida and Gertler analyze German monetary policy in the post-Bretton Woods era. Despite the public focus on monetary targeting, in practice German monetary policy involves the management of short-term interest rates, as occurs in the United States. Except during the mid- to late 1970s, the Bundesbank has adjusted interest rates aggressively to achieve and maintain low inflation. However, the performance of the real economy also influences the bank's decisionmaking. The authors suggest that the Bundesbank has adjusted short-term interest rates according to a modified version of the feedback policy rule that describes the behavior of the Federal Reserve under Alan Greenspan.

Romer and Romer argue that failures in monetary policy arise not just from dynamic inconsistency but, more importantly, from an imperfect understanding of the workings of the economy and the effects of policy. This imperfect understanding can take several forms: even the best available knowledge at any time is limited; policymakers' knowledge may be inferior to the best available; and policymakers must answer to elected leaders and voters, whose knowledge may be even more limited than their own. In light of this analysis, Romer and Romer discuss recent and proposed reforms in monetary policy in industrialized countries. Most of the recent reforms are changes in the conduct of policy within existing institutional arrangements. They argue that these reforms are single-mindedly focused on avoiding a repetition of one specific failure of policy in the past—namely excessive inflation—and that they do little to address the underlying sources of this or other policy failures.

Shiller conducted a questionnaire survey in the United States, Germany, and Brazil to explore how people think about inflation, and the problems it may cause. Among noneconomists surveyed in all three countries, the largest concern is that inflation lowers people's standard of living: they seem to believe that wages do not respond to inflationary shocks that are caused by people or institutions acting badly. This standard-of-living effect is not the only perceived cost of inflation among noneconomists; other concerns involve the ill effects of inflation on fairness, morale, and national prestige. Shiller uncovers important differences in the understanding of the mechanics of inflation both across countries and between economists and noneconomists.

Because inflation exacerbates tax distortions to consumption and housing demand, reducing inflation from 2 percent to zero would lower the tax system's annual deadweight loss by 1 percent of GDP, **Feldstein** finds. The present value of this gain substantially exceeds the one-time cost—of about 5 percent of GDP—of shifting from 2 percent inflation to price stability.

Card and Hyslop ask whether relative wage adjustments occur more quickly in higher-inflation environments. Using matched individual wage data from consecutive years, they find that about 6 to 10 percent of workers experience wage rigidity in a 10 percent inflation environment, while this proportion rises to over 15 percent when inflation is less than 5 percent. Using counterfactual distributions, they estimate that a 1 percent increase in the inflation rate reduces the fraction of workers affected by downward nominal rigidities by about 0.5 percent, and slows the

rate of real wage growth by 0.06 percent. Using state-level data, their findings on nominal rigidities are less conclusive: they find only a weak statistical relationship between the rate of inflation and the pace of relative wage adjustments across local labor markets.

Staiger, Stock, and Watson find that the natural rate of unemployment (the NAIRU) is not estimated precisely: a typical 95 percent confidence interval for the NAIRU in 1990 is 5.1 percent to 7.7 percent. This imprecision obtains under a variety of specifications, including the leading "Phillips Curve" formulations that dominate the literature, as well as a variety of alternative specifications. The authors conclude that this imprecision suggests caution in using the NAIRU to guide monetary policy.

Lamont counts the number of times per month during 1969–94 that the word "shortage" appears on the front page of the *Wall Street Journal* and the *New York Times*. Using this as a general measure, he tests whether these shortages help predict inflation in the U.S. economy. Using a variety of different specifications, he finds that this time-series measure of shortages strongly predicts inflation, and contains information not captured by commodity prices, monetary aggregates, interest rates, and other proposed predictors of inflation. This suggests that disequilibrium was an important part of the adjustment of prices to macroeconomic shocks during this period.

Ball asks why the NAIRU rose in most OECD countries in the 1980s. He finds that a central cause was the tight monetary policy that countries pursued to reduce inflation. The evidence comes from a cross-country comparison: countries with larger decreases in infla-

tion and longer disinflationary periods had larger increases in the NAIRU. Imperfections in the labor market have little direct relationship to changes in the NAIRU. However, long-lived unemployment benefits greatly magnify the effects of disinflation. These results

support "hysteresis" theories of unemployment.

Also participating in this conference were: Stanley Fischer, International Monetary Fund; Donald Kohn, and Governors Lawrence Lindsey and Janet Yellen, Federal Reserve Board; Michael H. Mos-

kow, president, Federal Reserve Bank of Chicago; and Robert Parry, president, Federal Reserve Bank of San Francisco. The papers presented and their discussions will be published by the University of Chicago Press. The availability of this volume will be announced in an upcoming issue of the *Reporter*.

Eleventh Annual Macroeconomics Conference

Despite an unseasonal snowstorm, nearly 60 academics and government economists attended the NBER's Eleventh Annual Conference on Macroeconomics in Cambridge on March 8 and 9. Ben S. Bernanke, NBER and Princeton University, and Julio J. Rotemberg, NBER and MIT, organized this program:

Nobuhiro Kiyotaki, NBER and University of Minnesota, and

Kenneth D. West, NBER and University of Wisconsin, Madison, "Business Fixed Investment and the Recent Business Cycle in Japan"

Discussants:

Jonas Fisher, University of Western Ontario, and David S. Scharfstein, NBER and MIT

Matthew D. Shapiro, NBER and University of Michigan, and

David Wilcox, Federal Reserve Board, "Causes and Consequences of Imperfections in the Consumer Price Index"

Discussants:

John Greenlees, Bureau of Labor Statistics, and Zvi Griliches, NBER and Harvard University

John Y. Campbell, NBER and Harvard University, and

Robert J. Shiller, NBER and Yale University, "A Scorecard for Indexed Government Debt"

Discussants:

Stanley Fischer, International Monetary Fund, and Deborah J. Lucas, NBER and Northwestern University

Andreas Hornstein, University of Western Ontario, and

Per Krusell, University of Rochester, "Technology Improvements and Productivity

Slowdowns: Another Crazy Explanation"

Discussants:

Robert J. Gordon, NBER and Northwestern University, and Valene A. Ramey, NBER and University of California, San Diego

Paul R. Krugman, NBER and Stanford University, "Are Currency Crises Self-Fulfilling?"

Discussants:

Timothy Kehoe, University of Minnesota, and Maurice Obstfeld, NBER and University of California, Berkeley

Roland Bénabou, NBER and New York University, "Inequality and Growth"

Discussants:

Roberto Perotti, Columbia University, and José-Victor Ríos-Rull, Federal Reserve Bank of Minneapolis

Kiyotaki and West observe that business fixed investment in Japan has been unusually volatile in recent years. They find that movements in business fixed investment are consistent with movements in output and the cost of capital, both on average during the entire 1961-94 sample that they study and during the recent 1986-94 business cycle.

Shapiro and Wilcox study measurement problems in the Consumer Price Index (CPI) and systematically analyze the available evidence concerning the magnitude of these problems. They conclude that the CPI overstates increases in the cost of living, but they do not know the exact extent of this bias. Available evidence

suggests that the bias is centered on 1.1 percentage points per year, but there is a 10 percent chance that the bias is less than 0.7 percentage points, and a 10 percent chance that it is greater than 1.6 percentage points per year. This paper also presents an experimental price index for cataract surgery. This index shows how current CPI

procedures overstate the price increase for medical procedures that are subject to technological improvement. The experimental index also illustrates a better method for the pricing of medical care.

Within the last few years, Canada, Sweden, and New Zealand have joined the ranks of the United Kingdom and other countries in issuing government bonds that are indexed to inflation. Some observers of the experience in these countries have argued that the United States should follow suit. **Campbell** and **Shiller** provide an overview of the issues surrounding debt indexation, and try to answer three empirical questions about indexed debt: How different would the returns on indexed bonds be from the returns on existing U.S. debt instruments? How would indexed bonds affect the government's average financing costs? How might the Federal Reserve be able to use the information contained in the prices of indexed bonds to help formulate monetary policy?

Hornstein and **Krusell** explore

two channels through which increases in the rate of investment-specific technological change can lead to decreases in measured productivity growth. The first channel is learning: with an increase in the rate of adoption, more resources are devoted to new technologies in which experience is low. As a result, labor productivity and total factor productivity growth fall temporarily. Second, if unmeasured quality of final outputs depends significantly on capital input, then declines in productivity growth will be recorded as the growth rate of capital goes up. **Hornstein** and **Krusell** document the productivity slowdown in the United States and elsewhere, and discuss evidence suggesting that an increase in the rate of investment-specific technological change may have occurred at about the same time that the slowdown began.

It has been argued that currency crises are self-defeating—that is, when speculators attack a currency in the belief that it will be devalued, they force the government to devalue and thus ratify their expect-

tations. **Krugman** argues, however, that both in theory and in practice such multiple equilibria are much less important than recent models have suggested.

Bénabou examines the main theories used to explain the negative correlation between initial income inequality and subsequent aggregate growth. A first model captures both the case in which markets are complete and distributional effects arise solely through the political system (democratic or not), and the case in which capital market imperfections constrain investment by poorer agents. A second model focuses on how socio-political conflict reduces the security of property rights. Accumulation is not constrained by inequality of income per se, but rather by inequality of income relative to political power.

These papers and their discussions will be published later this year by the MIT Press as *NBER Macroeconomics Annual, Volume 11*. Its availability will be announced in a future issue of the *NBER Reporter*.

International and Interarea Comparisons of Prices, Income, and Output

The NBER's Conference on Research in Income and Wealth sponsored a meeting on "International and Interarea Comparisons of Prices, Income, and Output" in Washington on March 15-16 to appraise the methods of estimating output, income, and prices used by the United Nations International Comparison Program. The conference included several papers on methods of interspatial comparisons, current and pro-

posed; examples of actual comparisons; progress reports on the incorporation of new countries into the measurement program; discussion of measures based on industry, rather than expenditure comparisons; examinations of methods of dealing with particularly difficult sectors, such as construction and health services; and uses of the comparison data in various analytical studies. **Robert E. Lipsey**, NBER and Queens Col-

lege, and **Alan Heston**, University of Pennsylvania, organized this program.

W. Erwin Diewert, NBER and University of British Columbia, "Axiomatic and Economic Approaches to International Comparisons"

Discussant:
Irwin L. Collier, Jr., Free University of Berlin

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Patricia M. Danzon and **Allison Percy**, University of Pennsylvania, "The Effects of Price Regulation on Productivity in Pharmaceuticals"

Discussant:

Ernst R. Berndt, NBER and MIT

Nanno Mulder, University of Groningen, "The Measurement of Performance in Distribution, Transport, and Communications: The ICCOP Approach Applied to Brazil, Mexico, France, and the U.S.A."

Discussant:

Peter Hooper, Federal Reserve Board

Bart van Ark and

Erik Minnikhof, University of Groningen, and

Marcel Timmer, University of Eindhoven, "Prices, Quantities, and Productivity in Industry: A Study of Transition Economies in a Comparative Perspective"

Discussant:

Irwin L. Collier, Jr.

Angus Maddison, University of Groningen, "Long-Term Economic Performance of China: A Quantitative Reevaluation"

Discussant:

Yuri Dhikanov, The World Bank

Mary F. Kokoski,

Brent Moulton, and

Kimberly Zieschang, U.S.

Bureau of Labor Statistics,

"Interarea Price Comparisons for Heterogeneous Goods and Several Levels of Commodity Aggregation"

Discussant:

Paul Pieper, University of Illinois

Bettina H. Aten, University of Illinois, "Cities in Brazil: An Interarea Price Comparison"

Discussant:

Jorge Salazar-Carrillo, Florida International University

John Ruser,

Brooks Pierce, and

Kimberly Zieschang, U.S.

Bureau of Labor Statistics,

"Constructing Interarea Compensation Cost Indexes with Data from Multiple Surveys"

Discussant:

Joel Popkin, Joel Popkin and Company

Robert E. Lipsey, and

Birgitta Swedenborg,

Studieförbundet Näringsliv och Samhälle, "Wage Dispersion and Country Price Levels"

Discussant:

Andrew Levin, Federal Reserve Board

Robert Summers and

Alan Heston, University of Pennsylvania, "The World Distribution of Income Dissected"

Discussant:

Timothy Smeeding, Syracuse University

Edward N. Wolff, NBER and New York University, "Patterns of Specialization Among Manufacturing Industries in OECD Countries"

Discussant:

Dale Jorgenson, Harvard University

Robert J. Hill, University of New South Wales, "Chained PPPs and Minimum Spanning Trees"

Discussant:

D. S. Prasada Rao, University of Notre Dame

Daniel A. Nuxoll, Virginia Polytechnic Institute, "The

Convergence of Price Structures and Economic Growth"

Discussant:

Keir Armstrong, Carleton University

Diewert considers the problem of choosing a multilateral system of index numbers in order to make aggregate price and quantity comparisons among many countries and regions. He reviews ten classes of multilateral methods, from the viewpoint of the axiomatic as well as the economic approach. He then suggests a new system of 11 desirable axioms or properties for multilateral systems. Four classes of methods are deemed "best": they are all "superlative," and satisfy slightly different sets of axioms.

Danzon and **Percy** develop a simple model of the pharmaceutical firm's willingness to accept higher variable input costs in return for higher prices. They test the predictions of the model using OECD-STAN data on input levels and productivity in the pharmaceutical industry in France, Germany, the United Kingdom, Italy, and the United States for 1970-90. They confirm that strict price regulation in France has led to excessive use of labor and capital, and hence has reduced productivity significantly in

pharmaceuticals relative to other industries. These excess costs result in lower returns to quasifixed factors, presumably to the sunk capital that is provided by multinational firms and invested in R and D.

Mulder presents new methods for comparing output and productivity in transport, communications, and wholesale and retail trade among countries. He measures productivity by value added per employee. To compare value added among countries, Mulder uses the purchasing power parity (PPP),

the price of a service of one country relative to that of another, as a converter. He demonstrates that the new method of output measurement in transport, which covers loading and unloading services, yields slightly higher productivity ratios for Brazil, Mexico, and France relative to the United States than traditional measures do. The relative productivity performance of transport in Brazil and Mexico decreases by 16 percent and 29 percent respectively after adjusting for quality differences. The new procedure for deriving PPPs in wholesale and retail trade, by double deflation, yields lower relative productivity in the Brazil/U.S. comparison, and higher productivity in the Mexico/U.S. comparison, compared to the single deflation results.

Van Ark, Minnikhof, and Timmer present measures of manufacturing productivity for a number of former centrally planned economies (CPEs)—Czechoslovakia in 1989, East Germany in 1987 and 1992, Hungary in 1987, and Poland in 1989 and 1993—as compared to (West) Germany. Then, taking into account similar measures for another 18 countries including the United States, they conclude that the productivity performance in Central and East European countries on average was between that of the Asian and the Latin American low-productivity economies. Only East Germany experienced a large improvement in comparative productivity since the beginning of the economic transition. Further, there is above-average price distortion in the former CPEs.

Maddison evaluates Chinese growth performance in comparative perspective, with 1933 as a prewar reference point, and looking at changes in agricultural technology since 1400. He finds that

between 1933 and 1978, value added in farming rose 0.9 percent per year, and that there was no increase in labor productivity. That was a period in which postwar reconstruction and land reform were followed by massive collectivization. From 1978 to 1994, the institutional responsibility for agriculture reverted largely to peasant households. This resulted in a great acceleration in growth of value added (5.5 percent per year), labor productivity (4.9 percent per year), and total factor productivity. Chinese farm value added in 1987 was two-and-a-quarter times as large as U.S. farm value added, while labor productivity was at 1.8 percent of U.S. levels. Over the longer term, from 1400 to 1933, there was significant diffusion of better practice technology within “traditional” agriculture as a response to population pressure. Maddison also finds that Chinese GDP growth was 2.5 percent per year for 1933–78, and 7.7 percent per year for 1978–94.

Kokoski, Moulton, and Zieschang derive a general form of Törnqvist multilateral (transitive) place-to-place index numbers. Their method incorporates characteristics-based, hedonic quality adjustment as an integral feature. They apply the method to a subset of commodity price and expenditure data for the 44 areas of the United States covered by the Consumer Price Index. They also discuss an application of the method that makes time-series and geographical comparisons consistent with one another.

Based on a limited sample of prices for 1984–7, **Aten** finds that price levels in Brazil are higher in the low-income areas. The range of price levels is greater when inflation rates are higher. Also, the inclusion of service headings, such as

utilities and public transport, raises the price level in the mid- to high-income areas, most notably in São Paulo and Brasília. Conversely, the price level for basic food headings is even higher in the poorer north and northeast regions. Finally, the difference in the estimates from all four methods that she uses generally decreased as the level of incomes increased, but did not appear to increase with higher inflation rates.

Ruser, Pierce, and Zieschang compare the cost of labor input for 39 areas of the United States. Their adjustments are based on establishment data at the level of the approximately 18,000 jobs priced in the Employment Cost Index (ECI) survey, and worker data at the level of the 39 areas in the ECI sample from the Current Population Survey. They find that the compensation parities are generally more variable from place to place prior to adjustment of labor composition than after adjustment. The primary determinants of variations in geographical compensation, after controlling for industry and occupation, are firm size and unionization from the establishment data, and education/experience from the worker data.

Lipsev and Swedenborg note that there are large intercountry differences in the degree of wage dispersion among industries and individuals. They theorize that if the prices of goods, particularly extensively traded goods, tend to be equalized across countries, then the effects of wage policy (and other policies, or country characteristics) on prices will be reflected mainly in nontraded services. If services tend to use mostly unskilled labor, then a country with large wage differences by skill will have low prices for services, and to

a lesser extent low prices in general, as compared with a country with small wage differences. Using price level data, Lipsey and Swedenborg confirm that countries with high wage dispersion do have lower aggregate price levels, although the effect is not always large. More consistently, these countries have lower prices for many services, and also for some goods. The negative relationship between wage dispersion and prices, and the positive relationship between per capita income and prices, are more often statistically significant, and are larger for services than for goods. These two variables explain a larger part of the differences among country price levels for services than for goods. Thus higher prices to consumers can be thought of as a cost of egalitarian wage policies.

Summers and Heston examine in detail the world's income distribution from 1960 to 1990. After quantifying growth and inequality of gross domestic product per capita, they consider other concepts of income. These include a per-equivalent-adult measure and a consumption measure designed to describe the country's current standard of living. Their principal emphasis is on intercountry rather than intracountry differences, with some examination of the relationship between the two. The paper closes with some remarks about the possibility of integrating an important social indicator, longevity, into the notion of a world distribution of welfare.

Wolff analyzes patterns of industry specialization, as measured by a country's share of total industry production, for 14 OECD countries from 1970 to 1993. He finds that the industrialized countries tended to specialize manufacturing production in very different indus-

tries, and that most countries retained their specialization over the entire period. He also shows that labor productivity is a powerful predictor of a country's share of total industry output (for the countries in this sample). Relative labor costs generally are associated negatively with a country's relative share of total industry output for 1970-9, but are not significant for 1979-93, except among low-tech industries. Capital formation plays an important role in the determination of market share for low-tech industries, but is less significant for medium-tech industries, and not significant for high-tech ones.

The advantages of chained index numbers in a time-series context, which also apply in a cross-section context, are widely appreciated. However, chaining across countries largely has been ignored because of the lack of a natural ordering of countries. **Hill** develops a framework for chaining purchasing power parities (PPPs) across countries using Kruskal's Minimum Spanning Tree (MST) algorithm to choose among a vast number of

possible chain paths. The MST method dramatically simplifies the construction of multilateral PPPs, and improves the quality of the comparisons, by reducing the number of countries that must be compared directly. The MST method also has important implications for the measurement of growth and inflation, and for the treatment of seasonal goods.

Nuxoll uses a price variability index to show that price structures are highly correlated with real income levels; that is, the relative prices of goods are similar in countries with the same income levels. Moreover, as economies grow, their price structures converge to those of wealthier countries. This is consistent with closed-economy growth models, and with open-economy growth models that include nontraded goods.

These papers and their discussions 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*.



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Bureau News

Science and Technology Policy

Over 30 economists and specialists in science policy met at the Cambridge office on February 2 to participate in the NBER's second meeting on Science and Technology Policy. These meetings are part of the NBER Project on Industrial Technology and Productivity, supported by the Alfred P. Sloan Foundation. The agenda, organized by Adam B. Jaffe, NBER and Brandeis University, Paul M. Romer, NBER and University of California, Berkeley, and David Mowery, University of California, Berkeley, was

Discussion on the National Academy of Sciences Committee Report on Criteria for Federal Support of R and D. "Allocating Federal Funds for Science and Technology," led by **Paul M. Romer**

William F. Massy, Stanford University, and **Charles M. Goldman**, RAND Corporation, "The Production and Utilization of Science and Engineering Doctorates in the United States"

Discussant: Ronald G. Ehrenberg, NBER and Cornell University

Panel Discussion on "Data Collection in the Labor Market for Ph.D.s"

Panelists:

Paula Stephan, Georgia State University, "An Essay on the Economics of Science";

Charlotte Kuh, National Research Council;

Maresi Nerad, University of California, Berkeley, "Ph.D.s Ten Years Later"

James D. Adams, NBER and University of Florida, and **Zvi Griliches**, NBER and Harvard University, "Measuring Science: An Exploration"

Discussant:

Michael Fogarty, Case Western Reserve University

Frank R. Lichtenberg, NBER and Columbia University, "The Effect of Pharmaceutical Utilization and Innovation on Hospitalization and Mortality" (NBER Working Paper No. 5418)

Discussant:

Jain M. Cockburn, NBER and University of British Columbia

Marco Iansiti and **Jonathan West**, Harvard University, "The Evolution of R and D in the Semiconductor Industry"

Discussant:

Peter Klenow, University of Chicago

Romer, a member of the National Academy of Sciences Committee, discussed how it had grappled with the criteria to use in determining priorities for federal research support within an increasingly restrictive funding environment. The committee concluded that, of the approximately \$70 billion the federal government spends on R and D each year, approximately \$30 billion constitutes testing and evaluation, leaving about \$40 billion that more properly might be considered R and D. Of this, allocations to federal labs, universities, firms, and other institu-

tions amount to \$16 billion, \$12 billion, \$8 billion, and \$4 billion, respectively. After Romer's comments, much discussion ensued on how economic research could help in determining priorities for the allocation of funds among these different types of institutions, and among fields of science and engineering. Important questions that were identified include: 1) Does the creation of Ph.D.s create spillovers that justify supporting university research over and above the benefits of the research itself? 2) If the answer is yes, then can we say anything about the magnitude of

these effects across fields of science and engineering? 3) Given that many U.S. Ph.D. students are foreign, can we understand better what happens to them and how that affects the United States? 4) Does the extent to which spillover benefits from research are captured within the United States differ across different institutions and different modes of research support?

Massy and **Goldman** describe a simulation of the supply and demand for doctorates in science and engineering, time to the doctorate, departmental choice, and related matters. Their goal is to determine

whether there is long-term structural underemployment among people with doctoral degrees. They conclude that there is. In fact, based on the conditions prevailing in the early 1990s, about 22 percent of the new doctorates could fail to find suitable employment when the supply-demand system achieves steady state.

Stephan suggested that the following issues merited more study: 1) the importance of M.D.s (as opposed to Ph.D.s) in R and D; 2) the contribution of foreign-born scientists to U.S. technological progress; 3) the extremely skewed distribution of research results, and the possibility this raises that studies of Ph.D.s as a group may be misleading; 4) the increasing size and apparent relevance of monetary rewards for important developments in university-based science; 5) the apparently increasing importance of "teams" of researchers relative to individual investigators. **Kuh** emphasized that our data collection system for Ph.D.s was designed at a time when many fewer people received the degree, and we did not think it important to keep track of any except those who continued to perform research. She suggested that in a time in which there is new interest in the economic spillovers of research, as well as a possibly shrinking academic job market, we need to do a better job of understanding the career trajectories of Ph.D.s, including the role played by post-doctoral positions and the nature of career progression for scientists in industry. **Nerad** reported on a study currently being undertaken by the graduate division at the University of California, Berkeley, in which about 5000 Ph.D. recipients from the early 1980s will be identified. Their institutions will be asked to provide recent address-

es, and the individuals then will be surveyed regarding current employment, career paths, and reasons for choosing particular career paths.

Adams and Griliches use available U.S. data on academic R and D expenditures, number of papers published, and number of citations to those papers to measure "output." They look at science and engineering as a whole, five selected major fields, and the individual university/field level data. Based on *Science and Engineering Indicators*, there are sharply diminishing returns to academic R and D if published papers are considered "output." However, a newer dataset on papers and citations, based on an "expanding" set of journals and the newly released government-calculated R and D deflators, eliminates the appearance of diminishing returns. It raises the question of why the input prices of academic R and D are rising so much faster than either the GDP deflator or the implicit R and D deflator, though. Analyzing individual university/field level data, the authors find significant diminishing returns to "own" R and D, with coefficients hovering around 0.5 for estimates with paper numbers as the dependent variable, and around 0.6 if total citations are the dependent variable. Allowing for individual university effects drives these numbers down even further.

Lichtenberg analyzes how changes in the quantity and type of pharmaceuticals prescribed by physicians in outpatient visits affect rates of hospitalization, surgical procedure, mortality, and related variables. His estimates for 1980-92 indicate that the number of hospital stays, bed-days, and surgical procedures declined most rapidly for those diagnoses with the greatest increase in the total number of

drugs prescribed and the greatest change in the distribution of drugs, by molecule. These estimates imply that an increase of 100 prescriptions is associated with 1.48 fewer hospital admissions, 16.3 fewer hospital days, and 3.36 fewer inpatient surgical procedures. A \$1 increase in pharmaceutical expenditure is associated with a \$3.65 reduction in hospital care expenditure.

Iansiti and West focus on the evolution of R and D in a business environment characterized by close links to science. Using data from an empirical study of the semiconductor industry, they show a striking improvement in the R and D performance of one group of organizations during the early 1990s. Their study combines an extensive dataset comprising public and proprietary performance information on all major product and process generations introduced in the last 20 years, with detailed field observations of projects conducted by all major competitors in recent years. These observations suggest that the source of this turnaround was neither research nor development capability alone. Rather, performance improvement derived from the organizational processes that *integrate* these two, merging scientific advance with the complex requirements of evolving production and use environments. The roots of superior performance lie in the capability for "technology integration": the selection and adaptation of technological possibilities, which define the match between innovation at the fundamental level and critical characteristics of the product's environment.

Economic Fluctuations Research Meeting

The NBER's recently merged Program on Economic Fluctuations and Growth met in Stanford, California on February 9. Mark Bils, NBER and University of Rochester, and Russell Cooper, NBER and Boston University, organized this program:

Thomas Cooley, University of Rochester, and

Lee Ohanian, University of Minnesota, "Postwar British Economic Growth and the Legacy of Keynes"

Discussant:

Kenneth I. Judd, NBER and Stanford University

David Laibson, NBER and Harvard University, "Hyperbolic Discount Functions, Undersaving,

and Savings Policy"

Discussant:

Casey Mulligan, University of Chicago

Charles Jones, Stanford University, and

John Williams, Federal Reserve Board, "Too Much of a Good Thing? The Economics of Investment in R and D"

Discussant:

Samuel S. Kortum, NBER and Boston University

Andrew B. Abel and

Janice C. Eberly, NBER and University of Pennsylvania,

"Investment and q with Fixed Costs: An Empirical Analysis"

Discussant:

John C. Haltiwanger, NBER and

University of Maryland

Alberto Trejos, Northwestern University, and

Randall Wright, University of Pennsylvania, "Toward a Theory of International Currency: A Step Further"

Discussant:

S. Rao Aiyagari, Federal Reserve Bank of Minneapolis

Susanto Basu, NBER and University of Michigan, and

John Fernald, Federal Reserve Board, "Aggregate Productivity and the Productivity of Aggregates"

Discussant:

Robert E. Hall, NBER and Stanford University

The policies that Britain used to finance World War II represented a dramatic departure from those used to finance earlier wars and from the policies used by the United States. Britain relied much more heavily on the taxation of factor incomes. In this paper, **Cooley** and **Ohanian** describe the magnitude of the public finance problem faced by Britain and examine the origins of the fiscal policies that were adopted. They use an endogenous growth model to contrast the policies actually used with tax-smoothing policies, and with policies advocated by John Maynard Keynes.

Laibson proposes two normative savings concepts in this paper, providing a framework for a numerical analysis of the undersaving phenomenon. Calibration of the hyperbolic economy—to match Bernheim's (1994) survey data on

undersaving—generates reasonable parameter values. Laibson presents a menu of policy responses to address the undersaving problem, all of which are qualitatively and quantitatively similar to existing tax-advantaged savings schemes, such as 401(k) plans. Finally, he evaluates the welfare benefits of implementing these policies. He finds that consumers are willing to sacrifice a year's worth of income to induce the government to implement the proposed revenue-neutral policies.

Jones and **Williams** incorporate several distortions to R and D into a general equilibrium growth model that provides a framework for the analytical and empirical analysis of the degree of over- or underinvestment in R and D. They derive the relationship between the social rate of return to R and D and the parameters typically estimated in the productivity literature. Sur-

prisingly, their results indicate that estimates in the productivity literature represent lower bounds on the social rate of return to R and D, and that the bias is limited to the overall growth rate of the economy.

Abel and **Eberly** use panel data to estimate a model of optimal investment and disinvestment, with Tobin's q as a measure of expected returns, and allowing for a general "augmented adjustment cost function" that incorporates fixed, linear, and convex adjustment costs. Their results indicate both statistically and economically important nonlinearities, potentially arising from fixed costs, in the relationship between investment/disinvestment and its determinants. These nonlinearities imply that the cross-sectional distribution of q affects aggregate investment, so that the nonlinear model predicts annual aggregate investment substantially more suc-

cessfully than the linear model does, particularly during large cyclical fluctuations.

Trejos and **Wright** generalize the two-country, two-currency model of Matsuyama, Kiyotaki, and Matsui to resolve two "shortcomings" in their approach. After endogenizing prices and exchange rates and introducing monetary policy, Trejos and Wright ask: How does the fact that a currency circulates internationally affect its purchasing power? Where does an in-

ternational currency purchase more? What are the effects on seignorage and welfare when a currency becomes international? How is policy affected by concerns of currency substitution? How are national monetary policies connected, and what is the scope for international cooperation?

Basu and **Fernald** decompose changes in aggregate productivity into several terms, each of which has an economic interpretation. Many of these terms measure com-

position effects, such as reallocations of inputs across productive units. Applying this decomposition to U.S. data by aggregating from roughly the two-digit level to the private economy, Basu and Fernald find that the compositional terms are significantly procyclical. Controlling for these terms virtually eliminates the evidence for increasing returns to scale, and implies that input growth is not correlated with technology change.

Macroeconomic Complementaries

As part of the Program Meeting on Economic Fluctuations and Growth held a day earlier, a small group of NBER economists and their guests met in Stanford, California on February 10 for a workshop on "Macroeconomic Complementaries." Russell Cooper, NBER and Boston University, and Costas Azariadis, University of California, Los Angeles, organized this program.

Jess Benhabib, New York University, and
Roger Farmer, University of

California, Los Angeles, "Indeterminacy and the Monetary Transmission Mechanism" Discussant.

Craig Burnside, The World Bank
Stephanie Schmitt-Grohé and **Martín Uribe**, Federal Reserve Board, "Balanced Budget Rules, Distortionary Taxes, and Aggregate Instability"

Russell Cooper, and
Dean Corbae, University of Iowa, "Deflation and Financial Activity in the Great Depression"

Andrew John, University of Virginia, and

Kei-Mu Yi, Rice University, "Language, Learning, and Location"

Jang-Ting Guo, University of California, Riverside, and

Kevin Lansing, Federal Reserve Bank of Cleveland, "State-Contingent Fiscal Policy and Equilibrium Selection"

Christophe Chamley, Boston University, "Random Phase Switching and Simmering in a Model of Coordination"

Benhabib and **Farmer** characterize market economies by a set of stylized responses to increases in the stock of money. These monetary innovations lead to increased output and reductions in short-term interest rates in the short run, and to changes in nominal prices only in the long run. Most authors have attributed the real short-run effects of money either to mistaken expectations or to nonmarket clearing or both. Benhabib and Farmer argue that neither of these channels is needed to explain the facts. They show that a competitive market-

clearing model in which money enters the production function is fully capable of mimicking the broad features of the data. Their argument relies on an explanation of "price stickiness" that exploits a multiplicity of equilibria in a rational expectations model.

A common argument against a balanced budget fiscal policy rule is that it would tend to amplify business cycles, inducing tax increases and public expenditure cuts during recessions and the reverse during booms. **Schmitt-Gro-**

hé and **Uribe** suggest an additional source of instability that may arise from this type of fiscal policy rule. Within the standard neoclassical growth model, they show that a balanced budget rule can make expectations of higher tax rates self-fulfilling if the fiscal authority relies heavily on changes in labor income taxes to eliminate short-run fiscal imbalances. Calibrated versions of their model show that this result is empirically plausible for the U.S. economy and for other G-7 countries.

Cooper and Corbae analyze the financial collapse that occurred during the Great Depression from the perspective of a monetary model with multiple equilibriums. The economy is financially fragile because of returns to scale in the intermediation process. Intermediaries provide the link between savers and firms who require working capital for production. Fluctuations in the intermediation process are driven by variations in the confidence that agents have in the banking system. This model quite closely matches the qualitative movements during the Great Depression in some financial and real variables: the currency/deposit ratio ex post real interest rates, the level of intermediated activity, deflation, employment, and production.

John and Yi study the joint determination of location and lan-

guage in a two-period setting. Agents are endowed with both a location and a language, and they can choose whether to learn a second language and move to a new location. The interaction among agents occurs in the production process: agents can produce only in conjunction with others who share both the same language and location. The equilibrium may exhibit full assimilation, in which all agents ultimately speak the same language. Both partial assimilation and isolation also may be equilibriums.

Guo and Lansing show how government policy can overcome the indeterminacy caused by increasing returns. The policy they consider consists of a state-contingent income tax and a depreciation allowance. An appropriately chosen tax policy shrinks the set of rational expectations equilibriums

and thus offsets the effects of the increasing returns to scale.

Chamley analyzes a model with strategic complementarities between agents in a setting of imperfect information. He shows that there is a unique equilibrium with regimes of high and low activity and random switches. A "simmering" effect may occur, in which fluctuations of small amplitude and high frequency appear before the transition to another regime.

Also participating in this meeting were: Max Alier and Rosalind Bennett, University of California, Los Angeles; Robert E. Hall, NBER and Stanford University; John C. Haltiwanger, Jr., NBER and University of Maryland; Walter P. Heller, University of California, San Diego; and Randall Wright, University of Pennsylvania.

Industrial Organization Program Meeting

Members and guests of the NBER's Program in Industrial Organization met in the Bureau's Palo Alto office on February 23-4 to discuss their recent research. Timothy F. Bresnahan and Peter C. Reiss, both of NBER and Stanford University, organized this program.

Fiona Scott Morton, Stanford University, "Modeling Entry Decisions in the Pharmaceutical Industry"

Severin Borenstein, NBER and University of California, Davis, and

Joseph Farrell, University of California, Berkeley, "Is There

Fat in Oil? Diagnosing Profit Dissipation from the Stock Market Values of Oil Companies"

Steven T. Berry, NBER and Yale University,

Michael Carnall, University of Illinois, and

Pablo Spiller, University of California, Berkeley, "The Evolution of Cost and Demand in the Domestic Airline Industry, 1985-93"

Margaret Slade, University of British Columbia, "Beer and the Tie: Did Divestiture Lead to Higher Prices?"

Thomas Hubbard, University

of California, Los Angeles, "Consumer Beliefs and Buyer and Seller Behavior in the Vehicle Inspection Market"

Shane Greenstein, NBER and University of Illinois, and

Pablo Spiller, "The Welfare Benefits from Infrastructure Deployment: Local Exchange Company Investment in Digital Technology"

Frank A. Wolak, NBER and Stanford University, "The Impact of Market Rules and Market Structure on the Price Determination Process in the England and Wales Electricity Market"

Generic pharmaceutical firms each pay a sunk cost as they make simultaneous decisions to enter new markets. Both the firms and consumers gain from coordination under these conditions. **Scott Morton** finds that low costs for a firm in a market predict entry into that market. However, this effect appeared to diminish sharply during the "generic scandal," supporting the notion that an industry coordination equilibrium broke down during this time.

Borenstein and **Farrell** examine the relationship between the price of oil and cost-cutting announcements in the oil industry. They then study the response of oil company stock values to changes in crude oil prices. The value of a cost-minimizing, profit-maximizing firm will be convex in the price of a competitively supplied input or output, but oil company stock values are generally concave in the price of crude oil. This is consistent with a positive correlation between accumulation of fat and the wealth of the firm. They discuss three alternative explanations for the concavity: progressive taxes; mean reversion in oil prices; and noncompetitive behavior in the market for refined petroleum products.

Berry, Carnall, and **Spiller** show that the increase in passenger volume from 1985-93 is attributable to increased flights by tourists. On the other hand, the 10 percent increase in average yield over the period is attributable to a 30 percent increase in the fare per mile paid by business passengers, along with an almost negligible increase in fares paid by tourists. The data indicate that, perhaps in response to customers' positive valuation of direct and more frequent flights, and the availability of more efficient aircraft, carriers have increased flight

frequencies, especially those of direct flights. Marginal costs estimates show that the associated fleet and operational changes have resulted in a reduction in the returns to density apparent in the early years of the period. The data indicate that airlines change prices quickly in response to changing demand, and therefore can be expected to maintain prices at equilibrium levels under most conditions. To summarize, **Berry, Carnall,** and **Spiller** show that neither strategy nor technology alone can provide a convincing explanation of the sector's evolution during the last decade. Instead, the implementation of increasingly sophisticated marketing strategies and the rise of smaller and more efficient aircraft seem to be behind much of the drastic structural changes in the industry.

In 1989, the British government enacted measures that led brewers to divest themselves of 14,000 public houses. Since that time, retail beer prices have risen. **Slade** finds that retail prices have risen for tied (to a beer producer) pubs but not in free pubs, and that brewer profits have fallen.

How do buyers provide sellers with incentives to supply high-quality advice or diagnoses? **Hubbard** estimates a model of consumer choice using transaction-level panel data from California's vehicle inspection and maintenance program. He finds that passing, rather than failing, a previous inspection at a firm has as much of an effect on the probability that an individual will choose the firm as a \$16 difference in the inspection price. A 10-percentage-point higher failure rate is associated with the same difference in the probability of choosing a firm as a \$4-\$5 difference in price. Together, these indicate that multiperiod mecha-

nisms play a role in aligning buyers' and sellers' interests: firms that fail vehicles look more expensive in the future, both to the drivers of these vehicles and possibly to other individuals.

Greenstein and **Spiller** examine investment in fiber optic cable, ISDN lines, and signal seven software (SS7), three types of infrastructure that play an essential role in bringing digital technology to local telephone networks. They find that consumer demand is sensitive to investment in modern infrastructure. Fiber optic cable and ISDN lines enhance demand, but SS7 does not. The estimated elasticity of consumer-surplus-to-fiber-optic-deployment is never less than 11 percent and as high as 24 percent in some estimates. The elasticity for ISDN ranges between 8 and 16 percent. The elasticity for SS7, however, is never significantly different from zero. **Greenstein** and **Spiller** conclude that infrastructure investment is responsible for a substantial fraction of consumer surplus and business revenue.

Wolak empirically assesses the extent to which the spot market for electricity in England and Wales promotes more efficient pricing. He first characterizes the time-series behavior of spot electricity prices over the past four years, and then describes a strategy for the exercise of market power by the two largest generators, National Power and PowerGen. Both firms use the market rules governing the England and Wales market to achieve very high prices for short periods of time. Finally, **Wolak** discusses the lessons of the England and Wales market for the design of electricity spot markets in the United States.

Income Distribution

A small group associated with the NBER's Program on Economic Fluctuations and Growth met in Cambridge on March 9 and 10 to discuss the relationship between growth and income distribution. Roland Benabou, NBER and New York University; Steven N. Durlauf, NBER and University of Wisconsin; and Oded Galor, Brown University, organized the following program:

Suzanne Cooper, Harvard University, "Redistribution and the Persistence of Income Inequality"

Casey Mulligan, University of

Chicago, "Economic and Biological Approaches to Inheritance: Some Evidence"

Ana Castañeda and **Javier Díaz-Giménez**, Universidad Carlos III de Madrid, and

José-Victor Ríos-Rull, Federal Reserve Bank of Minneapolis, "A General Equilibrium Analysis of Progressive Income Taxation: Quantifying the Trade-Offs"

Julio J. Rotemberg, NBER and MIT, "Ideology and the Distribution of Income"

Daron Acemoglu, MIT, "Changes in Unemployment and

Wage Inequality: An Alternative Theory and Some Evidence"

Andrew Newman, Columbia University, "Risk-Bearing and Knightian Entrepreneurship"

Raquel Fernandez, NBER and New York University, and

Richard Rogerson, University of Minnesota, "Education Finance Reform and Investment in Human Capital: Lessons from California"

Mark Gradstein and

Moshe Justman, Ben-Gurion University, "The Political Economy of Mixed Public and Private Schooling: A Dynamic Analysis"

Cooper examines the role of redistribution in the persistence of income inequality across generations. She uses data on intergenerational income and information on the degree of human capital redistribution carried out through intercommunity transfers of education funding to assess this impact. She finds that redistribution has a significant effect in reducing persistence for families in poor neighborhoods. By contrast, redistribution appears to increase persistence for families in wealthy neighborhoods, suggesting that families from a wide range of the community income distribution may benefit from transfers of educational spending.

Mulligan's paper is innovative in making empirical comparisons of intergenerational consumption. He derives those implications of the economic approach to the theory of inheritance that are distinct from the biological approach, and provides evidence on three of them. The economic approach dominates the biological approach with

respect to one of the implications, but others appear to be refuted.

Castañeda, Díaz-Giménez, and Ríos-Rull analyze a general equilibrium economy that includes uninsured household-specific risk, some elements of the life cycle, and both the consumption/savings and labor/leisure decisions. They calibrate their model to the facts about U.S. growth, distributions and mobility of income and wealth, the 1992 income tax schedule, and the ratio of government-expenditures-to-GDP. They find that switching from a progressive to a proportional tax system implies these trade-offs: 1) it increases efficiency, as measured by aggregate output, by 4 percent; but 2) it increases income inequality, as measured by the Gini index of the income distribution, by 9.5 percent; and 3) it increases wealth inequality, as measured by the Gini index of the wealth distribution, by 11.7 percent; finally 4) it reduces the mobility among the different income and wealth groups very slightly.

Rotemberg builds a simple model with a connection between employees' trust in the "fairness" of employers and the actual distribution of income. Wages are based in part on employers' assessments of the productivity of individual employees. He shows that the equilibrium distribution of income depends on the beliefs of employees about the accuracy of these evaluations. The distribution of income across employees of the same vintage may be more nearly equal if employees believe that these evaluations are generally inaccurate (so that they are skeptical of capitalists in general) than if they believe that these evaluations are accurate.

Acemoglu describes a model in which firms decide the composition of jobs and then match those jobs with skilled and unskilled workers. The demand for skills is endogenous in equilibrium, and an increase in the proportion of skilled workers can alter the nature of equilibrium so that firms start creating separate jobs for the skilled and the unskilled. Such a change in-

creases wage inequality and the unemployment of all workers. Although skilled workers are better off, total social surplus can decrease as a result of this change.

Newman asks to what extent attitudes toward risk account for individuals' decisions to enter into specific types of contractual relationships. He extends existing models by allowing for endogenous risk-bearing, not only via self-selection into occupations, but also through optimal insurance contracts. Even under decreasing risk aversion, there are robust instances in which wealthy agents prefer to accept safe wages while poor ones choose to become entrepreneurs. This empirically implausible result suggests that risk-based explanations for entrepreneurship are inadequate.

Fernandez and Rogerson ex-

amine the effect of different systems of education financing on the level and distribution of resources devoted to public education. They focus on California, which moved in the 1970s from a system of mixed local and state financing to one of effectively pure state finance; its funding of public education subsequently fell between 10 and 15 percent relative to the rest of the United States. They find that while the distribution of spending became more nearly equal, this was mainly at the cost of a large reduction in spending in the wealthier communities with little increase for the poorer districts. If California had moved to the opposite extreme and abolished state aid altogether, funding for public education also would have dropped by almost 10 percent.

Gradstein and Justman analyze the political economy of education, acquired through a combination of compulsory public schooling and supplementary private education. The level of public schooling, fully funded by a proportional income tax, is determined by a majority vote, while supplementary private education is purchased individually. They show that for moderate parameter values, the share of public schooling increases as incomes rise and inequality falls.

Also participating in this meeting were: Gerhard Gloom, Michigan State University; Lawrence F. Katz, NBER and Harvard University; Michael Kremer, NBER and MIT; and Per Krusell, University of Rochester.

Program Meeting on Monetary Economics

Around 40 members of the NBER's Program in Monetary Economics and their guests gathered in Cambridge on March 15 for their spring meeting. John V. Leahy, NBER and Harvard University; and Mark W. Watson, NBER and Princeton University, organized this program.

Paul Beaudry, NBER and University of British Columbia, and **Mustafa Caglayan** and **Fabio Schiantarelli**, Boston College, "Monetary Instability, the Predictability of Prices, and the Allocation of Investment: An Empirical Investigation Using U.K. Panel Data"

Discussant:
Janice C. Eberly, NBER and University of Pennsylvania
V. V. Chari, University of

Minnesota, and **Lawrence J. Christiano** and **Martin S. Eichenbaum**, NBER and Northwestern University, "Expectation Traps and Discretion"

Discussant:
Michael Woodford, NBER and Princeton University

Michael D. Bordo, NBER and Rutgers University;

Christopher Erceg, Federal Reserve Board; and **Charles Evans**, Federal Reserve Bank of Chicago, "Money, Sticky Wages, and the Great Depression"

Discussant:
Sergio T. Rebelo, NBER and University of Rochester

Alberto Trejos, Northwestern University; and **Randall Wright**, University of Pennsylvania, "Toward a Theory

of International Currency: A Step Further" (see "Economic Fluctuations Research Meeting" earlier in this issue of the *NBER Reporter*)

Discussant:
Martin Hellwig, University of Basel and Harvard University

Peter Garber and **Subir Lall**, Brown University, "The Role and Operation of Derivative Markets in Foreign Exchange Market Crises"

Discussant:
Kenneth A. Froot, NBER and Harvard University

Ravi Bansal and **Wilbur Coleman**, Duke University, "A Monetary Explanation of the Equity and Term Premium Puzzles"

Discussant:
Julio J. Rotemberg, NBER and MIT

Beaudry, Caglayan, and Schiantarelli use a signal extraction framework to predict that as monetary uncertainty decreases, the cross-sectional distribution of investment widens. They explore this hypothesis using panel data on U.K. companies over 20 years. In general, the data support the view that monetary instability may affect the allocation of investment through its effect on the predictability of prices.

Chari, Christiano, and Eichengreen argue that discretionary monetary policy exposes the economy to welfare-decreasing instability by creating the possibility that private expectations about monetary policy will be self-fulfilling. The authors refer to the volatile equilibria that can arise under discretion as in "expectation traps." They study two such traps: the first arises when agents expect monetary policy to react to shocks that do not affect preferences or technology; the second arises when agents expect monetary policy to react strongly to fundamental shocks. This second type of expectation trap may help to explain the prolonged rise in U.S. inflation that began in the mid-1960s. Credibly

committing to a noninflationary monetary policy, even for a limited time, eliminates the possibility of expectation traps.

Bordo, Erceg, and Evans quantitatively assess the extent to which monetary shocks, working through a sticky wage channel, can account for the severity and duration of the Great Depression in the United States. Their model is surprisingly successful in accounting for the decline in output, hours worked, and investment that occurred between mid-1929 and early 1932. However, the model incorrectly predicts that open-market purchases in the spring of 1932 should have led to a major recovery beginning in that year, and that output would recover to pre-Depression levels by late 1933. Their analysis indicates that the challenge is to explain why it took so long for the economy to recover despite rapid remonetization during 1933-6.

Garber and Lall examine the nature of the derivatives used in an attack on a country's foreign reserves. These derivatives can include simple forward contracts, swap contracts, and options contracts in the currencies themselves,

and interest rate contracts or equity contracts. While regulations have limited their onshore use in many developing countries, such instruments are proliferating offshore in international financial centers. For example, position regulations on foreign exchange were circumvented during the recent peso crisis through the use of structured notes sold to Mexican banks by New York houses. Such products were outstanding in large amounts, and they exacerbated the crisis, especially in the months after the devaluation and possibly at the time of the devaluation.

Bansal and Coleman theorize a monetary economy that distinguishes payment by cash, checks, and credit. They compare the implications of that type of economy versus the U.S. economy for the behavior of asset returns, velocity, inflation, money growth, and consumption growth. They also offer a monetary explanation for the puzzle of the low real rate and the high equity premium. Further, their model explains the average positive relationship between maturity and the term premium for nominally riskless bonds.

International Trade and Investment

The spring meeting of the NBER's Program in International Trade and Investment took place in Cambridge on March 22. Program Director Robert C. Feenstra, also of University of California, Davis, organized this agenda:

Douglas A. Irwin, NBER and University of Chicago, "The Smoot-Hawley Tariff: A Quantitative Assessment" (NBER Working Paper No. 5509)

Kyle Bagwell, Northwestern University, and
Robert W. Staiger, NBER and University of Wisconsin, "Reciprocal Trade Liberalization" (NBER Working Paper No. 5488)

James R. Markusen, NBER and University of Colorado, and
Anthony J. Venables, London School of Economics, "Multinational Production, Skilled Labor, and Real Wages" (NBER Working

Paper No. 5483)

Gordon H. Hanson, NBER and University of Texas, and
Antonio Spilimbergo, Inter-American Development Bank, "Illegal Immigration, Border Enforcement, and Exchange Rates"
Dani Rodrik, NBER and Columbia University, "Why Do More Open Economies Have Larger Governments?"

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In the two years after the imposition of the Smoot–Hawley tariff in June 1930, the volume of U.S. imports fell by over 40 percent. To what extent can this collapse of trade be attributed to the tariff itself versus other factors, such as declining income or foreign retaliation? **Irwin** indicates that the Smoot–Hawley tariff itself reduced imports by 4–8 percent, although the combination of specific duties and deflation further raised the effective tariff and reduced imports an additional 8–10 percent. A counterfactual simulation suggests that nearly a quarter of the observed 40 percent decline in imports can be attributed to the rise in the effective tariff (Smoot–Hawley plus deflation).

Why have governments found reciprocal trade agreements, such as GATT, to be a more effective means of facilitating trade liberalization than unilateral initiatives? **Bagwell** and **Staiger** argue that political-economy factors are important for explaining the range of trade policies observed, but that these factors cannot explain why governments seek reciprocal trade agreements as an institutional form for implementing their preferred policies. Rather, the central purpose of a reciprocal trade agreement is to eliminate the policies driven by terms of trade that arise in the absence of such an agreement. Bagwell and Staiger also establish an economic interpretation of postwar reciprocal trade agreements, and offer new insights on the treatment of export subsidies in reciprocal trade agreements.

Adapting their earlier model of multinationals, **Markusen** and **Venables** address policy issues involving wages and labor skills. Multinational firms may export their firm-specific knowledge capital to foreign production facilities, and fragment production geographically and

into skilled- and unskilled-labor-intensive activities. Multinationals thus alter the nature of trade, from trade in goods (produced with both skilled and unskilled labor) to trade in skilled-labor-intensive producer services.

Hanson and **Spilimbergo** examine illegal immigration from Mexico to the United States. They address two general questions: how responsive is illegal immigration to changes in U.S.–Mexico relative wages? And, does border enforcement by the U.S. government deter illegal immigration? They observe the number of individuals apprehended attempting to cross the U.S.–Mexico border illegally—using monthly data from the U.S. Immigration and Naturalization Service (INS) on total apprehensions at the U.S.–Mexico border—and the number of person-hours the INS spends policing the border, along with data on current and expected wage streams in the United States and Mexico. They find that the Mexican real wage, but not the U.S. real wage, helps to explain apprehensions. The long-run elasticity of border apprehensions with respect to the Mexican real wage is -0.22 . The long-run elasticity of border apprehensions with respect to border enforcement is 0.49 , which suggests that there are strongly diminishing marginal returns to enforcement. This finding is consistent with the existence of a deterrent effect.

Rodrik demonstrates that there is a robust empirical association between the extent to which an economy is exposed to trade and the size of its government sector. This association holds for a large cross section of countries, in low- as well as high-income samples, and is robust to the inclusion of a wide range of controls. Government consumption seems to play a risk-re-

ducing role in economies exposed to significant amounts of external risk. When openness and explicit measures of external risk—such as terms-of-trade uncertainty and product concentration of exports—interact, it is the interaction term that enters significantly, and the openness term then loses its significance (or turns negative). Rodrik also demonstrates that government consumption is the “safe” activity, in the empirically relevant sense, in the vast majority of countries.

*

International Finance and Macroeconomics

Members and guests of the NBER's Program in International Finance and Macroeconomics met in Cambridge on March 29. Program Director Jeffrey A. Frankel and Andrew K. Rose, both of NBER and University of California, Berkeley, organized this program.

Charles M. Engel, NBER and University of Washington, "Accounting for U.S. Real Exchange Rate Changes"

Discussants:

Marianne Baxter, NBER and University of Virginia, and Menzie Chinn, University of California, Santa Cruz

Rex Ghosh,

Anne-Marie Gulde, and

Jonathan Ostry, International

Monetary Fund, and

Holger C. Wolf, NBER and New York University, "Does the Nominal Exchange Rate Regime Matter?"

Discussants:

Robert P. Flood, International Monetary Fund, and Rudiger W. Dornbusch, NBER and MIT

Alessandra Casella, NBER and Columbia University, "Setting Standards in a Europe Without Borders"

Discussants:

Jorge Braga de Macedo, NBER and Universidade Nova de Lisboa, and Shang-Jin Wei, NBER and Harvard University

Pierre-Olivier Gourinchas, MIT and Centre d'Étude et de Recherche de l'Activité Socioéconomique (Paris), and **Aaron Tornell**, NBER and Harvard University, "Exchange Rate Dynamics and Learning"

Discussants:

Kenneth A. Froot, NBER and Harvard University, and Nouriel Roubini, NBER and New York University

Andrés Velasco, NBER and New York University, "When Are Fixed Exchange Rates Really Fixed?"

Discussants:

Paolo Pesenti, Princeton University, and Luisa Lambertini, University of California, Los Angeles

Engel finds that the relative prices of nontraded goods account for little of the movement in U.S. real exchange rates at any horizon. Only one crude measure, which uses the aggregate producer price index as an index of traded goods prices, seems to matter much. This appears to be true even during episodes of fixed nominal exchange rates.

Ghosh, Gulde, Ostry, and Wolf analyze a dataset with nine types of exchange rate regimes, covering over 130 countries for a period of 30 years. They find that both the mean and the variability of inflation increase with the flexibility of the exchange rate regime, a reflection of both lower growth in the money supply (a discipline effect) and higher growth in money demand (a credibility effect). In

contrast, average growth rates of GDP differ only marginally across regimes, while the volatility of growth rates is substantially higher under pegged rates. However, investment ratios are lower, while both trade growth and residual growth are significantly higher, under flexible rates.

Casella points out that traditional analyses in international trade identify "standards" as government regulations, and then investigate the potential for distortions in trade flows. However, in reality private industry groups have a critical influence on the determination of technical standards. The composition of such groups is affected by technology and market conditions. In an integrated market, the alliances of private firms are likely to cross national boundaries, generat-

ing harmonization "from the bottom." If standards are public goods whose ideal value differs across economic activities and countries, then economic integration should bring increased harmonization across countries and finer differentiation across products.

Using a unique survey dataset on interest rate forecasts for G-7 countries from 1986 to 1995, **Gourinchas** and **Tornell** find that interest rate shocks are significantly more persistent in sample than the market expects. This is consistent with the finding that changes in the forward rate reflect changes in interest rate expectations. They then present a model of nominal exchange rate determination that rationalizes the forward discount puzzle and exhibits a delayed overshooting pattern.

Velasco analyzes the sustain-

ability of fixed exchange rates with a model in which the level of debt determines the payoffs available to the government at each point in time. If debt is sufficiently low,

there is an equilibrium in which the government does not devalue. For an intermediate range of debt levels, the government devalues in response to an attack but not oth-

erwise, so that self-fulfilling attacks can occur. Finally, there can be sunspot equilibriums in which an attack (and the corresponding devaluation) may occur.

Development of the American Economy

The NBER's Program on the Development of the American Economy met in Cambridge on March 30. Program Director Claudia Goldin, also of Harvard University, organized this agenda:

Joseph P. Ferrie, NBER and Northwestern University, "The Impact of Immigration on Natives in the Antebellum U.S. Labor Market, 1850-60"

John J. Wallis, NBER and University of Maryland, "The Allocation of Federal Grants to the States: Economic, Presidential, and Congressional Factors During the New Deal and Beyond"

Sukkoo Kim, NBER and Washington University, "Regions, Resources, and Economic Geography: Sources of U.S. Regional Comparative Advantage, 1880-1987"

Lance E. Davis, NBER and California Institute of Technology, and

Robert E. Gallman, NBER and University of North Carolina, "International Capital Flows and Economic Development: 1870 to 1914"

Alan M. Taylor, NBER and Northwestern University, "International Capital Mobility in History"

Ferrie measures the impact of immigration, if any, on wages in the years before the Civil War. His analysis covers a period in which the immigration rate was more than twice as high as in the modern period; he controls for immigrants' location decisions and considers both outmigrants and nonmigrants among the native born. He finds that the impact of immigration on the income of natives was limited to skilled workers in the urban northeast, and was greater for outmigrants than for nonmigrants. This latter result suggests that the impact of immigration on local labor markets was dissipated by internal migration. Although these results are not encouraging to those who seek a large impact from immigration today, they help to explain both the reluctance of the United States to impose restrictions on immigrant entry in this period and some important political developments leading up to the Civil War.

Wallis shows that, during the 1930s, both political and economic effects determined the allocation of grants to states for support of social welfare and other programs. Congressional factors were not important, while presidential factors were. When Wallis extends the analysis to 1932 to 1982, however, congressional influences do seem important. On the other hand, the dominant influence on federal grant policy over the longer sample appears to be state government expenditures, while both political and economic influences play a minor role.

Kim studies regional comparative advantage in U.S. manufacturing for various years between 1880 and 1987. He finds that in the late 19th century, the sources of regional comparative advantage in U.S. manufacturing were labor and extractive resources. In the early 20th century, capital became more important, and labor and resources became less important. In the latter

half of the 20th century, labor became the most important source of regional comparative advantage, capital declined slightly from its turn-of-the-century peak, and resources continued to decline in importance. Further, a consistent set of factor endowments explains a significant amount of the geographic distribution of manufacturing activities over time.

Davis and **Gallman** note that, despite troubled political circumstances in the period between the revolt against Spain in 1810 and the establishment of political stability and republican institutions in the early 1880s, Argentina grew at a more than satisfactory rate, based on its export of pastoral products. Then, between 1880 and 1914, Argentine rates of growth of real GDP (absolute and per capita) were probably the highest in the world. Growth reflected a healthy investment rate and a falling capital/output ratio, the latter attributable to

structural changes including a major expansion of the production of grains for the booming international market, and some industrialization. Investment was drawn heavily from foreign sources, which accounted for virtually all investment in the transportation system, and two-thirds of all Argentine gross capital formation. The savings rate

remained low, leaving Argentine growth vulnerable to a reduction in foreign capital flows with the advent of World War I, the hectic years of the 1920s, and the Great Depression of the 1930s.

Taylor investigates long- and short-run criteria for capital mobility using time-series and cross-section analysis of the saving-invest-

ment correlation for ten countries since 1850. His results present a nuanced picture of the evolution of the capital market: long-run capital mobility exhibits considerable fluctuation; short-run mobility evolves differently in the several sample countries studied. Further research will take up the role of demographic structure, growth, relative prices, and financial development.

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2021. "401(k) Plans and Tax-Deferred Saving," by **James M. Poterba**, **Steven F. Venti**, and **David A.**

Wise (NBER Working Paper No. 4181)

2022. "Government Intervention in the Markets for Education and Health Care: How and Why?" by **James M. Poterba** (NBER Working Paper No. 4916)

2023. "The Gold Standard as a Rule: An Essay in Exploration," by **Michael D. Bordo** and **Finn E. Kydland** (NBER Working Paper No. 3367)

2024. "Garbage, Recycling, and Illicit Burning or Dumping," by **Don Fullerton** and **Thomas C. Kinna-man** (NBER Working Paper No. 4374)

2025. "A Note on Subsidizing Gifts," by **Louis Kaplow** (NBER Working Paper No. 4868)

2026. "Do 401(k) Contributions Crowd Out Other Personal Saving?" by **James M. Poterba**, **Steven F. Venti**, and **David A. Wise** (NBER

Working Paper No. 4391)

2027. "Stock Ownership Patterns, Stock Market Fluctuations, and Consumption," by **James M. Poterba** and **Andrew A. Samwick**

2028. "Inflation Indicators and Inflation Policy," by **Stephen G. Cecchetti** (NBER Working Paper No. 5161)

2029. "Tax Incentives and the Decision to Purchase Health Insurance," by **James M. Poterba** and **Jonathan Gruber** (NBER Working Paper No. 4435)

2030. "Optimal Insurance Contracts When Establishing the Amount of Losses Is Costly," by **Louis Kaplow** (NBER Working Paper No. 4290)

2031. "A Fundamental Objection to Tax Equity Norms: A Call for Utilitarianism," by **Louis Kaplow** (NBER Working Paper No. 4961)

Bureau Books

Buying the Best

Buying the Best by Charles T. Clotfelter is now available from the Princeton University Press for \$29.95. (A profile of Charles T. Clotfelter appears earlier in this issue.) Since the early 1980s, the rapidly increasing cost of college, together with what many see as inadequate attention to teaching, has elicited a barrage of protest. *Buying the Best* looks at the realities behind these criticisms—the economic factors that are driving the institutions. Clotfelter examines the escalation in spending in the arts and sciences at four elite institutions: Harvard, Duke, Chicago, and Carleton. He argues that the rise in costs has less to do with increasing faculty salaries or lowered productivity than with a broad-based effort to improve quality, provide new services to students, pay for large investments in new facilities and equipment (including computers), and ensure access for low-income students through increasingly expensive financial aid.

In Clotfelter's view, spiraling costs arise from the institutions' lofty ambitions, and are made possible by steadily intensifying demand for places in the country's elite col-

leges and universities. Only if this demand slackens will universities be pressured to make cuts or pursue efficiencies. *Buying the Best* is the first study to make use of the internal historical records of specific institutions, as opposed to the frequently unreliable aggregate records made available by the federal government for the use of survey researchers. While acknowledging the obvious drawbacks of a small sample, Clotfelter notes that the institutions studied are significant for the disproportionate influence they, and comparable elite institutions, exercise in research and in the training of future leaders.

Order this volume directly from Princeton University Press, Order Department, 3175 Princeton Pike, Lawrenceville, NJ 08648; 1-800-777-4726.

The Microstructure of Foreign Exchange Markets

The Microstructure of Foreign Exchange Markets, edited by Jeffrey A. Frankel, Giampaolo Galli, and Alberto Giovannini, is

now available from the University of Chicago Press for \$55. This book is the product of a July 1994 conference cosponsored by the NBER, the Centre for Economic Policy Research, and the Banca d'Italia. It uses a "microstructure" approach that describes and analyzes the workings of the foreign exchange market, with special emphasis on institutional aspects and the characterization of market participants.

Frankel is the director of the NBER's Research on International Finance and Macroeconomics and a professor of economics at the University of California, Berkeley. Galli is director of the Centro Studi Confindustria in Rome. Giovannini is a research associate in the NBER's Program in International Finance and Macroeconomics and a professor of economics at Columbia University.

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

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Cambridge, MA 02138-5398.

"Morality, Predation, and Welfare," by **Herschel I. Grossman** and **Minseong Kim**.

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NBER Working Papers

Local Property and State Income Taxes: The Role of Interjurisdictional Competition and Collusion

Thomas J. Nechyba

NBER Working Paper No. 5419

January 1996

JEL No. H7

Public Economics

This paper attempts to address two long-standing questions in public finance: 1) Why, despite widespread popular complaints against its fairness, is the property tax the almost exclusive tax instru-

ment used by local governments? 2) Why do we consistently observe higher levels of government (states) undermining local property tax systems through income-tax-funded grants and state-imposed caps on local property tax rates? I present and test in general equilibrium simulations a new intuitive argument to explain the first question. The simulations use a computable general equilibrium model of local public finance with parameters set to be consistent with micro tax data. Different types of agents are endowed with income and houses, and are able to move to their preferred house in their preferred jurisdiction. Furthermore, agents vote myopically on local property tax rates (and levels of local public goods), while nonmyopic community planners set a local income tax. I postulate six possible objective functions for community planners, and all six lead to the same equilibrium outcome: community planners always will set local income tax rates at or close to zero. In fact, the intuitive argument, as well as the simulation results, indicate that setting local income tax rates at zero is a *dominant* strategy for community planners. When faced with popular sentiment against the property tax, community planners simultaneously can collude and introduce local income taxes to prevent adverse general equilibrium migration and price changes. Since zero income tax rates are dominant, however, such an agreement is enforceable only if an outsider, such as the state government, steps in. State grants funded through a state income tax can play such an enforcement role.

A Computable General Equilibrium Model of Intergovernmental Aid

Thomas J. Nechyba

NBER Working Paper No. 5420

January 1996

JEL No. H7

Public Economics

This paper introduces a computable general equilibrium model of intergovernmental relations in which heterogeneous agents are endowed with income and houses, are fully mobile between multiple jurisdictions, and vote in both local and state elections on local property and state income tax rates. I calibrate the model to New Jersey micro tax data, and use it to study the general equilibrium effects of state government policies. I analyze three different types of intergovernmental programs: redistributive revenue sharing; district power equalization; and deductibility of local taxes. This approach facilitates a heretofore difficult comparative analysis, in that it provides for an integrated investigation of these programs in a single general equilibrium model.

Tariff Phaseouts: Theory and Evidence from GATT and NAFTA

Carsten Kowalczyk and Donald Davis

NBER Working Paper No. 5421

January 1996

International Trade and Investment

This paper considers tariff phaseouts in multilateral and preferential agreements. We find that early GATT rounds primarily were about binding existing rates; it was not until the 1962-7 Kennedy Round's 50 percent reduction in manufactured goods tariffs that the time paths of tariff reductions became a substantive part of GATT

agreements. Existing empirical work has demonstrated that U.S. industries with high initial tariffs tended to receive long periods for tariff adjustment, or tended to be exempted from agreed reductions in both the Kennedy and Tokyo Rounds. This paper demonstrates that high U.S. tariffs and little intra-industry trade are associated with long NAFTA phaseout periods for U.S. imports from Mexico. On the other hand, Mexico's phaseouts are correlated with those of the United States—but not generally with Mexico's tariffs.

How Well Do Foreign Exchange Markets Function: Might a Tobin Tax Help?

Jeffrey A. Frankel

NBER Working Paper No. 5422

January 1996

JEL No. F31

International Finance and Macroeconomics

Figures for 1995 estimate trading by dealers in the foreign exchange market at over 1200 billion dollars per day, most of it with other dealers. Some have linked this volume to concerns about excessive volatility in the market. Tobin's proposal to address this volatility with a small tax on all foreign exchange transactions has not received the serious attention it deserves. This paper argues that a better case can be made than most economists believe for the proposition that the tax might dampen exchange rate volatility. Calculations show that the tax, unlike some forms of capital control, would fall far more heavily on short-term transactions than on long-term ones. Survey data and a simple model suggest, in turn, that short-term activity can be destabilizing. The paper also offers crude estimates of the revenue that

would be raised from the Tobin tax. I leave to other authors examination of a major shortcoming of the proposal: enforceability.

Repeat Use of Unemployment Insurance

Bruce D. Meyer and

Dan T. Rosenbaum

NBER Working Paper No. 5423

January 1996

JEL No. J65

Labor Studies, Public Economics

We examine the extent to which unemployment insurance (UI) insures workers against unforeseen events or subsidizes firms and workers engaged in temporary layoffs. Our main source of data is a five-year panel of UI administrative records from five states. While most claimants receive UI only once during this period, nearly 40 percent of claims go to those individuals with three or more years of receipt during the five-year period. Most repeat recipients are concentrated in seasonal industries and are laid off by the same employer each time. We also find that middle-aged and high-paid workers are more likely to be repeat recipients, suggesting that workers in bad jobs are not the individuals who repeatedly receive UI.

Globalization, Outsourcing, and Wage Inequality

Robert C. Feenstra and Gordon H. Hanson

NBER Working Paper No. 5424

January 1996

JEL Nos. F21, F23

International Trade and Investment

There is considerable debate over whether international trade has contributed to the declining economic fortunes of less-skilled workers. One issue that has be-

come lost in the current discussion is how firms respond to import competition and how these responses, in turn, are transmitted to the labor market. In previous work, we have argued that outsourcing, by which we mean the import of intermediate inputs by domestic firms, has contributed to an increase in the relative demand for skilled labor in the United States. If firms respond to import competition from low-wage countries by moving nonskill-intensive activities abroad, then trade will shift employment toward skilled workers *within* industries. In this paper, we extend our previous work by combining new import data from the revised NBER trade database with disaggregated data on input purchases from the *Census of Manufactures*. We construct industry-by-industry estimates of outsourcing for 1972–90 and reexamine whether outsourcing has contributed to an increase in relative demand for skilled labor. Our main finding is that outsourcing can account for 31–51 percent of the increase in the relative demand for skilled labor that occurred in U.S. manufacturing industries during the 1980s, compared to our previous estimate of 15–33 percent.

U.S.–Mexico Integration and Regional Economies: Evidence from Border-City Pairs

Gordon H. Hanson

NBER Working Paper No. 5425

January 1996

JEL No. F15

International Trade and Investment

In this paper, I examine whether U.S.–Mexico economic integration is causing economic activity in the United States to relocate to the U.S.–Mexico border region. My approach is to study U.S.–Mexico bor-

der-city pairs. Border cities are natural laboratories in which to study the effects of trade policy. To the extent that transport costs are the main nontrade-policy barriers to trade, we expect regional economic integration to cause economic activity in border cities to expand. I exploit the fact that U.S.–Mexico integration effectively has been underway since the early 1980s. A large portion of U.S.–Mexico trade is the result of U.S. multinationals establishing export assembly operations in Mexico. Mexico's export assembly plants are concentrated in cities on the U.S.–Mexico border. I ask whether the growth of export manufacturing in Mexican border cities increases the demand for goods and services produced in neighboring U.S. border cities. I estimate demand links between Mexican and U.S. border cities using data on the six largest border-city pairs during 1975–89. My results indicate that the growth of export manufacturing in Mexico can account for a substantial portion of employment growth, in general, and of manufacturing employment growth, in particular, in U.S. border cities over the sample period. This suggests that NAFTA will contribute to the formation of binational regional production centers along the U.S.–Mexico border.

Education, Human Capital, and Growth: A Personal Perspective

Zvi Griliches

NBER Working Paper No. 5426

January 1996

JEL Nos. J24, D24, O4

Labor Studies, Productivity

This paper reviews the literature on the relationship of economic growth to the education levels of the labor force. The emphasis is on Ben-Porath's contribution to some

of the issues in this field: the endogeneity of schooling; the role of the public sector as an “absorber” of educated labor; and the importance of personal human capital created by investments in reputation and personal relationships, the F-connection.

In Search of Stolper–Samuelson Effects on U.S. Wages

Edward E. Leamer

NBER Working Paper No. 5427

January 1996

International Trade and Investment

Economic growth in Europe, Asia, and Latin America could have contributed in many different ways to the lower wages and increased income inequality that the United States has been experiencing. The Heckscher–Ohlin–Samuelson general equilibrium model plausibly links external product markets to internal labor markets. This model operates over a long enough time period to allow complete detachment of workers and capital from their original sectors. According to this model, the news of Asian growth is carried to the U.S. labor markets by declines in prices of labor-intensive tradables. These price reductions twist the labor demand curve, dictating lower real wages for unskilled workers who reside in communities with abundant unskilled labor, but raising the wages for unskilled workers fortunate enough to live in communities inhabited mostly by skilled workers.

U.S. relative producer prices of labor-intensive tradables did decline in the 1970s by about 30 percent. These declines in product price are compatible in the long run with reductions in the real wage totaling almost 40 percent for unskilled workers. In the 1980s, however, changes in U.S. producer prices

worked in favor of these low-wage workers, raising their equilibrium wages by about 20 percent.

The sectoral bias of total factor productivity (TFP) growth did not particularly favor either low- or high-wage workers, but TFP changes did work strongly in favor of nonproduction workers, and against production workers, in the 1970s. If these TFP improvements had not generated any product price response, then the TFP improvements in the 1970s would have called for a 100 percent increase in earnings of nonproduction workers and a 60 percent reduction in earnings of production workers.

Integrating Behavioral Choice into Epidemiological Models of AIDS

Michael Kremer

NBER Working Paper No. 5428

January 1996

JEL No. I10

Health Economics

Increased HIV risk creates incentives for people with low sexual activity to reduce their activity, but may make high-activity people fatalistic, leading them to reduce their activity only slightly, or actually to increase it. If high-activity people reduce their activity by a smaller proportion than low-activity people, then the composition of the pool of available partners will worsen. This creates positive feedbacks, and possibly multiple-steady-state levels of prevalence. The timing of public health efforts may affect the long-run prevalence of HIV.

Displacing the Family: Union Army Pensions and Elderly Living Arrangements

Dora L. Costa

NBER Working Paper No. 5429

January 1996

JEL Nos. N31, J14

Development of the American Economy, Aging

I argue that the trend toward single households among retired men 65 years of age or older has been ongoing since 1880. When coresidence is measured by the percentage of elderly men living in the households of their children or other relatives, fully 57 percent of the decline in coresidence among elderly retired men from 1880 to 1990 occurred between 1880 and 1940. This trend has been disguised in more aggregated statistics by the relatively low retirement rates that prevailed in the past and by the unchanging coresidence levels of labor force participants.

I investigate the factors that fostered this rise in separate living quarters for the aged by examining the determinants of living arrangements in 1910 among retired veterans receiving Union Army pensions. I find that Union Army pensions exerted a sizable, negative impact on the coresidence rates of the retired. This implies that increases in income always have been associated with an increased demand for the privacy and autonomy provided by separate living arrangements. My findings imply that prior to 1940 rising incomes were the most important factor enabling the elderly to live alone. After 1940, increases in the attractiveness of independent living may have played a role.

Why Is There More Crime in Cities?

Edward L. Glaeser and Bruce Sacerdote

NBER Working Paper No. 5430

January 1996

JEL Nos. K42, R10

Labor Studies

Crime rates are much higher in big cities than in either small cities or rural areas, and this situation has been relatively pervasive for several centuries. This paper attempts to explain this connection by using victimization data, evidence from the National Longitudinal Survey of Youth on criminal behavior, and the Uniform Crime Reports. Higher pecuniary benefits for crime in large cities can explain approximately 27 percent of the effect for overall crime, although obviously much less of the urban-crime connection for nonpecuniary crimes such as rape or assault. Lower arrest probabilities, and lower probability of recognition, are a feature of urban life, but these factors seem to explain at most 20 percent of the urban crime effect. The remaining 45–60 percent of the effect can be related to observable characteristics of individuals and cities. The characteristics that seem most important are those that reflect tastes, social influences, and family structure. Ultimately, we can say that the urban crime premium is associated with these characteristics, but we are left trying to explain why these characteristics are connected with urban living.

Regional Trading Arrangements: Natural or Supernatural?

Jeffrey A. Frankel, Ernesto Stein, and Shang-Jin Wei

NBER Working Paper No. 5431

January 1996

JEL No. F1

International Finance and Macroeconomics, International Trade and Investment

This paper summarizes our recent research on the effects of free trade areas (FTAs). Within our model, which emphasizes interconti-

mental transport costs, several conclusions arise: 1) FTAs are likely to be detrimental over a moderate range of parameter values, even if drawn along natural regional lines. 2) A small margin of preferences for neighbors is beneficial. 3) Optimal preferences depend on the parameters, particularly on transport costs. 4) If preferences are raised further, they enter the zone of negative returns to regionalization, and eventually the supernatural zone, where welfare is lower than under the most favored nation status quo.

Estimates from the gravity model suggest that the world system already may be in the supernatural zone. The core model leaves out many factors, but we have pursued a variety of extensions by now. Perhaps the two most important are generalizing the highly stylized model of trade (to include factor endowments), and relaxing the assumption that the interbloc level of tariffs remains fixed. In the latter case, allowing tariffs to be endogenous yields a much more optimistic outlook for the effects of FTAs.

On the Costs of Inward-Looking Development: Historical Perspectives on Price Distortions, Growth, and Divergence in Latin America from the 1930s to the 1980s

Alan M. Taylor

NBER Working Paper No. 5432

January 1996

JEL Nos. N1, O1

Development of the American Economy

From the 1930s to the 1980s, economic policies in Latin America epitomized the inward-looking model of development. The model emerged in the Depression, and was later codified in unorthodox economic theories. Even though

economic performance was seen as disappointing by the 1960s, the distortions of the regime were long-lived, persisting and worsening into the 1970s and 1980s. I examine the costs of distortions and explore the structural differences between growth dynamics in Latin America and elsewhere. Distortions had pervasive and profound effects on many aspects of the growth process, and help explain divergent development in the region.

Labor Mobility and Fiscal Coordination

Assaf Razin and Chi-Wa Yuen

NBER Working Paper No. 5433

January 1996

International Finance and Macroeconomics

Using a human-capital-based growth model, we show that labor mobility and cross-country tax harmonization play an essential role in equalizing income levels of countries that start from different positions. Knowledge-spillovers-cum-labor-mobility are the driving forces behind the equalization process of the income level. In the absence of tax harmonization within an economic union, equality in income levels is not achievable. Coordination of educational subsidies necessary for the internalization of knowledge spillovers may not be necessary. These considerations constitute the basis for our efficient growth agenda for an economic union, such as the EU.

The Effect of Maternal Drug Use on Birthweight: Measurement Error in Binary Variables

Robert Kaestner, Theodore J. Joyce, and Hassan Wehbeh

NBER Working Paper No. 5434

January 1996

JEL No. I12

Health Economics

We develop a method to correct for nonrandom measurement error in a binary indicator of illicit drugs. Our results suggest that estimates of the effect of self-reported prenatal drug use on birthweight are biased upward by measurement error; this finding is contrary to predictions of a model of random measurement error. We show that more accurate estimates of the true effect of drug use on birthweight can be obtained by using the predicted probability of falsely reporting drug use. This suggests that out-of-sample information on drug use may improve estimates of the effect of reported drug use in other settings.

Working for Nothing: The Supply of Volunteer Labor

Richard B. Freeman

NBER Working Paper No. 5435

January 1996

Labor Studies

Volunteer activity is work performed without monetary recompense. This paper shows that: volunteering is a sizable economic activity in the United States; volunteers have high skills, and their time has high opportunity costs; standard labor supply explanations of volunteering explain only a minor part of volunteer behavior; and many individuals volunteer only when they are asked to do so. This suggests that volunteering is a "conscience good or activity": something that people feel morally obligated to do when asked, but that they would just as soon let someone else do.

Relational Investing: The Worker's Perspective

**Edward P. Lazear and
Richard B. Freeman**

NBER Working Paper No. 5436
January 1996
Labor Studies

Workers who hold a firm's stock make different decisions than pure capital owners, but certain institutions and compensation packages generally will lead workers to favor efficient firm decisions. Workers care about their firm-specific rents, and may seek shares in their firm in order to protect those rents. Their views about firm decisions will differ, depending on their firm-specific human capital and tenure in the firm. The very young and very old workers are most favorable to efficient firm decisions, as are those with the least to lose in employment rent, and those with larger shares of ownership. An appropriate severance pay policy will induce workers to choose efficient outcomes, even if it calls for their own layoffs. Single-company-based defined-contribution pension funds, which hold shares in their own firm, are likely to tilt worker-owners to favor efficient decisions when layoffs and other changes are modest, but not when the changes are huge. Pension funds are more likely to buy up shares and to change behavior successfully in small firms, firms that are highly levered, and when the investment community has diverse views on the benefit of changing a firm's current irresponsible policies.

Currency Crashes in Emerging Markets: Empirical Indicators

**Jeffrey A. Frankel and
Andrew K. Rose**

NBER Working Paper No. 5437
January 1996

JEL Nos. F32, F34
International Finance and
Macroeconomics

We use a panel of annual data for over 100 developing countries from 1971 through 1992 to characterize currency crashes. We define a currency crash as a large change in the nominal exchange rate that also represents a substantial increase in the rate of change of nominal depreciation. We examine the *composition* of the debt as well as its *level*, and a variety of other macroeconomic factors, both external and foreign. We find that crashes tend to occur when: output growth is low; the growth of domestic credit is high; and the level of foreign interest rates is high. A low ratio of foreign direct investment to debt is associated consistently with a high likelihood of a crash.

Employer Learning and the Signaling Value of Education

**Joseph G. Altonji and
Charles R. Pierret**

NBER Working Paper No. 5438
January 1996
JEL Nos. H83, J34
Labor Studies

If profit-maximizing firms have limited information about the general productivity of new workers, they may choose to use easily observable characteristics, such as years of education, to "statistically discriminate" among workers. The pure credential value of education depends on how quickly firms learn. To obtain information on employer learning, we work with a wage equation that contains both the interaction between experience and a hard-to-observe variable that is related positively to productivity, and the interaction between experience and a variable that firms can

observe easily, such as years of education. The time path of the co-efficient on the unobservable productivity variable provides information about the rate at which employers learn about worker productivity. Using data from the National Longitudinal Survey of Youth, we obtain preliminary estimates of the rate at which employers learn about worker quality. We use these, along with some strong auxiliary assumptions, to explore the empirical relevance of the educational screening hypothesis. We show that even if employers learn relatively slowly about the productivity of new workers, the portion of the return to education that could reflect signaling of ability is limited.

Nominal Wage Stickiness and Aggregate Supply in the Great Depression

**Ben S. Bernanke and
Kevin Carey**

NBER Working Paper No. 5439
January 1996
JEL Nos. N31, N32
Economic Fluctuations

Building on earlier work by Eichengreen and Sachs, we use data for 22 countries to study the role of wage stickiness in propagating the Great Depression. Recent research suggests that monetary shocks, transmitted internationally by the gold standard, were a major cause of the Depression. Accordingly, we use money supplies and other aggregate demand shifters as instruments to identify aggregate supply relationships. We find that nominal wages adjusted quite slowly to falling prices, and that the resulting increases in real wages depressed output. These findings leave open the question of why wages were so inertial in the face of extreme labor market conditions.

The Trade Effects of U.S. Antidumping Actions

Thomas J. Prusa

NBER Working Paper No. 5440

January 1996

JEL No. F13

International Trade and Investment

In this paper, I present evidence on the effectiveness of antidumping (AD) actions. Using a dataset based on the line-item tariff codes identified in the cases, I examine the trade patterns of countries named in the petition and of countries not subject to the investigation. There are several important findings. First, AD duties substantially restrict the volume of trade from named countries, especially for those cases with high duties. Second, AD actions that are rejected still have an important impact on named country trade, especially during the period of investigation. Third, there is substantial trade diversion from named to nonnamed countries, and the diversion is greater if the estimated duty is larger. Because of the diversion of imports, the overall volume of trade continues to grow, even for those cases that result in duties. Fourth, despite the diversion of imports, AD law still offers important benefits, because it induces substantial increases in import prices both by named and nonnamed countries. Finally, because of the diversion of imports, aggressive use of AD law by U.S. firms has the peculiar side-effect of benefiting nonnamed countries that are active in the areas under investigation.

The Social Costs of Rent Control Revisited

Edward L. Glaeser

NBER Working Paper No. 5441

January 1996

JEL Nos. H89, R52

Public Economics

The textbook graphical analysis of price control is inappropriate whenever there is substantial consumer heterogeneity. In cases such as rental apartments, where one unit is usually the maximum bought per customer, and the downward slope of the demand function comes exclusively from consumer heterogeneity, this analysis misses a primary source of welfare loss. A major social cost of rent control is that, without a fully operational price mechanism, the "wrong" consumers end up using apartments. When rents are set below market price, many consumers want to rent apartments even though they receive little utility from those apartments. Unless apartments somehow are allocated perfectly across consumers, rental units will be allocated to consumers who gain little utility from renting, and rental units will not go to individuals who desire them greatly. The social costs of this misallocation are first order when the social costs from underprovision of housing are second order. Thus, for a sufficiently marginal implementation of rent control, these costs always will be more important than the undersupply of housing.

The Efficiency of Self-Regulated Payments Systems: Learning from the Suffolk System

Charles W. Calomiris and Charles M. Kahn

NBER Working Paper No. 5442

January 1996

JEL Nos. G21, N21, E42

Development of the American Economy

This paper analyzes the operation of the Suffolk System, an interbank note-clearing network operating throughout New England from the 1820s through the 1850s. Banks made markets in each other's notes

at par, which allowed New England to avoid the discounting of bank notes in trade. Privately enforced regulations prevented free-riding in the form of excessive risk-taking. Observers of the Suffolk System have been divided. Some emphasized the stability and efficiency of these arrangements. Others argued that the arrangements were motivated by rentseeking on the part of Boston banks, and were primarily coercive and exploitative.

In the neighboring Mid-Atlantic states, regulations limited the potential for developing a regional clearing system on the model of the Suffolk System but centered in New York City. This difference makes it possible to compare the performance of banks across regulatory regimes to judge the relative merits of the sanguine and jaundiced views of the Suffolk System.

Evidence supports the sanguine view. New England's banks were able to issue more notes, and these notes traded at uniform and low discount rates compared to those of other banks. An examination of the balance sheets and stock returns of Boston and New York City banks indicates that the stock market perceived that bank lending produced less risk for bank debt-holders in Boston than in New York. The benefits of the system extended outside of Boston. Peripheral New England banks displayed high propensities to issue notes, and were able to maintain low specie reserves. Boston banks did not exhibit high profit rates or high ratios of market-to-book values of equity. Thus, there is no evidence that Boston banks extracted rents from their control of the payments system.

Why, Indeed, in America? Theory, History, and the Origins of Modern Economic Growth

Paul M. Romer

NBER Working Paper No. 5443

January 1996

JEL Nos. O3, N1

Development of the American
Economy, Economic Fluctuations

When they are used together, economic history and new growth theory give a more comprehensive picture of technological change than either can give on its own. An empirical strategy for studying growth that does not use historical evidence is likely to degenerate into sterile model-testing exercises. Historical analysis that uses the wrong kind of theory or no theory may not emphasize the lessons about technology that generalize. An analysis of early industrialization illustrates the complementarity between these fields. The key theoretical observation is that larger markets and larger stocks of resources create substantially bigger incentives for discovering new ways to use the resources. This simple insight helps to explain why the techniques of mass production emerged in the United States during the first half of the 19th century. It also helps to explain how a narrow advantage in the techniques of mass production for a small set of goods grew into broad position of industrial supremacy by the middle of the 20th century.

Incentives in Basic Research

Edward P. Lazear

NBER Working Paper No. 5444

January 1996

JEL Nos. D00, J33, J41

Labor Studies

Individuals involved in basic re-

search, like other workers, respond to incentives. Funding agencies provide implicit incentives when they specify the rules by which awards are made. This paper is an exercise in understanding incentives at an applied level. I examine and analyze specific rules to determine their incentive effects. For example, what is the effect of rewarding past effort? What happens when a few large awards are replaced by many small awards? How does the timing of an award affect effort? How does an agency choose which topics to fund? After having mapped out the responses of researchers to rules, I derive socially optimal rules. Research incentive issues have private business analogues, and I discuss briefly the extension to the operation of the firm.

Target Zones and Exchange Rates: An Empirical Investigation

**Geert Bekaert and
Stephen F. Gray**

NBER Working Paper No. 5445

January 1996

Asset Pricing, International Finance and
Macroeconomics

We develop an empirical model of exchange rates in a target zone. The model is general enough to nest most theoretical and empirical models in the existing literature. We find two types of jumps in exchange rates. *Realignment jumps* are associated with the periodic realignments of the target zone; *within-the-band jumps* can be accommodated within the current target zone. The exchange rate may jump outside the current target zone band, in the case of a realignment, but when no jump occurs, the target zone is credible (there is no probability of a realignment) and the exchange rate must stay within

the band. We incorporate jumps, in general, by conditioning the distribution of exchange rate changes on a jump variable, in which the probability and size of a jump vary over time as a function of financial and macroeconomic variables. With this more general model, we revisit the empirical evidence from the European Monetary System on the conditional distribution of exchange rate changes, the credibility of the system, and the size of the foreign exchange risk premiums. In contrast to some previous researchers, we conclude that the French Franc/Deutschemark rate exhibits considerable nonlinearities, realignments are predictable, and the credibility of the system did not increase after 1987. Moreover, our model implies that the foreign exchange risk premium becomes large during speculative crises. A comparison with the Deutschemark/dollar rate suggests that an explicit target zone does have a noticeable effect on the time-series behavior of exchange rates.

Public Information and the Persistence of Bond Market Volatility

**Charles M. Jones,
Owen Lamont, and
Robin Lumsdaine**

NBER Working Paper No. 5446

January 1996

JEL No. G12

Asset Pricing

We examine the reaction of daily bond prices to the release of government macroeconomic news. These news releases are of interest because they are released on periodic, preannounced dates, and because they cause substantial volatility in the bond market. The news component of volatility is not auto-correlated positively on these dates, since the news is released at a specific moment in time. We find

that expected returns on the short end of the bond market are significantly higher on these announcement dates, and that the persistence pattern of daily volatility is quite different around these days.

Intergenerational Redistribution with Short-Lived Governments

Gene M. Grossman and Elhanan Helpman

NBER Working Paper No. 5447

January 1996

JEL Nos. E62, D72, H23

Economic Fluctuations,
Public Economics

We study the politics of intergenerational redistribution in an overlapping-generations model with short-lived governments. The successive governments—who care about the welfare of the currently living generations and possibly about campaign contributions—are unable to precommit the future course of redistributive taxation. In a stationary politico-economic equilibrium, the tax rate in each period depends on the current value of the state variable, and all expectations about future political outcomes are fulfilled. We find that there are multiple stationary equilibria in many political settings. Steady-state welfare is often lower than it would be in the absence of redistributive politics.

What's the Use of Factor Contents?

Edward E. Leamer

NBER Working Paper No. 5448

February 1996

International Trade and Investment

The net imports of labor embodied in international trade have been a fairly small and stable share of the U.S. labor force. From this, some conclude that trade has not

been a major contributor to the trends in income inequality. This is a non sequitur. The labor embodied in trade is determined jointly by tastes, technologies, factor supplies, and the external goods market. Although it is impossible to use factor contents to disentangle trade from technology, the factor contents can be used to suggest the change of earnings *shares* if the country were to close down external trade entirely. However, this is a proper application of factor contents only if tastes and technologies are log-linear, if trade is balanced, and if foreign input intensities are used to compute factor contents of noncompeting imports. Factor contents are virtually useless if technologies and tastes are not log-linear, or if the external deficit is substantial and variable. Factor contents do not tell us anything about earnings levels as opposed to shares. They also do not inform us of the impact of partial trade barriers that change relative product prices but do not eliminate trade completely. In other words, the title question is rhetorical.

Budget Institutions and Fiscal Policy in the U.S. States

James M. Poterba

NBER Working Paper No. 5449

February 1996

JEL No. H61

Public Economics

This paper summarizes state balanced budget requirements, and the available empirical evidence on the effect of these rules on state fiscal policies. Existing state rules differ from many current proposals at the federal level. Typically, they are restricted to part of the state budget, they frequently permit short-term borrowing, and they lack formal enforcement mechanisms. The

paper also surveys previous research on how antideficit provisions affect state fiscal policy. The available evidence indicates that stringent antideficit provisions lead to more rapid adjustment of state taxes and expenditures when fiscal deficits emerge. This suggests that changing the federal budget process has the potential to affect federal fiscal policy.

Labor Market Effects of School Quality: Theory and Evidence

David Card and Alan B. Krueger

NBER Working Paper No. 5450

February 1996

JEL No. I20

Labor Studies

This paper presents an overview and interpretation of the literature relating school quality to students' subsequent success in the labor market. We begin with a simple theoretical model that describes the determination of schooling and earnings with varying school quality. A key insight of the model is that changes in school quality may affect the characteristics of individuals who choose each level of schooling, imparting a potential selection bias to comparisons of earnings conditional on education. We then summarize the literature that relates school resources to students' earnings and educational attainment. A variety of evidence suggests that students who were educated in schools with more resources tend to earn more and to have more schooling. We also discuss two important issues in the literature: the trade-offs involved in using school-level versus more aggregated (district or state-level) measures of quality; and the evidence on the effects of school quality for African-Americans who

were educated in the segregated school systems of the South.

Why Do So Many Young American Men Commit Crimes and What Might We Do About It?

Richard B. Freeman

NBER Working Paper No. 5451

February 1996

Labor Studies

This paper shows that participation in crime and involvement with the criminal justice system has reached extraordinary levels among young men. With about 2 percent of the male work force incarcerated, the crime rate should have plummeted. It didn't. Evidence suggests that the depressed labor market for low-skill American workers contributed to the continued high level of crime by less-educated men, despite incapacitation and the deterrent effect of imprisonment. The costs of incarceration are such that even marginally effective prevention policies can be socially desirable.

Inflation's Children: Tales of Crises That Beget Reforms

Michael Bruno and William Easterly

NBER Working Paper No. 5452

February 1996

International Finance and

Macroeconomics, Monetary Economics

Are broad reforms the children of high inflation? Do growth recoveries follow? We find that countries that had external debt crises with high inflation both reformed more and recovered better than countries that had external debt crises with low inflation. Countries with extremely high inflation also wound up later with lower inflation than countries that had moderately high

inflation to begin with. The low-inflation debtor countries had more aid than the high-inflation debtor countries, which may have created stronger incentives to reform in the high-inflation countries. Recent reforms look like they are the children of high inflation, even if further paternity tests are in order.

Universal Banking and the Performance of German Firms

Gary Gorton and Frank A. Schmid

NBER Working Paper No. 5453

February 1996

JEL No. G2

Corporate Finance

Universal banking is an alternative mechanism to a stock market for risksharing, for providing information that guides investment, and for contesting corporate governance. In Germany, where the stock market has been small historically, banks hold equity stakes in firms and have proxy voting rights over other agents' shares. In addition, banks lend to firms and have representatives on corporate boards. If a banking relationship is a substitute for the stock market, then interaction with a bank should improve the performance of firms. But, if banks have private information about firms that they lend to, and have monopolistic control over access to external capital markets, then bank interests may conflict with those of other equityholders, especially those whose shares are voted in proxy by the banks. We empirically investigate the influence of banks on the performance of German firms taking account of banks' equity holdings, the extent of banks' proxy voting rights, and the ownership structure of the firms' equity. We test for conflicts of interest in bank behavior and

ask whether the relationship between banks and firms has changed between the 1970s and 1980s.

Searching for the Effect of Immigration on the Labor Market

George J. Borjas, Richard B. Freeman, and Lawrence F. Katz

NBER Working Paper No. 5454

February 1996

Labor Studies

We compare two approaches to analyzing the effects of immigration on the labor market, and find that the estimated effect of immigration on the labor outcomes of U.S. natives depends critically on the empirical experiment used. Area analyses contrast the level or change in immigration by area with the level or change in the outcomes of nonimmigrant workers. Factor proportions analyses treat immigrants as a source of increased national supply of workers with the relevant skill. Cross-section comparisons of wages and immigration in the 1980 and 1990 Censuses yield unstable results, casting doubt on the validity of these calculations. Analyses of changes over time for various education groups within regions give negative estimated immigration effects, which increase in magnitude as the area covered widens. Factor proportions calculations show that immigration was somewhat important in reducing the relative pay of U.S. high school dropouts during the 1980s, while immigration and trade contributed much more modestly to the falling pay of high school equivalent workers. The different effects of immigration on native outcomes in the area and factor proportions methodologies appear to result from the diluting effect of native migration flows

across regions, and from failure to take adequate account of other regional labor market conditions in area comparisons.

Wage Mobility in the United States

Moshe Buchinsky and Jennifer Hunt

NBER Working Paper No. 5455

February 1996

JEL Nos. J30, J31, J60

Labor Studies

This paper examines the mobility of individuals through the distribution of wages and earnings. This is of extreme importance, since mobility has a direct implication for the way one views the vast changes in wage and earnings inequality in the United States over the last few decades. The measures of wage and earnings mobility that we analyze are based on data for individuals surveyed in the National Longitudinal Survey for Youth from 1979 to 1991.

We introduce summary measures of mobility computed over varying time horizons in order to examine how the effect on measured inequality changes as the time horizon is increased. The results suggest that mobility is predominantly within-group, and increases most rapidly when the time horizon is extended up to four years, reducing wage inequality by 12–26 percent. We then proceed with more detailed examination of short-term (year-to-year) within-group mobility, by estimating nonparametrically the transition probabilities among quintiles of the distribution. We find that the staying probabilities, by quintiles, were higher throughout the period at the higher quintiles for both wages and earnings, and that mobility is declining over time. Hence, this paper suggests that while the level of

wage inequality in the United States is somewhat lower once mobility is taken into account, the sharp increase in inequality during the 1980s is worse than it appears, because of falling mobility over time.

The L.A. Riot and the Economics of Urban Unrest

Denise DiPasquale and Edward L. Glaeser

NBER Working Paper No. 5456

February 1996

JEL Nos. K42, J78

Labor Studies

The Los Angeles riot of 1992 resulted in 52 deaths, 2500 injuries, and at least \$446 million in property damage; this staggering toll rekindled interest in identifying the underlying causes of the widespread social phenomenon of rioting. We examine the causes of rioting using international data, evidence from the race riots of the 1960s in the United States, and 1990 Census data on Los Angeles. We find some support for the notions that the opportunity costs of time and the potential costs of punishment influence the incidence and intensity of riots. Beyond these individual costs and benefits, community structure matters. In our results, ethnic diversity seems to be a significant determinant of rioting, while we find little evidence that poverty in the community matters.

Japanese and U.S. Exports and Investment as Conduits of Growth

Jonathan Eaton and Akiko Tamura

NBER Working Paper No. 5457

February 1996

International Trade and Investment

We develop a simple model of

the choice between exploiting a technology in another country via export versus direct foreign investment (DFI). The model points to the destination country's size, level of technological sophistication, and distance from the source as factors in the decision. Moreover, it suggests that the effects of these variables may not be only nonhomogeneous but nonmonotonic as well. We use the model as a basis for estimating Japanese and U.S. exports and DFI positions around the world. Consistent with the theory, we find that the importance of DFI relative to exports grows with population. Contrary to our theory, though, the elasticity of DFI, as well as exports, with respect to population is less than one. We find that distance tends to inhibit DFI much less than it inhibits exports, as our theory predicts. We find some tendency for Japanese exports to rise relative to DFI as countries become more advanced, with U.S. exports and DFI exhibiting the opposite tendency. Taking population, per capita income, factor endowments, and distance into account, we find Japan to be more open to U.S. exports than any region in the world except East Asia.

Rent-Shifting Export Subsidies with an Imported Intermediate Product

Jota Ishikawa and Barbara J. Spencer

NBER Working Paper No. 5458

February 1996

JEL Nos. F12, F13

International Trade and Investment

This paper argues that export subsidies aimed at shifting rents from foreign to domestic producers of a final good also may serve to shift rents to foreign firms supplying an intermediate good, weaken-

ing the incentive for the subsidy. By contrast, assuming Cournot competition for both the final and intermediate goods, this second layer of rent-shifting between final and intermediate good firms can strengthen the argument for an export subsidy if intermediate good firms are domestic. We also consider the domestic welfare implications of alternative rent-shifting policies (a production subsidy and an import tariff) at the intermediate good stage.

Wage Inequality and Family Labor Supply

Chinhui Juhn and Kevin M. Murphy

NBER Working Paper No. 5459

February 1996

JEL No. J22

Labor Studies

Using data from the March CPS and the 1960 Census, this paper describes changes in earnings and employment for married couples in different types of households stratified by the husband's hourly wage. While the declines in male employment and earnings have been greatest for low-wage men, gains in employment and earnings have been largest for wives of middle- and high-wage men. These findings cast doubt on the notion that married women have increased their labor supply in recent decades to compensate for the disappointing earnings growth of their husbands. We conclude that own wage effects dominate cross effects between husband and wife in accounting for changes in male and female employment.

A Citation-Based Test for Discrimination at Economics and Finance Journals

Scott Smart and Joel Waldfogel

NBER Working Paper No. 5460

February 1996

JEL Nos. J71, K31

Law and Economics

Discrimination is notoriously difficult to document. Convincing tests for discrimination require good measures of the legitimate determinants of the outcome of interest, for example wages and productivity. While few contexts provide data adequate to the task of measuring discrimination, copious bibliographic data on the impact of academic research make possible tests of discrimination in the editorial process. This study develops a test for possible bias—with respect to author gender, prestige of author's institution, article content (theory versus empiricism), and whether the author has ties to the editor—using a new approach based on an analysis of citations. We treat citations as a measure of an article's quality, and ask whether papers by certain groups receive systematically different numbers of citations. The key to our approach is the observation that editors do not simply accept or reject papers. For accepted papers, editors determine the order of articles within the journal issue and their length based on assessments of quality. We show that these "editorial treatment" decisions are highly correlated with citations. Thus, we infer bias against a particular group of authors if their published articles have more citations, conditional on editorial treatment, than other articles. Surprisingly, we document systematic editorial bias *in favor of authors located outside of top institutions*.

Threats Without Binding Commitment

Steven Shavell and Kathryn Spier

NBER Working Paper No. 5461

February 1996

JEL Nos. K42, C70

Law and Economics

This paper explores the power of threats in the absence of binding commitment. The one who makes the threat cannot commit to carrying it out if the victim refuses to pay, and cannot commit to *not* carrying it out if payment is made. If exercising the threat is costly to the one who makes it, then the threat cannot succeed in extracting money from the victim. If exercising the threat would benefit the threatener, however, then the success of the threat depends upon whether it may be repeated. In the equilibrium of a finite-period game, the threat is carried out and the victim makes no payments. In an infinite-horizon game, however, it is an equilibrium for the victim to make a stream of payments over time. The expectation of future payments keeps the threatener from exercising the threat.

Financing Constraints and Corporate Investment: Response to Kaplan and Zingales

Steven F. Fazzari, R. Glenn Hubbard, and Bruce C. Petersen

NBER Working Paper No. 5462

February 1996

JEL No. G3

Corporate Finance

Kaplan and Zingales (1995, hereafter KZ) criticize Fazzari, Hubbard, and Petersen (1988, hereafter FHP) and much ensuing research that uses cross-sectional differences in firm behavior to test for financing constraints on investment. This reply identifies flaws in the KZ analysis. We also challenge both of KZ's main results. First, their finding that most of the FHP firms are not constrained financially relies on an inappropriate operational definition

of what it means to be constrained. Their definition ignores the incentives for firms that operate in imperfect capital markets to accumulate stocks of cash or to maintain unused debt capacity to offset partially shocks to the flow of internal finance. Second, the KZ regression results (lower sensitivity of investment to cash flow for firms classified as constrained than for those classified as unconstrained) are not informative. Their classification approach relies on possibly self-serving managerial statements that may present a distorted picture of the firm's availability of finance. It also employs misleading criteria to make unrealistically fine distinctions in the degree of financing constraints, and emphasizes financial distress rather than financing constraints. Finally, econometric problems affect the interpretation of the KZ regressions. We conclude that the KZ findings do not contradict the interpretation of the empirical results in FHP and subsequent research.

A Time-Series Analysis of Crime and Drug Use in New York City

**Hope Corman and
H. Naci Mocan**

NBER Working Paper No. 5463

February 1996

JEL No. K42

Health Economics

This report summarizes the results of a project that investigated the time-series interrelationships among crime, drug use, police, and arrests in New York City. We use monthly data from 1970 through 1990 and plot the individual time series for five different nondrug crimes, the arrest rates for these crimes, drug deaths, the number of police officers, and drug arrests. We find that drug usage, as prox-

ied by drug deaths, increased from the mid-1980s to about 1988-9. At the same time, felony drug arrests increased substantially. During the mid-1980s, there were increases in murders, assaults, and motor vehicle thefts. Robberies increased in the later 1980s, and burglaries declined throughout the 1980s. Arrest rates and total arrests for nondrug crimes did not decline during this period of increased drug arrests.

In a multivariate analysis, we found that the three property crimes investigated—robberies, burglaries, and motor vehicle thefts—increased when there were unexpected increases in drug usage. We did not find such a relationship between drug use and murders or assaults, holding constant arrest rates and police. In addition, we found evidence of police deterrence, either directly or through arrests, of property-related and assault offenses, but not for murders. Thus, in a time-series approach, we are able to find a causal relationship between drug usage and property-related felonies.

The Channels of Monetary Transmission: Lessons for Monetary Policy

Frederic S. Mishkin

NBER Working Paper No. 5464

February 1996

JEL Nos. E0, E5

Economic Fluctuations,
Monetary Economics

This paper provides an overview of the transmission mechanisms of monetary policy, starting with traditional interest rate channels, going on to channels operating through other asset prices, and then to the so-called credit channels. Finally, the paper discusses the implications from this literature for how central banks might best conduct monetary policy.

The Rise and Fall of Money Growth Targets as Guidelines for U.S. Monetary Policy

Benjamin M. Friedman

NBER Working Paper No. 5465

February 1996

JEL No. E5

Monetary Economics

A familiar question raised by the Federal Reserve System's evolving use of money growth targets over the past 20 years is whether monetary policymakers had sound economic reasons for changing their procedures as they did—either in adopting money growth targets in the first place, or in subsequently abandoning them, or in both instances. This paper addresses that question by comparing two kinds of evidence based on U.S. time-series data: first, evidence bearing on what Federal Reserve policymakers should have known about the relationship of money to income and prices, and when they should have known it; and second, evidence showing how and when the Federal Reserve changed its actual (as opposed to stated) reliance on money growth targets. The main conclusion from this comparison is that whatever economic conditions might have warranted reliance on money growth targets in the 1970s and early 1980s had long disappeared by the 1990s, so that abandoning these targets was an appropriate response to changing circumstances. Whether adopting money growth targets earlier on was likewise appropriate is less clear.

Do Doctors Practice Defensive Medicine?

**Daniel P. Kessler and
Mark McClellan**

NBER Working Paper No. 5466

February 1996

JEL Nos. I1, K13

Health Care, Law and Economics

"Defensive medicine" is a potentially serious social problem: if fear of liability drives health care providers to administer treatments that do not have worthwhile medical benefits, then the current liability system may generate inefficiencies many times greater than the costs of compensating malpractice claimants. To obtain direct empirical evidence on this question, we analyze the effects of malpractice liability reforms using data on all elderly Medicare beneficiaries treated for serious heart disease in 1984, 1987, and 1990. We find that malpractice reforms that directly reduce liability pressure on providers lead to reductions of 5 to 9 percent in medical expenditures without substantial effects on mortality or medical complications. We conclude that liability reforms can reduce defensive medical practices.

Sustainability of Persistent Current Account Deficits

**Gian Maria Milesi-Ferretti
and Assaf Razin**

NBER Working Paper No. 5467

February 1996

JEL Nos. F32, F34

International Finance and
Macroeconomics

This paper presents a notion of current account sustainability that explicitly takes into account willingness to pay and willingness to lend in addition to intertemporal solvency. We argue that this notion of sustainability provides a better framework for understanding the variety of country experiences with protracted current account imbalances. Based on this notion, we identify a number of operational indicators related to the structure of the economy, the economic policy

stance, and political economy factors. We use these sustainability indicators to evaluate the experience of a number of countries that ran persistent current account imbalances, and to derive policy implications consistent with our notion of sustainability.

Sticky Prices, Inventories, and Market Power in Wholesale Gasoline Markets

**Severin Borenstein and
Andrea Shepard**

NBER Working Paper No. 5468

February 1996

JEL Nos. L1, L13, E32

Industrial Organization

We present and test an explanation for lags in the adjustment of wholesale gasoline prices to changes in crude oil prices. Our simple model with costly adjustment of production and inventories implies that output prices will respond with a lag to cost shocks even in the absence of menu costs, imperfect information, and long-term buyer/seller relationships. The model predicts that futures prices for gasoline will adjust incompletely to crude oil price shocks occurring close to the expiration date of the futures contract. We test and confirm this implication. The model also predicts that firms with market power will choose a different price adjustment path than perfectly competitive firms would. We examine the responses of prices in 188 local wholesale gasoline markets, and find that greater market power leads to slower adjustment of market prices.

The Costs and Benefits of Going from Low Inflation to Price Stability

Martin Feldstein

NBER Working Paper No. 5469

February 1996

JEL Nos. E5, E6

Public Economics

This paper evaluates the welfare gain from achieving price stability and compares it to the cost of the transition. In calculating the gain from price stability, I emphasize the distortions caused by the interaction of inflation and taxes on capital income. Because inflation exacerbates the tax distortions that would exist even with price stability, the annual deadweight loss of a 2 percent inflation rate is a surprisingly large 1 percent of GDP. Since the real gain from shifting to price stability grows in perpetuity at the rate of growth of GDP, its present value is a substantial multiple of this annual gain. Discounting the annual gains at the rate that investors require for risky equity investments (that is, at the 5.1 percent real net-of-tax rate of return on the Standard & Poors portfolio of equities from 1970 to 1994) implies a gain in present value of more than 35 percent of the initial level of GDP. Since the estimated cost of shifting from 2 percent inflation to price stability is about 5 percent of GDP, the gain substantially outweighs the cost of transition.

Economic Growth and Social Capital in Asia

John F. Helliwell

NBER Working Paper No. 5470

February 1996

JEL Nos. F43, O57

Economic Fluctuations and Growth,
International Trade and Investment

The paper reviews the growth performance of different groups of Asian economies, confirms the role of openness as a key factor in explaining those growth differences, and undertakes a preliminary investigation of the role of social capital and institutions. The role of

openness in explaining growth differences among the Asian economies appears to be, if anything, greater than has been established in global samples. Various measures of social capital and institutional quality do not add explanatory power, perhaps because of the shortage of comparable data for the Asian economies. I conjecture that the prospects are good for the technological catchup that has taken place in Southeast Asia to be repeated elsewhere in Asia, and especially in South Asia, partly in response to recent increases in openness. The role of social capital and institutions in facilitating this catch-up remains to be established.

The "Fundamental Transformation" in Macroeconomics

Ricardo J. Caballero and Mohamad L. Hammour

NBER Working Paper No. 5471
February 1996
JEL Nos. E00, E1, D23
Economic Fluctuations and Growth

When factors enter into joint production, they typically develop a degree of *specificity* with respect to each other. It is well known that, when combined with contracting difficulties, specificity gives rise to a Williamsonian "Fundamental Transformation" from an ex ante competitive relationship to a ex post bilateral monopoly. The *macroeconomic* consequences of widespread specificity are far reaching. Specificity results in misallocation, underutilization, and unemployment of the economy's productive factors; it hampers growth by depressing the incentives to replace what is outdated and to fully utilize the economy's resources; it disrupts macroeconomic adjustment by inducing a wedge between timid creation and excessive destruction of

the old system; and it exacerbates downturns by "elastifying" the cyclical response of inelastic factors.

The Welfare Implications of Trading Blocs Among Countries with Different Endowments

Antonio Spilimbergo and Ernesto Stein

NBER Working Paper No. 5472
March 1996
JEL No. F15
International Finance and Macroeconomics

We present a model in which trade is motivated by both preference for variety and comparative advantage. We use this framework to analyze the welfare implications of trading blocs among countries with different endowments, with and without transportation costs.

Within this framework, we address the following issues: 1) the welfare implications of the consolidation of the world into a few trading blocs; 2) the different incentives that rich and poor countries have in choosing their partners in trade arrangements; 3) whether the welfare consequences of continental preferential trade arrangements depend on relative endowments.

Domestic Distortions and the Deindustrialization Hypothesis

Paul R. Krugman

NBER Working Paper No. 5473
March 1996
International Trade and Investment

It is widely believed that U.S. trade deficits have displaced workers from highly paid manufacturing jobs into lower-paid service employment, contributing to declining incomes for the nation as a whole. Although proponents of this view usually do not think of it this way,

this analysis falls squarely into the "domestic distortions" framework pioneered by Jagdish Bhagwati. This paper models the deindustrialization hypothesis explicitly as a domestic distortions issue, and shows that while it makes conceptual sense, it is of limited quantitative importance.

Open-Access Renewable Resources: Trade and Trade Policy in a Two-Country Model

James A. Brander and M. Scott Taylor

NBER Working Paper No. 5474
March 1996
JEL Nos. F1, Q2
International Trade and Investment

This paper develops a two-good, two-country model with national, open-access, renewable resources. We derive an appropriate analog of "factor proportions" for the renewable resource case, and link it to trade patterns and to the likelihood of diversified production. The resource importer gains from trade. However, a diversified resource exporting country necessarily suffers a decline in steady-state utility as a result of trade, and may lose along the entire transition path. Thus, the basic "gains-from-trade" presumption is undermined substantially by open access resources. Tariffs imposed by the resource exporting country always benefit the resource exporter, and may be pareto-improving.

Protectionist Threats and Foreign Direct Investment

Bruce A. Blonigen and Robert C. Feenstra

NBER Working Paper No. 5475
March 1996
JEL Nos. F13, F21
International Trade and Investment

The recent literature on *quid pro quo* foreign direct investment (FDI) suggests that FDI may be induced by the threat of protection, and further, that FDI may be used as an instrument to defuse a protectionist threat. This paper uses a panel dataset of four-digit SIC level observations of Japanese manufacturing FDI into the United States in the 1980s to explore these hypotheses empirically. We find strong statistical support for the hypothesis that higher threats of protection lead to greater FDI flows. Post-regression simulations find that a rise in the expected probability of protection from 5 to 10 percent means over a 30 percent rise in next-period FDI flows for an average industry. In addition, there is evidence that nonacquisition FDI by the Japanese was successful in defusing the threat of an escape clause investigation in future periods.

Trade and Growth: An Empirical Investigation

Jeffrey A. Frankel and David H. Romer

NBER Working Paper No. 5476

March 1996

JEL Nos. O47, F43

Economic Fluctuations and Growth,
International Finance and
Macroeconomics

Countries' geographic characteristics have important effects on their trade, and are plausibly uncorrelated with other determinants of their incomes. Therefore this paper constructs measures of the geographic component of countries' trade, and uses those measures to obtain instrumental-variables estimates of the effect of trade on income. The results suggest that ordinary-least-squares estimates understate the effects of trade, and that trade has a quantitatively large, significant, and robust positive effect on income.

How Precise Are Estimates of the Natural Rate of Unemployment?

Douglas Staiger, James H. Stock, and Mark W. Watson

NBER Working Paper No. 5477

March 1996

JEL No. E6

Economic Fluctuations and Growth,
Monetary Economics

This paper investigates the precision of conventional and unconventional estimates of the natural rate of unemployment (the NAIRU). Our main finding is that the NAIRU is not estimated precisely: a typical 95 percent confidence interval for the NAIRU in 1990 ranges from 5.1 percent to 7.7 percent. This imprecision obtains whether the natural rate is modeled as a constant, a slowly changing function of time, an unobserved random walk, or a function of various labor market fundamentals. It also obtains using other series for unemployment and inflation, including additional supply shift variables in the Phillips curve; using monthly or quarterly data; and using various measures for expected inflation. This imprecision suggests caution in using the NAIRU to guide monetary policy.

Measuring Science: An Exploration

James Adams and Zvi Griliches

NBER Working Paper No. 5478

March 1996

JEL Nos. O47, O30, H40

Productivity

This paper examines the available U.S. data on academic R and D expenditures, the number of papers published, and the number of citations to those papers as possible measures of "output" of this enterprise. We look at these numbers for science and engineering as a whole, for five selected major

fields, and at the individual university-field level. The published data in *Science and Engineering Indicators* imply sharply diminishing returns to academic R and D if published papers are the "output" measure. These data are quite problematic, though. Using a newer set of data on papers and citations, based on an "expanding" set of journals and the newly released Bureau of Economic Analysis R and D deflators, changes the picture drastically, eliminating the appearance of diminishing returns but raising the question of why the input prices of academic R and D are rising so much faster than either the GDP deflator or the implicit R and D deflator in industry.

We then do a production function analysis of such data at the individual university-field level. It indicates significant diminishing returns to "own" R and D, with the R and D coefficients hovering around 0.5 for estimates with paper numbers as the dependent variable and around 0.6 if total citations are used as the dependent variable. When we substitute scientists and engineers in place of R and D as the right-hand-side variables, the coefficient on papers rises from 0.5 to 0.8, and the coefficient on citations rises from 0.6 to 0.9, indicating systematic measurement problems with R and D as the sole input into the production of scientific output. But allowing for individual university-field effects drives these numbers down significantly below unity. Since in the aggregate both paper numbers and citations are growing as fast or faster than R and D, this finding can be interpreted as leaving a major, yet unmeasured role, for the contribution of spillovers from other fields, other universities, and other countries.

Dynamic Equilibrium and Volatility in Financial Asset Markets

Yacine Ait-Sahalia

NBER Working Paper No. 5479

March 1996

JEL Nos. G12, C13, C22

Asset Pricing

This paper develops and estimates a continuous-time model of a financial market in which investors' trading strategies and the specialist's rule of price adjustments are the best response to each other. I examine how far modeling market microstructure in a purely rational framework can go in explaining alleged asset pricing "anomalies." The model reproduces some major findings of the empirical literature: excess volatility of the market price compared to the asset's fundamental value; serially correlated volatility; contemporaneous volume–volatility correlation; and excess kurtosis of price changes. I implement a nonlinear filter to estimate the unobservable fundamental value, and to avoid the discretization bias by computing the exact conditional moments of the price and volume processes over time intervals of any length.

Market Access and Welfare Effects of Free Trade Areas Without Rules of Origin

Jiandong Ju and Kala Krishna

NBER Working Paper No. 5480

March 1996

International Trade and Investment

We study the effects on market access and welfare of Free Trade Areas (FTAs) without Rules of Origin. We consider the markets for both final and intermediate goods and their interlinkage. The FTA weakly reduces all tariffs and prices within itself. This raises quantity demanded, and reduces quantity

supplied, for both final and intermediate goods, thereby raising imports. This is the classic trade-creation effect and improves welfare. We identify two additional effects that work in the opposite direction, and identify conditions under which these welfare-reducing, import-reducing effects dominate.

Deterministic Versus Stochastic Trend in U.S. GNP, Yet Again

Francis X. Diebold and Abdelhak S. Senhadji

NBER Working Paper No. 5481

March 1996

JEL Nos. C00, E3

Economic Fluctuations and Growth

A sleepy consensus has emerged that U.S. GNP data are not informative as to whether trend is better described as deterministic or stochastic. Although the distinction is not critical in some contexts, it is important for point forecasting, because the two models imply very different long-run dynamics, and hence different long-run forecasts. We argue that, even for the famously recalcitrant GNP series, unit root tests over long spans *can* be informative. Our results make clear that uncritical repetition of the "we don't know, and we don't care" mantra is just as scientifically irresponsible as blind adoption of the view that "all macroeconomic series are difference-stationary," or the view that "all macroeconomic series are trend-stationary." There is simply no substitute for serious, case-by-case analysis.

Bounded Rationality and Strategic Complementarity in a Macroeconomic Model: Policy Effects, Persistence, and Multipliers

Antúlio N. Bomfim and Francis X. Diebold

NBER Working Paper No. 5482

March 1996

JEL No. E00

Economic Fluctuations and Growth

Motivated by recent developments in the literature on bounded rationality and strategic complementarity, we examine an intentionally simple and stylized aggregative economic model, with relaxed assumptions of fully rational expectations and no strategic interactions. We show that small deviations from rational expectations, taken alone, only lead to small deviations from the effectiveness of classical policy, but the situation can change dramatically when strategic complementarity is introduced. Strategic complementarity magnifies the effects of even small departures from rational expectations, producing equilibria with policy effectiveness, output persistence, and multiplier effects.

Multinational Production, Skilled Labor, and Real Wages

James R. Markusen and Anthony J. Venables

NBER Working Paper No. 5483

March 1996

JEL Nos. F12, F23

International Trade and Investment

Adapting our earlier model of multinationals, we address policy issues involving wages and labor skills. Multinational firms may arise endogenously, exporting their firm-specific knowledge capital to foreign production facilities, and geo-

graphically fragmenting production into activities that are skilled and unskilled labor-intensive. Multinationals thus alter the nature of trade, from trade in goods (produced with both skilled and unskilled labor) to trade in skilled-labor-intensive producer services. Our results shed light on several policy questions. First, multinationals increase the skilled-unskilled wage gap in the high-income country and, under some circumstances, in the low-income country as well. Second, there is a sense in which multinationals export low-skilled jobs to the lower-income country. Third, trade barriers do not protect unskilled labor in the high-income countries. By inducing a regime shift to multinationals, trade barriers protect the abundant factor, at least in the high-income country and possibly in both countries. Fourth, a convergence in country characteristics induces the entry of multinationals and raises the skilled-unskilled wage gap in the initially large and skilled-labor-abundant country, and possibly in the small skilled-labor-scarce country as well.

Transferable Licenses Versus Nontransferable Licenses: What Is the Difference?

Kala Krishna and Ling Hui Tan

NBER Working Paper No. 5484

March 1996

International Trade and Investment

This paper questions the presumption that transferable quota licenses are worth more and result in higher welfare. We show that the price of a transferable license will tend to be higher than that of its nontransferable counterpart only if the underlying quota is quite restrictive. Despite this, if consumer surplus and license revenue have

equal weight in the welfare function, then transferability is preferable to nontransferability. If their weights are unequal, then the comparison could go either way. We also show that increased uncertainty, in the form of a mean-preserving spread, does not affect the license price under nontransferability, and could raise or lower the level of the license price with transferability depending on the restrictiveness of the quota.

A Statistical Analysis of Crime Against Foreigners in Unified Germany

Alan B. Krueger and Jörn-Steffen Pischke

NBER Working Paper No. 5485

March 1996

JEL Nos. J15, K42

Labor Studies

Germany has experienced a high and rising rate of antiforeigner violence during the early 1990s. To analyze the determinants of crime against foreigners, we assembled a new dataset on the number and nature of such crimes at the county level based on newspaper reports. We find significant differences in the patterns of violence in the eastern and western parts of the country. The incidence of antiforeigner crime is higher in the east and rises with distance from the former west German border. Economic variables such as unemployment and wages matter little for the level of crime once location in the east is taken into account. The relative number of foreigners in a country has no relationship with the incidence of ethnic crimes in the west, whereas in the east it has a positive association with the number of crimes per resident and a negative association with the number of crimes per foreign resident.

Reputation Spillover Across Relationships: Reviving Reputation Models of Debt

Harold L. Cole and Patrick J. Kehoe

NBER Working Paper No. 5486

March 1996

JEL Nos. E61, F34, F00

International Finance and Macroeconomics

A traditional explanation for why sovereign governments repay debts is that they want to keep good reputations so that they can easily borrow more. Bulow and Rogoff show that this argument is invalid under two conditions: 1) there is a single debt relationship, and 2) regardless of their past actions, governments can earn the (possibly state-contingent) market rate of return by saving abroad. Bulow and Rogoff conjecture that, even under the second condition, in more general reputation models with multiple relationships and spillover across them, reputation may support debt. This paper shows what is needed for this conjecture to be true.

Changes in the Relative Structure of Wages and Employment: A Comparison of the United States, Canada, and France

David Card, Francis Kramarz, and Thomas Lemieux

NBER Working Paper No. 5487

March 1996

JEL No. J31

Labor Studies

Standard models suggest that adverse shocks to labor demand will lead to bigger employment losses if institutional factors, such as minimum wages and trade unions, prevent downward wage adjustments. Some economists

have argued that this explains the contrast between the United States—where real wages fell over the 1980s and aggregate employment expanded vigorously—and Europe, where real wages were (roughly) constant and employment was stagnant. We test this hypothesis by comparing changes in wages and employment rates over the 1980s for different age and education groups in the United States, Canada, and France. We argue that the same forces that led to falling real wages for less-skilled workers in the United States affected similar workers in Canada and France. Consistent with the view that labor market institutions are more rigid in France and more flexible in the United States, we find that relative wages of less-skilled workers fell the most in the United States, fell somewhat less in Canada, and did not fall at all in France. Contrary to expectations, however, we find little evidence that wage inflexibilities generated divergent patterns of relative employment growth across the three countries.

Reciprocal Trade Liberalization

Kyle Bagwell and Robert W. Staiger

NBER Working Paper No. 5488

March 1996

JEL No. F13

International Trade and Investment

Why have governments found reciprocal trade agreements such as GATT to be a more effective means of facilitating trade liberalization than unilateral initiatives? We provide an analytic framework for the study of reciprocal trade agreements, and use it to establish three main results. First, we argue that political-economy factors are important for explaining the range of

trade policies observed, but that these factors cannot explain why governments seek reciprocal trade agreements as an institutional form for implementing their preferred policies. Rather, whether or not governments are politically motivated, Johnson (1953–4) was right: the central purpose of a reciprocal trade agreement is to eliminate the terms-of-trade-driven policies that arise in the absence of such an agreement. Second, we establish an economic interpretation of the principles of reciprocity and nondiscrimination that represent the foundation of postwar reciprocal trade agreements. Finally, we offer new insights regarding the treatment of export subsidies in reciprocal trade agreements.

Beyond Arbitrage: “Good-Deal” Asset Price Bounds in Incomplete Markets

John H. Cochrane and Jesús Saá-Requejo

NBER Working Paper No. 5489

March 1996

Asset Pricing

It is often useful to price assets and other random payoffs by referring to other observed prices, rather than constructing full-fledged economic asset pricing models. This approach breaks down if one cannot find a perfect replicating portfolio. We impose weak economic restrictions to derive useful tight bounds on asset prices in this situation. The bounds basically rule out high Sharpe ratios—“good deals”—as well as arbitrage opportunities. We present the method of calculation; we extend it to a multi-period context by finding a recursive solution; and we apply it to option pricing examples, including the Black–Scholes setup with infrequent trading, and a model with stochastic stock volatility and a varying riskfree rate.

Costly Pollution Abatement, Competitiveness, and Plant Location Decisions

James R. Markusen

NBER Working Paper No. 5490

March 1996

JEL Nos. F23, Q20

International Trade and Investment

The U.S.–Mexico free trade debate included some theoretical assertions that then were used as arguments against trade and investment liberalization: 1) Trade liberalization increases the degree to which production is relocated internationally in response to environmental restrictions (“environmental dumping”?). 2) Investment liberalization, leading to multinational firms, similarly increases the production and welfare response to costly environmental restrictions.

This paper adapts an oligopoly model, in which multinationals can arise endogenously, to examine these arguments. The findings are: 1) Trade liberalization increases production sensitivity to costly environmental restrictions, but arguments against liberal trade on welfare grounds do not follow. 2) Multinationals do not increase the production-reallocation effect caused by environmental restrictions or regulations. The interfirm reallocation of production by competitive market forces in the absence of multinationals is slightly larger than the intrafirm reallocation when multinationals are present. In addition, I find that the *form* taken by cost increases is crucial: restrictions that fall on fixed costs (for example, more efficient burners and motors) have much smaller effects on production and welfare than restrictions that fall on marginal costs (for example, cleaner fuels).

Globalization and Inequality Then and Now: The Late 19th and Late 20th Centuries Compared

Jeffrey G. Williamson

NBER Working Paper No. 5491
March 1996
Development of the American Economy, International Trade and Investment

The late-19th and the late-20th century shared more than simply globalization and convergence. Globalization also seems to have had an impact in both centuries on income distribution: in the late-19th century, inequality rose in rich countries and fell in poor countries; according to Adrian Wood, the same was true of the late-20th century. Furthermore, while both George J. Borjas and Wood think that globalization accounted for something like one-third to one-half of the rise in inequality in America and other OECD countries since the 1970s, evidence from the late-19th century suggests at least the same effect from globalization, perhaps more. However, those modern economists who favor an explanation of rising inequality coming from (unskilled)-labor-saving technological change will be pleased to learn that technological change probably accounted for more than a third of the rising inequality in the New World, and for more than a half of the falling inequality in Europe. It also appears that the inequality trends that globalization produced prior to World War I were at least partly responsible for the interwar retreat from globalization. Will the world economy of the next century also retreat from its commitment to globalization because of its side effect on inequality?

Cross-State Variation in Medicaid Programs and Female Labor Supply

Edward Montgomery and John Navin

NBER Working Paper No. 5492
March 1996
JEL Nos. J22, J16
Health Economics, Labor Studies

Although the Medicaid program is controlled partially by the federal government, there is considerable latitude in the ability of states to set eligibility requirements and the types of services available to recipients. This paper examines the impact of different state Medicaid programs on the decision to enter the labor force, and on the number of hours worked by female heads of households. We use a pooled cross-section dataset constructed from the 1988-93 March Supplement of the Current Population Survey to test if different benefit levels across states affect labor supply behavior. This study adds to the existing Medicaid literature by incorporating new benefit measures and by explicitly controlling for state random and fixed effects. Ordinary-least-squares results support the prediction that Medicaid expenditures reduce labor supply. Controlling for state fixed or random effects alters the effect of both the AFDC and Medicaid programs on the decision to participate and the number of hours worked by female heads of households. We also consider the effects of policy endogeneity on these estimates using instruments for the generosity of state welfare. We find that estimates of the effect of welfare on labor supply are sensitive to the failure to control for time-varying policy endogeneity.

Compensation Structure and Product Market Competition

John M. Abowd and Laurence Allain

NBER Working Paper No. 5493
March 1996
JEL Nos. J30, J51
Labor Studies

The inability to measure the opportunity cost of labor has plagued analyses of firm-level compensation policies for many years. Using a newly constructed dataset of French workers and firms, we estimate the opportunity cost of the employees' time, based on a measure of the person-effect in the wage equations (derived from Abowd, Kramarz, and Margolis, 1994). Then, using a representative sample of private French firms, we directly calculate the quasi-rent per worker at each firm and the conditions within that firm's product market, as measured by international prices. We find that quasi-rents per worker are only mildly related to the structure of the French product market. The systematic variation in our quasi-rents is related to international market prices and the structure of the work force, however, which produces an estimate of bargaining power for the employees of about 0.4. This estimate, while slightly larger than other estimates, may be quite reasonable for the workers in an economy in which the vast majority of jobs are covered by industry-level collective bargaining agreements.

Determinants of Privatization Prices

Florencio López-de-Silanes

NBER Working Paper No. 5494
March 1996
Corporate Finance, Public Economics

Generating government revenue is a common objective in privatization. This paper asks: *what determines privatization prices?* Answering this query will help resolve the current controversies about the relevance of speed and the role of government actions prior to privatization. The data, gathered from primary sources, encompass 361 privatized Mexican companies in 49 four-digit industry codes. The determinants of auction privatization prices are divided into three groups: 1) company performance and industry parameters; 2) the auction process and its requirements; and 3) the prior restructuring actions taken by the government. Controlling for company and industry effects reveals that the costs and characteristics of the labor force have a significant impact. Minority control packages carry large discounts. Auction requirements that allow foreign investors result in higher sale premiums, while restrictions constraining participation or forms of payment reduce net prices. The speed of privatization substantially influences net prices: the longer it takes to put the company on the block, the more severe the deterioration in performance, and the lower the premium obtained. Presale reductions in labor force, and particularly the firing of CEOs, lead to significantly higher premiums. Debt absorption, investment, and performance improvement programs do not increase the net price, while deinvestment measures prove more beneficial. Overall, the results show increased premiums for government actions that stimulate bidder participation and expedite the privatization process.

Explaining Domestic Content: Evidence from Japanese and U.S. Auto Production in the United States

Deborah L. Swenson

NBER Working Paper No. 5495

March 1996

International Trade and Investment

This paper studies the domestic content decisions of automakers in the United States between 1984 and 1993, using foreign trade zone activity as a tool by which one can observe individual sourcing and production. The results show that although the domestic content of Japanese firms is rising, differences are not being eliminated completely. Also, the apparent elasticity of substitution is lower for Japanese than for U.S. firms. These results suggest that although transplant production may reduce the U.S. automotive deficit with Japan, transplant production will not cause its elimination.

Rational Capital Budgeting in an Irrational World

Jeremy C. Stein

NBER Working Paper No. 5496

March 1996

Asset Pricing, Corporate Finance

This paper addresses the following basic capital budgeting question: if cross-sectional differences in stock returns can be predicted based on variables other than beta (for example, book-to-market), and this predictability reflects market irrationality rather than compensation for fundamental risk, how should companies determine hurdle rates? I show how factors such as managerial time horizons and financial constraints affect the optimal hurdle rate. Under some circumstances, beta can be useful as a capital budgeting tool, even if it

is of no use in predicting stock returns.

Getting Pegged: Comparing the 1879 and 1925 Gold Resumptions

Michael D. Bordo and Tamim Bayoumi

NBER Working Paper No. 5497

March 1996

JEL Nos. F31, E42, N10

Development of the American Economy, International Finance and Macroeconomics, Monetary Economics

We compare the resumption of convertibility of currency into gold by the United States in 1879 and Britain in 1925 to ascertain the degree to which the outcomes reflected differences in strategies adopted by the authorities versus the external environment. We conclude that external factors were the most important determinant of the very different outcomes of the two episodes.

Pricing Strategy and Financial Policy

Sudipto Dasgupta and Sheridan Titman

NBER Working Paper No. 5498

March 1996

JEL Nos. G31, G32

Corporate Finance, Industrial Organization

Recent empirical evidence indicates that changes in capital structure affect pricing strategies. In most cases, prices increase after the implementation of a leveraged buy-out of a major firm in an industry, with the more levered firm charging higher prices on average. Notable exceptions exist when rival firms are relatively unlevered. The first observation is consistent with a relatively simple model in which firms compete for market share on the basis of price. To explain the second observations (that is, the

exceptions), the model must be extended to allow for reputation effects related to product quality. The extended model illustrates how product market imperfections in combination with high leverage can make firms vulnerable to predatory pricing.

Cash Flow and Investment: Evidence from Internal Capital Markets

Owen Lamont

NBER Working Paper No. 5499

March 1996

JEL Nos. G30, E44

Corporate Finance, Industrial Organization, Monetary Economics

Using data from the 1986 decrease in oil prices, I examine the capital expenditures of nonoil subsidiaries of oil companies. I test the joint hypothesis that a decrease in cash/collateral decreases investment (if the profitability of investment is fixed), and the finance costs of different parts of the same corporation are interdependent. My results support this joint hypothesis: oil companies significantly reduced their nonoil investment compared to the median industry investment. The 1986 decline in investment was concentrated in non-oil units that had been subsidized by the rest of the company in 1985.

Implied Volatility Functions: Empirical Tests

Bernard Dumas, Jeff Fleming, and Robert E. Whaley

NBER Working Paper No. 5500

March 1996

JEL Nos. G12, G13

Asset Pricing

Black and Scholes (1973) implied volatilities tend to be related systematically to the exercise price and time to expiration of an option. Derman and Kani (1994), Du-

pire (1994), and Rubinstein (1994) attribute this behavior to the fact that the Black-Scholes assumption of constant volatility is violated in practice. These authors hypothesize that the volatility of the underlying asset's return is a deterministic function of the asset price and time; they develop the deterministic volatility function (DVF) option valuation model, which has the potential of fitting the observed cross section of option prices exactly. Using a sample of S&P 500 index options from June 1988 through December 1993, we evaluate the economic significance of the implied DVF by examining the predictive and hedging performance of the DV option valuation model. We find that its performance is worse than that of an ad hoc Black-Scholes model with variable implied volatilities.

Estimating the Productivity of Research and Development: An Exploration of GMM Methods Using Data on French and U.S. Manufacturing Firms

Jacques Mairesse and Bronwyn H. Hall

NBER Working Paper No. 5501

March 1996

Productivity

We present a comparative study of the contribution of R and D to firm-level productivity in French and U.S. manufacturing firms in the 1980s. The study uses two large panels of approximately 1000 manufacturing firms covering over half of all R and D spending in each country, and focuses on the estimation and interpretation of the relationship between output growth and the growth of R and D investment in the presence of simultaneity and firm heterogeneity. We use generalized-method-of-

moments methods to control for both sources of estimation bias, and we find overall that the contribution of R and D to sales productivity growth appears to have declined during the 1980s, and that the role of simultaneity bias is higher in the United States than in France, possibly reflecting the greater importance of liquidity constraints for R and D investment in that country.

Reflections on Ricardian Equivalence

Robert J. Barro

NBER Working Paper No. 5502

March 1996

JEL Nos. H6, E6

Economic Fluctuations and Growth, Public Economics

The Ricardian equivalence proposition for public debt in my 1974 *Journal of Public Economics* paper is related to the discussions in Ricardo's *Funding System*, Smith's *Wealth of Nations*, and a number of treatments in macroeconomics from the 1950s to the 1970s. Useful extensions of the basic invariance proposition involve tax smoothing (in the context of distorting taxation), and the determinants of the maturity and other characteristics of the debt structure (in an environment of uncertainty).

Labor Productivity: Structural Change and Cyclical Dynamics

Martin Neil Baily, Eric J. Bartelsman, and John C. Haltiwanger

NBER Working Paper No. 5503

March 1996

Economic Fluctuations and Growth

A long-standing puzzle of empirical economics is that average labor productivity declines during recessions and increases during booms.

This paper provides a framework for assessing the empirical importance of competing hypotheses in explaining the observed procyclicality. For each competing hypothesis, we derive the implications for cyclical productivity conditional on expectations of future demand and supply conditions. The novelty of this paper is that we exploit the tremendous heterogeneity in *long-run* structural changes across individual plants in order to identify the *short-run* sources of procyclical productivity. Our findings favor an adjustment-cost model that involves a productivity penalty for downsizing as the largest source of procyclical labor productivity.

Adoption of Financial Technologies: Implications for Money Demand and Monetary Policy

Casey B. Mulligan and Xavier X. Sala-i-Martin

NBER Working Paper No. 5504

March 1996

JEL Nos. E40, E41, E44

Monetary Economics

In this paper we argue that the relevant decision for the majority of U.S. households is not the fraction of assets to be held in interest-bearing form, but whether to hold any such assets at all (we call this "the decision to adopt" the financial technology). We show that the key variable governing the adoption decision is the product of the interest rate times the total amount of assets. The implication is that, instead of studying money demand using time series and looking at historical interest rate variations, we can look at a cross section of households and analyze variations in the amount of assets held. We can use this methodology to estimate the interest elasticity of mon-

ey demand at interest rates close to zero.

We find that: 1) the elasticity of money demand is very small when the interest rate is low; 2) the probability that a household holds any amount of interest-bearing assets is related positively to the level of financial assets; and 3) the cost of adopting financial technologies is related positively to age and negatively to the level of education. The finding that the elasticity is very small for interest rates below 5 percent suggests that the welfare costs of inflation are small.

We also find that at interest rates of 6 percent, the elasticity is close to 0.5. We find that roughly one-half of this elasticity can be attributed to the Baumol-Tobin or intensive margin and half of it can be attributed to the new adopters or extensive margin. The intensive margin is less important at lower interest rates and more important at higher interest rates.

Technical Trading Rule Profitability and Foreign Exchange Intervention

Blake LeBaron

NBER Working Paper No. 5505

March 1996

Asset Pricing

There is reliable evidence that simple rules used by traders have some predictive value over the future movement of foreign exchange prices. This paper reviews some of this evidence and discusses the economic magnitude of this predictability. It then analyzes the profitability of these trading rules in connection with central bank activity, using intervention data from the Federal Reserve. The objective is to learn the extent to which foreign exchange predictability can be confined to periods of central bank ac-

tivity in the foreign exchange market. The results indicate that after removing periods in which the Federal Reserve is active, exchange rate predictability is reduced dramatically.

R and D, Production Structure, and Productivity Growth: A Comparison of the U.S., Japanese, and Korean Manufacturing Sectors

M. Ishaq Nadiri and Seonjun Kim

NBER Working Paper No. 5506

March 1996

JEL Nos. H52, C32, L6

Productivity

We estimate and compare the production structures of the U.S., Japanese, and Korean total manufacturing sectors for 1974-90. We use a translog variable cost function that includes such inputs as labor, materials, and physical and R and D capital, with the latter treated as quasi-fixed subject to adjustment costs. We estimate markups, returns to scale, rates of return on physical and R and D capital, and technical change. We also identify the sources of the growth of output, labor productivity, and total factor productivity (TFP). Our results show that resource accumulation, not technical change, is the key factor in rapid output growth. Further, R and D capital and technical change have been major contributors to TFP growth in U.S. and Japanese manufacturing, but not in the Korean manufacturing sector.

Inflation Targeting in a St. Louis Model of the 21st Century

Robert G. King and Alexander L. Wolman

NBER Working Paper No. 5507

March 1996

Economic Fluctuations and Growth

Inflation targeting is a monetary policy rule that has implications for both the average performance of an economy and its business cycle behavior. We use a modern, rational expectations model to study the twin effects of this policy rule. The model highlights forward-looking consumption and labor supply decisions and forward-looking investment and price-setting decisions by firms. In the model, monetary policy has real effects because imperfectly competitive firms are constrained to adjust prices only infrequently and to satisfy all demand at posted prices.

In this "sticky price" model, the average rate of inflation also has effects on the amount of time that individuals must devote to shopping, and on the average markup of price over cost that firms can charge. However, in terms of the welfare effects of long-run inflation, it is optimal to set monetary policy so that the nominal interest rate is close to zero, replicating in an imperfectly competitive model the result that Friedman found under perfect competition.

A perfect inflation target has desirable effects on the response of the macroeconomy to permanent shocks to productivity and money demand. Under such a policy rule, the monetary authority makes the money supply evolve so a model with sticky prices behaves much like one with flexible prices.

Fixed Costs: The Demise of Marginal q

Ricardo J. Caballero and John V. Leahy

NBER Working Paper No. 5508

March 1996

JEL No. E22

Economic Fluctuations and Growth

The standard version of q theory, in which investment is related

positively to marginal q , breaks down in the presence of fixed costs of adjustment. With fixed costs, investment is a nonmonotonic function of q . Therefore its inverse, which is the traditional investment function, does not exist. Depending upon auxiliary assumptions, the correlation between investment and marginal q can be either positive or negative. Given certain homogeneity assumptions, a version of the theory based on *average* q still holds, although under the same assumptions profits and sales perform as well as average q . More generally, q is no longer a sufficient statistic.

The Smoot-Hawley Tariff: A Quantitative Assessment

Douglas A. Irwin

NBER Working Paper No. 5509

March 1996

JEL Nos. N72, C68, F13

Development of the American Economy, International Trade and Investment

In the two years after the imposition of the Smoot-Hawley tariff in June 1930, the volume of U.S. imports fell by more than 40 percent. To what extent can this collapse in trade be attributed to the tariff itself versus other factors, such as declining income or foreign retaliation? Partial and general equilibrium assessments indicate that the Smoot-Hawley tariff itself reduced imports by 4-8 percent (*ceteris paribus*), although the combination of specific duties and deflation further raised the effective tariff and reduced imports by an additional 8 to 10 percent. A counterfactual simulation suggests that nearly a quarter of the observed 40 percent decline in imports can be attributed to the rise in the effective tariff (that is, Smoot-Hawley plus deflation).

Log-Rolling and Economic Interests in the Passage of the Smoot-Hawley Tariff

Douglas A. Irwin and Randall S. Kroszner

NBER Working Paper No. 5510

March 1996

JEL Nos. D72, F13, N72

Development of the American Economy, International Trade and Investment

We analyze Senate roll-call votes concerning tariffs on specific goods in order to understand the economic and political factors that influenced the passage of the Smoot-Hawley Tariff Act of 1930. Contrary to recent studies emphasizing the partisan nature of the congressional votes, our reading of the debates in the *Congressional Record* suggests that the final, party line voting masks a rich vote-trading dynamic. We estimate a logit model of specific tariff votes that permits us to identify both important influences of specific producer beneficiaries in each senator's constituency and log-rolling coalitions among senators with otherwise unrelated constituency interests that succeeded in raising tariff rates.

Second-Best Pollution Taxes

Don Fullerton

NBER Working Paper No. 5511

March 1996

JEL Nos. H23, Q28

Public Economics

When government needs more revenue than is generated by a pollution tax rate equal to marginal environmental damage, intuition suggests raising the tax on the clean good above zero and raising the tax on the dirty good above the first-best Pigouvian rate. Yet new results suggest that the second-best pollution tax is below the Pigouvian rate. This paper reconciles these views by showing that these new

results use a labor tax to acquire additional revenue, and that the labor tax is equivalent to a uniform tax on both clean and dirty goods. Thus, depending on the normalization, the total tax on the dirty good can be above the Pigouvian rate. These recent results are meant to show that the *difference* between the tax on the dirty good and the tax on the clean good is less than the Pigouvian rate. Any one tax rate can be set to zero as a conceptual matter, but implementation of some taxes might be easier than implementation of others as a practical matter.

Social Security Privatization: A Structure for Analysis

Olivia S. Mitchell and Stephen P. Zeldes

NBER Working Paper No. 5512

March 1996

JEL Nos. H55, E62, J26, G23

Aging, Public Economics

This paper identifies the key economic issues that must be addressed in the debate over a privatized social security system. We examine a two-pillar plan: The first pillar consists of a "demogram," that is, a small indexed pension of the same dollar amount for all retirees who had contributed to the system over a full lifetime of work. The second pillar consists of a fully funded, individual defined-contribution account, financed by payroll taxes, held in financial institutions, and directed by participants. We explore how such a system would affect the risks that households face, how it would alter the distribution of income, and how it might influence household behavior, including the incentives to work and save, and choices about portfolios. We also examine such macroeconomic issues as how the

transition to a private plan would occur, and what the likely effects would be on national saving.

We conclude that a two-pillar system offers several positive features, including a reduction in political risk, an increase in household portfolio choice, and improved work incentives. Its disadvantages include less tendency to redistribute income and less national risksharing, and increased administrative costs.

Tax Principles and Capital Inflows: Is It Efficient to Tax Nonresident Income?

Assaf Razin, Efraim Sadka, and Chi-Wa Yuen

NBER Working Paper No. 5513

March 1996

JEL Nos. F21, H20

International Finance and Macroeconomics

Even though financial markets today show a high degree of integration, the world capital market is still far from the textbook story of high capital mobility. The failure to have a tax scheme in which the rates of return across countries are equated can result in inefficient capital flows across countries. This is a result of the interaction of market failure and the tax system. The purpose of this paper is to highlight some key sources of market failure in the context of international capital flows, and to provide guidelines for efficient tax structure in the presence of capital market imperfections.

We distinguish among three main types of international capital flows: foreign portfolio debt investment, foreign portfolio equity investment, and foreign direct investment. We emphasize the efficiency of a nonuniform tax treatment of the various vehicles of international capital flows.

Implicit Budget Deficits: The Case of a Mandated Shift to Community-Rated Health Insurance

David F. Bradford and Derrick A. Max

NBER Working Paper No. 5514

March 1996

Public Economics, Health Care

Since the economic effect of a typical regulatory mandate is equal to that of a combination of an expenditure program and a tax program, observers often have suggested that it would serve consistent public policy to bring regulatory decisions into the same budgetary framework. This paper concerns an important example of a regulatory program that would mimic deficit financing in effecting a transfer of fiscal burdens toward younger and future generations: the mandated purchase of (or provision by employers of) health care insurance under a system of community rating, under which the same price is charged for health insurance for all comers, regardless of age, sex, or health condition. Such a shift would result in redistributions of burdens across birth cohorts, in this case from existing, especially middle-aged, birth cohorts toward young and future generations. Using data from a variety of sources, we conclude that the effect would be substantial. For our central-case assumptions about discount, health care cost, and productivity growth rates, and about the locus of responsibility for paying health care bills, a shift to community rating is estimated to generate gains for people over age 30 in 1994, for example \$16,700 per person aged 50, at a cost to younger cohorts. Those born in 1994 would acquire an extra payment obligation with a discounted value of \$7100 each. The burden passed

along to future generations can be described by a \$9300 per capita tax at birth (growing with productivity). The analysis makes clear that the regulatory policy shift, with no direct budgetary implications, would have an intergenerational transfer effect comparable to what would be considered a major change in on-budget tax or transfer programs.

U.S. Imports, 1972-94: Data and Concordances

Robert C. Feenstra

NBER Working Paper No. 5515

March 1996

International Trade and Investment

This paper describes data on U.S. imports from 1972-94, classified according to the Tariff Schedule of the U.S. Annotated (TSUSA), Harmonized System (HS), Standard International Trade Classification (SITC, Revisions 2 and 3), and Standard Industrial Classification (SIC, 1972 basis), along with various concordances. All of these datasets are disaggregated by the source country for imports. These data are available on the CD-ROM: "NBER Trade Database, Disk 1: U.S. Imports, 1972-94," which can be ordered for \$50 from the Publications Department, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138. The TSUSA and HS import data are at the most disaggregated level collected by the U.S. Census, and will be particularly useful for research on antidumping cases. The SITC import data will be valuable for those wanting to compare U.S. trade flows at a more aggregate level with comparable data for other countries. The SIC import data will be particularly useful for those wanting to study the effects of import competition on U.S. industries. A summary of the SIC data, which does not contain the

source country detail and incorporates earlier years, is available via anonymous FTP from:

nber.harvard.edu/pub/feenstra

A second CD-ROM, containing U.S. export data, will be released later in 1996.

Measuring U.S. International Goods and Services Transactions

**Robert E. Baldwin and
Fukunari Kimura**

NBER Working Paper No. 5516

March 1996

JEL Nos. F1, J3

International Trade and Investment

In order to better capture the close relationship between firms' cross-border trading activities and the sales and purchasing activities of their foreign affiliates, we propose supplementary accounting formats that classify those activities on an ownership basis, in contrast to the residency approach followed in the balance-of-payments accounts. One format combines net cross-border sales by Americans to foreigners, net sales by foreign affiliates of U.S. firms to foreigners, and net sales of U.S. firms to U.S. affiliates of foreign firms, to yield a figure that indicates net sales by Americans to foreigners. Another accounting format measures the value added embodied in cross-border and foreign affiliate activities on an ownership basis. We present and analyze U.S. cross-border and foreign affiliate activities based on these two approaches for 1987-92. In addition, we present data by industry in these formats.

Fiscal Policy and Monetary Union: Is There a Trade-Off Between Federalism and Budgetary Restrictions?

**Barry Eichengreen and
Jürgen von Hagen**

NBER Working Paper No. 5517

March 1996

JEL Nos. E6, F3

International Finance and
Macroeconomics

The Maastricht Treaty on European Union (EU) features an "Excessive Deficit Procedure" limiting the freedom to borrow of governments participating in the European Monetary Union. One justification is to prevent states from overborrowing and demanding a bailout that could divert the European Central Bank from its pursuit of price stability. We challenge this rationale. Using data for a cross section of federal states, we show that there is no association between monetary union and restraints on borrowing by subcentral governments. There is, however, an association between fiscal restraints and the share of the tax base under the control of subnational authorities. Restraints are prevalent where subcentral governments finance a relatively small share of spending with their own taxes. Lacking control of the tax base, such governments cannot be expected to resort to increased taxation to deal with debt crises.

Prohibiting borrowing by subcentral governments will not eliminate the demand for tax smoothing and public investment. Governments whose ability to provide such services is limited therefore may pressure the central government to borrow for them. We report evidence that the financial position of central governments is more fragile where subcentral jurisdictions are prevented from borrowing.

The implications for the EU are

direct. That EU member states control their own taxes should strengthen the hand of authorities seeking to resist pressure for a bailout. In the longer run, however, borrowing restraints may weaken the financial position of Brussels, transferring bailout risk from the member states to the EU itself.

The Effects of Industry Structure on Economic Exposure

Richard C. Marston

NBER Working Paper No. 5518

March 1996

JEL No. F3

International Finance and Macroeconomics

A firm is subject to "economic exposure" if changes in exchange rates affect value, as measured by the present value of its future cash flows. This paper shows that in many forms of competition, including the most commonly studied case of monopoly, the economic exposure of an exporting firm is simply proportional to the firm's net revenues based in foreign currency. So the firm's hedging strategy is simple: sell foreign currency futures equal to the value of its net revenues in foreign currency. This simple result breaks down under some, but not all, forms of competition between the exporting firm and local firms. In that case, the exporting firm needs to know about the price elasticity of its product demand and its marginal cost in order to assess its exposure to exchange rates. So its hedging strategy also requires detailed knowledge of demand and cost conditions. The key determinant of economic exposure, therefore, is the competitive structure of the industry in which a firm operates.

Problems in the Measurement and Performance of Service-Sector Productivity in the United States

Robert J. Gordon

NBER Working Paper No. 5519

March 1996

JEL Nos. O40, O47

Productivity

Not only has U.S. productivity been poor by international standards, but it is highly heterogeneous at the disaggregated industry level. Manufacturing has continued to do well while nonmanufacturing has done poorly, especially the services. Within services, apparel retailing has done well while food retailing has done badly; railroad productivity has accelerated while airline productivity has decelerated. This dispersion of performance argues against a single overarching explanation of the slowdown.

The recent shift to chain-weighted productivity measures substantially increases the magnitude of the U.S. productivity slowdown and shifts it later in time. Performance in the 1970s is better than previously thought, while performance in the 1990s has been substantially worse. In addition, productivity performance in each decade has been understated because of an upward bias in the Consumer Price Index (CPI). This "CPI bias" has led to an uneven understatement of productivity change, with major errors in manufacturing, trade, and some services.

The paper emphasizes two substantive causes of the productivity slowdown that go beyond measurement errors. First, some industries (for example, electric utilities and airlines) reached a technological frontier in which the sources of earlier rapid productivity growth were exhausted. Second, slow pro-

ductivity growth in food retailing and some service industries reflects a feedback from the weak bargaining position of U.S. labor. Weak unions, a falling real minimum wage, and immigration have combined to keep real wages in U.S. service industries relatively low, and this encourages overhiring by the standards of some other industrial nations.

Disinflation and the NAIRU

Laurence M. Ball

NBER Working Paper No. 5520

March 1996

JEL Nos. E31, E32, J60

Economic Fluctuations and Growth, Monetary Economics

This paper asks why the natural rate of unemployment (NAIRU) rose in most OECD countries during the 1980s. I find that one central cause was tight monetary policy, which was used to reduce inflation. In cross-country comparisons, countries with larger decreases in inflation and longer disinflationary periods have larger rises in the NAIRU. Imperfections in the labor market have little direct relationship to changes in the NAIRU, but long-term unemployment benefits magnify the effects of disinflation. These results support "hysteresis" theories of unemployment.

Are Brothers Really Better? Sibling Sex Composition and Educational Achievement Revisited

Robert Kaestner

NBER Working Paper No. 5521

April 1996

JEL Nos. I21, J13

Labor Studies

In this paper, I examine the relationship between the sex of siblings and educational achievement.

First, I replicate Butcher and Case's 1994 study using data on a more recent birth cohort. Contrary to the findings of that study, I find basically no effect of sibling sex on the educational attainment of white males or females, although among black adults, those who grew up with a sister, or who had relatively more sisters, had greater levels of educational attainment than persons with no or fewer sisters. Second, I broaden the analysis by examining the educational outcomes of children and teenagers. This extension is important because it provides an additional opportunity to test for the effect of siblings' sex, and it helps to differentiate among potential causes of a "sibling sex composition effect." My results from the analysis of children and teens suggest that sibling sex had little effect on educational achievement. The only group affected was black teens between the ages of 15 and 18. Those who grew up with sisters had higher levels of educational achievement than those who grew up with brothers.

The Effects of Income and Wealth on Time and Money Transfers Between Parents and Children

**Joseph G. Altonji,
Fumio Hayashi, and
Laurence J. Kotlikoff**

NBER Working Paper No. 5522

April 1996

Aging, Labor Studies, Public Economics

We use the 1988 Panel Study of Income Dynamics to study the effects of income and wealth on transfers of money and time between individuals and their parents, and the effects of other relatives' incomes on these flows. We relate the relative incomes of parents and parents-in-law to the amounts of transfer given and re-

ceived by married couples. We also study how the relative incomes of divorced parents influence transfers. We find that money transfers tend to reduce inequality in household incomes, and that time transfers are related only weakly to income differences. Richer siblings give more to parents and receive less. Among parents and parents-in-law, the richer set is more likely to give money and less likely to receive money. The same is true of divorced parents. In contrast to the implications of simple exchange models of transfers, there is little evidence in the cross section or in the analysis using siblings that parental income or wealth raises time transfers from children, or that time transfers are exchanged for money transfers. In the cross section and among siblings, the strong negative relationship between time transfers and distance from parents is not associated with a strong negative relationship between distance and money transfers. We discuss the implications of our results for alternative models of transfers.

The 1995 NRC Ratings of Doctoral Programs: A Hedonic Model

**Ronald G. Ehrenberg and
Peter J. Hurst**

NBER Working Paper No. 5523

April 1996

JEL No. I21

Labor Studies

We describe how to use multivariate regression models along with data collected by the National Research Council as part of its recent ranking of doctoral programs (*Research-Doctorate Programs in the United States: Continuity and Change*) to analyze the influence of program size, faculty seniority and research productivity, and faculty

productivity in producing doctoral degrees on subjective ratings of doctoral programs in 35 academic fields. Using data for economics, we illustrate how university administrators can use the models to compute the impact of changing the number of faculty positions allocated to the field on the programs' ranking. Finally, we illustrate how administrators can "decompose" the differences between a department's rating and the ratings of a group of higher-ranked departments in the field into the difference attributable to faculty size, faculty seniority, faculty research productivity, and faculty productivity in producing doctoral students. This decomposition suggests the types of questions that a department and a university should be addressing if they are serious about wanting to improve the department's ranking.

Public Policy and Youth Smokeless Tobacco Use

**Frank J. Chaloupka,
Michael Grossman, and
John A. Tauras**

NBER Working Paper No. 5524

April 1996

JEL No. I2

Health Economics

While much is known about the effects of prices and tobacco control policies on cigarette smoking, relatively little is known about their impact on the use of smokeless tobacco. This paper addresses these issues using data taken from the 1992, 1993, and 1994 Monitoring the Future Surveys on the use of smokeless tobacco by adolescent males. We add site-specific data on the smokeless tobacco tax and several measures of limits on youth access to tobacco products to the survey data. We use ordered probit methods to examine the impact of

prices and tobacco control policies on the frequency of smokeless tobacco use among young males. We estimate comparable two-part models for participation in smokeless tobacco use and for conditional smokeless tobacco demand. The estimates indicate that increases in taxes on smokeless tobacco would lead to significant reductions in both the number of young men using it and in the frequency of use. The average estimated price elasticity of smokeless tobacco participation for adolescent males is -0.4 , while the overall average estimated price elasticity of demand is -0.65 . In addition, strong limits on youth access to smokeless tobacco products are effective in reducing both participation in the use of smokeless tobacco and the frequency of use by young males.

Labor Market Responses to Rising Health Insurance Costs: Evidence on Hours Worked

**David M. Cutler and
Brigitte C. Madrian**

NBER Working Paper No. 5525

April 1996

JEL Nos. I11, J32

Aging, Labor Studies, Public Economics

Increases in the cost of providing health insurance must have some effect on labor markets, either in lower wages, changes in the composition of employment, or both. Despite a presumption that most of this effect will be in the form of lower wages, this paper documents a significant effect on work hours as well. Using data from the Current Population Survey and the Survey of Income and Program Participation, we show that rising health insurance costs over the 1980s increased the hours worked of those with health insurance by up to 3 percent. We argue

that this occurs because health insurance is a fixed cost, and as it becomes more expensive to provide, firms face an incentive to substitute hours per worker for the number of workers employed.

The Significance of International Tax Rules for Sourcing Income: The Relationship Between Income Taxes and Trade Taxes

John Mutti and Harry Grubert

NBER Working Paper No. 5526

April 1996

JEL No. F1

International Trade and Investment

This paper examines how rules to determine the source of income internationally for tax purposes can have important effects on the form in which taxable income is reported and on the location of economic activity. In the case of U.S. law, two provisions are significant: allowing a portion of export income to be regarded as foreign source, and treating royalties received as foreign source. These source rules have become increasingly important because of tax policy changes adopted in the 1980s, and the growing role in U.S. production and trade of goods that require intangible intellectual property. In addition, very similar transactions can be carried out as trade in goods, trade in services, or production by a foreign affiliate; tax incentives can influence that choice. We demonstrate how the source rules operate and the incentives they create in a set of stylized calculations to determine aftertax returns under various assumptions about relevant income and withholding tax rates, tariffs, and the importance of tangible and intangible capital in production. We assess the empirical importance of

these provisions based on recent studies of the determinants of trade and investment by U.S. multinational corporations. The treatment of royalty income appears to encourage royalty payments from high tax countries and to promote real economic activity there.

Tax Avoidance and Value-Added Versus Income Taxation in an Open Economy

**Roger H. Gordon and
Soren Bo Nielsen**

NBER Working Paper No. 5527

April 1996

JEL Nos. H21, H26

Public Economics

Ignoring the possibilities of tax avoidance, a value-added tax (VAT) and a cash flow income tax have identical behavioral and distributional consequences. Yet the available means of tax avoidance under each are very different. Under a VAT, avoidance occurs through cross-border shopping; under an income tax, it occurs through shifting taxable income abroad. Given that avoidance exists, we show that a country would use both taxes in order to minimize the efficiency costs of avoidance, relying relatively more on the tax that is harder to avoid. We then use aggregated Danish tax and accounting data from 1992 to measure the amount of avoidance that occurred under the two taxes. While the estimates of avoidance are small, the figures imply that Denmark could reduce the real costs of avoidance by putting more weight on income taxes than value-added taxes.

Free Entry and Social Inefficiency in Radio Broadcasting

Steven Berry and
Joel Waldfogel

NBER Working Paper No. 5528

April 1996

JEL Nos. L13, L82

Law and Economics

In theory, free entry can lead to social inefficiency. When new products are substitutes for existing products, the business stolen from incumbents places a wedge between the private and the social benefits of entry. The business-stealing effect can be offset if entry reduces prices or increases the variety of available products. Our study of the radio industry provides one of the first empirical attempts to quantify the inefficiency associated with free entry. Using data on advertising prices, number of stations, and radio listening in 135 U.S. metropolitan markets, we estimate how listening and revenue vary with the number of stations. Assuming free entry, we infer the distribution of station costs, which are fixed with respect to listening. We then use our estimates of revenue and fixed costs to calculate the welfare of market participants (excluding listeners) and the number of stations under free entry and social optimality. Relative to the social optimum, the welfare loss of free entry is 40 percent of industry revenue. However, we calculate that the free entry equilibrium would be optimal if the marginal value of programming to listeners were over three times the value of marginal listeners to advertisers, who pay 4.5 cents per hour.

The Theory of Endowment, Intraindustry, and Multinational Trade

James R. Markusen and
Anthony J. Venables

NBER Working Paper No. 5529

April 1996

JEL Nos. F1, F2

International Trade and Investment

We consider a trade model combining a $2 \times 2 \times 2$ Heckscher–Ohlin structure, monopolistic competition, transport costs, and multinational corporations. We demonstrate how the mix of national and multinational firms that operate in equilibrium depends on technology and on the division of the world endowment between countries. Multinationals are more likely to exist as countries are more similar in both relative and absolute endowment. Where multinationals exist, they reduce the volume of trade, and raise world welfare (although not necessarily that of both countries). They also reduce the agglomeration forces that arise when international factor mobility is allowed.

Exchange Rate Dynamics and Learning

Pierre-Olivier Gourinchas
and Aaron Tornell

NBER Working Paper No. 5530

April 1996

International Finance and
Macroeconomics

Interest rate expectations are essential for exchange rate determination. Using a unique survey dataset on interest rate forecasts from 1986–95 for G-7 countries, we find that interest rate shocks were significantly more persistent in the sample than the market expected. This is consistent with the finding that changes in the forward rate reflect changes in exchange rate ex-

pectations. We then present a model of nominal exchange rate determination that rationalizes the forward discount puzzle and exhibits a delayed overshooting pattern: following a monetary expansion that reduces the domestic interest rate, there is a gradual depreciation of the exchange rate, followed by a gradual appreciation several months later. Delayed overshooting results from the interaction of *learning* about the current state of affairs and the intrinsic dynamic response of interest rates to monetary shocks, and the discrepancy between the actual distribution of shocks in the sample and its expectation by market participants. This discrepancy is consistent with rational expectations if there is a small sample or peso problem, or the true structure of the economy evolves over time, and agents are learning about it with some delay.

Intranational Versus International Trade: How Stubborn Are Nations in Global Integration?

Shang-Jin Wei

NBER Working Paper No. 5531

April 1996

JEL Nos. F02, F10, F13, F36

International Finance and
Macroeconomics, International Trade
and Investment

This paper examines the home country bias in the goods market among OECD countries. An average country imports about two-and-a-half times as much from itself as from an otherwise identical foreign country, after controlling for sizes of exporter and importer, their direct distance, geographic positions relative to the rest of the world, and a possible linguistic tie. If one believes that the substitutability among goods produced

in OECD countries is high, as seems reasonable, then the observed bias implies relatively small nontariff barriers. Over 1982-94, the home bias of OECD countries as a whole exhibited a slow but steady decline. The bias in a typical member country of the European Community relative to its imports from other member countries showed a 50 percent decline during the period.

Monetary Cohabitation in Europe

Torsten Persson and Guido Tabellini

NBER Working Paper No. 5532

April 1996

JEL Nos. E42, E52, F33, F42

International Finance and Macroeconomics

How can monetary policy in stage III of European Monetary Union be coordinated between the "ins" and the "outs"? This paper compares alternative institutional mechanisms, and concludes that a generalized system of inflation targets at the European level has several merits. It: 1) strengthens domestic credibility of monetary policy; 2) rules out deliberate attempts to gain competitiveness through devaluations; 3) forces monetary policy to respond automatically to various macroeconomic shocks, which is stabilizing for the real exchange rate; and 4) distributes these shocks symmetrically across countries. On the basis of a simple theoretical model of policy coordination, this paper shows that a system of inflation targets approximates an optimal policy of international cooperation. Preliminary empirical evidence supports these theoretical results.

Balanced Budget Rules and Public Deficits: Evidence from the U.S. States

Henning Bohn and Robert P. Inman

NBER Working Paper No. 5533

April 1996

JEL Nos. H61, H62, H74

Public Economics

Most states (Vermont is the exception) have a constitutional or statutory limitation on the ability to run deficits in the state's general fund. Balanced budget limitations may be either prospective, that is beginning-of-the-year, or retrospective, that is end-of-the-year, requirements. Using budget data from a panel of 47 U.S. states for 1970-91, we find that states with end-of-the-year balance requirements that are enforced as constitutional constraints by an independently elected state supreme court experience significant positive effects on their general funds' surpluses. The surpluses are accumulated through cuts in spending, not through tax increases. They are saved in a state "rainy day" fund in anticipation of future deficits in the general fund. In contrast, prospective requirements, statutory end-of-the-year requirements, or constitutional end-of-the-year requirements enforced by a politically appointed court do not constrain the deficit behavior of the general fund significantly. Finally, we find little evidence that the constraints "force" deficits into other fiscal accounts.

Technology and the Wage Structure

Steven G. Allen

NBER Working Paper No. 5534

April 1996

JEL Nos. O33, J31

Labor Studies

This paper reports on how re-

cent changes in technology are related to changes in wage differentials by schooling, experience, and gender. Wage differentials by industry in the full-year 1979 and 1989 Current Population Surveys are related to R and D intensity, use of high-tech capital, how recent the technology is, growth in total factor productivity, and growth of the capital-labor ratio. Returns to schooling are larger in industries that are intensive in R and D and high-tech capital. Technology variables account for 30 percent of the increase in the wage gap between college and high school graduates.

What Do Bureaucrats Do? The Effects of Performance Standards and Bureaucratic Preferences on Acceptance into the JTPA Program

James J. Heckman, Jeffrey A. Smith, and Christopher Taber

NBER Working Paper No. 5535

April 1996

Labor Studies

Bureaucratic performance standards are featured in many proposals to increase efficiency in government. These standards reward bureaucrats on the basis of measured outcomes. The performance standards system created under the Job Training Partnership Act (JTPA) of 1982 often is cited as a successful prototype. Under the JTPA system, local training centers receive monetary rewards based on the employment levels and wage rates attained by their trainees upon completion of the program. Critics of the JTPA performance standards system argue that it creates an incentive for program managers to encourage case workers to "cream-skim" the most employable applicants into the program.

We examine this issue by analyzing the determinants of acceptance into JTPA among applicants at a training center for which we have data on everyone who applied over a two-year period. We find that case workers prefer to accept the least employable applicants, rather than the most employable as suggested by the cream-skimming story. This evidence indicates that concerns about cream-skimming in JTPA may be exaggerated. Instead, the performance standards system may operate as a countervailing force against the preferences of case workers.

Using experimental data from the recent National JTPA Study, we also determine whether case workers accept those applicants with higher expected gains from the program. Our evidence only weakly supports this hypothesis.

Race Differences in Labor Force Attachment and Disability Status

**John Bound,
Michael Schoenbaum, and
Timothy Waidmann**

NBER Working Paper No. 5536
April 1996
JEL Nos. J15, J26
Labor Studies

We use the first wave of the Health and Retirement Survey to study the effect of health on the labor force activity of black and white men and women in their fifties. Our evidence confirms the notion that health is an extremely important determinant of early exit from the labor force. Our estimates suggest that health differences between blacks and whites can account for most of the racial gap in labor force attachment for men. For women, whose participation rates are comparable, our estimates

imply that blacks would be substantially more likely to work than whites if not for marked differences in health. We also find for both men and women that poor health has a substantially larger effect on labor force behavior for blacks. The evidence suggests that these differences result from black/white differences in access to the resources necessary for retirement.

Why Do More Open Economies Have Bigger Governments?

Dani Rodrik

NBER Working Paper No. 5537
April 1996
JEL Nos. H1, F15, E62
International Finance and
Macroeconomics, International Trade
and Investment, Public Economics

This paper demonstrates that there is a robust empirical association between the extent to which an economy is exposed to trade and the size of its government sector. This association holds for a large cross section of countries; in low- as well as high-income samples, and is robust to the inclusion of a wide range of controls. The explanation appears to be that government consumption plays a risk-reducing role in economies exposed to a significant amount of external risk. When openness interacts with explicit measures of external risk, such as terms-of-trade uncertainty and product concentration of exports, the interaction terms enter significantly, and the openness term loses its significance (or turns negative). This paper also demonstrates that government consumption is the "safe" activity, in the empirically relevant sense, in the vast majority of countries.

Does Inflation "Grease the Wheels" of the Labor Market?

David Card and Dean Hyslop

NBER Working Paper No. 5538
April 1996
JEL Nos. E31, J30
Economic Fluctuations and Growth,
Labor Studies, Monetary Economics

If nominal wages are rigid downward, then moderate levels of inflation may improve the efficiency of the labor market by facilitating cuts in real wages. In this paper, we test the hypothesis that downward changes in real wages occur more readily in higher-inflation environments. Using individual data on wage changes from two sources, we find that about 6-10 percent of workers experience nominally rigid wages in an environment with 10 percent inflation. This proportion rises to over 15 percent at a 5 percent inflation rate.

We use the assumption of symmetry to generate counterfactual distributions of real wage changes in the absence of rigidities. These counterfactual distributions suggest that a 1 percent increase in the inflation rate reduces the fraction of workers with downward-rigid wages by about 0.8 percent, and allows real wages to fall about 0.06 percent faster. A market-level analysis of the effects of nominal rigidities, based on wage growth and unemployment at the state level, is less conclusive. We find only a weak statistical relationship between the rate of inflation and the pace of relative wage adjustments across local labor markets.

Why Do People Dislike Inflation?

Robert J. Shiller

NBER Working Paper No. 5539

April 1996

JEL No. E31

Monetary Economics

I conducted a questionnaire survey to explore how people think about inflation, and what real problems they see it as causing. With results from 677 people, I compared people in the United States, Germany and Brazil; the young and the old; and economists and noneconomists. Among noneconomists in all countries, the largest concern with inflation appears to be that it lowers people's standard of living. Noneconomists often appear to believe in a sort of sticky-wage model, by which wages do not respond to inflationary shocks, which themselves are perceived as caused by certain people or institutions acting badly. This standard-of-living effect is not the only perceived cost of inflation among noneconomists: other perceived costs are tied up with issues of exploitation, political instability, loss of morale, and damage to national prestige. The most striking differences among the groups studied were between economists and noneconomists. There were also important international and intergenerational differences. The U.S.-Germany differences (on questions not simply about information) were usually less strong than the intergenerational differences.

Historical Factors in Long-Run Growth

Financing the American Corporation: The Changing Menu of Financial Relationships

Charles W. Calomiris and Carlos D. Ramirez

NBER Historical Paper No. 79

February 1996

JEL Nos. N21, N22, G32

The history of the financing of the American corporation can be described along many dimensions. One dimension is the range of feasible relationships between corporations and intermediaries.

Intermediaries (including commercial banks, investment banks, pensions, insurance companies, mutual funds, venture capitalists, and commercial paper dealers) provide alternative mechanisms for reducing "frictions," including communicating information, controlling the use of funds, and physically transacting with corporations, all of which arise from a corporation's financing needs. The menu of choices of financial relationship available to firms has varied over time. That changing menu has been the driving force behind the history of American corporate finance.

Changes in potential relationships sometimes have been dictated by conscious regulatory policy, and sometimes by "induced" private financial innovations. The peculiar fragmentation of financial intermediation in the United States has been a costly feature of American corporate finance history, which is traceable to regulatory distortions that limited particular kinds of relationships. In large part, the history of institutional change and

financial innovation in the United States has been the history of attempts to work around costly restrictions on relationships not faced by corporations in most other countries.

Long-Term Marriage Patterns in the United States from Colonial Times to the Present

Michael R. Haines

NBER Historical Paper No. 80

March 1996

Marriage in colonial North America was notable for being early (for women) and marked by a low percentage of individuals never marrying. This was different from the distinctive northwest European pattern of late marriage and high proportions never married by late in life. But the underlying neolocal family formation behavior was the same in both colonial North America and the areas of origin of this population. Thus, Malthus was correct: abundant resources, rather than basic behavioral differences, made early and extensive marriage possible in the colonies.

Between 1800 and the present there have been long cycles in nuptiality. Since about 1800, female age at first marriage rose from relatively low levels to a peak around 1900. Afterward, there was a gradual decline, with a trough reached around 1960 at the height of the baby boom. Then there began another rapid upswing in female age at first marriage. Proportions never married at ages 45-54 replicated these cycles with a lag of about 20-30 years. Since 1880 (when comprehensive Census data became available), male nuptiality patterns generally have paralleled those of women. Male marriage ages were higher than those of females, with proportions never mar-

rying also usually higher. Considerations of differentials by race and ethnicity are important in looking at the American experience over time. Black ages at first marriage, for example, have moved from being lower to being higher than those for whites. More work is needed on the period 1800 to 1880 for which we lack comprehensive Census, vital, and other data.

Two Views of the British Industrial Revolution

Peter Temin

NBER Historical Paper No. 81
March 1996

There are two views of the British Industrial Revolution in the literature today. The more traditional description, represented by the views of Ashton and Landes, sees the Industrial Revolution as a broad change in the British economy and society. This broad view of the Industrial Revolution has been challenged by Crafts and Harley, who see the Industrial Revolution as a much narrower phenomenon, the result of technical change in a few industries.

This paper tests these views using the Ricardian model of international trade with many goods. British trade data are used to implement the test and to discriminate between the two views of the Industrial Revolution.

Were Free Southern Farmers "Driven to Indolence" by Slavery? A Stochastic Production Frontier Approach

Elizabeth B. Field-Hendrey and Lee A. Craig

NBER Historical Paper No. 82
JEL No. N51
April 1996

Antebellum critics have argued

that slavery was responsible for the relative inefficiency of free southern farms. We examine this issue, using a stochastic production function, which allows us to distinguish between technological superiority and technical inefficiency, and controlling for crop mix, which we treat as endogenous. We find that although large plantations enjoyed a technological advantage, slave farms were less efficient than free northern farms but more efficient than free southern farms. In addition, free southern farms were significantly less efficient than comparable northern farms.

Technical Papers

On Biases in Tests of the Expectations Hypothesis of the Term Structure of Interest Rates

Geert Bekaert, Robert J. Hodrik, and David A. Marshall

NBER Technical Paper No. 191
January 1996
Asset Pricing

We document extreme bias and dispersion in the small-sample distributions of five standard regression tests of the expectations hypothesis of the term structure of interest rates. These biases are a result of the extreme persistence in short interest rates. We derive approximate analytic expressions for these biases, and then characterize the small-sample distributions of these test statistics under a simple, first-order, autoregressive data-generating process for the short rate. The biases are also present when

we model the short rate with a more realistic regime-switching process. The differences between the small-sample distributions of test statistics and the asymptotic distributions partially reconcile the different inferences drawn when alternative tests are used to evaluate the expectations hypothesis. In general, the test statistics reject the expectations hypothesis more strongly and uniformly when they are evaluated using the small-sample distributions, rather than the asymptotic distributions.

Forecast Evaluation and Combination

Francis X. Diebold and Jose A. Lopez

NBER Technical Paper No. 192
March 1996
JEL No. C5
Economic Fluctuations and Growth

It is obvious that forecasts are of great importance and are used widely in economics and finance. Quite simply, good forecasts lead to good decisions. The importance of forecast evaluation and combination techniques follows immediately: forecast users naturally have a keen interest in monitoring and improving forecast performance. More generally, forecast evaluation figures prominently in many questions in empirical economics and finance.

We provide selective account of forecast evaluation and combination methods. First we discuss evaluation of a single forecast, and in particular, evaluation of whether and how it may be improved. Second, we discuss the evaluation and comparison of the accuracy of competing forecasts. Third, we discuss whether and how a set of forecasts may be combined to produce a superior composite forecast. Fourth, we describe a number of

forecast evaluation topics of particular relevance in economics and finance, including methods for evaluating direction-of-change forecasts, probability forecasts, and volatility forecasts.

Instrument Relevance in Multivariate Linear Models: A Simple Measure

John Shea

NBER Technical Paper No. 193

March 1996

JEL Nos. C20, C30

Monetary Economics

The correlation between instruments and explanatory variables is a key determinant of the performance of the instrumental variables estimator. The R-squared form regressing the explanatory variable on the instrument vector is a useful

measure of relevance in univariate models, but can be misleading when there are multiple endogenous variables. This paper proposes a computationally simple partial R-squared measure of instrument relevance for multivariate models.

Exact Maximum Likelihood Estimation of Observation-Driven Econometric Models

Francis X. Diebold and Til Schuermann

NBER Technical Paper No. 194

April 1996

JEL No. C1

Economic Fluctuations and Growth

Is exact maximum likelihood estimation of many observation-driven models possible? Often, only approximate maximum likelihood

estimation is attempted, because the unconditional density needed for exact estimation is not known in closed form. Using simulation and nonparametric density estimation techniques that facilitate empirical likelihood evaluation, we develop a procedure for exact maximum likelihood estimation. We provide an illustrative application to the estimation of ARCH models, in which we compare the sampling properties of the exact estimator to those of several competitors. We find that, especially with small samples and high persistence, there are efficiency gains. We conclude with a discussion of directions for future research, including application of our methods to panel data models.

NBER Trade Data on CD-ROM

Robert C. Feenstra has created a CD-ROM with disaggregated data on U.S. imports from 1972-94, classified according to the Tariff Schedule of the U.S. Annotated (TSUSA), Harmonized System (HS), Standard International Trade Classification (SITC, Revisions 2 and 3), and Standard Industrial Classification (SIC, 1972 basis), along with various concordances. All of these datasets are disaggregated by the source country for imports. The CD-ROM: "NBER Trade Database, Disk 1: U.S. Imports, 1972-94," can be ordered for \$50 from the Publications Department, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138. The TSUSA and HS import data are at the most disaggregated level collected by the U.S. Census, and will be particularly useful for

research on antidumping cases. The SITC import data will be valuable for those wanting to compare U.S. trade flows at a more aggregated level with comparable data for other countries. The SIC import data will be particularly useful for those wanting to study the effects of import competition on U.S. industries. A summary of the SIC data, which does not contain the source country detail and incorporates earlier years, is available via anonymous FTP from:

nber.harvard.edu/pub/feenstra

A more comprehensive description of these data is available as NBER Working Paper No. 5515, "U.S. Imports, 1972-94: Data and Concordances" by Feenstra. A second CD-ROM, containing U.S. export data, will be released later in 1996.

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NATIONAL BUREAU OF ECONOMIC RESEARCH

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

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