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NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.

SUMMER 1986

Program Report

Economic Fluctuations

Robert E. Hall

NBER's Program of Research in Economic Fluctuations studies the movements of the U.S. economy as a whole. The primary unifying principle of the research in this program is a concern with occasional contractions in output, such as occurred in 1981-82, and subsequent expansions, such as the long period of growth that the economy has enjoyed since then. Much of our research examines the related movements in inflation, employment, unemployment, interest rates, and other macroeconomic variables.

Research Programs

Research within the program is carried out by 39 research associates, 13 faculty research fellows, and a number of collaborators. Some of the projects involve only a single researcher, while others bring together groups of program members and other economists. What follow are some examples of the work being done or recently completed by members of the program.

Financial and Monetary Topics

Ben S. Bernanke, Princeton University, is studying the role of financial markets and institutions in the determination of macroeconomic equilibrium. His goal is to understand by what means, if any, such phenomena as financial panics, disintermediation, and financial deregulation can affect the real (nonfinancial) economy. In related work, he is conducting empirical tests of some alternative structural models of the relationship among money, credit, and output.

Thomas J. Sargent, University of Minnesota, with coauthor Neil Wallace, is analyzing various plans for paying interest on bank reserves. They are focusing on the method of financing the interest payments in order to determine how well a system of paying interest on revenue would work. With Albert Marcet, Sargent is

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This issue of the *Reporter* highlights the Bureau's Program of Research in Economic Fluctuations. Next, Kala Krishna describes her work on trade policy. Then, Bruce N. Lehmann discusses the arbitrage pricing theory. After the quarterly Economic Outlook Survey are biographical sketches, news of NBER conferences, the Conference Calendar, and other NBER news and reports. The *Reporter* concludes with short summaries of recent NBER Working Papers.

also studying systems in which agents learn by examining economic data. They are calculating the conditions under which such systems converge to a rational expectations equilibrium. Finally, Sargent is attempting to reconcile the empirical success of the accelerator with equilibrium theories of investment under uncertainty. He has been making some progress by pursuing the implications of the hypothesis that the data available to the econometrician are polluted by measurement errors.

In his work, Robert J. Shiller of Yale University has sought further evidence about expectations models of prices of long-term assets. Econometric work on models of long-term bonds and stock prices has explained why these models were rejected. He has also explored

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behavioral alternatives, such as contagion models, using survey research.

Frederic S. Mishkin, Columbia University, is examining the link between real interest rates in the United States and rates in other countries. He is also analyzing the role of shifts in monetary policy regimes on the behavior of real interest rates, and why real interest rates are currently so high.

Anna J. Schwartz, of NBER's New York office, is carrying out research on real and pseudo-financial crises, on alternative monetary regimes, and on sustained recovery and trade liberalization. She is also working jointly with Milton Friedman on a study of the government's role in the monetary system and on the failure of the Bank of the United States.

Investment

Matthew D. Shapiro, Yale University, is studying the demand for business fixed capital in the United States. He finds, contrary to earlier results, that the response of the demand for capital to a change in the cost of capital is large and fairly quick. In work with N. Gregory Mankiw, Harvard University, and David Romer, Princeton University, he has focused on measures of risk and volatility in asset markets. Mankiw and Romer have also examined the adequacy of standard statistical tests of rational expectations models.

Recently, Robert S. Chirinko of the University of Chicago completed a survey of investment models. It develops a general framework from which models found in the literature can be derived as special cases, depending on assumptions about the intertemporal technology and expectations. He reports existing empirical results in that work, especially as they pertain to tax policy. Chirinko is also continuing his empirical work using investment models in separate studies of Tobin's q and data on new orders/expenditures. Finally, he is examining the role of information, accumulated through customer relationships, on bank loan rates and lending activity.

Consumption

Marjorie A. Flavin, University of Virginia, is currently focusing on models of the individual's joint consumption-asset demand decision. She tests these models using a large microdata set. Also, Flavin recently completed a study with James D. Hamilton that investigated whether the time-series data on government deficits were consistent with the proposition that by running a deficit, the government makes an implicit promise to run offsetting surpluses in the future.

Carnegie-Mellon University's Martin Eichenbaum is studying the empirical determinants of aggregate fluctuations in the consumption of nondurable and durable goods and in asset prices. This has led him to reconsider the microeconomic foundations of existing models that have been used to investigate these questions

empirically. He is particularly interested in critically evaluating equilibrium models that assume that consumers are homogeneous. This line of research has also led him to investigate the role of monetary shocks in generating aggregate fluctuations during the postwar period. One of his conclusions is that there is very little statistical evidence to support the hypothesis that exogenous monetary shocks have been an important source of fluctuations in postwar aggregate U.S. output.

For several years now, Alan S. Blinder of Princeton University has been working on a major study of inventory behavior. His latest research on this subject questions whether the stock-adjustment model is consistent with the facts about manufacturers' inventories of finished goods, and he points to an econometric pitfall in estimating such models. More recently, he has turned his attention toward credit-based models of the monetary transmission mechanism. He has developed a model by which monetary policy impinges on aggregate supply via credit rationing.

Angus Deaton, also of Princeton, is studying the determinants of aggregate consumption, particularly in relation to life-cycle models and the testing of Euler conditions. His work suggests that representative consumer models of aggregate consumption are unlikely to be very useful and that the life-cycle model poorly describes the joint behavior of earnings and consumption.

Structure of Product Markets

Dennis W. Carlton, University of Chicago, is considering a range of topics related to how markets clear when prices are inflexible. He has empirically analyzed the rigidity of transaction prices and has developed theoretical models to explain the endogenous flexibility of price. Moreover, his work has implications for market structure and for a market's responses to shock.

As program director, I have launched a new project on market structure and macroeconomic issues. As part of that project, I have developed a new method for measuring the market power of firms; it is based on measuring marginal cost and comparing it to price. Some, but not all, U.S. industries show evidence of considerable departures from competition; these results are now being applied to the puzzle of extended industrial slumps.

Inflation and Disinflation

Robert J. Gordon divides his time between topics in time-series applied macroeconomics and issues in the measurement of output and prices, related to the much-discussed but little-explained productivity slowdown in the United States and abroad. One of Gordon's papers on U.S. inflation concludes that the Phillips curve relationship has been stable since 1954, after allowance has been made for the effects of oil and import prices, and that flexible exchange rates played a crucial role in

the U.S. disinflation of 1980-5. In addition, Gordon's work on measurement issues has centered on durable goods prices and service productivity. Completed chapters of his monograph have demonstrated much slower price increases (or greater price declines) than in the national accounts for commercial aircraft, electric utility equipment, electronic computers, and appliances. Some new work suggests that much of the slowdown in productivity in the services and retailing sectors may reflect activities that are not valued as output in the national accounts.

Romer, with Laurence Ball of New York University, is investigating externalities from nominal price and wage rigidities. Specifically, they are asking whether it is possible for small nominal frictions to cause large reductions in average welfare by increasing the magnitude of cyclical fluctuations. If this is possible, it would provide theoretical grounding for the Keynesian view that the benefits of stabilizing aggregate demand could be large even if the private costs of making nominal prices flexible were small.

MIT's Stanley Fischer is working primarily on problems of disinflation from both moderate inflation and hyperinflation, in closed and open economies. In most of the theoretical research, he used a model in which price inertia was a result of the existence of long-term labor contracts. He showed that such a model could account for a substantial part, but not all, of the cost of U.S. disinflation from 1982 to 1986. In a further paper, he examined the role of the exchange rate, showing that the exchange rate appreciation (in real terms) that typically accompanies a disinflation will generally reduce the cost of disinflating. He also examined the effects of wage indexation on the cost of disinflation. In another paper, Fischer analyzed the choice between money and exchange rate targets in the process of disinflating from high inflation, showing that the exchange rate targets would typically produce a less costly disinflation (this applies mainly to a small open economy).

Angelo Melino, University of Toronto, has looked at the ability of models of intertemporal choice with market clearing to account for production, prices, and sales in the automobile industry. He has also examined the output and revenue aspects of major strikes in that industry. However, Melino is mainly interested in asset pricing models. He has written a survey on the term structure of interest rates, examined the consequences of time averaging for the consumption-beta model, and is currently working on continuous-time versions of the arbitrage pricing theory.

Structural Models

MIT's Olivier J. Blanchard is participating in a project on wage and price setting that seeks to explain the effects of demand shocks on unemployment. He has studied the empirical behavior of prices, wages, and employment for the postwar United States and Britain,

using and extending the "just-identified structural approach" developed earlier with Mark W. Watson of Harvard University, a faculty research fellow in this program. In joint work with Lawrence H. Summers of Harvard University, Blanchard has also proposed an explanation for periods of long and sustained unemployment, such as those currently prevailing in the United Kingdom. This explanation is based on the dynamics of labor markets with insider and outsider workers.

Monetary and Fiscal Policy

Rudiger Dornbusch of MIT, who is also an active member of NBER's Program in International Studies, has studied problems of exchange rates and macroeconomics and questions of LDC debt. In the exchange rate area, he has looked at the relationship between exchange rate movements and prices. Using an industrial organization perspective, he has tried to identify how market structure and separation and product differentiation affect the influence of exchange rates on prices. In the area of LDC debt, he has been concerned with the macroeconomic policies that are part of the origins of the debt crisis, specifically currency overvaluation in the face of capital mobility or trade liberalization. A third area of research for Dornbusch is a fresh look at the experience of high inflation and hyperinflation in the 1920s and in Latin America today. He has attempted to identify the sources of high inflation and the essential elements, other than austerity, in successful stabilization programs.

Bennett T. McCallum, of Carnegie-Mellon University, is reviewing monetary policy and evaluating the most important existing criticisms of policy strategies that feature adherence to money stock targets.

Herschel I. Grossman, Brown University, has focused on positive choice-theoretic models of monetary and fiscal policy. Two of his recent papers, jointly authored with John B. Van Huyk, explore the properties of reputational equilibriums and apply this analysis to understanding the relationship between seigniorage and inflation and between sovereign defaults and the role of sovereign debt as a risk-shifting device. Another recent paper, jointly authored with Steven Green, analyzes the effects of disturbances to productivity and to demand on the pattern of monetary policy necessary to stabilize inflation. In related work, Grossman explores the implications of choice-theoretic models of policy for econometric analysis of policy and forecasting. Grossman has also continued to investigate the behavior of asset prices. A recent paper of his, jointly authored with Behzad T. Diba, reports empirical tests based on nonstationary properties of rational bubbles; it shows that stock prices do not exhibit rational bubbles.

Other Topics

Sanford J. Grossman, Princeton University, is studying bargaining models in which disputes over the divi-

sion of the gains from trade cause a costly delay in the consummation of the trade. In addition, he is developing models of asset pricing when consumers must bear a fixed cost to change their consumption patterns.

The microeconomic foundations of macroeconomic coordination failures is the research topic of Russell Cooper, University of Iowa. In joint work with Andrew John, he considers a number of possible sources of strategic complementarities that, in turn, generate multiplier effects and underemployment equilibriums. In a model with imperfect competition in product markets, these complementarities arise because of the structure of demands across sectors of a multisector economy. Cooper is also studying the interaction of optimal labor contracts and strategic behavior in the product markets and dynamic extensions of these models.

Watson has been concerned with the proper treatment of long-run components in macroeconomic time series. He has viewed "trends" as integrated stochastic processes and has compared a variety of univariate time-series models, including ARIMA and Unobserved Component. These models produce very similar short-run forecasts for macro time series but give very different long-run predictions. Watson extended this work to multivariate time-series models in work with James H. Stock, Robert G. King, and Charles I. Plosser. That work shows how a typical real business cycle model with stochastic growth gives rise to a common stochastic trend among a group of macro variables. They investigate this characteristic of the data using new statistical tools developed for inference in "cointegrated" stochastic processes.

Victor Zarnowitz, University of Chicago, has been updating and analyzing the record of short-term economic forecasting in an effort to establish whether the predictions are getting better or worse over time. He is also reviewing some evidence from a large collection of time series covering a long stretch of U.S. economic history with a focus on the sequences and interactions among cyclical indicators. This study reconsiders questions about the existence of predictable periodicities and other regularities in past business cycles. It finds that the latter exhibit much variation in their overall quantitative aspects (duration, depth, diffusion) and much stability in their anatomic qualitative aspects (amplitude and timing differences among the indicators).

Research Groups and Summer Institute Groups

Some of the research activities of the program occur in small workshop groups, involving no more than 10 researchers all engaged in closely related work. The groups meet once or twice during the academic year, often in conjunction with the program's meetings. They also meet for a more extended period of time as part of NBER's Summer Institute.

One group, organized by Kenneth J. Singleton of Carnegie-Mellon University, is studying the relation-

ship between the structure of security markets and real economic activity. They met in Cambridge last August and in Chicago this March and will meet for a full week this July. A second group, led by Julio J. Rotemberg of MIT, is working on industry structure and macro performance. They met in Chicago last November and will also meet for a week this July.

Summers is organizing a third group, on wage structure and unemployment. They will meet for the first time this July.

Dissemination

Most of the research of the program is published first as NBER Working Papers; it is subsequently published in major professional journals. Many of these papers are finally distributed as part of the NBER Reprint Series. Since 1984, the program has produced a total of 131 Working Papers and Reprints.

Research Summaries

Trade Policy

Kala Krishna

Recently there has been a great deal of interest in the effects of international trade and trade restrictions on markets that are imperfectly competitive. Since a significant portion of international trade takes place in such markets, it is vital to study them, and an important part of my research has been in this area. This summary reports some results of my work on this topic.

The Market

Deviations from perfect competition can occur in a number of ways, while there is only one type of perfectly competitive market. For this reason, there is no grand way of thinking about trade policy in imperfectly competitive markets. The basic way to analyze trade restrictions in imperfectly competitive markets is to focus on a particular characteristic of such markets and to examine its implications for policy.

One characteristic of perfectly competitive markets is that there is no scope for firms to act strategically; by definition, firms are so small that their actions cannot

affect outcomes in the market. Monopolists, at the other extreme, can control market outcomes by their actions alone. So, while there is scope for strategic behavior on their part, it takes a relatively simple form, since the monopolist is the only strategic player. Trade restrictions on monopolistic markets will have relatively straightforward effects.

In oligopolistic markets many firms behave strategically, and strategic interactions between firms determine market outcomes. Even seemingly minor trade restrictions may have extremely large effects on such markets.

In my research I use simple duopoly models from game theory to analyze the effects of two different kinds of trade restrictions on strategic interactions among firms and their implications for trade policy. One of these restrictions, the voluntary export restriction (VER), has been widely used recently, probably because it is not forbidden under the terms of the GATT (General Agreement on Tariffs and Trade). The second trade restriction is a content protection scheme that has been used in many instances and has been proposed to protect the steel industry in the United States. While a VER "voluntarily" and directly restricts total imports from the targeted sources, a content protection scheme does so indirectly by limiting the foreign content in domestic production.

Voluntary Export Restrictions (VERs)

VERs have been used frequently in the recent past, especially in the automobile industry where their impact has been significant. While a VER restricts imports in quantitative terms, often it is not set at extremely restrictive levels. In the auto industry, for example, VERs were first imposed in 1981 for March 1981–April 1984 at 1.68 million cars per year. This was about 5 percent below the level of imports of the preceding year. The limits subsequently were raised to 1.85 million for 1984–5 and to 2.3 million for 1985–6. However, the increase in the price of Japanese automobiles in the first year of the VER, adjusted for changes in the average quality of imports, was almost 20 percent.¹ It is essential to make the adjustment for changes in the quality mix because, if quality rose substantially as the result of a VER, an increase in price would not indicate a decrease in competition caused by the VER.² In one study,

¹See R. Feenstra, "Quality Change under Trade Restraints: Theory and Evidence from Japanese Autos," *Columbia University Discussion Paper No. 298, 1985, p. 14 and Table 2.*

²The possibility that the market for Japanese cars is almost unrelated to that of U.S. cars is ruled out by the fact that U.S. car prices rose significantly with the imposition of the VER. Moreover, the possibility that Japanese automakers behaved completely collusively in a market where little substitution existed between U.S. and Japanese cars is ruled out since they would have been on an inelastic part of their demand curve, which means they could not have been maximizing profits.

I show that quantitative constraints can lower the quality of imports when a foreign monopolist supplies domestic consumers.³ Quality falls if the valuation of increments in quality of marginal consumers exceeds that of all consumers purchasing the product. Quality rises if this relationship is reversed. Thus, the empirically observed increase in quality following quantitative restraints in a wide variety of industries, from footwear to steel, suggests that marginal consumers tend to value increments of quality less than all consumers do on average.

When there are many large firms in the market, even slightly binding restrictions may cause a large increase in price.⁴ The basic reason is quite simple. In the equilibrium prior to the VER, a U.S. firm would not wish to raise its price because this would cause it to lose customers to the Japanese. However, the VER limits Japanese sales and impedes their ability to compete effectively in the U.S. market. This creates an incentive for a U.S. firm to raise its price. Since this increase in the price charged by the U.S. firm causes an increase in demand for Japanese cars that cannot be met at the prevailing prices, it is also in the Japanese interest to raise prices.

In another paper, I show that even when firms behave noncooperatively, the VER creates incentives for both countries' firms to raise their prices; in equilibrium, both their prices and their profits rise. In this sense, VERs facilitate collusion.⁵ When a VER is imposed, strategic interaction effects work in the same direction as the effects that operate under domestic monopoly and foreign competitive supply. However, the equilibrium requires mixed strategies. It calls for the domestic firm to randomize over prices and for the foreign firm not to randomize, that is, a policy of the domestic firm having periodic sales. The strategic interaction effects may work against the effects that operate under domestic monopoly and foreign competitive supply as they do in the case of content protection policies.

Dixit also presents evidence that VERs lead to collusive behavior.⁶ He finds that Japanese firms acted more collusively because of the VER, and that U.S. firms also may have behaved more collusively. He shows that the Cournot equivalent number of firms corresponding to actual prices fell from about 19 in 1980 to about 14 in 1983 for U.S. firms, and from 10 in 1980 to 4 in 1983 for Japanese firms. Although these figures correspond to

extremely rough estimates, they give some support to the theory.

My analysis suggests that VERs are unlikely to raise the level of national welfare. Losses to consumers tend to outweigh the gains to domestic producers, because profit is not shifted from foreign to domestic firms. However, such a shift might make the VER policy worthwhile even in the absence of any tariff revenues from the VER.

Content Protection

Content protection schemes are usually specified in physical or value added terms. They require that at least a certain physical proportion of domestic inputs be used in production or that a certain proportion of value added in production be of domestic origin. These schemes affect the derived demand for inputs. Itoh and I ask how such schemes affect strategic interactions between oligopolistic domestic and foreign suppliers of inputs in oligopolistic markets.⁷ Although the effects of content protection schemes are generally similar to those of VERs, their effects on strategic interactions could hurt domestic firms. Their impact depends critically on the form of the restriction, the elasticity of substitution between inputs, and the elasticity of demand for the final product.

Content protection schemes, when set at free trade levels, can never harm a domestic monopolist who supplies an input that is a substitute for inputs supplied competitively from abroad; the domestic monopolist can always choose his free trade actions. However, when the foreign input supplier also has market power, the equilibrium actions of the foreign producer also change. This can either raise or lower the domestic firm's profits.

Although inputs are substitutes for each other in production, their derived demands may be either substitutes or complements for each other. We show that a physical content protection scheme, set at the free trade level, will raise domestic profits if the input demand functions are complements and will lower domestic profits if they are substitutes. The same results hold when the restriction is in value added terms and the elasticity of substitution exceeds unity, but they are reversed if elasticity is less than unity. This allows us to predict when domestic input producers will find it in their interest to lobby for protection. The model suggests that input producers will benefit from content protection schemes if the elasticity of substitution between inputs is large.

We also analyze the effects of content protection schemes on wages in a competitive labor market. The incentives to lobby for protection become more complicated, but when substitution between the domestic and foreign inputs is large, the domestic input supplier

³K. Krishna, "Tariffs versus Quotas with Endogenous Quality," NBER Working Paper No. 1535, January 1985.

⁴Bhagwati showed that this occurs when there is a domestic monopolist and competitive foreign supply. See J. N. Bhagwati, *Trade Tariffs and Growth*, London and Tinling, 1969.

⁵K. Krishna, "Trade Restrictions as Facilitating Practices," NBER Working Paper No. 1546, January 1985.

⁶A. Dixit, "Optimal Trade and Industrial Policy for the U.S. Automobile Industry," Paper presented at the Conference on Empirical Methods for International Trade, sponsored by the NBER, April 4, 1986.

⁷K. Krishna and M. Itoh, "Content Protection and Oligopolistic Interactions," NBER Working Paper No. 1843, February 1986.

will gain from protection. However, the interests of labor may go in the opposite direction. Labor can lose, because content protection has two opposing effects on the derived demand for labor: (1) it raises the price of nonlabor inputs, thus causing substitution toward labor that shifts the derived demand for labor outward and raises the wage; and on the other hand, (2) the increase in the price of nonlabor inputs raises the cost of producing the final product, thus raising its price and reducing its sales, so the derived demand for labor shifts inward and this reduces the wage. The former effect dominates if the elasticity of substitution between labor and nonlabor inputs is higher than the elasticity of demand for the final product.

The Arbitrage Pricing Theory

Bruce N. Lehmann

The modern theory of finance is largely concerned with two problems: the manner in which optimizing investors choose their portfolios, and the rate at which investors and firms should discount future cash flows. Financial theory can solve these two problems simultaneously and determine the equilibrium discount rate by combining a model of investor choice under uncertainty with an explicit characterization of future cash flows. One of the fundamental scientific contributions of financial economics is the construction of such models for the risk premiums of individual securities.

The Capital Asset Pricing Model (CAPM) has been the central equilibrium model of the pricing of risky assets for much of the past 25 years. Its main assumption is that investor portfolio choice involves trading expected returns on the portfolio (which are goods) for their variances (which are bads) either because individuals possess quadratic utility functions or because all securities returns are jointly normally distributed. In this setting, all investors will choose to hold the market portfolio of risky assets (in which all risky assets are held in proportion to their overall market values) with perhaps different relative holdings of riskless assets. As a consequence, the risk of any asset, and the concomitant risk premium that investors earn as a reward for holding it, depends not on its total risk (as measured by the variance of its returns) but rather on its contribution to the riskiness of the market portfolio. Therefore, the risk premiums for individual securities are proportional to their covariance with the market portfolio of all risky assets (that is, the beta and centerpiece of the CAPM).

Unfortunately, the CAPM has encountered fatal conceptual and empirical roadblocks. The theory is not robust with respect to changes in the assumed eco-

nomical environment, such as fluctuations in the stochastic structure of securities returns, the consideration of nontraded assets such as human capital, or assets such as houses with nontrivial transactions costs. Moreover, Richard W. Roll has emphasized a major conceptual problem with its empirical implementation: the CAPM predicts that risk premiums depend on the relationship between individual securities returns and those of the market portfolio of all risky assets.¹ Actual tests of the theory examine whether risk premiums are explained by equally weighted or value-weighted portfolios consisting only of listed equities, a small proportion of the universe of risky assets. But the CAPM says nothing about the role of these portfolios in asset pricing. Finally, these proxies in fact do not successfully account for risk premiums; equities with zero or high dividend yields, large return variances, and small total market values have average returns much higher than can be explained by their covariances with returns of equally weighted or value-weighted equity portfolios.

The Arbitrage Pricing Theory (APT), developed by Stephen A. Ross, is one of the major alternative paradigms within which empirical and theoretical research in financial economics is conducted.² It rests on the plausible assumption that a small number of common factors cause comovements among securities returns. That assumption is consistent with the implicit assumptions about aggregation made in macroeconomic theory as well as with the stylized facts regarding business cycle fluctuations. Moreover, all that is required for the validity of the theory is that these sources of systematic risk be the principal determinants of securities prices. As a consequence, the APT is consistent with the large assortment of models of macroeconomic equilibrium that emphasize the role of a small number of aggregate sources of uncertainty.

Finally, the theory presumes that a large number of traded assets follow the assumed factor structure; it does not require that all securities returns have a factor structure or that all assets be traded. Hence, the APT can be applied with considerable justification to listed equities on the New York and American Stock Exchanges with little concern for the behavior of other traded securities, such as bonds and foreign equities, and nontraded assets such as human capital and partnerships or proprietorships.

Even at this level of generality, there are obvious questions about the APT and its empirical implementation. What are these common factors and how do they affect asset prices? How can they be measured, and do

¹R. W. Roll, "A Critique of the Asset Pricing Theory's Tests—Part I: On Past and Potential Testability of the Theory," *Journal of Financial Economics* (1977).

²S. A. Ross, "The Arbitrage Theory of Capital Asset Pricing," *Journal of Economic Theory* (1976), and "Risk, Return, and Arbitrage," in I. Friend and J. L. Bicksler, eds., *Risk and Return in Finance*, Cambridge, MA: Ballinger, 1977.

alternative measurement strategies yield similar answers? If the APT correctly characterizes asset prices in one market, what are the implications for other asset markets and for macroeconomic equilibrium in goods and factor markets?

Several years ago, David M. Modest, of Columbia University, and I embarked on a comprehensive investigation of these questions. This report summarizes the first fruits of these efforts based on the analysis of listed equities on the New York and American Stock Exchanges between 1963 and 1982. In what follows, I will provide a brief development of the economic intuition underlying the APT, describe our results on both the validity of the theory and the efficacy of alternative strategies for its empirical implementation, and indicate some of the projects on our collective and individual research agendas.

The Arbitrage Pricing Theory

The heart of the APT is an assumption about the stochastic structure of a large set of securities returns: a small number of common factors are the dominant source of covariation among returns. Individual securities presumably differ in their exposure to these common or systematic risk factors. Of course, securities returns fluctuate for other reasons as well, reflecting changes that follow from firm- or industry-specific events. The theory assumes that such idiosyncratic risk is not an important source of covariation among securities returns. In particular, the APT requires that arbitrary, large, well-diversified portfolios formed from securities whose returns have this factor structure contain negligible idiosyncratic risk.

How should individual securities be priced in capital markets that function well in these circumstances? Intuitively, investors need not bear idiosyncratic risk and hence should not be compensated for bearing it. Investors will then compare investment opportunities by their exposure to the common factors. Individual securities with similar systematic risk exposure will be close substitutes. Hence, their prices should reflect similar expected returns. In particular, there will be a risk premium associated with each common factor and the risk premiums of individual securities will be a weighted average of these factor risk premiums. Not surprisingly, the appropriate weights reflect the sensitivity of asset returns to the common factors.

This intuition is, in fact, quite slippery and is the source of much discussion in the literature. One cannot reasonably assert that investors will not choose to bear idiosyncratic risk in return for appropriate compensation without specifying the other investment opportunities and constraints confronting them. Idiosyncratic risk will not command a risk premium so long as some investors who collectively hold a nontrivial fraction of market wealth and who can trade freely in these securities choose to hold well-diversified portfolios in equilibrium. Such investors will make the marginal comparisons of investment opportunities in the manner

described above and hence must perceive that these securities are priced according to their systematic risk exposure if they are satisfied with their portfolio choices.

Systematic Risk Measurement and Tests of the APT

The discussion thus far has not mentioned the nature of the postulated common factors and how to measure them. One obvious strategy is to specify the set of common factors a priori and to measure them with the appropriate aggregate data. For example, we might suppose that unexpected inflation, unexpected changes in expected inflation, and long- and short-term real interest rate changes are plausible sources of systematic risk and that proxies for these factors may be constructed with appropriate econometric methods. Similarly, we might attempt to measure directly the sensitivity of individual securities returns to systematic risk. For example, firms differ in their quantities of short- and long-term debt financing and hence in their exposure to the risk of real and nominal interest rate fluctuations. Unfortunately, aggregative economics is capable of rationalizing a wide variety of sources of systematic risk and hence it is difficult to argue that one has specified the right ones, let alone a cogent strategy for their measurement.

As a consequence, most investigators have turned to the statistical method of factor analysis in order to measure implicitly these unobservable common factors. Such statistical procedures provide estimates of the systematic risk exposure of individual securities (termed their factor loadings). Portfolios that mimic each common factor can then be formed by placing relatively heavy weight on those securities that exhibit substantial systematic risk exposure.

This solution exchanges the problem of a priori stipulation of the sources of systematic risk for the econometric difficulties associated with implicit measurement of the common factors. The APT assumes that large, well-diversified portfolios contain only systematic risk. As a consequence, statistical methods such as factor analysis will yield reliable measurements of the common factors only if applied to large cross sections of securities returns. Unfortunately, the application of such methods to large cross sections is very expensive.

How large is a "large" cross section? Of course, this question is an empirical one and computationally burdensome maximum-likelihood methods for estimating factor models for securities returns can be replaced with less costly but less efficient estimation methods. We examined the efficacy of alternative strategies for measuring the common factors presumed to underlie securities returns.³

³B. N. Lehmann and D. M. Modest, "The Empirical Foundations of the Arbitrage Pricing Theory II: The Optimal Construction of Basis Portfolios," NBER Working Paper No. 1726, October 1985.

Three main conclusions emerged from our analysis. First, many securities are required to produce reliable reference or basis portfolios (that is, portfolios whose returns mimic the underlying common factors). We found, by our criteria, that factor models involving 750 securities provided performance markedly superior to those involving 30 or 250 securities. Second, maximum-likelihood estimation of the factor models yielded better basis portfolios than those produced by less efficient instrumental variables and principal components methods. Finally, we determined that there was little need to employ sophisticated programming procedures to choose the reference portfolio weights from the estimated factor models. These conclusions are robust with respect to the number of factors presumed to underlie securities returns.

These results are especially interesting in light of the inconclusiveness of the existing empirical literature on the APT. Most empirical research has involved analysis of cross sections or returns on 30 to 60 securities. Our results suggest that cross sections of this size are inadequate for measuring the sources of systematic risk underlying securities returns and hence for providing reliable tests of the APT. Similar remarks apply to the use of less efficient estimation procedures.

Of course, the finding that one method provides statistically superior performance need not imply that it will affect economic conclusions in actual practice. As a consequence, we supplemented the preceding analysis by examining the sensitivity of economic conclusions regarding the performance of mutual funds to alternative strategies for measuring the common systematic risk factors.⁴

The design of this experiment was quite simple. We obtained a sample of returns on 130 mutual funds for the 15-year period from 1968 through 1982. We used standard regression procedures to measure the abnormal performance of mutual funds. These measures require benchmarks for normal performance that indicate the appropriate risk-adjusted return for each fund. We used the reference portfolios constructed in the aforementioned paper as benchmarks, with two additional standard benchmarks: equally weighted and value-weighted indexes of equities listed on the New York Stock Exchange. We then examined the magnitudes of the abnormal performance measures as well as the implied relative rankings of the funds to see whether inferences regarding mutual fund performance were sensitive to the chosen benchmark.

Surprisingly, we found that inferences were quite sensitive to the choice of benchmark. The results differed markedly across APT benchmarks. By using a smaller number of securities in the preliminary factor analysis or by employing less efficient estimation methods than by using maximum-likelihood procedures

with 750 securities, one would reach very different conclusions regarding the funds' performance. Similarly, very different rankings and abnormal performance measures were produced by the equally weighted and value-weighted indexes that, in turn, diverged from those produced by the APT benchmarks. We found similar performance measures only when comparing APT benchmarks involving five to fifteen common factors. It certainly appears that different procedures for measuring the systematic risk exposure of mutual funds yield quite different economic conclusions about the funds' performance.

The most economically interesting results we obtained concern the validity of the theory itself.⁵ These results cover the 20-year period from 1963 through 1982.

We followed a simple strategy in constructing our tests. The APT implies that the risk premiums of both individual securities and portfolios are weighted averages of their factor loadings (that is, the regression coefficients that reflect systematic risk exposure) with the factor risk premiums as weights. As noted earlier, tests of the CAPM that used the value-weighted and equally weighted indexes as proxies for the unobservable market portfolio found that these portfolios could not successfully explain expected returns on portfolios of securities that differed in the magnitude of their market capitalizations, dividend yields, and the sample variances of their returns. We surmised that powerful tests of the APT could be conducted by studying its ability to account for these empirical anomalies.

Accordingly, we formed portfolios of individual securities based on the magnitude of these characteristics prior to the sample period, and we examined whether their average returns were completely explained by their systematic risk exposure. We found that the APT successfully accounted for the risk and returns characteristics of the portfolios formed on the basis of dividend yield and own variance. This is noteworthy, since the APT provides a risk-based explanation of these phenomena in contrast to the usual tax-related explanation of the dividend effect and the transactions cost account of the relationship between own variance and average returns. In contrast, the APT could not explain average returns of equities with very large or small aggregate market values. It is worth emphasizing that this size effect was concentrated in a relatively small number of securities, the very smallest and largest firms listed on the New York and American Stock Exchanges.

We examined two other aspects of the theory. First, we sought to determine whether five-, ten-, or fifteen-factor versions of the theory were appropriate. Our results provided little indication of their comparative merits except for the observation that the ten- and fifteen-factor models yielded similar results in most in-

⁴B. N. Lehmann and D. M. Modest, "Mutual Fund Performance Evaluation: A Comparison of Benchmarks and Benchmark Comparisons," NBER Working Paper No. 1721, October 1985.

⁵B. N. Lehmann and D. M. Modest, "The Empirical Foundations of the Arbitrage Pricing Theory: The Empirical Tests," NBER Working Paper No. 1725, October 1985.

stances. Second, there are two versions of the APT that differ in whether expected securities returns or expected excess returns (over the riskless rate) are determined by the relevant factor loadings and risk premiums. We found overwhelming evidence in favor of the appropriateness of the excess return version of the theory for listed equities.

Summary and Directions for Further Research

We have learned much about the APT and its empirical implementation. So long as one is unwilling to specify the common factors or measures of risk exposure a priori, reliable measurement of the common factors presumed to underlie securities returns requires the application of maximum-likelihood factor analysis to large cross sections. This stands in sharp contrast to the empirical methods of previous studies. Accordingly, we have made our reference portfolios available to other researchers.

We are encouraged by the outcome of the tests of the APT. The theory fared well when confronted with the strong relationship between average securities returns and their dividend yields and sample variances, although it failed to account for the well-documented firm size effect. Since the size effect we found is largely concentrated in the firms with the largest and smallest market capitalizations, it is perhaps reasonable to conclude that the APT is pricing most listed equities with little error.

Not surprisingly, we think that the theory warrants further investigation and are proceeding in several directions. We are currently investigating whether the basis portfolios we constructed from U.S. equity market data can account for expected returns in the Treasury bill and bond markets, futures markets, and foreign asset markets. Similarly, we are also exploring links between these equity market factors and fluctuations in major economic aggregates. Other investigators have proceeded along both lines but we are persuaded that there is considerable value added associated with our technology and research design.

I have recently embarked on similar research covering a longer time period. The Center for Research in Securities Prices provides monthly returns for all securities listed on the New York Stock Exchange between 1926 and the present. I am estimating factor models for securities returns on a quarterly basis for the six decades spanned by that data set. This will permit me to investigate in considerable detail the manner in which the factor structure of securities returns evolves over time. Tests of the theory employing these estimates will involve far richer and more varied experience in financial markets than those conducted on the most recent 20 years of data. Finally, the equity market factors measured over these six decades might provide interesting insights into the nature and origins of aggregate fluctuations. I think this is the most interesting aspect of this line of research.

Economic Outlook Survey

Second Quarter 1986

Victor Zarnowitz

According to the May survey of 28 professional forecasters taken by NBER and the American Statistical Association, real GNP will grow by 3.6 percent next year. The higher growth should lead to a gradual reduction in unemployment and moderately higher profits, but industrial production and business investment will be slow to improve. Inflation and interest rates will rise but by comparatively small margins. The decline in the exchange value of the dollar will be associated with a significant diminution in the U.S. trade deficit.

Growth Forecasts: Mostly Higher but Dispersed

Total output of the economy increased at an annual rate (a.r.) of 3.7 percent in 1986:1, according to the available data. (This is an upward revision from 3.2 percent reported in March.) For 1986:2, the median forecast from the survey is only 2.4 percent, reflecting the widespread belief that the unexpectedly large rise in inventories during the previous quarter will be followed by an effort to reduce unsold stocks of materials and finished goods (especially automobiles and other durables). However, most respondents see this as only a transitory problem that will not prevent average growth rates of 3.6–4.1 percent in the next four quarters, 1986:3–1987:3. These figures are comfortably above the long-term trend. The average forecast implies a definite recovery from the slower growth of 1984–5. The median year-to-year figures are 2.6 percent for 1985–6 and 3.4 percent for 1986–7. However, the individual forecasts show considerable dispersion. The central half of the predictions for 1986:2–1987:2 falls in the (interquartile) range of 2.6 to 4.2 percent; the total range is –2.2 to +5.1 percent.

Expansion to Continue, Lower Unemployment Likely

The probability that real GNP will decline in the year ahead is rated generally low, the means being 9, 12, 18, and 23 chances in 100 for the four successive quarters of 1986:3–1987:3. These figures are not very different from their counterparts in the survey released three months ago.

Projections of GNP and Other Economic Indicators, 1986-7

	Annual				
	1985 Actual	1986 Forecast	1987 Forecast	Percent Change	
				1985 to 1986	1986 to 1987
1. Gross National Product (\$ billions)	3988.5	4209.0	4490.4	5.5	6.7
2. GNP Implicit Price Deflator (1982 = 100)	111.7	114.7	118.4	2.7	3.3
3. GNP in Constant Dollars (billions of 1982 dollars)	3570.0	3663.0	3788.5	2.6	3.4
4. Unemployment Rate (percent)	7.2	6.9	6.7	-0.3 ¹	-0.2 ¹
5. Corporate Profits After Taxes (\$ billions)	140.2	149.0	160.9	6.3	8.0
6. Nonresidential Fixed Investment (billions of 1982 dollars)	472.0	474.0	484.0	0.4	2.1
7. New Private Housing Units Started (annual rate, millions)	1.7	2.0	1.8	13.3 ²	-7.0 ²
8. Change in Business Inventories (billions of 1982 dollars)	5.7	19.0	21.3	13.3 ³	2.3 ³
9. Treasury Bill Rate (3-month, percent)	7.5	6.3	6.6	-1.2 ¹	0.3 ¹
10. Consumer Price Index (annual rate)	3.3	2.0	3.3	-1.3 ¹	1.3 ¹

	Quarterly						Percent Change	
	1986 Q1 Actual	Q2	1986 Q3	Q4	1987		Q1 86 to Q1 87	Q2 86 to Q2 87
					Q1	Q2		
1. Gross National Product (\$ billions)	4116.7	4163.5	4237.5	4313.6	4384.5	4450.4	6.5	6.9
2. GNP Implicit Price Deflator (1982 = 100)	113.7	114.2	115.0	115.9	116.8	117.8	2.8	3.2
3. GNP in Constant Dollars (billions of 1982 dollars)	3619.2	3642.1	3675.1	3710.5	3743.0	3775.0	3.4	3.7
4. Unemployment Rate (percent)	7.1	7.0	6.9	6.8	6.7	6.7	-0.4 ¹	-0.3 ¹
5. Corporate Profits After Taxes (\$ billions)	141.8	145.5	150.5	155.2	158.9	159.0	12.0	9.3
6. Nonresidential Fixed Investment (billions of 1982 dollars)	469.1	471.5	475.5	480.4	481.5	481.0	2.6	2.0
7. New Private Housing Units Started (annual rate, millions)	2.0	2.0	2.0	1.9	1.9	1.8	-4.7 ²	-10.0 ²
8. Change in Business Inventories (billions of 1982 dollars)	26.0	16.0	13.1	16.0	20.0	21.0	-6.0 ³	5.0 ³
9. Treasury Bill Rate (3-month, percent)	6.9	6.1	6.1	6.1	6.3	6.5	-0.6 ¹	0.4 ¹
10. Consumer Price Index (annual rate)	2.5	-0.6	2.6	3.4	3.7	3.9	1.2 ¹	4.6 ¹

SOURCE: National Bureau of Economic Research and American Statistical Association, Business Outlook Survey, June 1985. The figures on each line are medians of twenty-eight individual forecasts.

¹Change in rate, in percentage points.

²Possible discrepancies in percentage changes are caused by rounding.

³Change in billions of dollars.

The median forecast has the unemployment rate declining slowly to 6.7 percent of the civilian labor force in 1987:2. For 1987 as a whole, the median forecast is 6.8 percent; the range of forecasts is 6.1-7.7 percent.

Inflation: Back to 3-4 Percent

The recent declines in consumer and producer price indexes are generally seen as caused by the downward drift in prices of industrial commodities and materials and, especially, to the collapse in oil prices. The latter, however, apparently has been halted, and most forecasters view the deflationary pressures as localized or transitory. The median forecasts of percentage changes in the consumer price index (CPI) increase from -0.6 percent for 1986:2 to 2.6 percent, 3.4 percent, 3.7 percent,

and 3.9 percent for the four successive quarters 1986:3-1987:2. The averages for 1986 and 1987 are 2.0 percent and 3.3 percent, respectively.

The forecasts of inflation in terms of the GNP price index rise from 1.6 percent for 1986:2 to 2.8 percent in 1986:3 and 3.2 percent in each of the following three quarters (all figures are at a.r.). The dispersion of the individual forecasts is low, apart from a few outliers.

Interest Rates Near Floor Levels

The 3-month Treasury bill rate is seen as staying a little above 6 percent in the middle quarters of this year, then rising to 6.5 percent or somewhat higher by mid-1987. The rate on new high-grade corporate bonds is

predicted to increase from 8.8 percent in 1986:2 to 9.6 percent in 1987:2. Once more, these averages conceal large differences among the forecasters. For example, the ranges of the individual predictions for 1987:2 are 5.2-8.3 percent for the bill rate, 7.8-11.0 percent for the bond yield. The standard deviation is 0.8 percent in either case.

Sluggish Sectors

Output of manufacturing, mining, and utilities is expected to rise 2.0 percent in 1985-6, 3.2 percent in 1986:2-1987:2, and 3.1 percent in 1986-7. These median projections are lower than those from the previous survey. They also fall short of the corresponding forecasts for real GNP.

Nonresidential fixed investment is expected to gain only 0.4 percent in 1985-6, according to the group medians, which in this case are fairly representative. The predicted increases average about 2 percent for both 1986:2-1987:2 and 1986-7.

Federal government purchases of goods and services in 1982 dollars are predicted to be 0.8 percent less in 1986 than in 1985, presumably as a result of the ongoing efforts to reduce the budget deficits. In the year ahead, however, they are expected to increase by 2.7 percent.

Sources of Expected Weakness and Strength

Housing permits and starts, which slipped in the first three quarters of 1985, regained the high ground, spurred on by lower financing charges and fears of adverse changes in the tax code. However, as these stimuli wear off, forecasters believe that activity in this sector will lessen. Starts are expected to gain over 13 percent in 1985-6 and only about 3 percent in 1986:2-1987:2; in 1986-7 they are predicted to fall 7 percent. The corresponding median forecasts for residential fixed investment are 8.1 percent, 3.6 percent, and 2.6 percent.

Most survey participants anticipate only modest rises in inventory investment; some foresee declines. Corporate profits after taxes are expected to improve moderately: the median forecasts show gains of 6.3 percent, 9.3 percent, and 8.0 percent in 1985-6, 1986:2-1987:2, and 1986-7, respectively.

At the same time, new strength is likely to develop elsewhere in the economy as a result of the falling dollar, improved terms of trade, and increased competitiveness of U.S. industry. Net exports of goods and services in billions of 1982 dollars are predicted to average -118 in 1986:2, -99 in 1987:2. Several respondents expect the trade deficit to fall into the \$75-80 billion interval at mid-1987.

Probabilistic Forecasts

The forecasters were asked what probabilities they attach to various ranges of percentage change in real GNP and the implicit price deflator (IPD) for 1985-6 and 1986-7. Their individual forecasts show the usual

increase in dispersion (uncertainty) associated with the predictive horizon becoming longer. The mean probability distributions based on these forecasts are:

Percentage Change in Real GNP	Percentage of Responses	
	1985-6	1986-7
4.0 percent or more	8	21
2.0 to 3.9 percent	69	49
0 to 1.9 percent	22	21
Negative	1	9

Percentage Change in IPD	Percentage of Responses	
	1985-6	1986-7
8.0 percent or more	3	9
6.0 to 7.9 percent	13	34
4.0 to 5.9 percent	72	51
Less than 4.0 percent	12	6

These measures indicate more uncertainty about the expected developments than would be inferred from the dispersion of the corresponding point forecasts, which is also typical. Predictions of growth for 1986-7 are skewed toward the two lowest intervals; inflation predictions are skewed toward the two highest intervals.

Major Assumption Made by Forecasters

The respondents who answered believe that a tax reform bill similar to the current Senate version is likely to pass. To some it means a possible increase in net taxes in the near future, with some shift from personal to corporate taxes.

The forecasters' views on defense outlays are divided. Three assume decreases of 1-3 percent in the year ahead, three assume no real change, and 16 assume increases of 1-5 percent (concentrated around 2-3 percent).

Assumptions about the growth rates in M1 and M2 range from 5 to 10 percent, and average 7-8 percent.

Levels of oil prices are assumed to vary between \$14 and \$18 per barrel, and to average \$16 in 1986. Some expect that energy demand and prices will tend to increase in 1987.

The most common assumption about exchange rates is that the trade weighted value of the dollar will continue to decline moderately during the current year and to decline more slowly in 1987.

This report summarizes a quarterly survey of predictions by 28 business, academic, and government economists who are professionally engaged in forecasting and are members of the Business and Economics Statistics Section of the American Statistical Association. Victor Zarnowitz of the Graduate School of Business of the University of Chicago and NBER, assisted by Robert E. Allison of NBER, was responsible for tabulating and evaluating this survey.

Kala Krishna

Kala Krishna has been a faculty research fellow in NBER's Program in International Studies since September 1984. Krishna, who was born in New Delhi, India, received her B.A. and M.A. in economics from Delhi University and her Ph.D. from Princeton University in 1984. She is currently an assistant professor at Harvard University and a research associate in Harvard's Center for International Affairs.



Krishna was a teaching assistant at Princeton University from 1982-3, and a research assistant at the World Bank in the summer of 1982. Her current research takes three directions: the effects of adjustment costs, especially as manifested in hiring and firing costs in the labor market; trade policy for high tech industries; and game-theoretic analysis of the GATT rules. Her fields

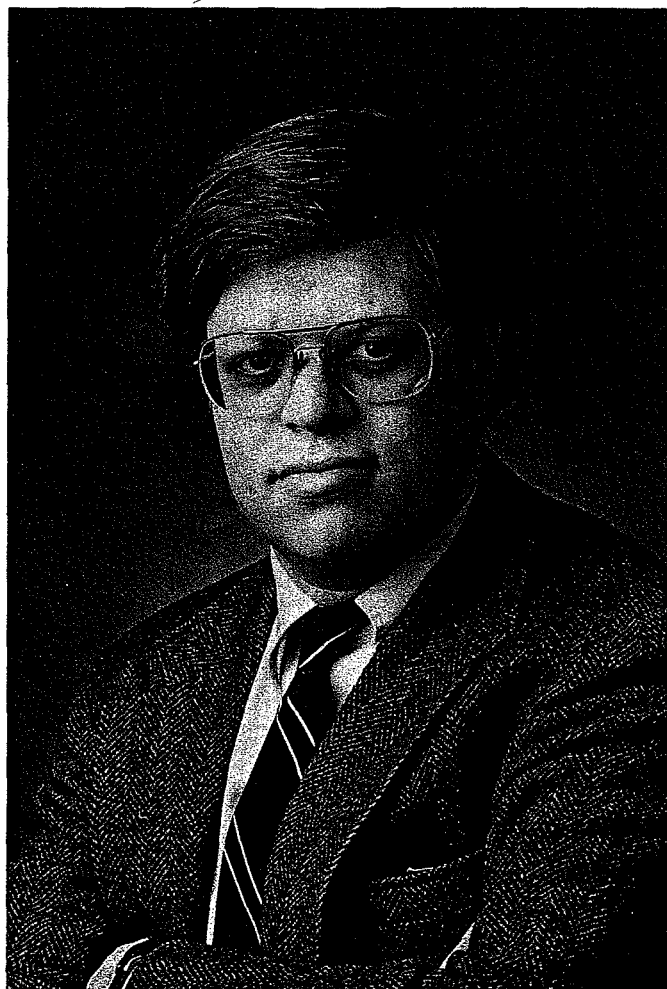
of interest are international trade, industrial organization, and labor economics. A report by Professor Krishna on some of her trade research appears in this issue of the *NBER Reporter*.

Krishna and her husband, Vijay Krishna, who is an assistant professor at the Harvard Business School, live in Cambridge. They enjoy classical music and also like to travel.

Bruce N. Lehmann

Bruce N. Lehmann, a faculty research fellow in NBER's Program in Financial Markets and Monetary Economics, has been associated with the Bureau since 1982. Lehmann received his A.B. with honors in economics and history from Washington University in St. Louis and his Ph.D. in monetary economics and econometrics from the University of Chicago. He received a joint appointment in the Economics Department and the Graduate School of Business at Columbia University in 1981 and has been there since except for a year's leave at UCLA. Lehmann was recently promoted to associate professor of economics and finance.

Lehmann's research interests include financial economics, monetary economics, and econometrics. More specifically, he has been assessing the validity of asset

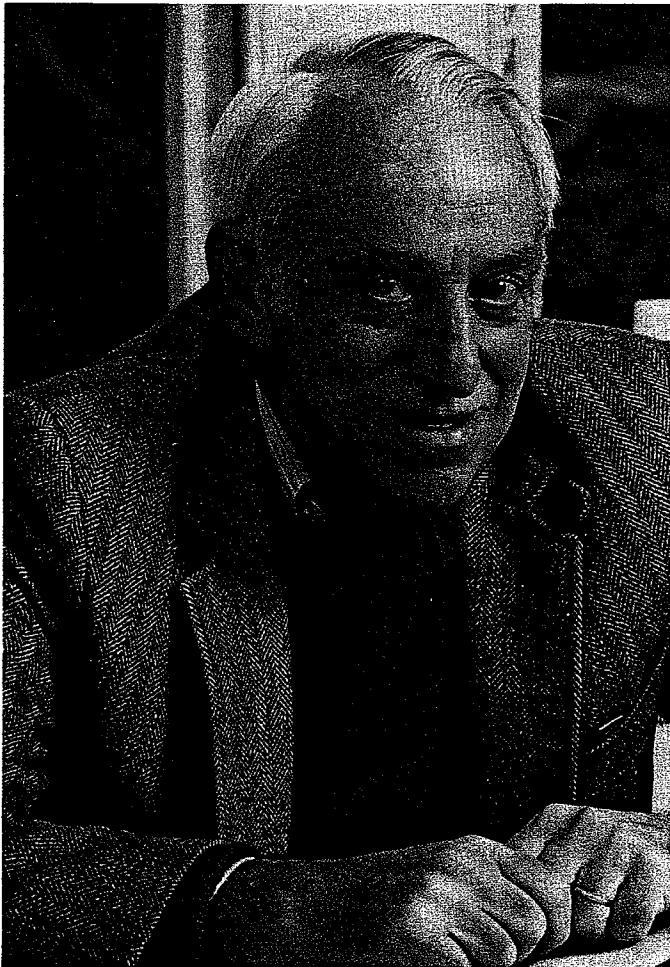


pricing models and studying the causes of business cycle fluctuations.

Lehmann and his wife, Irene Nieman, who is the administrator of the Economics Department at Columbia University, have a nine-year-old son, Dylan, and a 10-year-old cat. Their affiliation with Columbia is even reflected in their residences, Lehmann writes: they currently live in a Columbia University apartment in New York City but recently purchased a house in Columbiaville, New York (which, naturally, is in Columbia County). Irene collects antiques and Bruce apparently enjoys moving them long distances.

James Tobin

James Tobin has represented Yale University on NBER's Board of Directors since 1981, the year in which he received the Nobel Prize in Economics. He leaves



the Board this year when he retires from Yale. Tobin was born in Champaign, Illinois, and was educated at Harvard University, where he received his Ph.D. in 1947. He joined Yale's economics faculty in 1950, was appointed professor of economics in 1955, and twice served as department chairman (1968-9 and 1974-8). Tobin has also been a member of the Cowles Foundation for

Research in Economics since its establishment at Yale in 1955; he served as its director in 1955-61 and in 1964-5. He has also been a visiting professor at the University of Nairobi (Kenya) and at the University of California, Berkeley.

From 1961-2, Tobin was a member of the President's Council of Economic Advisers; he served as consultant to that group from 1962-8. He was also a consultant to the U.S. Treasury Department (1962-9) and has been a member of the Panel of Economic Advisers of the U.S. Congressional Budget Office since 1975.

Tobin, who received the John Bates Clark medal in 1955, is a past president of the American Economic Association, the Econometric Society, and the Eastern Economic Association. Since 1984, he has also served on the Committee on the Status of Black Americans of the National Academy of Sciences.

Tobin's fields of interest and research include economic theory, macroeconomics, monetary and fiscal theory and policy, consumer behavior, and social welfare policy. His publications are far too numerous to list here.

Tobin married Elizabeth Fay Ringo in 1946. They have three sons, a daughter, and one granddaughter. For recreation, Tobin enjoys tennis, skiing, sailing, canoeing, and chess. He pursues these and other activities in Vermont and Wisconsin.

Conferences

The Effect of Taxation on Capital Formation

NBER held a three-day conference in February as part of the ongoing study of the effects of taxation on capital formation. The agenda was:

N. Gregory Mankiw, NBER and Harvard University, "Consumer Spending and the Aftertax Real Interest Rate"

Discussant: Laurence J. Kotlikoff, NBER and Boston University

Steven F. Venti, NBER and Dartmouth College, and David A. Wise, NBER and Harvard University, "IRAs and Saving" (NBER Working Paper No. 1879)

Discussant: Angus Deaton, NBER and Princeton University

Lawrence B. Lindsey, NBER and Harvard University, "Capital Gains Rates, Revenues, and Realizations" (NBER Working Paper No. 1893)

Discussant: John H. Makin, American Enterprise Institute

Charles L. Ballard, John Karl Scholz, Stanford University, and John B. Shoven, NBER and Stanford University, "The Value-Added Tax: A General Equilibrium Look at Its Efficiency and Incidence"

Discussant: Harvey Galper, Brookings Institution

Alan J. Auerbach, NBER and University of Pennsylvania, and James R. Hines, Jr., Harvard University, "Anticipated Tax Changes and the Timing of Investment" (NBER Working Paper No. 1886)

Discussant: Andrew B. Abel, NBER and Harvard University

Martin Feldstein, NBER and Harvard University, and Joosung Jun, Harvard University, "The Effects of Tax Rules on Nonresidential Fixed Investment: Some Preliminary Evidence from the 1980s" (NBER Working Paper No. 1857)

Discussant: Roger H. Gordon, NBER and University of Michigan

Michael J. Boskin, NBER and Stanford University, and William G. Gale, Stanford University, "Taxes and the International Location of Investment"

Discussant: David G. Hartman, NBER and Data Resources, Inc.

Roger H. Gordon, James R. Hines, Jr., and Lawrence H. Summers, NBER and Harvard University, "Notes on the Tax Treatment of Structures" (NBER Working Paper No. 1896)

Discussant: Emil Sunley, Deloitte, Haskins & Sells

Patric H. Hendershott, NBER and Ohio State University, "Tax Changes and Capital Allocation in the 1980s" (NBER Working Paper No. 1911)

Discussant: Harvey S. Rosen, NBER and Princeton University

Don Fullerton, Department of the Treasury, and Yolanda K. Henderson, Federal Reserve Bank of Boston, "The Impact of Fundamental Tax Reform on the Allocation of Resources" (NBER Working Paper No. 1904)

Discussant: J. Gregory Ballantine, Peat, Marwick, Mitchell & Company

Mervyn A. King, NBER and London School of Economics, "A Cash Flow Type Corporate Income Tax"

Discussant: Daniel R. Feenberg, NBER

Alan J. Auerbach and James M. Poterba, NBER and MIT, "Tax Loss Carryforwards and Corporate Tax Incentives" (NBER Working Paper No. 1863)

Discussant: David F. Bradford, NBER and Princeton University

Saman Majd, University of Pennsylvania, and Stewart C. Myers, NBER and MIT, "Tax Asymmetries and

Corporate Income Tax Reform" (NBER Working Paper No. 1924)

Discussant: Joseph E. Stiglitz, NBER and Princeton University

Lawrence H. Summers, "Investment Incentives and the Discounting of Depreciation Allowances"

Mankiw's paper examines the responsiveness of consumer spending to the aftertax real interest rate. Unlike most previous studies, Mankiw's paper introduces durables into the consumer spending decision. By highlighting the channel that makes durable goods more sensitive to interest rates, the "user cost effect," Mankiw shows how the aftertax real interest rate affects the composition of consumer spending between durable and nondurable goods. He also compares consumer spending levels of the 1970s with the 1980s when the aftertax real interest rate was at extraordinarily high levels. He finds that these high rates may have substantially affected the level and composition of consumer spending. Mankiw concludes that policies that directly alter the aftertax interest rate, such as Individual Retirement Accounts (IRAs) or expenditure taxation, are likely to have an important impact on saving and capital formation.

Venti and Wise consider the impact of IRAs on saving. Specifically, they examine whether IRA contributions come from other existing savings accounts, whether the contributions would have been saved even without the availability of IRAs, or whether IRA contributions represent additional saving. Venti and Wise find that increasing IRA limits would lead to substantial increases in tax-deferred saving. Very little of this increase, however, would be offset by a reduction of saving in other financial assets. The authors' estimates suggest that about half of the IRA increase would be funded by reduced consumption, and about 35 percent by reduced taxes.

Lindsey examines the effect of capital gains tax rates on the level of capital gains realization and on tax revenue. His study uses detailed data from personal income tax returns for 1965-82 to estimate the effect of various tax provisions. Lindsey finds that capital gains tax revenues are maximized at a tax rate of 20 percent or lower. Although some gain in revenue resulting from a rate reduction is likely to be temporary, he finds that in the long run, for every one percentage point of reduction in the capital gains tax rate, approximately 5 percent more in capital gains will be realized.

Ballard, Scholz, and Shoven examine the efficiency and distributional consequences of a value-added tax (VAT) whose revenues are used to reduce existing personal or corporate income taxes. They study both a VAT as a flat-rate tax on consumption and a VAT similar to those used in Europe with different rates on different products. By simulating a computable general equilibrium model of the economy, the three authors find that the introduction of a VAT and an equal reduction in the

personal income tax would increase efficiency. The magnitude of the improvement is significantly larger for a flat VAT than for one with a differentiated rate structure.

Auerbach and Hines find that business investment responds both to existing rules and to anticipated changes in tax rules. Over the last three decades, investment in equipment has been much greater than investment in structures. This difference is partly the result of the introduction of major tax benefits for equipment. Auerbach and Hines also estimate the likely effects of three different tax proposals—Bradley-Gephardt, Treasury II, and H.R. 3838—on the timing and magnitude of investment in equipment and structures. Their simulations suggest that the provisions of all three plans would reduce fixed investment in the short run, with the reduction coming primarily in equipment.

Feldstein and Jun examine the relationship between tax-induced changes in the net profitability of investment and the share of GNP that is devoted to net investment in plant and equipment. Their evidence indicates a strong relationship between the two over the past three decades. In fact, spurred by the tax changes of 1981 and by the decline in inflation, the investment-GNP ratio increased to about 3.9 percent in 1984-5, up from 2.7 percent in the second half of the 1970s.

Boskin and Gale report that U.S. tax policy affects both foreign direct investment (FDI) in the United States and U.S. direct investment abroad (DIA). In particular, FDI financed by retained earnings is very sensitive to the aftertax rate of return. DIA by the United States is also somewhat affected by variations in the aftertax return available. The authors' estimates suggest that for every dollar of increase in the U.S. domestic investment induced by tax policy, a reduction of approximately six cents of DIA occurs. They also find that a tax policy that raises the aftertax rate of return enough to lead to a dollar of increased domestic investment in the United States brings with it 30 cents of FDI.

Gordon, Hines, and Summers find that current tax rules favor investment in structures over investment in equipment, for three reasons: the opportunity to depreciate buildings that have been resold; the ability to use debt to finance investments in structures; and the possibility of arbitrage among the investors in different tax brackets.

Hendershott studies the extent to which the current tax law favors high-income, owner-occupied housing and penalizes investment in inventories. He then examines the effect of three different tax proposals—the Treasury plan, the administration plan, and H.R. 3838—on corporate and noncorporate investment. He finds that only the administration's proposal would lead to a more efficient allocation of capital—one that is less biased toward high-income housing and corporate structures. Both the Treasury and House plans would increase overinvestment in housing.

Fullerton and Henderson design a simulation model to study alternative tax reform plans. Their model allows them to compare both resource allocations and

associated changes in welfare. They find that both the Treasury plan and the president's proposal would generate net welfare gains even with slight declines in the capital stock.

King shows that a cash flow tax on business income offers important advantages over traditional, income-based systems of taxation. Chief among these are freedom from depreciation measurement problems, neutrality with respect to both the investment-saving decision and among possible investments, and the potential for raising large revenues.

Auerbach and Poterba study the importance of tax loss carryforwards and their effects on the incentive for investment. Although their results suggest that loss carryforwards are important in some industries, the overall finding is that loss carryforwards affect a relatively small fraction of the corporate sector. Auerbach and Poterba also study the effect of loss carryforwards on investment incentives. They find that the tax structure discourages firms with tax loss carryforwards from investing in equipment since these firms are unable to use accelerated depreciation allowances as they accrue and are more likely to be taxable in the future when the investment is yielding taxable profits.

Majd and Myers examine a tax reform that reduces the statutory tax rate, eliminates the investment tax credit, and sets tax depreciation approximately equal to economic depreciation. They find that these changes would increase the effective tax rate on marginal investments by firms that always pay taxes but would reduce the potential burden of tax asymmetries dramatically.

Summers's study concentrates on the way in which major corporations take tax depreciation allowances into account in their investment planning. He presents new survey evidence on discount rates that corporations use on different components of cash flow. He finds that the discount rates average 17 percent. This is much higher than the rate assumed in most studies of the effects of alternative investment incentives, implying that those studies understate the relative potency of the investment tax credit.

A volume containing these studies, edited by Martin Feldstein, will be published by the University of Chicago Press. An announcement of its availability will appear in a future issue of the *NBER Reporter*.

Macroeconomists Gather in Cambridge

NBER held its first Annual Conference on Macroeconomics on March 7 and 8. More than 50 academic economists and business journalists gathered in Cambridge for the two-day program, organized by NBER Research Associate Stanley Fischer of MIT. The agenda was:

Chairman: Stanley Fischer

Lawrence F. Katz, NBER and University of California, Berkeley, "Efficiency Wage Theories: A Partial Evaluation" (NBER Working Paper No. 1906)

Discussants: Laurence Weiss, University of California, San Diego, and Joseph J. Altonji, NBER and Columbia University

Martin Feldstein, NBER and Harvard University, "The Budget Deficit and the Dollar" (NBER Working Paper No. 1898)

Discussants: Alan C. Stockman, NBER and University of Rochester, and Rudiger Dornbusch, NBER and MIT

Chairman: Martin Feldstein

Martin Weitzman, MIT, "Macroeconomic Implications of Profit Sharing"

Discussants: Alan C. Blinder, NBER and Princeton University, and Russell Cooper, NBER and University of Iowa

Martin Eichenbaum, Carnegie-Mellon University, "Do Equilibrium Real Business Cycle Theories Explain Postwar U.S. Business Cycles?"

Discussants: Robert J. Barro, NBER and University of Rochester, and N. Gregory Mankiw, NBER and Harvard University

Chairman: Robert E. Hall, NBER and Stanford University

Fumio Hayashi, Osaka University, "Why Is Japan's Saving Rate So Apparently High?"

Discussants: Albert K. Ando, University of Pennsylvania, and Paul Romer, University of Rochester

Olivier J. Blanchard, NBER and MIT, and Lawrence H. Summers, NBER and Harvard University, "Hysteresis and the European Unemployment Problem" (NBER Working Paper No. 1950)

Discussants: John Kennan, University of Iowa, and Robert E. Hall

Katz's paper compares efficiency wage theories to other models of the labor market. According to efficiency wage theories, some firms will pay above-market wages in order to attract higher-quality employees to reduce turnover, prevent worker malfeasance and collective action, and to motivate employees by creating a feeling of equitable treatment among them. Simple versions of efficiency wage models can explain involuntary unemployment, large differences among firms in wages for similar workers, the existence of segmented labor markets with queues for highly desirable jobs, and the behavior of labor markets over the business cycle.

Katz notes that long-term contracts and long-term employer-employee relationships can eliminate the need for firms to pay above-market wages. In fact, firms with the highest wages often have such long-term arrangements, so Katz finds efficiency wage theories less than satisfactory on this point. Still, he feels that the data, which show large, persistent wage differentials for similar workers and types of jobs, provide strong

support for some type of efficiency wage behavior by many firms. Which type of behavior is the question, because the evidence is difficult to reconcile with any individual variant of the efficiency wage argument.

Feldstein considers the extent to which expectations of large future government budget deficits have contributed to the strength of the U.S. dollar in the 1980s. His paper analyzes the determinants of movements in the U.S. dollar-West German mark exchange rate over 1973-84. Expected U.S. budget deficits had a significantly positive effect on this exchange rate and were responsible for a large part of the rise in the dollar, he finds. Also, the decreasing growth rate of the U.S. monetary base strengthened the dollar during this period, while tax incentives for investment had no apparent effect on the exchange rate. High rates of inflation also had a weak but negative effect on the dollar. Feldstein observes that his results are not totally conclusive but that expected future budget deficits are significant determinants of exchange rates in each of many alternative specifications of his model.

In his paper, Weitzman explores the possible macroeconomic consequences of partial profit sharing as an alternative to the traditional system of compensating workers with wages alone. Weitzman argues that the usual macroeconomic tools of demand management are unable to achieve simultaneously the goals of price stability and full employment. He analyzes an alternative economy in which firms share a part of their profits with their employees; while employees receive the same long-run average compensation as they would in a wage system, profit sharing produces less unemployment during cyclical downturns. The paper examines three major alternatives for structural reform of the labor market—incomes policy, two-tiered pay, and employee control—and finds profit sharing to have the most promising macroeconomic features. Weitzman also considers the Japanese experience with extensive profit sharing, and while he finds their system to have many desirable macroeconomic properties, he concludes that profit sharing alone is not responsible for the recent performance of the Japanese economy.

Eichenbaum and Singleton test different theories of the sources of business cycles with data on postwar economic fluctuations in the United States. In particular, they ask whether the data support "real business cycle" theories, which view business cycles as arising from variations over time in the economic opportunities of firms and individuals. These theories differ from monetarist or Keynesian approaches in which government policy, and in particular monetary policy, is responsible for a large part of the cyclical movement in income. Eichenbaum and Singleton find that independent variations in the money supply explain only a small fraction of the variation in national income. While the money supply has important effects during some short episodes—for example, in the early part of the 1980s—unanticipated movements in the money supply were not sufficiently frequent or large to have a significant effect on the real economy over the entire period

studied. However, these findings are sensitive to the method used to detrend the data. The authors conclude that the results support real business cycle theories, but other theories of business cycles are not necessarily wrong.

Hayashi analyzes the determinants of the high Japanese saving rate. He observes that definitions of national saving and income are not the same in Japan and the United States and finds that when consistent measures are used, much of the difference in saving rates between the two countries disappears. It remains true, however, that Japan saves at a higher rate than the United States. Hayashi rejects many of the standard explanations of this phenomenon: high growth rates of income; demographic changes; features of the Japanese social security system; the extensive use of bonuses as compensation; tax incentives; and the high cost of housing. In particular, the life-cycle hypothesis of saving fails to explain the data. And, while the Japanese tax code favors saving, it appears not to have much effect on saving and consumption decisions. Using data from household surveys, Hayashi finds a great deal of support for bequests as the source of high saving in Japan. Evidence from responses to recent legislative changes further suggests that these bequests are not accidental but are intentional intergenerational transfers.

Finally, the paper by Blanchard and Summers seeks to explain the recent European experience of persistently high unemployment. In many macroeconomic models used for policy analysis, unemployment can depart from its natural rate only over relatively short periods of time. But Blanchard and Summers present evidence that unemployment in France, West Germany, and the United Kingdom in the 1980s has been characterized by "hysteresis": that is, current unemployment depends strongly on past unemployment and will not necessarily return to earlier levels.

The authors note that many of the traditional explanations of unemployment as the outcome of aggregate demand or supply shocks do not satisfactorily account for hysteresis. They also discount the possibility that persistent economic downturns could be the result of the deterioration of physical or human capital during slack periods. Instead, Blanchard and Summers propose a theory of employment and wage setting based on union-type behavior of employed workers who insist on contracts that secure their positions and salaries to the disadvantage of the unemployed.

While observing that the European economies are heavily unionized, Blanchard and Summers suggest that their model of the wage and employment process also applies to nonunionized firms and sectors. In their model, unanticipated demand or supply shocks will have sustained effects on employment. When the model is tested with data from 1953-84, the results are consistent with persistent movements in unemployment in Europe, but U.S. employment tends to return to a natural level.

These papers will be published by The M.I.T. Press in October in a conference volume titled *NBER Macro-*

economics Annual 1986. This first volume of a new NBER series will cost \$25.95, clothbound, and \$9.95, paperback. For ordering information, please contact The M.I.T. Press, 28 Carleton Street, Cambridge, MA 02142. Their telephone number is (617) 253-2884.

Economic Problems in the United States and Japan

NBER's Program in International Studies sponsored a conference on "International Economic Problems Confronting the United States and Japan" on March 20-21 in Cambridge. The following papers were presented and discussed:

SESSION 1: PRODUCTIVITY GROWTH AND TRADE BETWEEN THE UNITED STATES AND JAPAN

Ryuzo Sato, NBER and New York University, and Shunichi Tsutsui, University of Georgia, "Information Strategies, Market Barriers, and Trade Performance"

Discussant: Albert K. Ando, University of Pennsylvania

Richard C. Marston, NBER and University of Pennsylvania, "Real Exchange Rates and Productivity Growth in the United States and Japan" (NBER Working Paper No. 1922)

Discussant: Ryuhei Okumura, Nagoya University (visiting at University of North Carolina, Chapel Hill)

SESSION 2: RECENT TRADE PERFORMANCE

William H. Branson, NBER and Princeton University, and James Love, Princeton University, "The Real Exchange Rate and Employment and Output in U.S. Manufacturing, 1974-85"

Discussant: Motoo Kaji, University of Tokyo

Tsuneo Nakauchi, International Christian University, Tokyo, "The United States and Japan's Trade with Asian Countries"

Discussant: Hugh Patrick, Columbia University

J. David Richardson, NBER and University of Wisconsin-Madison, "Recent U.S. Automobile Trade and Investment: Influence of Restraints and Exchange Rates"

Discussant: Koichi Hamada, University of Tokyo (visiting at Yale University)

SESSION 3: INDUSTRIAL ORGANIZATION AND TRADE PERFORMANCE

Motoshige Itoh and Kazuharu Kiyono, University of Tokyo, "Welfare-Improving Export Subsidies"

Discussant: Yoshiyasu Ono, Princeton University

Richard Baldwin, MIT, and Paul R. Krugman, NBER and MIT, "Market Access and International Competition: A Simulation Study of 16K Random Access Memories" (NBER Working Paper No. 1936)

Discussant: Masahiro Okuno, University of Tokyo
(visiting at University of Pennsylvania)

Munemichi Inoue, Director, Economic Research
Department, Marubeni Corporation, "Industrial
Organization of U.S.-Japan Bilateral Trade"

Discussant: Gary Saxonhouse, University of Michigan

The paper by Sato and Tsutsui investigates the nature of technological progress in such countries as the United States and Japan. The authors distinguish between technological leaders, such as the United States and Germany, and latecomers such as Japan and South Korea. The former tend to invest larger amounts in basic research and to generate scientific breakthroughs and innovations; the latter tend to invest larger amounts in applied research and to concentrate on improvements in production processes. Sato and Tsutsui develop a theory to explain the pattern of research that emerges, a pattern that depends on the rate of diffusion of basic technology and the relative efficiency of applied research.

In his paper, Marston examines the effects of Japanese productivity growth on real exchange rates between the yen and the dollar. Marston shows the concentration of Japan's high rate of productivity growth in its traded sector. This has resulted in a nearly continuous fall in the prices of traded goods relative to nontraded goods in Japan. In order to keep U.S. traded goods competitive over 1973-83, the real exchange rate based on general price series such as the GDP deflator or the CPI would have had to fall by about 40 percent relative to unit labor costs, he estimates. Instead, real exchange rates based on these broad price indexes were nearly constant over the period. This gave the misleading impression that U.S. goods were still competitive when in fact there had been a sharp rise in the relative price of U.S. traded goods.

Branson and Love investigate the effects of the misalignment of the dollar on employment and output in U.S. manufacturing. Using disaggregated data in reduced-form equations for employment and output, they find significant relative price effects in most subsectors of manufacturing. In the employment equations, for example, the relative price elasticity for transportation equipment is -0.36 and for primary metals -0.68 , suggesting that the misalignment of the dollar has had large effects on employment in these sectors. Branson and Love also present evidence on the effects of the misalignment on employment from state to state: in 34 of the states, the misalignment has had a significant effect on employment in manufacturing.

Nakauchi examines the pattern of U.S. and Japanese trade with Asia. He finds that while the United States imports more from the rest of Asia than Japan does, Japan exports more to this region than the United States does. Exports to the industrial countries have provided the impetus for export growth rates in the 1970s close to 10 percent in the newly industrializing countries (Taiwan, Korea, Hong Kong, and Singapore) and growth rates greater than 6 percent in the ASEAN

countries (Malaysia, Thailand, Philippines, and Indonesia). But the share of exports to Japan has not kept pace with total exports, despite the proximity of the Japanese market. Nakauchi concludes with a discussion of American and Japanese trade policies toward these Asian countries and the prospects for continued growth in Asian exports.

In assessing the impact of the misalignment of exchange rates and of the voluntary restraint arrangement (VRA) on the automobile industry, we usually rely on aggregate price indexes. Richardson points out that this procedure may generate misleading results because of the lack of a suitable exchange rate series, the neglect of possible constrained supply, and the inadequacy of price data. By carefully constructing appropriate country-specific exchange rate and price series, he traces the role of Canada, as well as a larger group of countries including Germany and Japan, as foreign suppliers of automobiles. His analysis of how the effects of anticipated quantity constraints vary depending on the degree of labor and capital mobility within American industry is particularly interesting. He proposes a comprehensive model to treat the interaction of anticipated as well and unanticipated VRAs and the putty-clay nature of investment in automobile production.

In the standard trade model, export subsidies usually lower the national welfare, but the experience of Japan raises doubts about this conventional wisdom. Itoh and Kiyono show that an export subsidy targeted on goods right on the margin of international competitiveness may improve the national welfare even under perfect competition with price flexibility. The subsidization of a marginal export (or import-competing) industry will distort resource allocation, but this effect may be more than offset by favorable changes in the terms of trade.

Perhaps in no industry have costs fallen as rapidly as in semiconductors. Baldwin and Krugman set out to model the learning-by-doing, dynamic adjustment process that has characterized the semiconductor industry. They specify an oligopolistic model consisting of a few U.S. and Japanese firms whose production of semiconductors is at a constant rate but whose "yield" from that production increases with cumulative production. They then calibrate the model using some estimates of parameters drawn from previous studies in order to study production of the 16K random access memory chip. Their estimates of costs in the industry yield some striking results: they conclude that in the absence of import barriers in the Japanese market, no Japanese firms would have found it profitable to enter the 16K market. With no barriers and no Japanese firms, there would have been fewer firms in the industry and larger production runs. Moreover, costs would have fallen in both the U.S. and Japanese markets, so the absence of barriers would have benefited consumers in both countries.

The paper by Inoue examines the degree of concentration in Japanese export and import industries. He

finds that over 50 percent of both Japanese exports and imports are produced by firms with over 1000 employees. The large firms, in turn, contract out much of their manufacturing of components rather than produce the components themselves. This "contract integration" is contrasted with the "vertical integration" found in many U.S. industries. Contract integration is said to provide much greater flexibility for large firms to shift product lines, since the burden of adjustment can be shifted to a large number of subcontractors.

The conference, which was organized by Koichi Hamada and Richard C. Marston, was part of the NBER research project on U.S.-Japan economic relations supported by the Ford Foundation, the Mellon Foundation, and the Japan-United States Educational Commission.

In addition to the authors and discussants, conference participants included: Geoffrey Carliner, NBER; Susan Collins, NBER and Harvard University; Richard N. Cooper, Toshiaki Hasegawa, Shuzo Nishimura, and Tatsuya Ohmura, Harvard University; Takatoshi Ito, NBER and University of Minnesota; Kiyoshi Otani, MIT; and Shiro Yabushita, Princeton University.

Empirical Methods for International Trade

A conference on empirical methods for international trade was held on April 3-4 at the Royal Sonesta Hotel in Cambridge. The conference was sponsored by NBER and the International Economics Research Center, Columbia University, and was organized by Robert C. Feenstra (NBER and Columbia University). The following papers were presented:

Richard A. Brecher and Ehsan U. Choudhri, Carleton University, "The Factor Content of Consumption in Canada and the United States: A Two-Country Test of the Heckscher-Ohlin-Vanek Model"

Discussant: Keith Maskus, University of Colorado

David R. Dollar, University of California, Los Angeles, joint work with William Baumol, Princeton University, and Edward Wolff, New York University, "The Factor Price Equalization Model and Industry Productivity: An Empirical Test across Countries"

Discussant: J. David Richardson, NBER and University of Wisconsin

James R. Markusen, University of Western Ontario, joint work with Linda Hunter, University of California, San Diego, "Per Capita Income as a Basis for Trade"

Discussant: Lawrence Schembri, Carleton University

W. Erwin Diewert, NBER and University of British Columbia, and Catherine J. Morrison, NBER and Tufts University, "Export Supply and Import Demand Functions: A Production Theory Approach"

Discussant: Earl Grinols, University of Illinois
Kar-riu Wong, University of Washington, "International Factor Mobility and the Volume of Trade: An Empirical Study"

Discussant: Alan Woodland, University of Sydney

W. Erwin Diewert, joint work with Alexandra Cas, Statistics Canada, and Lawrence Ostensoe, University of British Columbia, "Productivity Growth and Changes in the Terms of Trade in Canada"

Discussant: Michael Denny, NBER and University of Toronto

Robert C. Feenstra, "Gains from Trade in Differentiated Products: Japanese Compact Trucks"

Discussant: Shabtai Donnenfeld, New York University

Edward E. Leamer, University of California, Los Angeles, "Cross-Section Estimation of the Effects of Trade Barriers"

Discussant: James Anderson, Boston College

Bee Yan Aw and Mark J. Roberts, Pennsylvania State University, "Price and Quality Level Comparisons for U.S. Footwear Imports: An Application of Multilateral Index Numbers"

Discussant: Elias Dinopoulos, Michigan State University

Avinash K. Dixit, Princeton University, "Optimal Trade and Industrial Policies for the U.S. Automobile Industry"

Discussant: Jonathan Eaton, NBER and University of Virginia

Richard Baldwin, MIT, and Paul R. Krugman, NBER and MIT, "Market Access and International Competition: A Simulation Study of 16K Random Access Memories" (NBER Working Paper No. 1936)

Discussant: Kala Krishna, NBER and Harvard University

Brecher and Choudhri consider whether the Heckscher-Ohlin-Vanek (HOV) model holds for Canada and the United States. According to this model, the amount of any factor of production embodied in a dollar's worth of domestic expenditure must be the same across countries. The authors test this hypothesis using an errors-in-variables framework and reject it for several natural resources and some types of labor.

Dollar, Baumol, and Wolff, using a sample of manufacturing industries for industrial countries, also find evidence against the HOV model. If factor price equalization holds, then industries should have the same labor productivity (value added per worker) across countries. However, labor productivity actually differs substantially across countries, and the physical capital per worker for industries is correlated with the country endowments. The authors consider two alternative

models to explain their findings, one emphasizing economies of scale and the other technological differences across countries, and find greater support for the latter.

Markusen and Hunter examine another explanation for trade flows not explained by the HOV model: differences in taste across countries. Using a sample of 35 countries, they estimate a linear expenditure system that allows for nonhomothetic tastes. Differences in per capita income are then a basis for trade. The authors find that deviations from homotheticity are significant in both statistical and economic terms.

The next three papers use duality theory to estimate aggregate relationships between trade flows, domestic outputs, and factor endowments. Diewert and Morrison use data for the United States to estimate a GNP or profit function in which exports and domestic sales are outputs, imports and labor are variable inputs, and capital is a fixed input. Diewert and Morrison direct special attention to the correct curvature conditions. From the estimated elasticities, the authors calculate that a real devaluation of 28 percent would be required to eliminate the U.S. balance of trade deficit in 1982.

Also using data for the United States, Wong estimates an indirect trade utility function. In this case, exports are the difference between domestic production and consumption, imports are consumed but not produced at home, and there are endowments of capital, land, and labor. Wong asks how inflows of foreign capital or labor would affect the levels of trade and factor prices. Among his results, he finds that foreign investment in the United States substantially increases the export of goods.

Diewert, Cas, and Ostensoe use an integrated approach to measure changes in total factor productivity and the terms of trade for Canada. Assuming an underlying translog profit function, they use Fisher Ideal indexes to give exact measures of changes in productivity and the terms of trade, while also taking account of commodity taxes among sectors. Taken together, the productivity and terms-of-trade indexes imply annual changes in welfare for the Canadian economy.

The papers just described are mainly concerned with positive aspects of international trade, while those that follow deal with issues of trade policy. Feenstra presents a methodology for estimating the consumer gains from importing a product with new characteristics. He applies this technique to compact trucks and finds consumer gains that exceed 10 percent of the retail price of the imported trucks. After 1982, American compact trucks became available, produced under tariff protection. Since these models are very similar to imported products already available, the additional consumer gains from the American compact trucks are small.

Many studies of production are conducted on an industry-by-industry basis. Leamer asks whether it is valid to pool across commodities. The HOV model gives only weak support to pooling across commodities. In estimating the effects of tariffs on output, Leamer finds some support for pooling across countries and com-

modities, while including dummy variables for the latter. The simultaneity between tariffs and output, whereby tariffs affect domestic output through demand but output affects tariff levels through political pressure, also appears to be important.

Aw and Roberts discuss the construction of import price indexes when the disaggregate commodities may be protected. In particular, if there are quantitative restrictions, imports will shift in quality toward higher-priced categories. This quality shift can be measured by a comparison of unit values with exact price indexes. The authors apply their technique to U.S. imports of footwear.

Drawing on theoretical research dealing with imperfect competition and trade, Dixit constructs a simulation model of the automobile industry with domestic and Japanese producers. Their oligopolistic behavior is modeled as a Nash equilibrium with conjectural variations. Dixit uses this model to examine tariff and domestic antitrust policies, while also permitting some element of monopoly rents in U.S. labor costs. If appropriate antitrust policies are pursued, the scope for welfare-improving tariff policies is relatively limited.

Baldwin and Krugman consider competition between the United States and Japan in random access memories. This is an industry in which some form of dynamic scale economies is very important. The authors construct a model in which firm outputs increase along a yield curve and use it to simulate the effects of protectionist policies. They obtain rather dramatic results, in which protection substantially affects the number of firms operating at home or abroad. While the analyses of Dixit, Baldwin, and Krugman are preliminary, they still serve as a useful guide for further research.

Applied General Equilibrium Workshop

The NBER held an "Applied General Equilibrium [AGE] Workshop" at its Palo Alto office on April 18 and 19. This workshop, organized by John B. Shoven, NBER and Stanford University, and Herbert Scarf, Yale University, differed slightly from the previous five workshops on this subject that have been held since 1980. In addition to discussing papers outlining the latest developments in computational general equilibrium models of international trade and tax policy, the participants devoted some time to theoretical developments in the general equilibrium literature. This provided an opportunity for builders of applied models to interact with general equilibrium theorists on issues of common interest. The workshop was jointly funded by a grant from the National Science Foundation and by the Conference on Econometric and Mathematical Economics.

Day One

The first paper, "Deriving a Utility Function for the Economy," was presented by George Dantzig of Stanford University. He describes the conditions required to derive a utility function consistent with the structure of his PILOT model of the U.S. economy. Then Dantzig identifies the derived demand functions that are implied by the utility formulation. These functions were parameterized with income data from the Consumer Expenditure Survey. Dantzig finds that the level of consumer demand generated by his derived demand functions closely replicates actual consumer demands reported in that survey.

Scarf discussed "'Marginal Analysis' in the Presence of Indivisibilities." Almost all AGE models assume that production exhibits constant returns to scale. However, indivisibilities are inconsistent with this assumption. Marginal analysis is no longer appropriate in the presence of indivisibilities, but the question of what should replace it remains. Scarf uses a simple activity analysis description of production to illustrate several propositions. He shows that, regardless of the discrete problem, there are always a "small" number of increments between feasible points in the technology matrix. These increments in optimal outputs can be considered the analog of marginal products in the continuous case and therefore can be used to solve discrete programming problems. In fact, for any discrete programming problem, optimality can be achieved by checking only the increments in activity levels. Checking this relatively small set of increments is both a necessary and a sufficient condition for testing optimality.

Werner Hildenbrand of the University of Bonn discussed the question, "Is General Equilibrium Theory a Sound Foundation for Applied Equilibrium Analysis?" He focuses on a pure exchange general equilibrium model and, in particular, addresses questions surrounding the uniqueness of equilibria. If the Jacobian of the system of excess demand equations in a general equilibrium model is negative semidefinite, then the demand system has a unique solution. This Jacobian can be decomposed into the sum of two matrixes. The negative semidefiniteness of the first, the substitution matrix, is ensured by the traditional assumptions of consumer demand theory augmented by empirical evidence. However the second matrix, or income effect, depends on the initial endowments of commodities and may very well not be negative semidefinite. If we are to have more confidence in this income effect term, and therefore uniqueness, then further attention should be paid to issues concerning the income distribution.

Timothy Kehoe of Cambridge University followed with some additional comments on uniqueness. In the first part of his presentation, Kehoe describes the conditions that are necessary to achieve uniqueness in static models. These conditions generally use or imply the weak axiom of revealed preference (WARP). Kehoe

then asks how frequently models satisfy a weaker condition, gross substitutability, rather than WARP. He performs Monte Carlo simulations in which, for a uniform distribution of entries in Jacobian matrixes that satisfy the gross substitutability assumption, none of the 250,000 cases violated the WARP. In the second part of his presentation, Kehoe suggests that the problem of uniqueness in dynamic models with large or infinite numbers of consumers and goods in an overlapping-generations context are severe both in theory and in Monte Carlo simulations.

Anne Sibert, Board of Governors of the Federal Reserve System, and Andrew Feltenstein, World Bank, presented a paper entitled "An Analysis of the Welfare Implications of Alternative Exchange Rate Regimes: An Intertemporal Model with an Application." They used their two-period, open-economy, perfect-fore-sight model to analyze fixed and floating exchange rate regimes. They find that for Australia over 1981-4, floating exchange rates were superior (in a consumer welfare sense) to a fixed-rate regime.

Ramon Clarete and John Whalley, both of the University of Western Ontario, discussed "Equilibrium in the Presence of Foreign Exchange Premia." They describe a small open-economy trade model in which there is an associated foreign exchange premium. After discussing the pure exchange case, they describe how taxes, quotas, production, homegoods, and black markets for foreign exchange can be incorporated into the basic analysis. They then argue that in such a model, monetary policy can generate more important trade liberalizing changes than tariff reductions can.

Sherman Robinson, University of California, Berkeley, and Jaime de Melo, World Bank, presented a paper entitled "The Treatment of Foreign Trade in Computable General Equilibrium [CGE] Models of Small Economies." The authors describe a simple one-sector model with symmetric product differentiation for imports and exports. They suggest that the model captures the essence of the external specification for most single-country CGE trade models. They then explain how equilibrium is affected by terms-of-trade shifts and by changes in net capital inflow. They conclude by showing that a change in the exchange rate variable in their CGE model in response to some shock is affected by the choice of numeraire. This illustrates the general point that interpretation of these types of changes must be made with care.

Irma Adelman of the University of California, Berkeley, discussed "Modeling Uncertainty with Computable General Equilibrium Models." Adelman describes a methodology based on stochastic control theory that she used to build a model to derive optimal adjustment rules for coping with deviations from a target policy path. She implements the model with Korean data. Her principal result is that optimal adjustment strategies generally involve complex orchestration of all the instruments at the policymakers' disposal. This differs from some of the simple policy recommendations that

often emerge from nonstochastic general equilibrium models.

Day Two

In the April 19 session, Gerard Van der Laan of Vrije Universiteit (the Netherlands) discussed his paper on "The Computation of Quantity-Constrained Equilibria by Virtual Taxes." He develops a method to compute Drèzè equilibria by defining mutual tax equilibria. He then describes a constructional proof of the existence of such equilibria and shows that they are equal to Drèzè equilibria. Van der Laan concludes by presenting some numerical results that suggest that the initial equilibrium allocation is easily obtained.

Don Brown, Yale University, surveyed developments in general equilibrium and increasing returns to scale. He begins with Guesnerie's 1975 examination of the welfare properties of marginal cost pricing equilibrium. Brown then describes a succession of related papers that consider additional properties, including the existence of marginal cost pricing equilibrium. Brown concludes his presentation by describing a set of papers, including two computational models, that examine the existence and welfare properties of average cost pricing equilibrium.

Jean Waelbroeck, Free University (Brussels), and Alan Manne and Thomas Rutherford, both of Stanford University, presented "Toward Incorporating Money in CGE Models." The three authors describe their attempts to model the response of owners of wealth to uncertainty. They then present simulations of how the share, composition, and demand for assets would respond to changes in the interest rate, elasticity of marginal utility, and rates of return on shares.

Alfredo Pereira, Stanford University, discussed "A Stochastic Applied General Equilibrium Model for Tax Policy Evaluation." This paper summarizes his efforts to develop a model that would improve four weaknesses of the AGE literature. His model would be fully dynamic; it would model a stochastic environment; and it would incorporate financial markets, financial decisions, and government deficits. After describing the economic behavior of agents in the model, Pereira discussed its equilibrium features and the obstacles to be overcome in developing this type of model.

Eric Toder, of the Congressional Budget Office, discussed his paper on "Taxation, Portfolio Choice, and the Allocation of Capital: A General Equilibrium Approach." Toder introduces a general equilibrium model of household and firm portfolio choice under uncertainty. After describing the model, he discusses simulations of the effects that two changes in the U.S. tax structure—introduction of a flat tax and corporate tax integration—would have on the sectorial allocation of the physical capital stock. The results of this model differ from those generated by standard certainty models.

Yolanda K. Henderson, NBER and the Federal Reserve Bank of Boston, described "A Disaggregate Equilibrium Model of the Tax Distortions among Assets, Sectors, and Industries" (NBER Working Paper No. 1905, joint work with Don Fullerton). Compared to the standard Fullerton-Shoven-Whalley model, the Henderson-Fullerton model has very disaggregated types of capital. This allows them to measure interasset distortions arising from the differential taxation of assets. They are also able to model intersectional distortions by distinguishing among the corporate, noncorporate, and housing sectors. While distortions among assets are the largest of the various types of distortions in the model, the total of all distortions related to capital taxation is still below 1 percent of total income.

Lawrence H. Goulder, Harvard University, discussed "Tax Policy, Asset Prices, and Growth: A General Equilibrium Analysis." Goulder first describes a dynamic model in which adjustment costs are incorporated in the production side. By using this adjustment cost framework, Goulder is able to examine wealth capitalization effects from various policies and to focus in particular on policies that affect old and new capital differently. He then describes a series of policy simulations, including changes in corporate taxes, investment tax credits, and gasoline taxes. The results of his simulations suggest that modeling forward-looking investment behavior subject to adjustment costs in fact leads to different results from those of conventional general equilibrium models.

Finally, Bob Hamilton of the Canadian Department of Finance discussed "General Equilibrium Analysis of Taxation in a Small Open Economy: The Canadian Sales Tax System." This particular modeling effort arose from the desire to examine a very specific policy issue that faced Canadian tax administrators. The issue-oriented focus of the model led to the adoption of several assumptions, among the most important of which is the small, open, price-taking economy. Hamilton presents a set of simulations that estimate the efficiency gains that might result from altering the Canadian indirect tax system.

In addition to the authors, participants in the workshop included: Achim Bachem, Köln University; Charles L. Ballard, Michigan State University; Perry Beider, Curtis Eaves, Allan Gustafson, Peter Hammond, Osamu Ichioka, Ken Krenzin, Ralph Landau, Pat McAllister, D. John Roberts, John Karl Scholz, and Tim Wilson, all of Stanford University, and Michael J. Boskin and Bronwyn H. Hall of NBER and Stanford; Christophe Chamley, Hoover Institution; Charles E. McLure, Jr., NBER and Hoover Institution; Bernard Cornet, Gerard Debreu, and Andreu Mas-Colell, University of California at Berkeley; Thomas Hertel, Purdue University; Dale Jorgenson, Harvard University; Larry Kimbell, University of California at Los Angeles; Karl Koch, University of Bonn; Alex Meeraus, World Bank; Adolph Talman, University of Tilburg; and Leigh Tesfatsion, University of Southern California.

Keynesian and Classical Economics

On May 2 and 3, NBER sponsored a Universities Research Conference on "Keynesian and Classical Economics after 50 Years." The program, held in Cambridge and organized by Research Associate Bennett T. McCallum of Carnegie-Mellon University, included the following:

J. Bradford DeLong, Harvard University, and Lawrence H. Summers, NBER and Harvard University, "Is Increased Price Flexibility Stabilizing?"

Discussants: John C. Haltiwanger, University of California, Los Angeles, and John B. Taylor, NBER and Stanford University

Richard Startz, University of Washington, "Monopolistic Competition as a Foundation for Keynesian Macroeconomic Models"

Discussants: John J. Seater, North Carolina State University, and Stephen D. Williamson, University of Western Ontario

Russell Cooper, NBER and University of Iowa, "Sharing Some Thoughts on Weitzman's *The Share Economy*"

Discussants: Martin Weitzman, MIT, and Bruce Smith, Federal Reserve Bank of Minneapolis

James D. Hamilton, University of Virginia, "Monetary Factors in the Great Depression"

Discussants: Ben S. Bernanke, NBER and Princeton University, and Don Schlagenhauf, University of Chicago

Mancur Olson, University of Maryland, "A Collective-Choice and Microeconomics Approach to Macroeconomics: From Sticky Prices and Lags to Incentives"

Discussants: Michael Parkin, University of Western Ontario, and George von Furstenberg, Indiana University

Michael Woodford, Columbia University and New York University, "Expectations, Finance, and Aggregate Instability"

Discussants: George W. Evans, Stanford University, and Robert J. Hodrick, NBER and Northwestern University

Roger Farmer, University of Pennsylvania, "Is Nominal Price Stickiness Irrational?"

Discussants: Benjamin Eden, University of Iowa, and Bennett T. McCallum

In the first paper, DeLong and Summers reject sticky wages and prices as a major cause of recessions, just as Keynes did. Too much flexibility in wages and prices, they fear, could trigger a spiral of deflation, high real interest rates, and bankruptcy. DeLong and Summers also stress the importance of keeping aggregate demand high through stabilization policy. Finally, they highlight the potential danger of supposing that in-

creases in wage and price flexibility will improve macroeconomic performance if other sources of inflexibility exist.

Startz presents a general equilibrium macroeconomic model based on monopolistic competition. The predictions of the model are "Keynesian," in that there are fluctuations of aggregate demand that are Pareto inefficient and government policy can be both effective and beneficial. Startz concludes that the Keynesian results are a consequence of the assumption of monopolistic competition, which creates divergence between optimal private behavior and optimal social behavior.

Cooper's paper explores the positive and normative aspects of share contracts. His model highlights a macroeconomic externality created by the presence of imperfect competition in a multisector economy. Under a compensation system in which wages are constant and firms choose employment levels, exogenous shocks to the economy can produce large fluctuations in employment and output. Introducing share contracts into one sector influences the form of fluctuations throughout the economy. Cooper demonstrates that allocation may be more optimal under a system with share contracts than under a rigid wage system.

Hamilton surveys the literature and evidence on the role of monetary policy in the Great Depression, focusing particularly on the initial stages of the downturn in 1929-30. He concludes that tight money was a principal cause, although not the only cause, of both the initial economic downturn in 1929-30 and of the disastrous turn taken by the economy in 1931-3. He also finds that the impact of this policy on the economy came not so much through the conventional Keynesian channels of a shortage of liquidity and attendant high ex ante interest rates, but rather through unanticipated deflation and, after 1930, through the disruption of the real services of intermediation on the part of the financial sector as a consequence of the banking panics.

According to Olson, involuntary unemployment can occur only when transactions that would have been mutually advantageous are blocked by third parties. The only parties with incentives to block transactions are firms or workers that can act collectively to obtain noncompetitive prices. With the capacity for collective action, many transactions are blocked; this can lead to severe underemployment of the extra resources crowded into open sectors, and to large increases in queuing and searching for the rents in the organized sectors. Since coalitions make decisions more slowly than individuals or firms do, and sometimes set prices in nominal terms, their effects may be temporarily increased by aggregate demand shocks. In such cases, substantial amounts of involuntary unemployment can occur.

Woodford considers a class of equilibrium models of the business cycle in which fluctuations result from self-fulfilling revisions of agents' expectations in response to random events of no intrinsic significance, such as imperfect financial intermediation. He also discusses how business cycle models can yield test-

able predictions. He shows that if parameter values for technology and preference are realistic, the model will predict equilibrium fluctuations with the degree of persistence observed in actual aggregate data.

In his paper, Farmer shows that sticky nominal prices are consistent with rational expectations and with complete market clearing *even if* complete insurance is permitted. He does not explain why a sticky price equilibrium will come about in a model in which many other equilibriums are also consistent with rational expectations. Rather, he argues that pure rationality cannot be used to eliminate sticky nominal prices as equilibrium behavior. Farmer suggests that individual rationality is a minimal consistency requirement of any sensible economic model; contrary to widespread belief, this assumption is not very restrictive.

In addition to the authors and discussants, about 75 economists from the United States and Canada participated in the two-day meeting.

D.C. Meeting on Taxes and Capital Formation

About 200 corporate tax specialists and congressional staff members gathered in Washington on May 28 for an NBER conference on taxes and capital formation. There were seven brief presentations by Bureau economists, followed by questions from the audience. The topics discussed were:

David A. Wise, Harvard University, "Individual Retirement Accounts and Saving"

Lawrence B. Lindsey, Harvard University, "Rates, Realizations, and Revenues of Capital Gains"

Lawrence H. Summers, Harvard University, "Corporate Capital Budgeting Practices and the Effects of Tax Policies on Investment"

James R. Hines, Jr., Harvard University, "The Tax Treatment of Structures"

Patric H. Hendershott, Ohio State University, "Tax Reform and the Slope of the Playing Field" (NBER Working Paper No. 1909)

Martin Feldstein, Harvard University, "Tax Rules and Business Investment"

Michael J. Boskin, Stanford University, "Tax Policy and the International Location of Investment"

Wise finds that IRAs do increase saving in the United States. He estimates that the amount of net saving generated by IRAs is about half of total IRA contributions. Also, in response to a question, Wise pointed out that there will continue to be benefits for individuals who save in IRAs even if the Packwood proposal becomes

law: One dollar deposited in a conventional savings account for 30 years yields about \$8; if saved in an IRA under current law, the dollar would grow to \$20 after 30 years; under the Senate proposal, with interest compounding tax free, the balance after 30 years would be \$13.

Lindsey estimates that a single percentage point of increase in the tax rate on long-term capital gains causes a 5 percent decline in realizations. He points out that the Packwood plan would represent the largest increase in tax rates on capital gains in U.S. history. If one considers the behavioral response of taxpayers to the new rates, Lindsey estimates, the proposal would lead to a net revenue loss of about \$5.5 billion (rather than the predicted \$10 billion gain).

Summers reported on a survey of the capital budgeting practices of about 200 U.S. industrial corporations. He finds enormous dispersion in the rate of return demanded by a corporation on a marginal project: the range was from 8 to 30 percent. He also finds that investment incentives that are frontloaded, such as the investment tax credit (ITC), have more impact per dollar of foregone tax revenue than do backloaded schemes, such as the accelerated cost recovery system (ACRS). Therefore, he believes that the adverse investment incentives in recent proposals may have been understated because the ITC was not weighted more heavily than the ACRS in the calculation.

Hines's work on structures specifically considers two factors: the ability to resell assets at a purchase price that is inflated by the potential depreciation on it, and the ability to finance investment in structures with debt. He, too, finds a significant relationship between tax rates and investment (in structures). Hines also estimates that a lower maximum tax rate will reduce the incentive for tax arbitrage; for example, when a high-income individual buys a house and rents it to a middle-income tenant, the tax consequences for both owner and renter are improved.

Hendershott takes a look at the "slope of the playing field"—that is, the relative return to investment in different types of assets adjusted for risk and inflation—both under current law and under the various tax proposals. He finds that the Senate plan will not result in any significant change from current law. Moreover, only the administration's plan would make the playing field more nearly level than it now is. In general, Hendershott concludes, the tax reform proposals would reduce investment incentives. In order to maintain the current level of investment under any of the plans, interest rates would have to fall.

Feldstein focuses on investment in plant and equipment and concludes that it is highly sensitive to tax-induced changes in profitability. He estimates that the House tax proposal would reduce net investment by 10 percent, about twice as large a reduction as that induced by the administration's plan. The Senate proposal, on the other hand, would lower interest rates and equity yields, leading to the smallest reduction in in-

vestment (of the four tax proposals), and possibly an increase in investment.

Finally, Boskin analyzes recent data on foreign direct investment in the United States and U.S. direct investment abroad. He, too, finds that taxes matter, through their effect on available rates of return here and abroad. He concludes with a caution that the potential exodus of capital abroad should be considered in evaluating any proposed tax plan.

Conference Calendar

Each *NBER Reporter* includes a calendar of upcoming conferences and other meetings that are of interest to large numbers of economists (especially in academia) or to smaller groups of economists concentrated in certain fields (such as labor, taxation, finance). The calendar is primarily intended to assist those who plan conferences and meetings, to avoid conflicts. **All activities listed should be considered to be "by invitation only," except where indicated otherwise in footnotes.**

Organizations wishing to have meetings listed in the Conference Calendar should send information, comparable to that given below, to Conference Calendar, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138. Please also provide a short (fewer than fifty words) description of the meetings for use in determining whether listings are appropriate for inclusion. The deadline for receipt of material to be included in the Fall 1986 issue of the *Reporter* is August 15. If you have any questions about procedures for submitting materials for the calendar, please call Kirsten Foss Davis at (617) 868-3900.

July 25, 1986

Program Meeting: Economic Fluctuations, NBER

July 27-31, 1986

Annual Meeting, American Agricultural Economics Association*

August 4, 1986

International Macroeconomics, NBER

August 5-7, 1986

U.S.-Japan Conference, NBER

August 8, 1986

Conference: International Trade, NBER

August 14-15, 1986

Public Sector Unionism, NBER

August 18-21, 1986

Annual Meeting, American Statistical Association*

August 24-26, 1986

13th Annual Conference, European Association for Research in Industrial Economics*

August 28-31, 1986

22nd International Conference, Atlantic Economic Society*

September 1-2, 1986

Conference: Economics of Technology Policy, Center for Economic Policy Research

September 11-12, 1986

Brookings Panel on Economic Activity, Brookings Institution

September 13-17, 1986

Annual Meeting, National Association of Business Economists*

September 22-23, 1986

Anglo/French Colloquium, Center for Economic Policy Research

October 10, 1986

Program Meeting: Economic Fluctuations, NBER

October 16-17, 1986

Economic Policy Panel Meeting, Center for Economic Policy Research

October 23-24, 1986

Program Meeting: Taxation, NBER

October 30-31, 1986

Conference on Taxation, Brookings Institution

November 6-8, 1986

North American Conference, International Association of Energy Economists*

November 7, 1986

Program Meeting: Financial Markets and Monetary Economics, NBER

November 9-12, 1986

79th Annual Conference, National Tax Association-Tax Institute of America*

November 13-14, 1986

Macro Coordination Regimes and Policies, Center for Economic Policy Research-Brookings Institution

November 17, 1986

Conference: The Economics of Tax Policy, NBER

November 21-22, 1986

Universities Research Conference: The Economics of Government Expenditure Programs, NBER

November 21-22, 1986

Conference, Carnegie-Mellon University-University of Rochester

November 23-25, 1986

Annual Meeting, Southern Economic Association*

*Open conference, subject to rules of the sponsoring organization.

*Open conference, subject to rules of the sponsoring organization.

December 12-13, 1986

State and Local Government Finance, NBER

December 28-30, 1986

Annual Conference, American Economic Association*

February 12-13, 1987

International Economic Association Conference on Global
International Macroeconomics: Policy Conflict and Cooperation,
Center for Economic Policy Research

February 19-22, 1987

Mergers and Acquisitions, NBER

February 27, 1987

Program Meeting: Financial Markets and Monetary Economics,
NBER

March 1987

Misalignment of Exchange Rates, NBER

March 6-7, 1987

The United States in the World Economy, NBER

March 13-14, 1987

Macroeconomics, NBER

March 20-21, 1987

Conference on Aging, NBER

March 26-28, 1987

Annual Meeting, Midwest Economic Association*

March 27-28, 1987

Income and Wealth Conference: Measurement of Savings, NBER

April 1987

Annual Conference, Atlantic Economic Society*

April 3-5, 1987

International Coordination of Economic Policy, NBER

April 10-11, 1987

State and Local Government Finance, NBER

April 24-25, 1987

Conference, Carnegie-Mellon University-University of Rochester

May 1-2, 1987

Universities Research Conference: Labor Studies, NBER

June 3-5, 1987

3rd International Conference, Institute for Monetary and Economic
Studies-Bank of Japan

June 16-17, 1987

Conference: The Economics of Inventory Management, Wesleyan
University-International Society for Inventory Research

August 2-5, 1987

Annual Meeting, American Agricultural Economics Association*

August 17-20, 1987

Annual Meeting, American Statistical Association*

August 24-28, 1987

43rd Congress: Public Finance and Performances of Enterprises,
International Institute of Public Finance

*Open conference, subject to rules of the sponsoring organization.

September 9-12, 1987

18th Annual Conference, Center for International Research on
Economic Tendency*

September 27-October 1, 1987

Annual Meeting, National Association of Business Economists*

November 8-11, 1987

80th Annual Conference, National Tax Association-Tax Institute of
America*

November 22-24, 1987

Annual Meeting, Southern Economic Association*

August 8-11, 1988

Annual Meeting, American Statistical Association*

September 25-28, 1988

81st Annual Conference, National Tax Association-Tax Institute of
America*

September 25-28, 1988

Annual Meeting, National Association of Business Economists*

November 20-22, 1988

Annual Meeting, Southern Economic Association*

August 14-17, 1989

Joint Statistical Meetings, American Statistical Association*

September 17-20, 1989

Annual Meeting, National Association of Business Economists*

October 8-11, 1989

82nd Annual Conference, National Tax Association-Tax Institute of
America*

November 19-21, 1989

Annual Meeting, Southern Economic Association*

*Open conference, subject to rules of the sponsoring organization.

Bureau News

Darby Nominated to Treasury Post

Michael R. Darby, a research associate in NBER's Program in International Studies since 1976, was nominated by President Reagan to the post of Assistant Secretary of the Treasury for Economic Policy. The position requires confirmation by the Senate.

Darby received his B.A. from Dartmouth College and his M.A. and Ph.D. from the University of Chicago. He has been on the economics faculty at the University of California at Los Angeles since 1973. Before that, he was director of economic research at Ohio State University.

Bruno to Head Bank of Israel

On June 15, NBER Research Associate Michael Bruno was named governor of the Bank of Israel, that country's central bank. Bruno had been a full professor of economics at Hebrew University and a member of NBER's international studies program.

Born in Hamburg, Germany, Bruno received his B.A. and M.A. from Cambridge University (England) and his Ph.D. from Stanford University. In addition to his post at Hebrew University, Bruno has been a visiting professor at MIT, Harvard University, and the University of Stockholm. He has also held a number of positions at the Bank of Israel, including deputy director of research from 1961-3.

Cambridge Meeting of Financial Economists

NBER's Program in Financial Markets and Monetary Economics, directed by Benjamin M. Friedman of Harvard University, met in Cambridge on February 21. The papers discussed at the meeting were:

Charles R. Nelson, NBER and University of Washington, joint work with Andrew F. Siegel, University of Washington, "Parsimonious Modeling of Yield Curves"

Discussant: Mark W. Watson, Harvard University

N. Gregory Mankiw, NBER and Harvard University, and Jeffrey A. Miron, NBER and University of Michigan, "Seasonality, Band Spectrum Regression, and the Expectations Theory of the Term Structure of Interest Rates"

Discussant: Frederic S. Mishkin, NBER and Columbia University

Alex Kane and Alan J. Marcus, both of NBER and Boston University, "The Valuation of Security Analysis"

Discussant: Jeremy I. Bulow, NBER and Stanford University

Andrew B. Abel, NBER and Harvard University, "The Modified Golden Rule under Endogenous Fertility and Concave Altruism"

Discussant: B. Douglas Bernheim, NBER and Stanford University

John Y. Campbell, NBER and Princeton University, and Robert J. Shiller, NBER and Yale University, "Cointegration and Tests of Present-Value Models"

Discussant: Terry Marsh, NBER and Stanford University

The paper by Nelson and Siegel explores the possibility of modeling yield curves so that the term-to-maturity structure of interest rates can be represented by only a few parameters. The potential applications of this approach include money demand models, tests of theories of the term structure of interest rates, and graphic display of the term-to-maturity structure for informative purposes. Nelson and Siegel test their model using data on U.S. Treasury bills over a 37-month period from 1981-3. Their results suggest that the model is a good approximation of the term-to-maturity structure. To check whether the model could project outside the maturity range used to fit the model, the authors use curves to predict what the price of a representative long-term bond would be on each sample date. The correlation between the prediction of the bond price and the actual bond price was 0.96, although the model tends to overshoot as the level of interest rates changes. One especially interesting finding is that the change in monetary policy in October 1982 seems to coincide with a shift in the behavior of the term structure: in particular, yield curves became simpler and the data less noisy around the fitted curve.

Mankiw and Miron's paper provides a theoretical justification for examining interest rate movements at seasonal frequencies and shows how the technique of band spectrum regression can be used to examine the expectations theory of interest rates across frequencies. The authors use a new data set to test the expectations theory at seasonal and nonseasonal frequencies. The data set consists of observations on two- to six-month time loans at New York City banks for 1890-1914, during which there were substantial seasonal fluctuations in interest rates. At seasonal frequencies, the data provide substantial support for the expectations theory. At nonseasonal frequencies the data provide much less support and suggest strongly that time-varying term premiums are responsible for much of the variation in the spread between long- and short-term interest rates.

Kane and Marcus present a framework for computing the value of a security analyst to portfolio analysis. Active portfolio management is commonly divided into two types of activities: market timing, which requires forecasts of broad-based market movements; and security analysis, which requires the selection of individual stocks that are perceived to be underpriced by the market. Kane and Marcus compare the relative values of each type of investment analysis. Their results indicate that stock selection is potentially extremely valuable, but that its value depends critically on the relevant forecast horizon and on the correlation structure of residual stock returns. Finally, they show how to modify the value of selection for the important case in which analysts' forecasts of stocks' alphas are subject to error.

Abel's paper develops a simple growth model in which altruistic consumers choose the number of children they will have and how much wealth to bequeath to them. The model presents a unified framework that includes conventional optimal growth models, growth

models with endogenous time preference, and growth models with endogenous fertility as special cases. Abel uses it to analyze the effects of productivity and policy changes and demonstrates that many well-known invariance results do not hold in the more general framework. For example, an increase in government spending financed by lump-sum taxes will reduce steady-state fertility, and hence will increase steady-state capital intensity.

In their paper, Campbell and Shiller develop a new approach to present-value models. They use it to reexamine the expectations theory of the term structure of interest rates and the present-value model of stock prices. First, they note that even if the variables in a present-value model are individually stationary in first differences rather than levels, a linear combination of their levels is stationary; in the language of time-series analysis, the variables are cointegrated. Next, they show how to use this result to evaluate the present-value model. In particular, they compare a restricted forecast with an unrestricted vector autoregression forecast. Under the model, the two forecasts are identical except for sampling error. Campbell and Shiller find that in the term structure application, the difference between the two forecasts is highly significant statistically, but small in magnitude. In the stock market application, the estimated difference is large but imprecise nonetheless.

In addition to the authors and discussants, the following members of the Program in Financial Markets participated in the meeting: Robert B. Barsky and Roger H. Gordon, University of Michigan; Michael D. Bordo, University of South Carolina; James M. Poterba, MIT; R. Glenn Hubbard, Northwestern University; Takatoshi Ito, University of Minnesota; Edward J. Kane, Ohio State University; Laurence J. Kotlikoff, Boston University; Philippe Weil, Harvard University; Andrew Lo, University of Pennsylvania; Angelo Melino, University of Toronto; Robert H. Rasche, Michigan State University; and Carl E. Walsh, Federal Reserve Bank of San Francisco.

Macroeconomists Meet in Chicago

Members and guests of NBER's Program in Economic Fluctuations met in Chicago on March 22. The program, organized by Ben S. Bernanke of Stanford University and Andrew B. Abel of Harvard University, was:

Robert B. Litterman, Federal Reserve Bank of Minneapolis, "The Limits of Countercyclical Monetary Policy"

Discussant: Stephen LeRoy, University of California, Santa Barbara

John Y. Campbell, NBER and Princeton University, and N. Gregory Mankiw, NBER and Harvard University, "Are Output Fluctuations Transitory?" (NBER Working Paper No. 1916)

Discussant: James Stock, Harvard University

Alan Krueger, Harvard University, and Lawrence H. Summers, NBER and Harvard University, "Wages and the Interindustry Wage Structure"

Discussant: Edward P. Lazear, NBER and University of Chicago

Robert E. Hall, NBER and Stanford University, "The Relation between Price and Marginal Cost in U.S. Industry"

Discussant: Mark Bills, University of Rochester

Olivier J. Blanchard, NBER and MIT, "An Empirical Structural Investigation of the Behavior of Wages, Prices, and Output"

Discussant: Christopher A. Sims, NBER and University of Minnesota

Litterman's paper asks to what extent Federal Reserve System (Fed) policy can stabilize output growth and inflation and how well it has met these goals. In his methodology, economic fluctuations are modeled without strong and possibly incorrect assumptions about the direction of causality from one series to another. To carry out the exercise, Litterman must identify the contemporaneous impact of interventions in monetary policy on a vector of observable variables. He argues that such identifying assumptions make it possible to carry out policy analysis with his otherwise loosely restricted models. He also uses financial variables to capture private agents' reactions to policy changes. Litterman finds that the Fed has been relatively more successful at stabilizing output growth than at stabilizing inflation, although the deviation of actual Fed policy from optimal policy is small for both variables. This can mean either that there is little scope for the Fed to affect output growth and inflation or that Fed policy has been close to optimal.

Campbell and Mankiw consider whether an unexpected increase in GNP today should increase our forecast of GNP for the distant future. If it does, then GNP should be thought of as fluctuating around a stable trend, as the textbook paradigm states. The authors use statistical time series to identify and estimate stochastic processes for GNP. In 14 out of 15 representations of GNP growth, they find that shocks to GNP appear to be permanent. Indeed, a 1 percent shock to GNP today raises the forecast of GNP in the distant future by more than 1 percent.

Krueger and Summers ask if employees doing similar jobs in different industries are paid different wages. Standard competitive models of wage determination

predict that workers with similar skills should receive the same wages except for compensation for the differential characteristics of the jobs. If unexplained differences in wages remain, noncompetitive theories may need to be considered. Using data on individual workers, and attempting to control for their characteristics, Krueger and Summers find that there remain substantial unexplained differences in wages across industries. They consider a number of explanations of these differences beyond efficiency wages, but none is important enough to account for the differentials.

In his paper, Hall studies the strong, positive correlation between productivity and output. He argues that this correlation implies that marginal costs fall far below price during booms. In a boom, output expands much faster than labor input or labor costs. Hall finds this result to be true in aggregate, annual U.S. data as well as in annual data for a wide range of industries. Therefore, he concludes that the procyclicality of productivity is strong evidence against applying the competitive model in U.S. product markets.

Blanchard presents a structural model of wages, prices, and output that represents a compromise between traditional, behavioral macroeconomic models and more recent, atheoretical macroeconometric models. He includes such variables as materials prices, fuel prices, and tax rates; while his model does not explain these variables, he does not maintain that they are strictly exogenous. Blanchard finds that nominal wages are set to achieve target real wages. The target real wages depend on lagged real wages, changes in employment, and on actual and expected price levels. Prices act as a markup over wage costs, which are measured by a weighted average of current and expected wages. Blanchard also finds, surprisingly, that the lags in adjustment of prices are as long as those for wages.

In addition to the authors and discussants, about 50 economists from universities throughout the United States participated in this program meeting. Matthew D. Shapiro, of NBER and Yale University, attended and assisted in the preparation of this article.

Spring Meeting of Tax Group

NBER's Program in Taxation, directed by David F. Bradford of Princeton University, held its spring meeting in Cambridge on April 3 and 4. The following papers were presented and discussed:

James M. Poterba, NBER and MIT, and Lawrence H. Summers, NBER and Harvard University, "The Macroeconomic Irrelevance of Finite Lives" (NBER Working Paper No. 1955)

Discussant: Jonathan Skinner, NBER and University of Virginia

Louis Kaplow, NBER and Harvard University, "Optimal Policy Toward Risk Imposed by Uncertainty Concerning Government Action"

Discussant: Michael Rothschild, NBER and University of California, San Diego

Roger H. Gordon, NBER and University of Michigan, and John D. Wilson, Indiana University, "Measuring the Efficiency Cost of Taxing Risky Capital Income"

Discussant: Stewart C. Myers, NBER and MIT

Alan J. Auerbach, NBER and University of Pennsylvania, and Laurence J. Kotlikoff, NBER and Boston University, "Life Insurance of the Elderly: Adequacy and Determinants" (NBER Working Paper No. 1737)

Discussant: Daniel R. Feenberg, NBER

B. Douglas Bernheim, NBER and Stanford University, "Life Insurance, Annuities, and Bequests"

Discussant: Douglas Holtz-Eakin, NBER and Columbia University

Michael J. Boskin and John B. Shoven, NBER and Stanford University; Laurence J. Kotlikoff; and Douglas Puffert, Stanford University, "Social Security: A Financial Appraisal Across and Within Generations" (NBER Working Paper No. 1891)

Andrei Shleifer, MIT, "Do Demand Curves for Stocks Slope Down?"

Discussant: Fischer Black, NBER and Goldman Sachs & Co.

The length of the horizons over which households make their consumption and saving decisions in part determines how government deficits affect national saving. Poterba and Summers's paper argues that households' altruistic bequest motives that extend their planning horizons beyond their lifetimes are of little substantive importance. Households live long enough to make the infinite horizon a good approximation for analyzing the short-run savings effects of government budget deficits. In the absence of liquidity constraints or other market imperfections that make spending highly responsive to current income, private consumption will change very little when the government runs a deficit regardless of whether households care about future generations, Poterba and Summers find. Therefore, analyses that argue for large contemporaneous savings effects of government deficits must do more than demonstrate weak intergenerational links.

In his paper, Kaplow examines an important source of risk in the economy: uncertainty about future government policy. His central argument is that risk arising from uncertainty about future government action can be modeled in a way that makes it strictly analogous to other sources of risk that have received far

greater attention. Most of these other risks are not protected by the government but are left to private financial markets and insurance. Risks associated with changes in government policy are similar. Therefore, plausible justifications for transition relief require more elaborate development and are more contingent than is generally thought to be the case.

Gordon and Wilson note that measuring the welfare cost of taxing capital income is greatly complicated by risk considerations and that past procedures used for measuring these costs have varied widely. Their paper derives a theoretical expression for the efficiency cost of a marginal change in capital income taxes. Risk affects this measure through the stochastic properties of tax payments and of future investment behavior. Gordon and Wilson argue that the efficiency cost of taxing capital income is normally overestimated by models that ignore uncertainty.

Auerbach and Kotlikoff observe that despite a general reduction in poverty among the aged, roughly one-third of single elderly women are poor. Moreover, poverty rates are significantly larger for widows than for married women, suggesting that many married couples fail to buy sufficient life insurance. Auerbach and Kotlikoff conclude that for a significant minority of elderly households, combined private and public life insurance is inadequate. In fact, of those elderly households in which the husband's future income represents a significant fraction of total resources, roughly half are inadequately insured. However, Auerbach and Kotlikoff also find that households do not significantly offset Social Security's provision of survivor insurance by reducing their private purchases of life insurance.

Bernheim's paper examines the response of holdings of private life insurance and annuities to changes in Social Security benefits. His estimates strongly suggest that as Social Security benefits increase, households first stop obtaining annuities from private sources (for example, employers). Then, households go through a stage in which they neither acquire additional annuities nor buy any term life insurance. Ultimately, households will again purchase life insurance but will still shun private annuities. Bernheim concludes that most individuals are motivated in part by the desire to leave bequests; his evidence on the relationship between insurance holdings and total resources reinforces this view.

Boskin and his coauthors compute the expected present value of Social Security retirement benefits and taxes for households of different marital circumstances, incomes, and age cohorts. They also compute the net gain or loss from participation in the Social Security system and the expected internal rate of return it offers to various participants. The authors' general conclusion is that Social Security offers vastly different terms to households in different circumstances. Net gains or losses vary by \$200,000 and the real internal rate of return on contributions ranges from negative numbers to 6.6 percent. There is also a great deal of variance in the marginal linkage of benefits and taxes:

for many households, the present value of benefits increases from 0 to 30 cents per extra dollar of taxes paid.

Shleifer observes that since September 1976, stocks newly included in the Standard & Poors (S&P) 500 Index have increased significantly in price when their inclusion is announced. This price rise lasts for at least ten days after the announcement. Shleifer finds that these price increases are positively related to measures of buying by index funds; they are also consistent with the hypothesis that demand curves for stocks slope downward. However, price increases are not related to S&P bond ratings, which are inconsistent with the hypothesis that inclusion certifies the quality of the stock.

In addition to those already mentioned, the following members of the tax program participated in the discussions: Andrew B. Abel, Lawrence Goulder, and Jerry R. Green, Harvard University; Jeremy I. Bulow, Stanford University; Charles T. Clotfelter, Duke University; David G. Hartman, Data Resources, Inc.; Jerry A. Hausman, MIT; Patric H. Hendershott, Ohio State University; Charles E. McLure, Jr., Hoover Institution; and Joseph E. Stiglitz, Princeton University. Also attending were: Harvey Galper, Brookings Institution; Edward Gramlich, Congressional Budget Office; and Emil Sunley, Deloitte, Haskins & Sells.

Program in Labor Studies Meets

NBER's Program in Labor Studies held its spring meeting in Cambridge on April 18. The agenda was:

Richard B. Freeman, NBER and Harvard University, and Martin Weitzman, MIT, "Bonuses and Employment in Japan" (NBER Working Paper No. 1878)

Rebecca A. Luzadis, University of Minnesota, and Olivia S. Mitchell, NBER and Cornell University, "Explaining Patterns in Old Age Pensions"

David Card, NBER and Princeton University, and Daniel Sullivan, Northwestern University, "Measuring the Effect of CETA Participation on Movements In and Out of Employment"

William T. Dickens and Lawrence F. Katz, both of NBER and University California, Berkeley, "Industry Wage Patterns and Theories of Wage Determination"

In Japan, most workers receive large bonuses twice a year. Freeman and Weitzman examine the cyclical movement of these bonuses versus wages, and the relationship between bonuses and employment in the context of the Weitzman "share economy." They find

that bonuses are much more procyclical than base wages but not as cyclically variable as profits. Bonuses seem to have a quantitatively significant revenue- or profit-sharing component. Moreover, bonuses have quite different consequences for employment than do base wages. Even after controlling for other economic factors, bonuses are positively related to employment, whereas base wages are negatively related to employment. Finally, the bonus system of paying workers, while far from explaining the whole macroeconomic performance of Japan, seems to play a role in helping to stabilize Japanese unemployment at comparatively low levels.

In their paper, Luzadis and Mitchell model and empirically evaluate the determinants of structural features of employer-provided pensions in the U.S. labor market. They examine the institutional diversity of pensions, including defined-contribution plans and several types of defined-benefit plans. They first ask what function defined-contribution plans seem to perform in the labor market and whether their role is similar to that of certain types of benefit plans. Then they ask whether the distinction between different kinds of defined-benefit pension plans is important both conceptually and empirically. Using new data from the 1983 Survey of Consumer Finance, Luzadis and Mitchell conclude that defined-contribution plans play a very different role in the labor market than do defined-benefit plans. Moreover, the three kinds of defined-benefit plans that they examine differ markedly from each other in terms of the workers who are covered by them and the firms providing them.

Card and Sullivan's paper presents several alternative estimates of the effect of Comprehensive Employment and Training Act (CETA) participation on movements in and out of employment. Using Social Security earnings records for 1970 to 1979, they construct employment histories for adult males in the 1976 CETA group and a control group drawn from the Current Population Study. They find that CETA participation had a small to moderately large impact on the probability of employment. Classroom training programs had uniformly larger estimated effects on employment than did nonclassroom programs.

Finally, Dickens and Katz described their study of the extent, persistence, and nature of industry wage differences. Their analysis of data from the 1983 Current Population Survey shows large differences in wages across industries for nonunion workers, even after controlling for a wide variety of personal and geographical variables. Further, they show that industry wage premiums are correlated across occupations: if any occupation in an industry is highly paid, there is a tendency for all occupations to be highly paid. A review of the literature turns up two other attributes of industry differentials: they have not changed much over time, and they are very similar across all countries. Finally, Dickens and Katz examine the correlates of high industry wages and find that average education, firm and establishment size, profitability, capital-labor ratios,

concentration ratios, and several other attributes are positively correlated with nonunion workers' average wages. They conclude that the evidence is not wholly consistent with any standard theory of wage determination, either competitive or noncompetitive. It is most compatible with a theory of employers setting wages high to prevent workers from taking collective action against their firms, or with employers in certain industries being paid high wages to prevent turnover and shirking while others in the same firm are also more highly paid to prevent them from viewing the firm's compensation policy as unfair.

In addition to the authors, participants in the discussion were labor program members: John Abowd and Lisa Lynch, MIT; Steven G. Allen, North Carolina State University; Orley C. Ashenfelter and Rebecca M. Blank, Princeton University; David E. Bloom, Harvard University; George J. Borjas, University of California, Santa Barbara; Charles C. Brown and Gary Solon, University of Michigan; Wayne B. Gray, Clark University; Alan L. Gustman and Steven F. Venti, Dartmouth College; Harry J. Holzer, Michigan State University; Casey Ichniowski, Columbia University; Morris Kleiner, University of Kansas; and Jeffrey S. Zax, Queens College. Also attending was Joseph Tracy of Yale University.

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696. "Macroeconomic Stabilization through Taxation and Indexation: The Use of Firm-Specific Information," by Richard C. Marston and Stephen J. Turnovsky, 1985 (NBER Working Paper No. 1586)
697. "The Strategic Bequest Motive," by B. Douglas Bernheim, Andrei Shleifer, and Lawrence H. Summers, 1985 (NBER Working Paper No. 1303)

698. "Rational Expectations and Macroeconomic Forecasts," by Victor Zarnowitz, 1985 (NBER Working Paper No. 1070)
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700. "Trade and Financial Interdependence under Flexible Exchange Rates," by Jorge Braga de Macedo, 1986 (NBER Working Paper No. 1517)
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707. "Inflation and Labor Market Adjustment," by Daniel S. Hamermesh, 1986 (NBER Working Paper No. 1153)
708. "An Analysis of the Stabilizing and Welfare Effects of Intervention in Spot and Futures Markets," by Robert B. Campbell and Stephen J. Turnovsky, 1985 (NBER Working Paper No. 1698)
709. "Tax Rates and Interest Rates on Tax-Exempt Securities," by Joe Peek and James A. Wilcox, 1986 (NBER Working Paper No. 1544)
710. "Costs and Benefits of an Anti-Inflationary Policy: Questions and Issues," by Willem H. Buiter and Marcus M. Miller, 1985 (NBER Working Paper No. 1252)
711. "The Interaction of State and Federal Tax Systems: The Impact of State and Local Tax Deductibility," by Daniel R. Feenberg and Harvey S. Rosen, 1986 (NBER Working Paper No. 1768)
712. "Automobile Prices and Quality: Did the Gasoline Price Increases Change Consumer Tastes in the United States?" by Makoto Ohta and Zvi Griliches, 1986 (NBER Working Paper No. 1211)

713. "New Estimates of the Value of Federal Mineral Rights and Land," by Michael J. Boskin, Marc S. Robinson, Terrance O'Reilly, and Praveen Kumar, 1985 (NBER Working Paper No. 1447)
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55. "A Simple, Positive, Semidefinite, Heteroskedasticity- and Autocorrelation-Consistent Covariance Matrix," by Whitney K. Newey and Kenneth D. West, April 1986 (JEL Nos. 211, 212)
56. "Sequential Bargaining under Asymmetric Information," by Sanford J. Grossman and Motty Perry, May 1986 (JEL Nos. 021, 026)

Bureau Books

New Volume on Business Cycles

The American Business Cycle: Continuity and Change, edited by Robert J. Gordon, will be available in August from the University of Chicago Press. It is priced at \$78.00. The volume continues a long-standing tradition of NBER research in business cycles, dating back to the pioneering work of Wesley Mitchell and Arthur Burns in the 1920s and 1930s. It contains 12 original papers by macroeconomists on a wide variety of issues concerning the causes of business cycles and the nature of changes in business cycles since the years before World War II.

Among the papers that have already excited professional controversy and attention are studies of: the

sources of the monetary, fiscal, and supply shocks that have caused postwar business cycles; the role of greater price inertia as a cause of greater or lesser volatility in output and employment (the opposing cases are argued in two papers); the surprisingly low value of the Keynesian consumption multiplier; and, the surprisingly large role of monetary variables in causing investment fluctuations.

This book provides a comprehensive introduction to the current state of knowledge on business cycles. It should be useful to policymakers, business managers, and economists. A wide-ranging introduction explores not only the causes of changes in business cycle behavior but also changes in the methodology and style of business cycle research. Also included are two unique appendixes. The first provides a comprehensive explanation of the NBER business cycle chronology and includes chronologies for numerous industrial countries dating back to the mid-18th century. The second appendix provides newly created annual and quarterly data for major macroeconomic variables going back to 1875, including a complete set of quarterly data on components of expenditure for the interwar period (1919-41).

Gordon is a research associate in NBER's Program in Economic Fluctuations, a member of the Bureau's Business Cycle Dating Committee, and co-organizer of its annual International Seminar on Macroeconomics, which brings together macroeconomists from the United States, Europe, and Japan. He is also professor of economics at Northwestern University.

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

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Journal of Economic Literature (JEL) subject codes, when available, are listed after the date of the Working Paper. Abstracts of all Working Papers issued since March 1986 are presented below. For previous Working Papers, see past issues of the *NBER Reporter*. The Working Papers are intended to make results of NBER research available to other economists in preliminary form to encourage discussion and suggestions for revision before final publication. Working Papers are not reviewed by the Board of Directors of NBER.

Aggregate Savings in the Presence of Private and Social Insurance

Andrew B. Abel

Working Paper No. 1873

March 1986

JEL Nos. 320, 915

In the presence of uncertain lifetimes, Social Security has the characteristics of an annuity: a consumer pays a tax when young in exchange for receiving a Social Security benefit if he survives to be old. If consumers have identical ex ante mortality probabilities, then a fully funded Social Security system would offer a rate of return equal to the actuarially fair rate available on competitively supplied private annuities. In this case, fully funded Social Security would be a redundant asset and would have no effect on consumption or national saving.

In this paper, consumers have different (publicly known) ex ante mortality probabilities and consequently can buy actuarially fair private annuities that offer different rates of return. If the Social Security system does not discriminate on the basis of ex ante mortality probabilities, then the introduction of Social Security induces a redistribution of income from consumers with a high probability of dying while young to consumers with a low probability of dying at an early age. Under homothetic utility, this redistribution reduces aggregate bequests and aggregate consumption of young consumers in the steady state. The steady-state national capital stock can either increase or decrease. If consumers display at least as much risk aversion as the logarithmic utility function, then average steady-state welfare is increased by the introduction of fully funded Social Security.

The October 1979 Change in the Monetary Exchange Regime: Its Impact on the "Forecastability" of Interest Rates

James E. Pesando and Andre Plourde
Working Paper No. 1874
March 1986
JEL No. 313

Subsequent to the October 1979 shift in monetary policy in the United States, interest rates in North America not only reached unprecedented levels, but they also exhibited unprecedented volatility. This paper shows that the anticipated quarterly changes in long-term rates associated with the rational expectations model have remained small during this period after the shift. Recorded forecasts of long-term interest rates in Canada continue to prove inferior to the no-change prediction of the martingale model. The "perverse" relationship between the slope of the yield curve and the subsequent movement in long-term rates exists in the Canadian data but is of only modest value for forecasting. The excess return on long-term bonds implicit in the recorded forecasts of the level of interest rates varies sharply, yet there is no evidence that forecasters have identified a predictable component of a time-varying term premium.

The Theory and Measurement of Macroeconomic Disequilibrium in Centrally Planned Economies

Richard Portes
Working Paper No. 1875
March 1986

This paper considers recent research on macroeconomic equilibrium in centrally planned economies (CPEs). I defend the explicit, aggregative, macroeconomic approach in theory, institutional relationships, and measurement. It has offered a fresh, coherent framework for the analysis of many CPE phenomena, opened up a range of possibilities for empirical investigation, and generated several important spin-offs, including work on planners' behavior, insights into CPE policy problems of the 1970s and early 1980s, centered on macroeconomic equilibrium and threats to it, and developments in market economy macro theory and econometrics. The quantity-rationing macro model and disequilibrium econometrics give a more useful and a more nuanced view of macroeconomic reality in CPEs than the conventional wisdom characterizing them as perpetual "shortage economies."

Counterfeit Product Trade

Gene M. Grossman and Carl Shapiro
Working Paper No. 1876
March 1986
JEL Nos. 410, 422, 610, 026

We analyze a two-country model of trade in both legitimate and counterfeit products. In this model, domestic firms own trademarks and establish reputations for delivering high-quality products in a steady-state equilibrium, while foreign suppliers export legitimate low-quality merchandise and counterfeits of domestic brand-name goods. Heterogeneous home consumers either purchase low-quality imports or buy brand-name products, rationally expecting some degree of counterfeiting of the latter.

We characterize a counterfeiting equilibrium and explore its properties. We describe the positive and normative effects of counterfeiting in comparison with a no-counterfeiting benchmark. Finally, we provide a welfare analysis of border inspection policy and of policy regarding the disposition of counterfeit goods that are confiscated at the border.

Models of Firm Behavior under Minimum Wage Legislation

David E. Bloom and Gilles Grenier
Working Paper No. 1877
March 1986
JEL Nos. 824, 916

This paper sets out three simple models of firm behavior under minimum wage legislation. The key feature of these models is that they account for important aspects of the government's mechanism for monitoring and enforcing compliance with the minimum wage law. The major results of the paper are: (1) Minimum wage legislation does not generally lead to upward movements along labor demand curves. Rather, it often leads to movements off and to the left of the labor demand curve. (2) Minimum wage legislation is likely to have a positive effect on the distribution of wages paid to workers who would earn less than the minimum in the absence of the legislation but is not likely to bring all of those workers up to the minimum. (3) Imposing additional penalties on second offenders promotes compliance by firms with no previous violations. The paper considers the implications of these results for empirical work on the adverse employment effects of minimum wage legislation and for the design of government compliance mechanisms.

Bonuses and Employment in Japan

Richard B. Freeman and Martin Weitzman

Working Paper No. 1878

April 1986

Japan has a relatively unique system of labor compensation. Most Japanese workers are paid large bonuses twice a year. This paper examines the cyclical movement of bonuses as compared to wages and the relation of bonuses to employment in the context of the Weitzman "share economy."

The paper makes three basic points: (1) In Japan, the bonus is much more procyclical than base wages, but not as variable cyclically as profits. Bonuses can be interpreted as containing a quantitatively significant component of revenue or profit sharing. (2) Bonuses have quite different consequences for employment from base wages. Even after controlling for other economic factors, bonuses are positively related to employment, whereas base wages are negatively related to employment. (3) The bonus system of paying workers, while far from explaining the whole macroeconomic story in Japan, seems to play a role in helping to stabilize Japanese unemployment at comparatively low levels.

IRAs and Saving

Steven F. Venti and David A. Wise

Working Paper No. 1879

April 1986

JEL Nos. 310, 320, 210

Increasing current limits on Individual Retirement Accounts (IRAs) would lead to substantial increases in tax-deferred saving, according to evidence in the paper based on the 1983 Survey of Consumer Finances. For example, the recent Treasury plan would increase IRA contributions by about 30 percent.

The primary focus of this paper, however, is the effect of increases in IRA limits on other saving. How much of the IRA increase would be offset by reduction in saving that is not tax-deferred? The weight of the evidence suggests that very little of the increase would be offset by reduction in other financial assets, as little as 10 to 20 percent. The estimates further suggest that 45 to 55 percent of the increase in IRAs would be funded by reduced expenditures for other goods and services, and about 35 percent by reduced taxes. The analysis rests on a structure for saving decisions that recognizes the constraint placed by the IRA limit on the allocation

of current income; it is a constrained optimization model with the IRA limit as the principal constraint. The evidence also suggests substantial variation in saving behavior among segments of the population. In addition, it appears that IRAs do not serve as a substitute for private pension plans. Thus the legislative goal of disproportionately increasing retirement saving among persons without pension plans is apparently not being realized, but the more general goal of increasing individual saving is.

Country Risk, Asymmetric Information, and Domestic Rules

Joshua Aizenman

Working Paper No. 1880

April 1986

This paper describes an economy in which incomplete information about the default penalty can result in an upward-sloping supply of credit. I evaluate the role of partial information and other related factors in determining the elasticity of supply of credit and the credit ceiling facing the economy. I further identify conditions under which the presence of country risk induces a domestic distortion. Next, I derive the cost-minimizing domestic policies needed in the presence of such a distortion. I show that cost-minimizing policies for a country that wishes to service its debt in the presence of country risk call for a combination of taxes on borrowing and time-varying taxes on consumption. If all consumers have access to the domestic capital market, the two policies are equivalent. If domestic consumers are subject to liquidity constraints, then cost-minimizing policies call for a combination of time-varying consumption taxes and product subsidies that will mimic the consumption distribution achieved by cost-minimizing policies in the absence of liquidity constraints. The policies derived in the paper are formulated in terms of the country risk, as embodied in the elasticity of supply of credit facing the borrower. In a mixed economy, where some consumers are subject to credit rationing but others have full access to the domestic credit market, there is a need for taxes on borrowing and time-varying consumption, as well as production tax cum subsidies. The analysis also shows that if the level of external borrowing is substantial, cost-minimizing domestic policies call for instituting a two-tier exchange rate system.

Targeting Rules for Monetary Policy

Joshua Aizenman and Jacob A. Frenkel

Working Paper No. 1881

April 1986

JEL No. 311

This paper develops an analytical framework for the analysis of targeting rules for monetary policy. We derive the optimal money supply rule and analyze the implications of other monetary rules including ones that target nominal GNP, the price level, the monetary growth rate, and the interest rate. We then use an explicit welfare criterion to rank the alternative rules. In the model, monetary policy is needed because labor market contracts set nominal wages in advance of the realization of stochastic shocks. The principal result is that the welfare ranking of alternative targeting rules depends on whether the elasticity of labor demand exceeds or falls short of the elasticity of labor supply. Specifically, we show that if the demand for labor is more elastic than the supply, then targeting nominal GNP produces a smaller welfare loss than targeting the CPI, which in turn produces a smaller welfare loss than targeting of interest rates.

Structural Changes in Unionization: 1973-81

William T. Dickens and Jonathan S. Leonard

Working Paper No. 1882

April 1986

JEL No. 832

This paper uses CPS data for workers in the private sector to decompose the decline in union density into structural and within-sector components. We find that 58 to 68 percent of the decline in private sector unionization between 1973 and 1981 can be accounted for by structural changes in the economy, particularly in the occupational, educational, and gender distribution of the work force. While structural change is important, however, its importance was not appreciably greater during the 1970s than during previous decades. Moreover, we find that the decline of private sector unionization within sectors has been pervasive, accounting for 32 to 42 percent of union decline. As part of this analysis, we calculate that the decline in union density has been greater in those sectors of the economy in which the decline in employment has been greater. This fact can help to reconcile previous divergent findings on the importance of structural change.

Labor Market Segmentation and the Union Wage Premium

William T. Dickens and Kevin Lang

Working Paper No. 1883

April 1986

JEL Nos. 820, 830

Studies have consistently shown that union workers earn considerably more than do nonunion workers. This paper considers whether part of this union/nonunion differential is caused by union organizing in high-paying jobs in the primary sector. We extend our earlier work on the dual labor market, in which we used an unknown regime-switching regression to identify two labor market sectors—a high-wage primary sector and a low-wage secondary sector. Here we estimate a model in which workers' wages are determined by one of three wage equations: a union wage equation, a nonunion primary equation, or a nonunion secondary equation. If individuals are in the union sector, their sector is treated as known. If they are not, then their sector is treated as unknown. Parameter estimates for this model suggest that union/nonunion differences are very large for average workers even when comparing union and nonunion primary workers.

We continue to find distinct primary and secondary sectors with wage equations similar to those that would be expected from the dual market perspective. Since it appears that union workers may be receiving large wage premiums, it seems likely that there is nonprice rationing of union jobs. If there is, our finding in previous papers of nonprice rationing of primary sector jobs may have been caused only by the rationing of union jobs. We test for the existence of nonprice rationing of nonunion primary sector employment in this three-sector model and continue to find evidence that at least black workers find it difficult to secure employment in the primary sector.

Crime and Punishment Again: The Economic Approach with a Psychological Twist

William T. Dickens

Working Paper No. 1884

April 1986

JEL No. 916

Akerlof and I (1982) suggested that in a model of criminal behavior that considered the effects of cognitive dissonance, increasing the severity of punishment could increase the crime rate. This paper demonstrates

that our conjecture was correct. With cognitive dissonance and punishment that is not severe, people may have to rationalize not committing crimes under normal circumstances. The rationalization may lead them to underestimate the expected utility of committing crimes when opportunities do exist. If punishment is severe, then rationalization may not be necessary, and people may be more likely to commit crimes when the opportunity arises.

Cointegration and Tests of Present-Value Models

John Y. Campbell and Robert J. Shiller

Working Paper No. 1885

April 1986

JEL Nos. 313, 211

This paper shows how to test a present-value model when its variables follow linear stochastic processes that are stationary in first differences rather than in levels. If the present-value model is true, then a linear combination of the variables is stationary. The paper draws on the theory of cointegrated processes to estimate this linear combination, or spread, and to test the model.

We also propose an informal method for evaluating the "fit" of a present-value model. We use a vector autoregression to construct an optimal, unrestricted forecast and compare this with a restricted forecast from the model. We compute the standard deviations and the correlation of the two forecasts and plot their historical movements.

Finally, we apply our methods to the controversial present-value models for stocks and bonds. We find that both models can be rejected statistically at conventional significance levels, with much stronger evidence for bonds. However, in our data set the spread between long- and short-term interest rates seems to move quite closely with the present value of expected changes in short-term rates. Deviations from the present-value model for bonds do not appear to be highly persistent. In contrast, our evaluation of the present-value model for stocks indicates that the spread between stock prices and dividends moves too much, and that deviations from the present-value model are quite persistent, although the strength of the evidence for this depends sensitively on the discount rate assumed in the test.

Anticipated Tax Changes and the Timing of Investment

Alan J. Auerbach and James R. Hines, Jr.

Working Paper No. 1886

April 1986

JEL No. 320

This paper analyzes the short- and long-run effects of corporate tax changes over the past three decades and the likely consequences of proposed tax changes. Consideration of short-run effects of tax reform on investment and market value requires a careful analysis of three elements of behavior that are normally omitted from long-run analyses: the state of investor expectations; the time lags involved in putting new capital in place; and the tax laws' distinctions between new and old capital. The model described in this paper considers investment in equipment and investment in plant separately, and does so under different specifications of investor expectations.

Our results for 1954-85 suggest that investors did take account of fluctuations in profitability, real interest rates, and the tax code in making their investment plans. We examine the consequences of the nonindexation of depreciation benefits as well as the introduction of the investment tax credit and the Accelerated Cost Recovery System by simulating the corporate sector's performance in the absence of these features. In addition, we analyze the effects of changing the tax code in 1986 along the lines proposed in the Bradley-Gephardt "Fair Tax" plan, the Treasury II plan, and the Rostenkowski plan, H.R. 3838. The simulation suggests that all three plans would reduce fixed investment in the short run, with the reduction coming primarily in equipment. At the same time, the simulations predict large windfalls for existing capital assets under all three reform proposals.

Compensating Wage Differentials and the Duration of Wage Loss

Daniel S. Hamermesh and John R. Wolfe

Working Paper No. 1887

April 1986

JEL No. 824

We offer several reasons why workers receive larger compensating wage differentials for increases in the duration of wage losses than for increases in the probability of loss that produce the same expected loss. We also develop a formal model of occupational choice that shows the extent to which the compensation for increased duration exceeds that for increased risk.

Using Panel Study of Income Dynamics data linked to industry data on injuries and unemployment, we find: (1) nearly all the compensating wage differential for losses caused by workplace injuries is compensation for increases in the duration of loss; (2) similarly, nearly all the compensation for losses caused by cyclical unemployment is compensation for increases in duration, especially for increases that last beyond the 26 weeks of unemployment usually compensated by unemployment insurance. The compensating differentials for risk of injury are larger for union than for nonunion workers, while those for cyclical unemployment are smaller for union workers.

The Earnings Gap between Male and Female Workers: A Historical Perspective

Claudia Goldin

Working Paper No. 1888

April 1986

Has economic progress increased the earnings of females relative to males over the long run? Evidence on trends in the earnings gap for the past four decades appears to run counter to this hypothesis. This paper uses numerous data sources to piece together a 170-year history of the earnings of females relative to males and the variables that determine earnings in the marketplace. In brief, the constancy of the earnings gap from the 1950s is a short-run phenomenon and cannot be extrapolated into the more distant past. The ratio of female-to-male earnings in the economy as a whole rose from just over 0.45 to just under 0.60 during 1890-1930. It rose to just over 0.60 by 1950 but has been virtually stable since then, declining somewhat during the early to mid-1950s and rising after 1981. The ratio in the manufacturing sector rose from about 0.35 in 1920 to 0.50 in 1850 and to 0.58 in 1930.

Advances in the labor market experience of the female working population account for 24 percent of the increase in the earnings ratio over 1890-1940. Increases in the returns to education and, to a lesser extent, in educational attainment, account for about 40 percent of the increase from 1890-1970. It is also possible that the decreased return to physical attributes (such as strength) accounts for another 28 percent of the increase in the female-to-male earnings ratio. The various factors considered account for about 85 percent of the entire increase in the ratio from 1890-1970 (some factors decreased the ratio). The constancy of the gender gap from the 1950s is a function of the increased labor force participation of women that stabilized the work experience of the working population of women and made the future highly unpredictable for many cohorts.

The Illusion of Stabilization Policy?

Steven Green and Herschel I. Grossman

Working Paper No. 1889

April 1986

JEL No. 310

Money growth in the United States for 1959-72 was positively correlated with past inflation and negatively correlated with past unemployment, whereas for 1973-84 this correlation pattern was reversed. Moreover, international data show that the eight largest western economies exhibit a wide variety of patterns for these correlations, and these patterns seem to be unrelated to average inflation. Theoretical analysis reveals that a model in which the monetary authority is concerned only with controlling inflation is consistent with any pattern of sample correlations of money growth with past inflation and past unemployment. This analysis suggests that international differences in these sample correlations result from differences in the sample variances of disturbances to productivity growth and to aggregate demand. Specifically, the analysis suggests that the critical difference between the pre-1973 and post-1973 periods for the United States was a decrease in the importance of transitory disturbances to aggregate demand relative to permanent disturbances to productivity growth. More generally, these results imply that we cannot readily infer the objectives of the monetary authority from observed patterns of monetary policy.

Inside Money and Monetary Neutrality

Peter R. Hartley and Carl E. Walsh

Working Paper No. 1890

April 1986

JEL Nos. 311, 023

This paper examines the interaction between the financial and real sectors of the economy within the framework of a stochastic, rational expectations model that distinguishes between inside and outside money. The model also can be used to study the impact of variations in the degree of intermediation, measured by the elasticity of supply of bank deposits. In contrast to earlier work that emphasized confusion between monetary and real shocks, this paper focuses on the role played by confusion between inside and outside money and temporary and permanent disturbances to base money. We show that financial sector disturbances, as well as temporary shocks to the monetary base, have real effects even when private agents have complete information. When contemporaneous information on economic disturbances is incomplete, permanent shocks to the monetary base also have real effects. If

our model is correct, it is invalid to reject equilibrium models of the business cycle on the grounds that anticipated money affects output. We argue that this result is robust in the sense that many "reasonable" models that incorporate inside money would yield a nonneutrality of portfolio and temporary base money supply shocks.

Social Security: A Financial Appraisal Across and Within Generations

**Michael J. Boskin, Laurence J. Kotlikoff,
Douglas J. Puffert, and John B. Shoven**
Working Paper No. 1891
April 1986
JEL No. 915

This paper computes the expected present value of Social Security retirement benefits and taxes for households of different marital status, incomes, and ages. We also compute the net gain or loss from participation in the system and the expected internal rate of return it offers to various participants. The paper calculates the marginal linkage between benefits and contributions and also examines how the age of entry into the covered work force affects the participant. All computations are based on the 1985 Social Security and income tax laws.

The general results are that Social Security offers vastly different terms to households in different circumstances. The net gain or loss varies by \$200,000, and the real internal rate of return on contributions ranges from negative numbers to 6.6 percent for households of different ages, income levels, and marital status. These differences are far greater than the widely debated distributional effects of relevant income tax alternatives. We also find that there is a great deal of variance in the marginal linkage of benefits and taxes, with many households facing a situation in which the present value of benefits increases from 0 to 30 cents per extra dollar of taxes paid.

The Optimal Inflation Rate in an Overlapping-Generations Economy with Land

Bennett T. McCallum
Working Paper No. 1892
April 1986
JEL Nos. 111, 134, 311

This paper analyzes the optimal inflation rate in an overlapping-generations economy in which aggregate

output is constrained by a standard neoclassical production function with diminishing marginal products for both capital and labor, and the transaction-facilitating services of money are represented by means of a money-in-the-utility-function specification. With monetary injections provided by lump-sum transfers, the Chicago Rule prescription for monetary growth is necessary for Pareto optimality. But a competitive equilibrium may fail to be Pareto optimal even with that rule because of capital overaccumulation. Capital overaccumulation is not possible, however, if the economy includes an asset that is productive and nonreproducible—that is, if the economy includes *land*. As this conclusion is independent of the monetary aspects of the model, I argue that the possibility of capital overaccumulation should not be regarded as a matter of theoretical concern, even in the absence of government debt, intergenerational altruism, and Social Security systems, or other "social contrivances."

Capital Gains: Rates, Realizations, and Revenues

Lawrence B. Lindsey
Working Paper No. 1893
April 1986

This paper examines the effect of capital gains tax rates on the level of capital gains realizations and the resulting amount of tax revenues. It concludes that capital gains tax revenues are maximized at the current 20 percent rate or lower, with a central estimate of 16 percent. Some of any gain in revenue caused by a rate reduction is likely to be temporary. But even in the long run, about 5.4 percent more capital gains will be realized for every one percentage point of reduction in the capital gains tax rate.

The study uses detailed tabulation data of personal income tax returns for 1965–82. It carefully estimates the effect of a number of tax provisions on the marginal tax rate on capital gains. These include the Alternative Tax Computation, Additional Minimum Tax, Maximum Tax on Earned Income, and the Alternative Minimum Tax. In many cases these special provisions had unintended consequences.

I used data on household wealth to estimate the stock of unrealized capital gains in taxpayers' portfolios. The study finds a significant difference between tradable assets, such as real estate and common stock, and nontraded forms of household wealth, such as cash and checking accounts. As expected, capital gains realizations closely track changes in traded wealth but are inversely related to changes in nontraded wealth.

The Pure Theory of Country Risk

**Jonathan Eaton, Mark Gersovitz,
and Joseph E. Stiglitz**
Working Paper No. 1894
April 1986
JEL No. 441

This paper attempts to survey and put into perspective the recent literature on the nature of credit relations between developed and developing countries. It uses recent advances in the economics of information and strategic interaction. Traditional concepts of solvency and liquidity are of little help in understanding problems of sovereign debt. Creditors do not have the means to seize the assets of a borrower in default. Hence, the borrower's net worth is not relevant in determining the amount of a loan that can be recovered. A borrower who is expected to repay his debts eventually should be able to borrow to meet any current debt service obligations. But enforcement is essential to a theory of international lending. The difficulty is ensuring that the two sides of a loan contract adhere to it, and in particular that the borrower repays the lender and the lenders penalize the borrower if he does not.

Job Characteristics and Hours of Work

Joseph G. Altonji and Christina H. Paxson
Working Paper No. 1895
April 1986
JEL Nos. 821, 824

This paper shows that hours of work are heavily influenced by the particular job that a person holds. It compares the variance in the change in work hours across time intervals that include a job change versus time periods with only one job. To the extent that workers choose hours and that these choices are influenced by shifts in individual preferences and resources, the variance in the time change of hours should not depend upon whether the worker has switched jobs. The desire to reduce or increase hours could be acted upon in the current job. On the other hand, if hours are influenced by employer preferences, or if job-specific characteristics dominate the labor supply position, then changes in hours should be larger when persons change jobs than when they do not.

Using the Panel Study of Income Dynamics and the Quality of Employment Survey, we find that changes in hours are typically two to four times more variable across jobs than within jobs. The result holds for both

men and women and for both quits and layoffs and is not sensitive to the set of job characteristics (including the wage) that might influence the hours a person wants to work. The findings also do not support the view that workers may adjust hours costlessly by changing jobs.

Our finding that the job largely influences work hours suggests that much greater emphasis should be given to demand factors and to job-specific labor supply factors in future research on hours of work. The overwhelming emphasis on the wage and personal characteristics in conventional labor supply analyses in part may be misplaced.

Notes on the Tax Treatment of Structures

**Roger H. Gordon, James R. Hines, Jr.,
and Lawrence H. Summers**
Working Paper No. 1896
April 1986
JEL No. 320

More than 75 percent of the tangible capital stock of the United States is structures. Potentially, tax policies have a major impact on both the level and the composition of investment in structures and equipment. This point is recognized explicitly in most discussions of the effects of capital income taxation. Two aspects of the taxation of structures—the relative burden placed on structures as opposed to equipment investment and the nontaxation of owner-occupied housing under the income tax—have attracted substantial attention in recent years. This paper explores these two aspects of the taxation of structures investments.

While the tax system may well have a potent impact on the level and composition of structures investment, this paper argues that conventional analyses of these effects are very misleading. We reach two main conclusions. First, under current tax law, certain types of structures investment are very highly tax favored. Structures can be transferred, and therefore depreciated more than once, and structures may be readily financed with tax-favored debt. Overall, it is unlikely that a significant bias toward equipment and against structures exists under current law. Second, the conventional view that the tax system is biased in favor of homeownership is wrong. Because of the possibility of "tax arbitrage" between high-bracket landlords and low-bracket tenants, the tax system has long favored rental over ownership for most households. The 1981 reforms, by reducing the top marginal tax rate, reduced this bias somewhat.

Asset Prices in a Time-Series Model with Disparately Informed, Competitive Traders

Kenneth J. Singleton
Working Paper No. 1897
April 1986

This paper examines the time-series properties of the price of a risky asset implied by a model in which competitive traders are heterogeneously informed about the underlying sources of uncertainty in the economy. Traders do not observe the shocks in the period in which they occur. However, traders are imperfectly and heterogeneously informed about these shocks for three reasons: (1) the shocks are serially correlated and hence can be forecast in part from their history; (2) each trader receives private signals about the current values of a subset of the shocks; and (3) the equilibrium price conveys information about the private signals and beliefs of other traders. Since prices convey information in this economy, traders will face an infinite regress problem in expectations associated with their desire to forecast the beliefs of others, the beliefs of others about average beliefs, and so forth. I deduce the equilibrium time-series representation for the price of the risky security in various environments of imperfect information. Then, I compare the volatility and autocorrelations of prices in this model to the corresponding statistics for a model in which agents are informed homogeneously.

The Budget Deficit and the Dollar

Martin Feldstein
Working Paper No. 1898
April 1986

This study analyzes changes in the real deutschmark/dollar exchange rate from the beginning of the floating rate regime in 1973 through 1984. The econometric analysis focuses on the effects of anticipated structural budget deficits and monetary policy in the United States and Germany and the changes in U.S. profitability induced by changes in tax rules. The paper also examines the possible impact of a number of other variables.

The evidence indicates that the rise in the expected future deficits in the budget of the U.S. government has had a powerful effect on the exchange rate between the dollar and the German mark. Each percentage point of increase in the ratio of future budget deficits to GNP increased the exchange rate by about 30 percentage points. Changes in the growth of the money supply also affect the exchange rate. Changes in the tax rules and in the inflation-tax interaction that altered the corporate demand for funds did not have any discernible effect on the exchange rate.

A separate analysis confirms that there is an equilibrium structural relationship between the dollar-DM rates in the United States and Germany. An increase of one percentage point in the real interest rate differential has been associated with a rise of about 5 percent in the DM-dollar ratio.

The Dynamic Demand for Capital and Labor

Matthew D. Shapiro
Working Paper No. 1899
April 1986
JEL Nos. 131, 211

This paper specifies and estimates a model of the dynamically interrelated demand for capital and labor. It estimates the first-order conditions of the firm's problem rather than the closed-form decision rules. This use of the first-order conditions allows a random rate of return and a flexible specification of the technology. The estimates do not imply the very slow rates of adjustment found in other, related estimates of the demand for capital. Because adjustment is estimated to be rapid, contrary to the standard view, there is scope for factor prices to affect investment at relatively high frequencies.

Capital Utilization and Capital Accumulation: Theory and Evidence

Matthew D. Shapiro
Working Paper No. 1900
April 1986
JEL Nos. 131, 211, 641

A firm may acquire additional capital either by purchasing new capital or by increasing the utilization of its current capital. I study the margin between capital accumulation and capital utilization in a model of dynamic factor demand in which the firm chooses capital, labor, and the rates of utilization of each. The theory and estimates incorporate a direct measure of capital utilization, the workweek of capital. The estimates imply that capital stock is costly to adjust while the workweek of capital is essentially costless to adjust. The estimated response of the capital stock to changes in its price and in the required rate of return is more rapid than found in other estimates.

The Efficiency of the Supply of Public Education

Ted Bergstrom, Judith Roberts, Daniel L. Rubinfeld, and Perry Shapiro
Working Paper No. 1901
April 1986

The question of whether governments spend too much or too little has been debated frequently, but analyzed infrequently. This paper proposes and then applies a methodology that checks whether the "Samuelson condition" for the efficient provision of local public education is satisfied; that is, whether the sum over the school district of individual marginal rates of substitution between public education and a private numeraire equals the marginal rate of technical substitution between these two goods. The econometric methodology uses a microbased approach to the estimation of marginal rate of substitution functions and accounts for possible biases associated with the selection of school districts by individual households.

The Limited Viability of Dual Exchange Rate Regimes

Jacob A. Frenkel and Assaf Razin
Working Paper No. 1902
April 1986
JEL No. 431

This paper examines the viability of dual exchange rate regimes. Typically under such regimes, the exchange rates applicable to current account (commercial) transactions and to capital account (financial) transactions differ. The difference may be determined in the free market if the authorities peg the commercial exchange rate and set a binding quota on external borrowing, or it may result from direct pegging of both exchange rates.

This analysis starts with a specification of the characteristics of the distortion introduced by the exchange rate premium (that is, the percentage discrepancy between the financial and the commercial exchange rates) and then provides explicit formulas for the equilibrium premium, its evolution over time, and the welfare cost induced by the distortion. The paper outlines the policy options that are consistent with a permanently viable dual exchange rate system and highlights the severe constraints imposed by intertemporal solvency requirements of the private sector and of the government on the long-run viability of the regime. The paper concludes with an analysis of the monetary changes associated with dual exchange rate policies and the implications of such a regime for the intertemporal distribution of taxes and for the intergenerational distribution of welfare.

A Gold Standard Is Not Viable unless Supported by Sufficiently Flexible Monetary and Fiscal Policy

Willem H. Buiter
Working Paper No. 1903
April 1986
JEL No. 432

This paper studies an idealized gold standard in a two-country setting. Without flexible policies for national domestic credit expansion (DCE) that offset the effect of money demand shocks on international gold reserves, the gold standard certainly collapses in finite time through a speculative selling attack against one of the currencies. I consider various policies for postponing a collapse.

When a responsive DCE policy eliminates the danger of a run on a country's reserves, the exogenous shocks disturbing the system that previously were reflected in reserve flows now show up in the behavior of the public debt. Unless the primary (noninterest) government deficit is permitted to respond to these shocks, the public debt is likely to rise (or fall) to unsustainable levels.

For the idealized gold standard analyzed in the paper, viability can be achieved only through the active and flexible use of monetary and fiscal policy.

The Impact of Fundamental Tax Reform on the Allocation of Resources

Don Fullerton and Yolanda Kodrzycki Henderson
Working Paper No. 1904
April 1986

Recent proposals for fundamental tax reform differ in their relative emphasis on interasset, intersectoral, interindustry, and intertemporal distortions. The model in this paper addresses these multiple issues in the design of taxes on capital incomes. It is capable of measuring the net effects of changes in statutory rates, credits, depreciation allowances, and other features such as the indexation of interest and capital gains. It can compare costs of capital for individual assets, sectors, and industries, and it weighs these together to evaluate the impact on total investment incentives. In a fully general equilibrium system, it can simulate alternative resource allocations and associated changes in welfare. For the overall evaluation of alternative tax reform proposals, the simultaneous consideration of these multiple effects is crucial.

We use the model to compare current law, the Treasury tax reform plan of November 1984, and the president's proposal of May 1985. Under the "new view" that dividend taxes have a small effect on investment incentives, both reforms would reduce interasset distortions; the president's plan would reduce intersectoral distortions, but the Treasury plan would exacerbate intertemporal distortions. Still, for most parameters, both reforms generate net welfare gains even with slight declines in the capital stock. Under the "old view" that dividend taxes have a significant effect on investment incentives, both plans reduce corporate taxation through their partial deductions for dividends paid. Thus, they reduce intersectoral distortions as well as differences among assets. Under this view, the Treasury plan no longer increases intertemporal distortions. Even for the least favorable set of parameters in this case, these reforms raise both the capital stock and the real value of output above their baseline values. Finally, the paper shows alternative allocations of capital among assets, sectors, and industries.

A Disaggregate Equilibrium Model of the Tax Distortions among Assets, Sectors, and Industries

Don Fullerton and Yolanda Kodrzycki Henderson
Working Paper No. 1905
April 1986

This paper encompasses multiple sources of inefficiency introduced by the U.S. tax system into a single general equilibrium model. Using disaggregate calculations of user cost, we measure interasset distortions from the differential taxation of many types of assets. We simultaneously model the intersectoral distortions from the differential treatment of the corporate sector, noncorporate sector, and owner-occupied housing. Industries in the model have different uses of assets and different degrees of incorporation. Results indicate that distortions among sectors are much smaller than those of the Harberger model. Distortions among industries are also much smaller than those in models using average effective tax rates. Distortions among assets are larger, but the total of all these welfare costs is still below 1 percent of income.

Efficiency Wage Theories: A Partial Evaluation

Lawrence F. Katz
Working Paper No. 1906
April 1986

This paper surveys recent developments in the literature on efficiency wage theories of unemployment. Efficiency wage models have in common the property that, in equilibrium, firms may find it profitable to pay wages in excess of market clearing. High wages can help reduce turnover, elicit worker effort, prevent worker collective action, and attract higher-quality employees. Simple versions of efficiency wage models can explain normal involuntary unemployment, segmented labor markets, and wage differentials across firms and industries for workers with similar productive characteristics. Deferred payment schemes and other labor market bonding mechanisms appear to be able to solve some efficiency wage problems without resultant job rationing and involuntary unemployment. I analyze a wide variety of evidence on interindustry wage differences. Efficiency wage models appear useful in explaining the observed pattern of wage differentials. The models also provide several potential mechanisms for cyclical fluctuations in response to aggregate demand shocks.

Wage Changes in Job Changes

Jacob A. Mincer
Working Paper No. 1907
April 1986
JEL No. 800

This is a study of the wages gained in moving from one job (firm) to the next. Short-run wage gains are defined as wage changes that occurred during the year of the move, minus the opportunity cost of moving. The latter is measured by the wage growth of a subgroup of workers who stayed and whose mobility behavior and other characteristics are the same as those of the current-period movers. Longer-run wage gains are defined as the difference in wages between two successive jobs at the same tenure levels, net of experience and opportunity costs.

Wage gains of movers are generally positive, except for older workers who are ultimately laid off. A large

part of the gain is caused by the lower wage growth on the job of those who move compared to those who stay. This is consistent with below-average amounts of on-the-job training for those who move, compared to all workers.

Wage gains of people who quit exceed the gains of those who are laid off, despite similar wage levels and wage growth on the preceding job. Wage gains of older workers who move are smaller than gains of younger workers who move, both in quits and in layoffs. Differences in search conditions and in the nature of separations help to explain these findings.

Residual Risk Revisited

Bruce N. Lehmann

Working Paper No. 1908

April 1986

JEL No. 520

The Capital Asset Pricing Model, with the usual market model assumptions, implies that well-diversified portfolios should be mean-variance efficient. Hence, betas computed with respect to such indexes should completely explain expected returns on individual assets. In fact, there is now a large body of evidence indicating that the market proxies usually used in empirical tests are not mean-variance efficient. Moreover, there is considerable evidence suggesting that these rejections are in part a consequence of the presence of omitted risk factors associated with nonzero risk premiums in the residuals from the single-index market model. Consequently, the idiosyncratic variances from the one-factor model should partially reflect exposure to these omitted sources of systematic risk and, therefore, should help to explain expected returns. There are two plausible explanations for the inability to obtain statistically reliable estimates of a linear residual risk effect in the previous literature: (1) nonlinearity of the residual risk effect; and (2) the inadequacy of the statistical procedures used to measure it.

The results that I present indicate that the culprits are the econometric methods previously used. I find pronounced residual risk effects in the whole 54-year sample and in numerous five-year subperiods when weighted-least-squares estimation is coupled with the appropriate corrections for sampling error in the betas and residual variances of individual security returns. In addition, it is important to take account of the non-normality and heteroskedasticity of security returns when making the appropriate measurement error corrections in cross-sectional regressions. Finally, the results are sensitive to the specification of the model for expected returns.

Tax Reform and the Slope of the Playing Field

Patric H. Hendershott

Working Paper No. 1909

April 1986

JEL No. 323

Possible benefits of tax reform include faster economic growth and greater equity across households. Part of economic growth is channeling saving into the most productive real investments. This paper focuses on the ability of various tax regimes to channel saving efficiently and independently of the inflation rate. The tax regimes analyzed include: current law, pre-ERTA law, the Treasury and administration reform proposals, H.R. 3838, and what seems likely to come out of the Senate Finance Committee.

Life-Cycle Models of Consumption: Is the Evidence Consistent with the Theory?

Angus Deaton

Working Paper No. 1910

April 1986

This paper considers evidence on the validity of the life-cycle model of consumer behavior. In the first part of the paper, simple nonparametric tests are used to examine representative agent models of consumption and labor supply. It seems extremely unlikely that post-war U.S. evidence can usefully be explained by such a model, at least if the assumption of intertemporal separability is maintained. Changes in aggregate consumption bear little relationship to aftertax real interest rates, and consumption has tended to grow even during periods of negative real interest rates. Joint consideration of consumption and labor supply does nothing to resolve the problems that arise when consumption is taken by itself. I argue that these results cast doubt, not on the life-cycle theory itself, but on the representative agent assumption; there is little reason to suppose that changes in aggregate consumption *should* be related to the real interest rate.

The second part of the paper deals with the time-series representation of disposable income and its implications for the behavior of consumption under the assumptions of the life-cycle model. If real disposable income is truly a first-order autoregressive process in first differences, a process that fits the data well and is becoming increasingly popular in the macro time-series literature, then the life-cycle model implies that changes in consumption should be *more* variable than innovations in income, a prediction that is manifestly

false. I review various possible resolutions of this problem, including habit formation and alternative representations of disposable income. The paper concludes with some evidence on the excess sensitivity question, or why it is that consumption responds to *anticipated* changes in income. Monte Carlo evidence supports Mankiw and Shapiro's suggestion that the presence of time trends can cause severe problems of inference in models containing variables with unit roots, but the results make it seem unlikely that this is the cause of the widespread excess sensitivity findings.

Tax Changes and Capital Allocation in the 1980s

Patric H. Hendershott
Working Paper No. 1911
April 1986
JEL No. 323

This paper begins with a methodology for computing rental costs of capital under any tax regime. It describes tax law over 1980-4 and the provisions of the Treasury and administration tax reform proposals and H.R. 3838. I then construct a model to allow calculation of the impact of changes in tax regimes and/or expected inflation on interest rates and the allocation of real capital. The model allocates a fixed private capital stock among various classes of nonresidential and residential capital, depending upon the rental costs for the capital components, the price elasticities of demand with respect to the rental costs, and the elasticities of homeownership with respect to the cost of owning versus renting. The interest rate adjusts in response to tax/inflation changes to maintain the aggregate demand for capital at this initial level. I use the model to deduce the efficiency of the allocation of real capital under various tax regimes at different inflation rates.

The Assessment of National Price Levels

Irving B. Kravis and Robert E. Lipsey
Working Paper No. 1912
May 1986
JEL Nos. 431, 227

This paper attempts to find norms for long-run national price levels—and therefore, by implication, for

exchange rates—that are superior to those implied by the absolute or relative versions of the purchasing power parity theory. The structural variables we have found to determine these price levels—real income per capita, the openness of the economy, and the share of tradables in total output—are then used to explain price levels in periods since 1960, and to some extent since 1950.

The results suggest that there was a movement toward a more “orderly” alignment of price levels, especially in the period before the 1970s. That is, national price levels came to be explained to an increasing degree by our structural variables.

The price levels implied by the structural equations appear to come closer to representing long-run equilibrium levels than do those implied by purchasing power parity. The deviations from the structural equations seem to have value in predicting future changes in price levels or real exchange rates, in combination with changes in the structural variables. They also contribute to predicting changes in the balance of trade.

More on the Speed of Adjustment in Inventory Models

Alan S. Blinder
Working Paper No. 1913
May 1986
JEL Nos. 212, 132

When empirical stock-adjustment models of manufacturers' inventories of finished goods are estimated, there appear to be two local minimums in the sum of squared residuals functions. At one local minimum, the estimated adjustment speed is typically quite high; at the other, it is typically quite low. Furthermore, finding two sets of estimates that fit the data almost equally well does not appear to be a quirk of this particular application. Rather, it stems from a fundamental identification problem that afflicts partial adjustment models of all kinds.

In the specific context of manufacturers' inventories of finished goods, the estimation procedure employed by Maccini and Rossana seems to pick out the solution with rapid adjustment (and high serial correlation in the disturbances) whereas the solution with slow adjustment (and little serial correlation) is more often the global minimum.

Beer Taxes, the Legal Drinking Age, and Youth Motor Vehicle Fatalities

Henry Saffer and Michael Grossman

Working Paper No. 1914

May 1986

JEL No. 913

Based on a time series of state cross sections for 1975–81, we find that motor vehicle accident mortality rates of youths ages 15–17, 18–20, and 21–24 are negatively related to the real excise tax on beer. We also find that the death rate of 18- through 20-year-olds is inversely related to the minimum legal age for the purchase of beer. Simulations suggest that the lives of 1022 youths between ages 18–20 would have been saved in a typical year during the sample period if the federal excise tax rate on beer, which has been fixed in nominal terms since 1951, had been indexed to the rate of inflation since 1951. This represents a 15 percent decline in the number of lives lost in fatal crashes. The simulations also suggest that the lives of 555 youths per year would have been saved if the drinking age had been 21 in all states of the United States. These figures indicate that if reductions in youth motor vehicle accident deaths are desired, both a uniform drinking age of 21 and an increase in the federal excise tax rate on beer might be effective policies to accomplish this goal. They also indicate that the tax policy may be more potent than the drinking age policy.

Foreign Counterfeiting of Status Goods

Gene M. Grossman and Carl Shapiro

Working Paper No. 1915

May 1986

JEL Nos. 022, 411

We study the positive and normative effects of counterfeiting (that is, trademark infringement) in markets in which consumers are not deceived by forgeries. The fact that consumers are willing to pay more for counterfeits than for generic merchandise of similar quality suggests that they value the prestige, or status, associated with brand-name trademarks. Counterfeiters of status goods impose a negative externality on consumers of genuine items, as fakes degrade the status associated with a given label. But counterfeits allow consumers to unbundle the status and quality attributes of brand-name products and alter the competition among oligopolistic trademark owners. We analyze two policies designed to combat counterfeiting: enforcement policy that increases the likelihood of confiscation of illegal items, and the imposition of a tariff on low-quality imports.

Are Output Fluctuations Transitory?

John Y. Campbell and N. Gregory Mankiw

Working Paper No. 1916

May 1986

According to the conventional view of the business cycle, fluctuations in output represent temporary deviations from trend. This paper questions that conventional view. If fluctuations in output are dominated by temporary deviations from the natural rate of output, then an unexpected change in output today should not substantially change one's forecast of output in, say, 10 or 20 years. Our examination of quarterly postwar U.S. data leads us to be skeptical about this implication. We find that an unexpected change in real GNP of 1 percent should change one's forecast by over 1 percent over a long horizon. While it is obviously imprudent to make definitive judgments regarding theories on the basis of one stylized fact alone, we believe that the great persistence of output shocks documented in this paper is an important and often neglected feature of the data that should be used more widely for evaluating theories of economic fluctuations.

Incentive Contracts

Edward P. Lazear

Working Paper No. 1917

May 1986

Labor relations involve incentive problems. The market solves these problems by developing a variety of institutions. This paper describes and assesses the various forms of incentive contracts.

Multicountry, Multifactor Tests of the Factor Abundance Theory

Harry P. Bowen, Edward E. Leamer, and Leo Sveikauskas

Working Paper No. 1918

May 1986

This paper presents tests of the Heckscher–Ohlin (HO) proposition, that trade in commodities can be explained in terms of an interaction between factor input requirements and factor endowments. Most prior

work that claims to present tests of this hypothesis has used intuitive but inappropriate generalizations of the traditional two-by-two model to deal with a multidimensional reality. Moreover, prior work in general has used measurements on only two of the three variables (trade, factor input requirements, and factor endowments) that are required for a proper test of the HO theory.

We derive an exact specification of the HO interaction in a multicountry, multicommodity, multifactor world in the form of the Heckscher–Ohlin–Vanek (HOV) theorem that equates the factors embodied in net trade to excess factor supplies. This theorem implies sign and rank propositions analogous to those implicitly studied by Leontief, but it also implies hypotheses about the parameters linking factor contents and factor supplies. Accordingly, we conduct tests of the sign and rank propositions as well as several parametric hypotheses that permit various assumptions about measurement errors, nonproportional consumption, and technological differences. Our analysis uses separately measured data on trade, factor input requirements, and endowments for 27 countries and 12 factors in 1967.

Tests of the Leontief-type sign and rank propositions sharply reject this facet of the HOV model. In particular, the sign of net factor exports infrequently predicts the sign of excess factor supplies and therefore does not reveal factor abundance systematically.

The results from an extended set of tests conducted in a regression context reject the HOV hypothesis of an exact relationship between factor contents and national factor supplies. There is support for the HOV assumption of homothetic preferences, but we find that estimates of the parameters linking factor contents and factor supplies differ significantly from their theoretical values. We find clear evidence that the departure of the estimated coefficients from their theoretical values is importantly related to differences across countries in the matrix of factor input requirements and, by implication, to violation of the assumption of factor price equalization. We also find that errors of measurement in both trade and national factor supplies are an important reason for rejection of the HOV hypothesis.

On the Political Economy of Land Value Capitalization and Local Public Sector Rent Seeking in a Tiebout Model

Joseph Gyourko and Joseph Tracy
Working Paper No. 1919
May 1986

In this paper we examine the political economy of capitalization in a Tiebout model when there is a rent-seeking public bureaucracy. We then suggest a new

approach for testing the influence of successful local public sector rent seeking on local property values. We present empirical evidence showing that property values are lower in cities that pay their public sector workers significantly more than similar public sector workers in other cities. Finally, we discuss how the regulatory process can be used to distribute rents arising from a short-run Tiebout disequilibrium to landowners, public sector workers, and renters.

An Analysis of Public and Private Sector Wages Allowing for Endogenous Choices of Both Government and Union Status

Joseph Gyourko and Joseph Tracy
Working Paper No. 1920
May 1986

Studies of wage differentials in the public versus private sector typically assume that the government and union status of a worker are exogenous. Recently, some studies have relaxed this assumption slightly by allowing the union status to be endogenous. In this paper, we consider a more general selection model in which a worker selects among four labor markets: private/nonunion, private/union, public/nonunion, and public/union. We then estimate a multinomial logit model to capture this selection decision. Then we derive estimates of consistent wage equations using a generalization of the now-familiar two-step estimation procedure. We find some evidence for selection bias in the private/nonunion and the public/union sectors. The pattern of these selection effects produces larger union wage premiums in the public sector compared with the private sector. While this is in contrast to the standard findings, the standard errors on the public sector union wage differential are quite high. In addition, the data indicate that the public/private sector wage differential is largest for federal workers despite the “comparability” process that determines their wages.

Risk Aversion and Determinants of Stock Market Behavior

Robert S. Pindyck
Working Paper No. 1921
May 1986

In this paper, I develop a simple model of equity pricing to address two related questions. First, how can unan-

anticipated changes in such "fundamental" variables as profitability, real interest rates, inflation, and the variance of returns explain the observed behavior of the stock market? Second, how risk averse are investors in the aggregate? I find that both the pretax profit rate and the variance of returns explain a great deal of the market, and that interest rates explain somewhat less. Estimates of the index of relative risk aversion range from three to four.

Real Exchange Rates and Productivity Growth in the United States and Japan

Richard C. Marston
Working Paper No. 1922
May 1986
JEL No. 430

Real yen/dollar exchange rates based on general price indexes overestimate the competitiveness of the United States relative to Japan. High productivity growth in the traded sector of the Japanese economy results in a continuous fall in the prices of traded goods relative to nontraded goods in Japan. In order to keep U.S. traded goods competitive, the real exchange rate based on such general price series as the Gross Domestic Product (GDP) deflator and the Consumer Price Index must fall continually, resulting in a real *appreciation* of the yen.

This paper estimates how far real exchange rates based on general price series would have had to fall between 1973 and 1983 in order to keep U.S. traded goods competitive. For example, the real exchange rate based on GDP deflators would have had to fall by 38 percent relative to the real exchange rate based on unit labor costs in the traded sector. The GDP series remained roughly constant over the period, thus giving the misleading impression that U.S. goods were still competitive despite a sharp rise in the relative price of U.S. *traded* goods. The paper also estimates the relative wage changes that must occur to restore the competitiveness of U.S. traded goods.

Poverty among the Elderly: Where Are the Holes in the Safety Net?

Michael J. Boskin and John B. Shoven
Working Paper No. 1923
May 1986
JEL Nos. 320, 914, 915

Using data from the longitudinal retirement history survey, we examine the economic status of the elderly

who were 68-73 years old by 1979 to see who fell through the safety net in the 1970s. Our most important finding is that a nontrivial fraction of the elderly in the group we study either remained poor, became poor, or had very low replacement rates in terms of their total income. This occurred despite the enormous general improvement of the economic status of the elderly, part of which was made possible by very large increases in real Social Security benefits. Females, especially widows, were the most likely candidates for economic difficulty in this stage of their life.

We also note a sharp difference in realizations of expectations of retirement income among those who were poor and/or had low replacement rates relative to those who were well off and/or had high replacement rates. Both groups received substantially more Social Security benefits than they had expected. However, those with (ex post) low replacement rates received less in pensions and continued earnings than they had expected, while those with high replacement rates received more than expected.

Tax Asymmetries and Corporate Income Tax Reform

Saman Majd and Stewart C. Myers
Working Paper No. 1924
May 1986

This paper investigates the impact of tax asymmetries (the lack of full loss offsets) under current corporate income tax law and under a stylized tax reform proposal. We model the government's tax claim on the firm's pretax cash flows as a series of path-dependent call options and assign it value through option pricing procedures and Monte Carlo simulation.

The tax reform that we investigate reduces the statutory tax rate, eliminates the investment tax credit, and sets tax depreciation approximately equal to economic depreciation. These changes would increase the effective tax rate on marginal investments by firms that always pay taxes but would dramatically reduce the potential burden of tax asymmetries. "Stand-alone" investments, which are exposed to the greatest burden, are uniformly more valuable under this reform, despite the loss of the investment tax credit and accelerated depreciation.

We back up these general results with a series of numerical experiments. We vary investment risk, inflation (with and without indexing of tax depreciation), and then investigate how allowing interest on loss carryforwards would affect aftertax project value.

The Sources of Disagreement among International Macro Models and Implications for Policy Coordination

Jeffrey A. Frankel

Working Paper No. 1925

May 1986

JEL No. 431

This paper uses the simulation results of 12 leading large international econometric models to determine the effects of commonly specified changes in monetary and fiscal policy. The first half of the paper examines disagreement among the models on the signs of policy multipliers, and how such disagreement compares to the ambiguities in the theoretical literature. In fact, there is relatively little disagreement as to the effects on output, prices, and the exchange rate. The greatest disagreement is over the question of whether a monetary expansion worsens or improves the current account.

The second half of the paper examines the implications of certain policies for coordination of international macroeconomic policy. The existing literature makes the unrealistic assumption that policymakers all know the true model. It follows that the Nash bargaining solution is generally superior to the Nash competitive solution. But everything changes once we recognize that policymakers' models, like the models in the Brookings's simulations, differ from each other and therefore from the "true" model. When the central bank and fiscal authorities subscribe to conflicting models, it is still true that: the competitive equilibrium is suboptimal, and the two authorities generally will be able to agree on a cooperative policy package that each believes will improve the objective function. However, the bargaining solution is as likely to move the target variables in the wrong direction as in the right direction, in the light of a third true model. Out of 1210 possible combinations of different models subscribed to by the two policy authorities and models representing reality, bargaining raises welfare in only 819 cases. The conclusion is that disagreement as to the true model may be a more serious obstacle to successful policy coordination than is institutional failure to enforce Pareto-improving solutions.

Pricing to Market when the Exchange Rate Changes

Paul R. Krugman

Working Paper No. 1926

May 1986

It has been remarked widely that U.S. import prices have not fully reflected movements in the exchange

rate. This paper begins with an investigation of the actual extent of "pricing to market" by foreign suppliers. It shows that pricing to market is a real phenomenon, but not universal. In particular, evidence on German export prices suggests that stickiness of import prices is largely confined to machinery and transport equipment. The paper then considers a number of possible models. While the evidence is not sufficient to distinguish among these models, it seems probable that a full explanation will involve both dynamics and imperfect competition.

The Fisher Hypothesis and the Forecastability and Persistence of Inflation

Robert B. Barsky

Working Paper No. 1927

May 1986

JEL Nos. 023, 041, 131, 132, 134, 311, 313

From 1860 to 1939, the simple correlation of the U.S. commercial paper rate with the contemporaneous inflation rate was -0.17 . The corresponding correlation for 1950-79 was 0.71 . Inflation evolved from essentially a white noise process in pre-World War I years to a highly persistent, nonstationary ARIMA process in the post-1960 period. I argue that the appearance of an ex post Fisher effect for the first time after 1960 reflects this change in the stochastic process of inflation, rather than a change in any structural relationship between nominal rates and expected inflation. I find little evidence of inflation non-neutrality in data from the gold standard period. This contradicts the conclusion of a frequently cited study by Lawrence Summers, who examined the low-frequency relationship between inflation and interest rates using band spectrum regression. Deriving and implementing a frequency domain version of the Theil misspecification theorem, I find that neither high-frequency nor low-frequency movements in gold standard inflation rates were forecastable. Thus, even if nominal rates responded fully to expected inflation, one would expect to find the zero coefficient obtained by Summers.

An Assessment of the Benefits of Air Pollution Control: The Case of Infant Death

**Theodore J. Joyce, Michael Grossman,
and Fred Goldman**

Working Paper No. 1928

May 1986

JEL No. 913

This paper estimates the impacts of air pollutants on race-specific neonatal mortality rates using data for

heavily populated counties of the United States in 1977. Unlike previous research in this area, these estimates were obtained from a well-specified behavioral model of the production of health, which is estimated with the appropriate simultaneous equations techniques. The results suggest that sulfur dioxide is the dominant air pollutant in newborn survival outcomes. There is also evidence that an increase in sulfur dioxide raises the neonatal mortality rate by raising the percentage of births at low birth weights. Based on marginal-willingness-to-pay computations, we estimate that the benefits of a 10 percent reduction in sulfur dioxide levels range from \$54 million to \$1.09 billion in 1977 dollars.

U.S. Macroeconomic Policy and Performance in the 1980s: An Overview

Frederic S. Mishkin
Working Paper No. 1929
May 1986
JEL Nos. 300, 130

This paper provides an overview of U.S. macroeconomic policy and performance in the 1980s. It first outlines the behavior of key economic variables and then discusses the policies that have affected these variables. After gaining some insight into the interaction between these policies and macroeconomic performance, it examines where macro policy and the U.S. economy may be heading in the next several years.

Real Exchange Rate Variability: An Empirical Analysis of the Developing Countries Case

Sebastian Edwards
Working Paper No. 1930
May 1986
JEL Nos. 400, 431

This paper investigates the potential role of monetary and real factors in explaining real exchange rate variability in developing countries. For this purpose, I constructed two indexes of real effective exchange rate variability that measure short-term and long-term variability for 30 countries. The results obtained, using generalized least-squares procedures on cross-section data, indicate the real exchange rate variability has been affected both by real and by monetary factors. In particular, more unstable nominal exchange rate policies were reflected in higher real exchange rate instability in the short run. More unstable domestic credit policies resulted in higher short-term real exchange rate variability. More unstable external terms of trade also positively affected the degree of real exchange rate instability.

Efficient Contracts with Costly Adjustment: Short-Run Employment Determination for Airline Mechanics

David Card
Working Paper No. 1931
May 1986
JEL No. 824

This paper presents an empirical analysis of firm-specific employment and wage outcomes for mechanics in the domestic airline industry. It presents a dynamic contracting model that incorporates both costly employment adjustment and potential gaps between contract wage rates and the opportunity value of workers' time. The model describes the employment-output linkage in the data but is less successful in capturing the dynamic relationships among employment, contract wage rates, and wage rates outside the airline industry.

Do Equilibrium Real Business Cycle Theories Explain Postwar U.S. Business Cycles?

Martin Eichenbaum and Kenneth J. Singleton
Working Paper No. 1932
May 1986
JEL Nos. 131, 212, 311

This paper presents and interprets some new evidence on the validity of the real business cycle approach to business cycle analysis. We conduct the analysis in the context of a monetary business cycle model that makes explicit one potential link between monetary policy and real allocations. We use this model to interpret Granger causal relationships between nominal and real aggregates. Perhaps the most striking empirical finding is that money growth does not Granger-cause output growth in the context of several multivariate VARs and for various sample periods during the postwar period in the United States. We then discuss several possible reconciliations of this finding with both real and monetary business cycle models. We find that it is difficult to reconcile our empirical results with the view that exogenous monetary shocks were an important independent source of variation in output growth.

On "Real" and "Sticky-Price" Theories of the Business Cycle

Bennett T. McCallum
Working Paper No. 1933
June 1986
JEL Nos. 130, 023, 311

This paper begins by identifying the distinguishing characteristic of the "real business cycle" (RBC) class

of macroeconomic models. It then scrutinizes existing evidence, presented in support of the RBC approach, of three types: calibrated general equilibrium models with no monetary sector, vector autoregression variance decomposition results, and univariate measurements of trend and cyclical components. I argue that, in fact, these types of evidence have provided little support for the RBC hypothesis so far. Finally, with regard to an important alternative hypothesis concerning macroeconomic fluctuations, the paper proposes a partial rationalization for the stickiness of nominal product prices.

The Feminization of Poverty?

Victor R. Fuchs

Working Paper No. 1934

June 1986

JEL No. 914

This paper uses data from the Census of Population and the Current Population Survey to describe and analyze the incidence of poverty by sex in 1959, 1969, 1979, and 1984. It uses both a fixed standard of poverty and a standard that changes with national per capita real income. The popular view that there was a large increase in the percentage of adult poor who are female and that this trend has accelerated in recent years is not supported by the data. There was considerable feminization of poverty in the 1960s, but in the 1970s the mix of poverty between the sexes was relatively constant, and between 1979 and 1984 women's share of poverty decreased. Feminization was more severe for blacks than for whites, primarily as a result of disparate trends in the 1970s. Statistical decomposition of the changes shows that an increase in the proportion of women in households without men was the principal source of feminization of poverty and the principal reason why the trend was more adverse for blacks than for whites.

Are Efficiency Wages Efficient?

William T. Dickens, Lawrence F. Katz, and Kevin Lang

Working Paper No. 1935

June 1986

JEL No. 821

Efficiency wage models have been criticized because worker malfeasance can be prevented in a Pareto efficient manner by requiring workers to post a bond that

they lose if they are caught cheating. However, since it is costly to monitor workers and costless to demand a larger bond, firms should pay nothing for monitoring and should demand very large bonds. Since we observe that firms devote considerable resources to monitoring workers, bonds must be limited. Therefore, firms must use second-best alternatives—intensive monitoring and/or efficiency wages. The payment of efficiency wages cannot be ruled out on a priori theoretical grounds.

Market Access and International Competition: A Simulation Study of 16K Random Access Memories

Richard Baldwin and Paul R. Krugman

Working Paper No. 1936

June 1986

This paper develops a model of international competition in an oligopoly characterized by strong learning effects. We quantify the model by calibrating its parameters to reproduce the U.S.-Japanese rivalry in 16K random access memories (RAMs) from 1978-83. We then ask how much the apparent closure of the Japanese market to imports affected Japan's *export* performance. A simulation analysis suggests that a protected home market was a crucial advantage to Japanese firms, which otherwise would have been uncompetitive both at home and abroad. We find, however, that Japan's protection of its home market produced more costs than benefits for Japan.

Marginal Costs of Income Redistribution at the State Level

William R. Johnson

Working Paper No. 1937

June 1986

JEL No. 324

Previous analyses of the cost of redistribution by a unitary government have focused on the welfare losses of distorted labor supply choices. On the other hand, the analysis of redistribution by local governments in a federal system has emphasized the effect of the migration of taxpayers and transfer recipients in raising the cost (faced by state residents) of engaging in more redistribution. This paper combines both migration and

labor supply effects to compute marginal redistribution costs at the state and federal levels. Surprisingly, for a wide range of parameter values, states face lower redistribution costs than the national government does because they are able to "export" some of the cost through lower federal tax revenue. The normative implication of the analysis is that any case for national redistribution policies must be based on benefit spillovers across state lines rather than on tax competition among state governments.

An Analysis of the Selection of Arbitrators

David E. Bloom and Christopher L. Cavanagh
Working Paper No. 1938
June 1986
JEL No. 830

This paper analyzes data on union and employer rankings of different panels of arbitrators in an actual arbitration system. We develop and estimate a random utility model of bargainer preferences. The estimates indicate that unions and employers have similar preferences, in favor of lawyers, more experienced arbitrators, and arbitrators who seem to have previously favored their side. Alternative rankings models, which we estimated to test whether bargainers rank arbitrators strategically, reveal no evidence of strategic behavior.

News or Noise? An Analysis of GNP Revisions

N. Gregory Mankiw and Matthew D. Shapiro
Working Paper No. 1939
June 1986
JEL Nos. 221, 131

This paper studies the nature of the errors in preliminary GNP data. It first documents that these errors are large. For example, suppose the preliminary estimate indicates that real GNP did not change over the recent quarter; then one can be only 80 percent confident that the final estimate (annual rate) will be in the range from -2.8 percent to +2.8 percent. The paper also documents that the revisions in GNP data cannot be forecast. This finding implies that the preliminary estimates are efficient given available information. Hence, the Bureau of Economic Analysis appears to follow efficient statistical procedures in making its preliminary estimates.

Political Parties and the Business Cycle in the United States, 1948-1984

Alberto Alesina and Jeffrey D. Sachs
Working Paper No. 1940
June 1986
JEL Nos. 120, 131

This paper tests the existence and the extent of a politically induced business cycle in the United States in the post-World War II period. The cycle described in this paper is different from the traditional "political business cycle" of Nordhaus. It is based on a systematic difference between the monetary policies of the two parties in a model with labor contracts. From an explicit optimization problem, we derive a system of equations for output and money growth. Then we successfully test the nonlinear restriction imposed by the theory on the parameters of the system of equations. We cannot reject the hypothesis that money growth has been systematically different under the two types of administration and that this difference helps to explain output fluctuations.

Investment Incentives and the Discounting of Depreciation Allowances

Lawrence H. Summers
Working Paper No. 1941
June 1986
JEL No. 320

This paper examines the discounting of depreciation allowances both theoretically and empirically. Economic theory suggests that depreciation tax shields should be discounted at the aftertax riskless rates. However, a survey of 200 major corporations indicates that they use much higher discount rates for depreciation allowances. Typical discount rates are in the 15 percent range. This finding suggests that "front-loaded" incentives such as the investment tax credit provide maximum stimulus to corporate investment.

The Self-Employment Experience of Immigrants

George J. Borjas
Working Paper No. 1942
June 1986
JEL No. 800

Self-employment is an important aspect of the immigrant experience in the labor market. Self-employment

rates for immigrants exceed 15 percent for some national groups. This paper addresses three related questions on the self-employment experience of immigrants. First, how do self-employment rates of immigrants compare to those of native-born men? Second, is there an "assimilation" effect on the self-employment propensity of immigrants? Finally, are the more recent waves of immigrants facing different self-employment opportunities than the earlier waves did? Using the 1970 and 1980 U.S. Censuses, the analysis shows that self-employment rates of immigrants exceed those of native-born men. There is also a strong, positive impact of assimilation on self-employment rates. Finally, more recent waves of immigrants are opting for self-employment with increasing frequency.

The Relative Rigidity of Monopoly Pricing

Julio J. Rotemberg and Garth Saloner
Working Paper No. 1943
June 1986

This paper seeks to explain why monopolies keep their nominal prices constant for longer periods than tight oligopolies do. We provide two possible explanations. The first is based on the presence of a small fixed cost of changing prices. The second depends on low costs of discovering the optimal price. The incentive to change price for duopolists producing differentiated products exceeds that of a single monopolistic firm that produces the same range of products as the duopoly.

International Lending and Borrowing in a Stochastic Sequence Equilibrium

Richard H. Clarida
Working Paper No. 1944
June 1986
JEL No. 431

This paper investigates international lending and borrowing in the context of a general equilibrium model. National productivities are subject to random fluctuations and rates of time preference differ among countries. International capital flows arise from the efforts of risk-averse households in different countries to self-insure against random fluctuations in productivity. I establish the existence of a rational expectations equilibrium in which the world interest rate is constant and strictly less than the rate of time preference of the least impatient countries. I also analyze the rate of time preference, solvency restrictions on borrowing, and balanced-budget fiscal policies.

The Balance-of-Payments Adjustment Mechanism in a Rational Expectations Equilibrium

Richard H. Clarida
Working Paper No. 1945
June 1986
JEL No. 431

This paper provides a choice-theoretic, general equilibrium account of the balance-of-payments adjustment process and the determination of national price levels in a world of countries populated by rational households. Balance-of-payments adjustment dynamics arise in equilibrium from the precautionary saving behavior of risk-averse households that self-insure against random productivity fluctuations. These households accumulate buffer stocks of domestic money via balance-of-payments surpluses in productive periods. The buffer stocks can be drawn upon to finance payments deficits. The result is a less variable profile of consumption relative to output when productivity is unexpectedly low. Precautionary saving exhibits the partial-adjustment-to-target behavior typically postulated in the literature on monetary approach. I establish the existence of a rational expectations equilibrium in which the distribution of international reserves among central banks is stationary.

The Term Structure of Euromarket Interest Rates: An Empirical Investigation

John Y. Campbell and Richard H. Clarida
Working Paper No. 1946
June 1986
JEL No. 431

This paper empirically investigates the predictability and comovement of risk premiums in the term structure of Euromarket interest rates. We show that variables that have been used as proxies for risk premiums on uncovered foreign asset positions also predict excess returns in Euromarket term structures. Variables that have been used as proxies for risk premiums in the term structure also predict excess returns on taking uncovered foreign asset positions. These findings suggest that risk premiums in the Euromarket term structures and on uncovered foreign asset positions move together.

We formally test the hypothesis that risk premiums on uncovered 3-month EuroDM and Eurosterling deposits move in proportion to a single latent variable. We are unable to reject this hypothesis. We are also unable to reject the hypothesis that the risk premiums on these three strategies, and on rolling over 1-month Eurosterling (EuroDM) deposits versus holding a 3-month Eurosterling (EuroDM) deposit, move in pro-

portion to a single latent variable. The single latent variable model can be interpreted atheoretically, as a way of characterizing the extent to which predictable asset returns "move together." It can also be interpreted, as in Hansen and Hodrick (1983) and Hodrick and Srivastava (1983), as a specialization of the ICAPM in which assets have constant betas on a single, observable benchmark portfolio.

Maximum Hours Legislation and Female Employment in the 1920s: A Reassessment

Claudia Goldin

Working Paper No. 1949

June 1986

I explore the causes and consequences of state laws on maximum hours for female workers, passed from the mid-1800s to the 1920s, and find that they differ from a recent reinterpretation. Although maximum hours legislation reduced scheduled hours in 1920, the impact was minimal and it operated equally for men. Legislation affecting only women was asymptomatic of a general desire by labor for lower hours, and these lower hours were achieved in the tight, and otherwise special, World War I labor market: hours of work declined substantially for most workers in the second decade of this century. Most importantly, the restrictiveness of the legislation had no effect on the employment share of women in manufacturing. On the contrary, the legislation was associated with a positive impact on the employment share of women in sales (another covered sector). Finally, labor force participation rates of women across cities during the 1920s were strongly and negatively correlated with shorter hours of work per day, consistent with one time-series explanation for the increase in female work in the market. These results are consistent with a labor market model in which scheduled hours of work per day are negatively related to days worked per week, and that assumption is justified using previously untapped data for women in the covered sectors, on actual hours, scheduled hours, and days worked.

Hysteresis and the European Unemployment Problem

Olivier J. Blanchard and Lawrence H. Summers

Working Paper No. 1950

June 1986

European unemployment has been increasing steadily for the last 15 years and is expected to remain very high for many years. In this paper, we argue that this implies that shocks have much more persistent effects on unemployment than standard theories can possibly explain. We develop a theory that can explain such persistence, and that is based on the distinction between insiders and outsiders in wage bargaining. We argue that if wages are largely set by bargaining between insiders and firms, then shocks that affect actual unemployment also tend to affect equilibrium unemployment. We then relate the theory to both the detailed facts of the European situation and to earlier periods of high persistent unemployment, such as the Great Depression in the United States.

The Welfare Cost of Uncertain Tax Policy

Jonathan Skinner

Working Paper No. 1947

June 1986

JEL No. 320

Frequent shifts in tax policy can increase uncertainty about future net-of-tax wages and interest income. This paper measures the impact of uncertain tax policy on savings, labor supply, and welfare in the United States. In a vector autoregression model with six variables, the standard error of the one-year-ahead forecast for the wage tax was 1.8 percentage points, and for the tax on interest income, 3.3 percentage points. Furthermore, the negative correlation between unanticipated shifts in the real interest rate and changes in the tax on interest income amplifies the variability in the real aftertax return.

I develop a two-period model of consumption and labor supply that measures the effect of uncertain taxes on savings, work hours, and taxpayer welfare. Using plausible empirical parameters, I show that removing all uncertainty about future tax policy can lead to a welfare gain of 0.4 percent of national income, or about \$12 billion in 1985.

Quotas and the Stability of Implicit Collusion

Julio J. Rotemberg and Garth Saloner

Working Paper No. 1948

June 1986

This paper shows that the imposition of an import quota by one country can lead to increased competitiveness: protection can reduce the price in the country that imposes the quota, the foreign country, or both. This emerges from a model in which the firms are assumed to sustain collusion by the threat of reversion to more competitive pricing. We consider both prices and quantities as the strategic variables and study competition both in the domestic and the foreign market taken individually, and in the two markets taken together.

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