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Program Report

Business Cycles[1]

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While many readers of the popular press are familiar with such terms as "recession" and "expansion," few are likely to know that these downs and ups in the economy have been the subject of research at the NBER for nearly 70 years. Indeed, Wesley C. Mitchell, one of the Bureau's founders and its director of research for the first 25 years, had published a treatise on *Business Cycles* in 1913. When the NBER's certificate of incorporation was signed and recorded in 1920, business cycles had already been designated as the Bureau's second project, to follow the development of a series of national income accounts.

Business cycles are merely recurrent sequences of ups and downs in economic activity. These ups and downs are important because they represent major fluctuations in employment, production, real income, and real sales.

Shortly after the Bureau's founding, the NBER staff began to compile comprehensive chronological records of changes in economic conditions in the United States, England, France, Germany, Austria, and twelve other countries. These "business annals," as they were called, resulted in a 1926 volume with that title by Willard L. Thorp,[3] who is still a director emeritus on the NBER Board.

Also in the early 1920s, the NBER began collecting and analyzing time-series data on various aspects of

This issue of the *Reporter* highlights the Bureau's research on business cycles. Next, James H. Stock and Mark W. Watson describe their development of new experimental indexes of coincident and leading economic indicators; Kenneth A. Froot reports on his study of asset-price expectations; and Jeffrey A. Miron discusses his research on the seasonal cycle and the business cycle. 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.

modern economies. Narrowing the focus to the United States, England, France, and Germany, the NBER staff was able to compare these economic indicators to the trends described in the annals. Through a painstaking collective effort by a group of distinguished economists including Moses Abramovitz, Arthur F. Burns, Milton Friedman, Simon Kuznets, and Geoffrey H. Moore, the NBER finally compiled monthly, quarterly, and annual reference chronologies of business cycles. For the United States and Britain, these tables went back on a monthly basis to 1854.

In 1927, Mitchell published a volume on business

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[1] *Much of the historical information in this article comes from S. Fabricant, Toward a Firmer Basis of Economic Policy: The Founding of the National Bureau of Economic Research, NBER pamphlet, 1984.*

[2] *Director of Public Information, NBER.*

[3] *W. L. Thorp, Business Annals, NBER General Series No. 8, 1926.*

cycles that established a workable definition and outlined a research program that was followed for many years thereafter.[4] In 1946, Burns and Mitchell rephrased the definition as follows: "Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansion occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals that merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximately their own."[5]

This definition has been used for more than 60 years and is still used today. It is particularly noteworthy that the definition places no fixed requirement on the *duration* of expansions and contractions, their amplitude, or their scope. Nor did Mitchell define "aggregate economic activity," because there is no single comprehensive measure available for a long historical period—on a monthly or quarterly basis—that is comparable throughout in its coverage and adequate throughout in its statistical foundation.

In simple terms, one can visualize a business cycle by thinking of moving along a curve from a peak (or high point) through a trough (low point) and on to the next peak. Each peak marks the end of an expansion and the beginning of a contraction, or recession. Each trough marks the end of the contraction. The NBER's chronology of U.S. business cycles lists peaks and troughs in months and quarters back to 1854, and in annual terms back to 1790.

Historically, as now, determining when there was a turning point (peak or trough) in the economy was a two-step process. First, has there been a turning point? Here the NBER's historical series are useful for comparing current economic activity with earlier business cycles in terms of: duration, depth of the decline in aggregate activity, and diffusion among different economic activities and in different industries, sectors, and regions.

To identify the peak, for example, total business sales, the industrial production index, real GNP, the unemployment rate, nonagricultural employment, man-hours of nonfarm employment, and personal income must all be considered. Composite indexes of these series, and the components of each series, are also useful. As Moore points out, one of the advantages of basing the decision on such a wide variety of evidence "is that it reduces

[4] W. C. Mitchell, Business Cycles: The Problem and Its Setting, *NBER Studies in Business Cycles No. 1 and General Series No. 10, 1927.*

[5] A. F. Burns and W. C. Mitchell, Measuring Business Cycles, *NBER Studies in Business Cycles No. 2, New York: Columbia University Press, 1946.*

the possibility of error and the need for subsequent revision."[6]

In 1961, the U.S. Department of Commerce began to include the NBER business cycle chronology in a monthly publication, now called the *Business Conditions Digest*. In that year, in a sense, the NBER became the official arbiter of the business cycle in the United States.

Since 1980, official business cycle turning points in the United States have been determined by the NBER's Business Cycle Dating Committee. Its current membership is: Chairman Robert E. Hall; NBER President Martin Feldstein; Geoffrey H. Moore, an NBER director and research associate emeritus; NBER Program Directors William H. Branson and Benjamin M. Friedman; and NBER Research Associates Victor Zarnowitz and Robert J. Gordon.

The committee last met in July 1983 when it identified November 1982 as the trough of the recession that began in July 1981. Following the lessons of the Bureau's founders, the Committee reviews a wide range of seasonally adjusted, revised data before making its decision. In a brief statement explaining the dating of the 1982 trough, the Committee referred to real GNP, real retail sales, total employment, nonfarm employment, real personal income, industrial production, and total unemployment as some of the factors that were influential.

The NBER continues to conduct research on business cycles. A complete listing of this work appears in *A Decade of NBER Books, 1979-1988* or in *NBER Publications, 1921-1988*. Each is available free of charge by writing to: Publications Department, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138.

References

Fabricant, S., *Toward a Firmer Basis of Economic Policy: The Founding of the National Bureau of Economic Research,* NBER pamphlet, 1984.

Gordon, R. J., *The American Business Cycle: Continuity and Change,* NBER Studies in Business Cycles No. 25, Chicago: University of Chicago Press, 1986.

Moore, G. H., *Business Cycles, Inflation, and Forecasting,* NBER Studies in Business Cycles No. 24, Cambridge, MA: Ballinger Publishing Company, 1983.

A volume by Victor Zarnowitz on business cycles is forthcoming from the University of Chicago Press.

Research Summaries

Indexes of Coincident and Leading Economic Indicators[1]

James H. Stock and Mark W. Watson

For 50 years, economists in business and government have used the system of leading economic indicators to gauge the future course of economic activity. The system of leading, coincident, and lagging economic indicators originally was developed by Arthur F. Burns, Wesley C. Mitchell, and their colleagues at the NBER and is currently maintained by the U.S. Department of Commerce (DOC). Some 32 countries throughout the world now have a system of indicators that they use. The indexes of coincident and leading economic indicators themselves—weighted averages of key coincident and leading time series—play a central role in contemporary uses of this system. The coincident index measures the current state of the economy. The leading index often is interpreted as giving advance information about the future direction of the economy, particularly whether toward an expansion or a recession.

In recent work, we have taken a new look at the construction and interpretation of the indexes of coincident and leading economic indicators. The methods used to construct these indexes have remained largely unchanged for the last 30 years. We have exploited recent developments in time-series econometrics to improve the performance of the coincident and leading economic indexes constructed using traditional techniques. This work has resulted in the development of three experimental indexes: an index of coincident economic indicators (CEI), an index of leading economic indicators (LEI), and a new series that we call a "recession index" (RI). These three indexes, their construction, and their interpretation are described in this Research Summary.

The Index of Coincident Economic Indicators

In constructing an index of leading indicators, the first step is to define what this index leads. The index of coincident indicators currently maintained by the DOC is a weighted average of four broad measures of economic activity: industrial production, real personal income less transfer payments, real manufacturing and

[6] *G. H. Moore,* Business Cycles, Inflation, and Forecasting, *2nd ed., NBER Studies in Business Cycles No. 24, Cambridge, MA: Ballinger Publishing Company, 1983.*

trade sales, and the number of nonagricultural employees. While each of the series exhibits its own idiosyncratic movements (which include errors of measurement), the *common* movement among the series may arise from general swings in economic activity, that is, from the business cycle. Thus averaging these series provides one way to eliminate the idiosyncratic movements and obtain a better estimate of swings in overall activity.

But how can this averaging best be done? The traditional NBER/DOC approach is to take a weighted average of contemporaneous growth rates of the coincident series, in which the weights depend on the standard deviations of the series. Although we chose to construct the weights somewhat differently—using an explicit statistical model—the net result is very similar to the DOC coincident index. (Our weights are from an estimated "dynamic factor model," in which the unobserved state of the economy is the sole source of comovements among the coincident variables.)[2] The major difference between the variables in our experimental index and the DOC index is that we use employee-hours rather than the number of employees.

Figure 1

——— Experimental Index of Coincident Economic Indicators

- - - - Current DOC Index of Coincident Economic Indicators

The DOC coincident index and our experimental coincident index are plotted in Figure 1; both are scaled to equal 100 in 1967. The vertical bars in Figure 1 denote official NBER-dated peaks and troughs. The major difference between the experimental index and the DOC index is the slightly higher trend growth in the DOC index. The correlation between the monthly growth rates of the two series is high (the correlation coefficient is .95). Moreover, the timing of peaks and troughs in the two indexes is the same.

The Indexes of Leading Economic Indicators

The existing index of leading indicators serves two distinct purposes: to forecast the growth of the economy over the next several months, and to provide an early signal of an upcoming recession or expansion. Our experimental indexes separate these two functions: the experimental LEI is a forecast of the growth of the overall economy (as measured by the CEI) over the next six months, while the RI reports a probability of the economy being in a recession in six months.

We use seven leading series, selected from an original list of over 280 series, to construct the experimental LEI. Traditionally series for the leading index have been chosen based on their historical ability to lead some measure of overall activity, such as the coincident index. For our experimental LEI, we used this "bivariate" approach to screen possible series but relied on a "multivariate" criterion in developing the final list. This criterion identified variables that have information not contained in the other time series already in the experimental LEI but that have been useful historically for forecasting overall activity six months hence.

Of the seven variables in the experimental LEI, two are in the current DOC index: manufacturers' unfilled orders (durable goods industries) and new private housing authorizations.[3] Of the remaining five variables, three are based on interest rates: the spread between six-month commercial paper and six-month U.S. Treasury bills; the spread between ten-year Treasury bonds and one-year Treasury bonds; and the change in the ten-year Treasury bond rate. The final variables are part-time work in nonagricultural industries because of slack work and a trade-weighted index of exchange rates between the United States and the United Kingdom, West Germany, France, Italy, and Japan.

The experimental LEI (the forecast of the growth in the experimental CEI over the next six months, at annual rates, based on these seven variables) is plotted in Figure 2. Also plotted in Figure 2 is the actual six-month growth of the CEI. Like any forecast, the LEI is an imperfect map of future economic events. By comparing the two series, one can get a sense of when the experimental LEI would have succeeded and when it would

[2] *In theory the traditional method and the "dynamic factor model" approach could have produced quite different indexes. The fact that the indexes are so similar can be interpreted as providing a formal statistical rationalization for the traditional procedure. The application of dynamic factor models to macroeconomic time-series variables was developed by T. J. Sargent and C. A. Sims, "Business Cycle Modeling without Pretending to Have Too Much A Priori Economic Theory," in C. A. Sims et al.,* New Methods in Business Cycle Research, *Minneapolis: Federal Reserve Bank of Minneapolis, 1977. For details concerning the construction of the coincident indicator model, see J. H. Stock and M. A. Watson, "A Probability Model of the Coincident Economic Indicators," in G. H. Moore and K. Lahiri, eds.,* The Leading Indicators: New Approaches and Forecasting Records, *New York: Cambridge University Press, forthcoming.*

[3] *The DOC revised its leading and lagging indexes in March 1989, for data starting January 1989; the coincident index was not changed. These remarks refer to the most recent revision.*

Figure 2

Percent (Annual Rates)

— Six—month growth in the experimentol CEI
— — — — Six—month growth in the experimentol LEI

Figure 3(a)

Contemporaneous Recession Probobility

Figure 3(b)

Six—month Aheod Recession Probobility
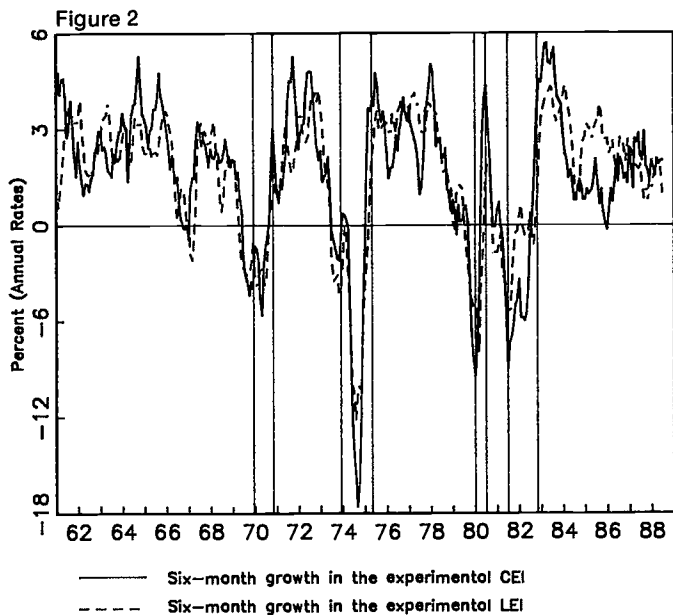
have failed. In the summer of 1979, for example, the experimental LEI became negative, indicating negative growth in the CEI over the next six months; in fact this is what occurred. In contrast, in early 1982 the experimental LEI hovered near zero, when in fact the economy continued to suffer a decline.

Interest rates play an important role in the LEI: an inverted Treasury bond yield curve and a high spread between short-term commercial paper and Treasury bills of a matched maturity are statistically important precursors of declines in overall economic activity. Interestingly, the statistical selection procedures that led to these seven series indicated that some tradition-al leading variables—in particular, the money supply (M2) and the growth of stock prices—have little addi-tional forecasting value, once the information in the seven series already in the experimental LEI are taken into account.

The Recession Index

An important objective of this research has been to develop a new index that provides a direct assessment of whether the economy will slip into a recession. The Recession Index estimates the probability that the economy will be in a recession six months hence. This probability is calculated using the time series compris-ing the experimental CEI and LEI.

Two series that measure whether the economy is or will be in a recession are plotted in Figure 3. Figure 3(a) represents a series that answers the question: is the economy currently in a recession? That is, this series is the probability that the economy is in a recession in a given month, using data available through the end of that month. Because this series is a probability, it ranges between zero and one: a value of near one indicates that it is highly likely that the economy is, at that date, in a recession.
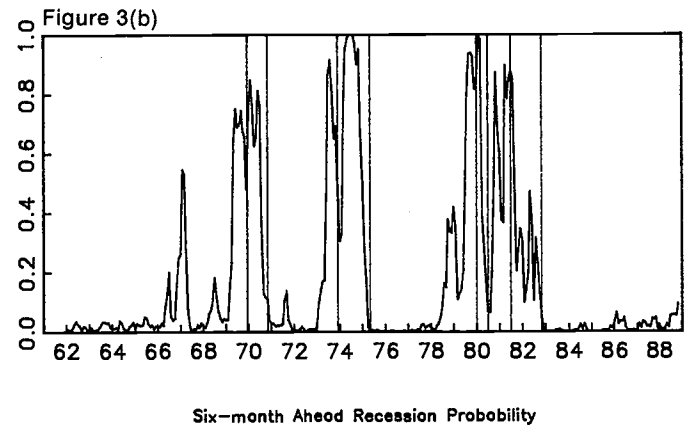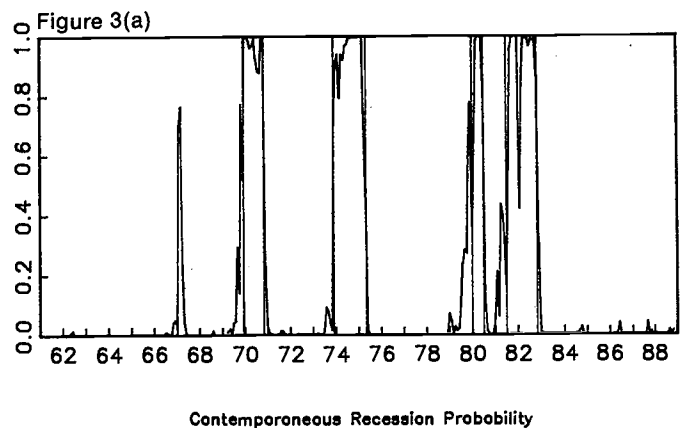
The series in Figure 3(b) answers a more difficult question: will the economy be in a recession six months hence? This is the experimental RI. Not surprisingly, the probabilities in Figure 3(b) are not as sharp as those in Figure 3(a). Still, based on historical data, the RI would have "predicted" each of the four recessions since 1960, although it incorrectly "predicted" one re-cession (in 1967) that did not occur.

Summary

These experimental indexes have been developed by closely examining historical patterns using the tools of modern econometrics. The emphasis in developing the LEI and the RI has been to exploit information in multiple time series, rather than to focus on the bivari-ate relationship between a given time series and the business cycle, one series at a time. In principle, this approach offers the possibility of substantial improve-ments in the prediction of recessions and expansions. By tracking the future performance of these indexes, we will be able to determine whether this possibility is realized.

Asset-Price Expectations

Kenneth A. Froot

Most investors know that excess returns on stocks, bonds, and exchange rates are largely unpredictable. Rationally, they realize that if an asset were widely perceived to be cheap, it would not remain cheap for very long. Speculation ensures both that there will be no easy money and that any predictable component of price changes will be dwarfed by the magnitude of the price changes themselves.

With sophisticated statistical methods at their disposal, economists have been busy identifying these predictable components. Although this portion of returns comprises only a tiny fraction of short-horizon price movements, it has become the subject of heated debate. Some economists argue that any portion of returns found to have been predictable must already have been in investors' minds. In other words, they argue that we can learn about investors' expectations by looking at what actually happened to prices. So, for example, if the stock market rises rapidly for several years, they might conclude that the expected return on stocks was very high (but that stocks also must have been very risky).

However, others disagree with this approach. They contend that investors do not think of this portion of returns as predictable but rather that the predictable components are either statistical artifacts or evidence that some investment strategies indeed pay high risk-adjusted returns. Therefore, the alternative view holds that a rapid rise in stock prices tells us little about investor expectations.

One portion of my research has focused on expectations of asset-price changes. In particular I ask: first, how well can one approximate the market's expectation from actual realizations; and, second, to the extent that the approximation is poor, how do expectations behave in fact?

Findings from Survey Data

In order to answer these questions, one needs a new measure of investor expectations. In a number of papers, several coauthors and I have used survey data on asset-price expectations elicited from asset-market participants. These data come from seven independent surveys (five from foreign exchange markets and two from bond markets) conducted across a broad range of sample periods, forecast horizons, and financial instruments. Despite this diversity, several striking facts emerge consistently from these data:

1) *The shorter the forecast horizon, the more expectations extrapolate recent price trends.* While at short horizons, investors expect current trends to continue, at long horizons they expect the reverse. In the foreign exchange market, for example, a recent depreciation of the dollar by 10 percent generates the expectation that the dollar will depreciate another 1.4 percent over the following seven days. Acting on the basis of such expectations, investors are more likely to sell when the price of foreign exchange is already low. By contrast, the same 10 percent depreciation leads investors to think that the spot rate will *appreciate* by 2.0 percent over the next year. This pattern across forecast horizons lends credence to the long-held concern that speculation based on shorter-term expectations may be destabilizing, making the exchange rate too volatile around its long-run equilibrium. Not incidentally, one requires the surveys to identify this pattern in the foreign exchange and bond markets. Actual short- and long-horizon price changes reveal little evidence for or against it because of statistical imprecision.[1]

2) *Expectations conform closely with the simplest— and most popular—theories of relative asset pricing.* Under these theories, expected holding returns for different assets are equal (at least up to a constant). In the bond market, for example, the "expectations hypothesis" states that investors expect to earn the same return by holding a long-term bond for two years as they would by rolling over two consecutive one-year bills. Thus, if the spread between long-term and short-term interest rates increases, expected future short-term rates must increase as well. The surveys suggest that investors' expectations move strongly with changes in this spread. In particular, when the spread between bond yields and short rates increases by one percentage point, expected future interest rates on average increase by the same amount.[2]

In work with Jeffrey A. Frankel, I found similar results in the foreign exchange market. When interest rates in the United Kingdom rise relative to those in the United States, investors believe that the pound will depreciate by enough to leave the relative rate of return in the two currencies unchanged. This is consistent with "uncovered interest parity," which says that movements in interest differentials are offset exactly by changes in expected depreciation. The survey measures suggest that investor expectations conform closely to what this theory predicts. As in the bond market, expected depreciation of the dollar tends to respond

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[1]For more detail see: J. A. Frankel and K. A. Froot, "Short-Term and Long-Term Expectations of the Yen/Dollar Exchange Rate: Evidence from Survey Data," NBER Reprint No. 1044, September 1988, and Journal of the Japanese and International Economies 1 (September 1987), pp. 249–274; K. A. Froot and T. Ito, "On the Consistency of Exchange Rate Expectations," NBER Working Paper No. 2577, May 1988, and Journal of International Money and Finance, forthcoming; and J. A. Frankel and K. A. Froot, "Using Survey Data to Test Standard Propositions Regarding Exchange Rate Expectations," NBER Reprint No. 854, April 1987, and American Economic Review 77 (March 1987), pp. 133–153.

[2]K. A. Froot, "New Hope for the Expectations Hypothesis of the Term Structure of Interest Rates," NBER Working Paper No. 2363, August 1987, and Journal of Finance, forthcoming.

one-for-one with changes in the interest rate in the United States relative to interest rates abroad.[3]

3) *Actual price realizations often provide a biased approximation of expectations.* While the survey measures reaffirm these popular pricing theories, actual price realizations do not. Indeed, by looking at ex post data and trying to infer the behavior of expectations from them, one arrives at exactly the *opposite* conclusion about expectations. For example, in the bond market, when the spread rises, one would infer from ex post data that expected future interest rates would remain essentially unchanged, not increase one-for-one. In the foreign exchange market, when the interest rate in the United Kingdom rises relative to that in the United States, one would similarly infer no effect on expected dollar depreciation. Thus, the inference from ex post prices is that investors suddenly expect to earn a higher return by holding bonds and pound deposits than by holding bills and dollar deposits. It is economists' peculiar form of hindsight that investors all along expected to receive high returns in one asset or another. This is very far from the predictions of the simple asset-pricing models, in which expected holding returns remain roughly equal.

The disparity between these two views of how expectations behave implies there are systematic differences between expected future rates (as measured by the surveys) and actual future rates. One way to understand these systematic differences is to think of expected future rates as "overreacting" to all information except the current spot (or short) rate.[4] For example, when long rates rise relative to short rates, expected future interest rates also rise. Unfortunately, at least in the post–World War II period, this prediction overstates the actual response: future interest rates did not tend to rise subsequent to increases in the spread. This kind of systematic error implies that when long-maturity rates rise—and, therefore, bond prices fall—bonds historically have been good buys. Similarly in the foreign exchange market, when interest rates abroad rise relative to those in the United States, foreign currency deposits tend to yield higher returns than domestic currency deposits do. The pattern also holds in the stock market: when short-term interest rates are low, stocks tend to yield relatively high returns.

To some economists, the idea that investors can make this kind of systematic mistake, even over short periods, is anathema. A more balanced view, however, would bear two points in mind. First, the economic gains from exploiting these systematic errors are both

small and precarious. In the foreign exchange market, for example, a $1000 bet that takes advantage of these errors earns an excess return of less than $2, with a standard deviation of $65! Second, the ability to identify such small returns itself indicates that the power of our econometric methods has far outraced our understanding of the world. Small systematic errors can plausibly stem from a variety of sources, including—but certainly not limited to—investor irrationality. Only recently have we begun to explore the following alternative explanations.

How Should We Interpret This Evidence?

1) *Ignore it.* However convenient, it is bad science to disregard independent, disconfirming information. Yet some may prefer this route. One sometimes hears that the mere existence of systematic prediction errors should disqualify survey data as a useful source of information.

2) *Conclude that investors are not rational.* This conclusion may be sensible but, based solely on the size of the errors, should not be disturbing. Surely the potential cumulation of these incremental mistakes into large and persistent swings in asset prices is much more disconcerting.[5] Recent examples of such swings include the stock market runup and crash of 1985-7 and the extraordinary overvaluation of the dollar during 1982-6. On this score, ironically, the survey predictions at long horizons get higher marks than those made by the time-series econometrician. For example, during 1982-4, the dollar was appreciating steadily and was overvalued by an average of about 30 percent (relative to standard measures of long-run equilibrium values). The surveys were calling for a rapid annual rate of depreciation of 10 percent, while the econometrician—noting that the exchange rate follows a random walk—was calling for something close to zero.

The problem may lie more with short-term expectations. Because they tend to extrapolate recent trends, they were calling for further appreciation over this period.[6] It is hard to square these predictions either with long-run fundamentals or with the long-horizon forecasts made by the same investors. This lack of consistency across different forecast horizons may reflect a tendency of investors to use different models of the spot rate at short versus long horizons, and a blend in

[3]K. A. Froot and J. A. Frankel, "Forward Discount Bias: Is It an Exchange Risk Premium?" Quarterly Journal of Economics 416 (February 1989), pp. 139-161. For an earlier, more comprehensive version of the same paper see "Findings of Forward Discount Bias Interpreted in Light of Exchange Rate Survey Data," NBER Working Paper No. 1963, June 1986.

[4]K. A. Froot, "Tests of Excess Forecast Volatility in the Foreign Exchange and Stock Markets," NBER Working Paper No. 2362, August 1987.

[5]For a model in which these persistent over- or undervaluations are caused by purely rational forces, see K. A. Froot and M. Obstfeld, "Intrinsic Bubbles: The Case of Stock Prices," NBER Working Paper, forthcoming.

[6]Evidence that trading volume and exchange rate volatility are related positively over short, but not long, horizons could be consistent with the hypothesis that short-term speculation destabilizes prices. For a discussion of these issues see K. A. Froot, "Multinational Corporations, Exchange Rates, and Direct Investment," in W. H. Branson, J. A. Frenkel, and M. Goldstein, eds., International Policy Coordination and Exchange Rate Determination, Chicago: University of Chicago Press, forthcoming.

between. Frankel and I model the interaction between "chartists" and "fundamentalists." We suggest that investors may form expectations by weighting these two views according to their own expected trading horizon, with chartist views more important for short horizons and fundamentalist views more important for long horizons.[7]

3) *Consider the possibility of influential, but uncommon events.* "Peso problems" may lead to repeated forecast errors in small samples and consequently invalidate standard statistical inferences. For example, investors may believe that if asset prices or fundamentals reach extreme values, then authorities will change not only their policies but also their policy reaction *functions*. In work with Maurice Obstfeld, I have studied how asset prices behave in the presence of several types of prospective regime shifts. The results (which rely on new techniques for regulated Brownian motions) show how potential regime shifts "bend" the response of rationally expected future asset prices to changes in fundamental factors. If the econometrician does not account explicitly for such shifts, this bending will appear in the form of systematic expectational errors.[8]

4) *Ask whether investors learn as they go.* Economists often assume investors are born understanding the economy. But if the economy is as much of a moving target as is economics, then the predictions of rational but initially uninformed investors may not converge quickly or at all to the economy's actual behavior. Put differently, rationality can be defined only relative to specific information. In the model of chartists and fundamentalists mentioned earlier, portfolio managers choose the best combination of these two predictions, based on the behavior of the exchange rate. In a sense they are not fully rational—they could do better if they understood the economy perfectly. Instead they do the best they can, working with limited information and trying to make sure they adjust their views as new information arrives.

In sum, my findings suggest that we should not feel complacent about our ability to understand expectations by looking at the behavior of realized prices. Easy answers from standard time-series regressions may not point in the right direction. These issues are, and will remain, important because of the real effects that asset prices and expectations have on economic activ-

ity.[9] These issues also raise doubts about the interpretation of financial economists' tests of subtle theories of relative asset pricing.

[9]*For an example of the real effects of prices and expectations on firms' market share investments and pricing decisions see K. A. Froot and P. Klemperer, "Exchange Rate Pass-Through When Market Share Matters," NBER Working Paper No. 2542, March 1988, and American Economic Review, forthcoming.*

The Seasonal Cycle and the Business Cycle

Jeffrey A. Miron

Most recent research on macroeconomic fluctuations ignores the seasonal variation in the economy by working with seasonally adjusted or annual data. There are several reasons why this approach may be desirable. Seasonal fluctuations might be small enough relative to business cycle fluctuations that removing them has little effect on empirical results. Alternatively, seasonal fluctuations might be generated by fundamentally different mechanisms than the ones that produce cyclical fluctuations, in which case the two kinds of fluctuations can be addressed separately. Finally, seasonal fluctuations might be natural and desirable while business cycle fluctuations traditionally are thought to involve significant welfare losses.[1]

The research that I have carried out over the past five years challenges a number of the most frequently cited reasons for ignoring seasonality, and it suggests that a unified approach to studying seasonal and cyclical fluctuations may be warranted. This line of research resumes an older tradition of NBER analysis of fluctuations, exemplified by Simon Kuznets, in which both seasonal and business cycle fluctuations were regarded as important topics of investigation.[2] Here I summarize the main findings of my research to date and discuss

[1]*Undoubtedly one further reason for the general preference for seasonally adjusted data is that seasonally unadjusted data often are difficult to obtain. In most cases, however, seasonally unadjusted data (or reasonable proxies for such data) can be constructed. See the appendixes to the papers cited below for sources of seasonally unadjusted data.*

[2]*S. Kuznets, Seasonal Variations in Industry and Trade, New York: NBER, 1933; W. S. Woytinsky, Seasonal Variations in Employment in the United States, Washington, DC: Social Science Research Council, 1939; J. P. Bursk, Seasonal Variations in Employment in Manufacturing Industries, Philadelphia: University of Pennsylvania Press, 1931; E. W. Kemmerer, Seasonal Variations in the Relative Demand for Money and Capital in the United States, National Monetary Commission, 1910; and F. R. Macaulay, Some Theoretical Problems Suggested by Movements of Interest Rates, Bond Yields, and Stock Prices in the United States since 1856, New York: NBER, 1938.*

[7]*J. A. Frankel and K. A. Froot, "Chartists, Fundamentalists, and the Demand for Dollars," in A. Courakis and M. Taylor, eds., Policy Issues for Interdependent Economies, London: Macmillan, forthcoming; "Understanding the U.S. Dollar in the 1980s: The Expectations of Fundamentalists and Chartists," NBER Reprint No. 957, December 1987; and "The Dollar as an Irrational Speculative Bubble: A Tale of Fundamentalists and Chartists," NBER Reprint No. 959, January 1988.*

[8]*K. A. Froot and M. Obstfeld, "Exchange Rate Dynamics under Stochastic Regime Shifts: A Unified Approach," NBER Working Paper No. 2835, February 1989.*

possible implications of the results for understanding economic fluctuations.

The Patterns and Importance of Seasonal Fluctuations

The first goal of my research has been to examine the seasonal patterns in standard macroeconomic variables and to document their quantitative importance.[3] Seasonal fluctuations account for more than 85 percent of the fluctuations in the rate of growth of real GNP, and seasonal fluctuations are present in every major type of economic activity, including consumption, investment, government purchases, industrial production, retail sales, unemployment, and the money stock. Seasonal movements are not a quantitatively important feature of either prices or interest rates, however.

The seasonal pattern in quarterly real GNP consists of large increases in the second and fourth quarters, a large decrease in the first quarter, and a mild decrease in the third quarter. In the fourth quarter boom, output on average is 8 percent higher than it is every winter. The seasonal patterns in consumption purchases and output are similar, and the seasonal pattern in government purchases also is dominated by a first quarter decline and a fourth quarter increase. Fixed investment grows strongly in the second quarter, grows slightly in the third quarter, declines weakly in the fourth quarter, and declines strongly in the first quarter.

Monthly data show that industrial production falls strongly one to three months before Christmas, recovers in February, declines dramatically in July, and then rebounds strongly in August. Retail sales grow substantially in December but then decline tremendously in January. Likewise, the money stock exhibits a large, positive growth rate in December and a large, negative growth rate in January. The movements in labor market variables mirror those in output for the most part, although the fluctuations are smaller in magnitude.

The seasonal patterns just described are characteristic of most developed countries. It is particularly noteworthy that Australia and New Zealand exhibit seasonal patterns strikingly similar to those in most countries in the Northern Hemisphere. These results therefore shed light on the reasons for particular seasonal movements in aggregate data. The large booms in consumption in the fourth quarter and in retail sales in December obviously are caused by Christmas spending, especially since these occur in Southern Hemisphere countries. The July–August troughs in industrial production, which do not appear in the Southern Hemisphere, presumably represent preferences for summer vacations. The first quarter trough in all economic activity, which is more pronounced in the Northern Hemisphere, plausibly reflects both the end of the Christmas season and the comparatively poor weather in the first quarter.

In addition to demonstrating the quantitative importance of seasonal fluctuations, the results on the patterns of seasonal variation provide some easily identifiable examples of shifts in demand or supply at the aggregate level. That is, there are identifying restrictions available for the seasonal cycle that are not available for the conventional business cycle. One important reason for studying seasonal cycles is that we can use the seasonal information to identify relationships that may not be identifiable from business cycle information alone.

The Similarity of the Seasonal Cycle and the Business Cycle

The second phase in my examination of seasonal fluctuations consists of a comparison of the properties of seasonal cycles and business cycles. That is, rather than assuming that seasonal cycles and business cycles are generated by different mechanisms, I ask to what extent the two types of fluctuations display similarities. The key finding of this investigation is that business cycles and seasonal cycles are surprisingly similar.

The first important similarity between seasonal and cyclical fluctuations is simply that there is an aggregate seasonal cycle. Just as with business cycles, there are sufficient similarities in seasonal cycles across sectors that a large seasonal cycle is present in *aggregate* output. The presence of this cycle is surprising. Seasonals in technology imply that production in certain sectors should be seasonal (for example, it is not surprising that construction falls in the winter), but it is far from obvious what *aggregate* seasonals in technology might be. Instead, it may be necessary to explain the seasonal bunching of output by means of increasing returns or other synergies combined with relatively small shifts in the productive technology.

A second similarity between cyclical and seasonal fluctuations is the tendency for output to be produced at the last minute—the absence of production smoothing.[4] The seasonal evidence against production smoothing consists of the finding that seasonals in production and sales are virtually identical in two-digit manufacturing industries.[5] This evidence is perhaps even more striking than the business cycle evidence against production smoothing because the anticipated, transitory fluctuations in demand represented by seasonals are precisely the ones that should be smoothed most easily by firms via inventory accumulations.

The third important similarity between seasonal and

[3]R. B. Barsky and J. A. Miron, "The Seasonal Cycle and the Business Cycle," NBER Working Paper No. 2688, August 1988, and Journal of Political Economy, forthcoming; and J. A. Miron, "A Cross-Country Comparison of Seasonal Cycles and Business Cycles," manuscript, University of Michigan, November 1988.

[4]This fact has been emphasized for business cycle fluctuations by A. S. Blinder in "Can the Production-Smoothing Model of Inventories Be Saved?" NBER Working Paper No. 1257, January 1984, and Quarterly Journal of Economics 101 (1986).

[5]J. A. Miron and S. P. Zeldes, "Seasonality, Cost Shocks, and the Production-Smoothing Model of Inventories," NBER Working Paper No. 2360, August 1987, and Econometrica 56, 4 (July 1988).

cyclical fluctuations is that increases in labor input are associated with more than one-for-one increases in output: labor productivity is procyclical. The fact that much of this procyclicality occurs between the third and fourth calendar quarters (output increases substantially without a significant increase in labor input) suggests that labor hoarding in the face of the Christmas demand shift is the most likely explanation for procyclicality at the seasonal frequencies. It seems harder to account for the seasonal variation in labor productivity by relying solely on changes in technological opportunities, which is the explanation found in real business cycle models.

A final important similarity between seasonal and cyclical fluctuations is a strong correlation between movements in nominal money and real output. The presence of this correlation over the seasonal cycle is a prime example of the endogeneity of money with respect to real output fluctuations, since it is implausible that seasonal fluctuations in output could be driven by monetary factors. The fourth quarter peak in output is more likely the result of the impulse to real spending associated with Christmas, and the comovement of money with output reflects active accommodation of the seasonal variation in output by the Fed. Indeed, a desire to eliminate the seasonal movements in interest rates was probably a primary motivation for the founding of the Fed, in addition to being one of the Fed's dominant objectives since its inception.[6] The Fed responds to the fourth quarter surge in spending by letting the nominal money supply increase just enough so that the money market clears without changes in the price level or nominal interest rates.

Interactions Between Seasonals and Cyclical Fluctuations

In the third main phase of my research on seasonality I have documented that countries with substantial amounts of seasonal variation also have substantial amounts of business cycle variation. For example, countries in which the seasonal variability of industrial production is high are also countries in which the nonseasonal variability of industrial production is high. This kind of cross-sectional relationship also holds for retail sales, the price level, the money stock, and nominal interest rates.

One issue that arises immediately is whether these

cross-sectional correlations might be explained by some exogenous third factor. Consider, for example, an economy that has two sectors, one seasonal and one nonseasonal. Assume that the seasonal sector (for example, construction) displays greater cyclical variation than the nonseasonal sector (for example, services). In this setting, there will be a positive correlation between the amount of seasonal variation displayed by a particular economy and the amount of nonseasonal variation displayed by that economy. If one accounts for the share of output originating in the construction sector, however, the correlation between the amounts of seasonal and nonseasonal variation should disappear.

The cross-sectional relationship between seasonal and cyclical variation does not appear to be explained easily by some mechanism such as the one just described. I have analyzed the potential role of the degree of economic diversity, of the industrial composition of output, and of the level of economic development, and I find that there is a strong correlation across countries between the amount of seasonal variation exhibited by a country and the amount of business cycle variation exhibited by that country, even after controlling for these other country characteristics.

The cross-sectional correlation between the amount of seasonal and cyclical variation most likely results instead from having the same economic mechanism operative in producing both seasonal and cyclical fluctuations. If this is the case, then it is possible to learn about the business cycle by studying what occurs over the seasonal cycle. Since, as mentioned above, there are identifying restrictions available for the seasonal cycle that are not available for the business cycle, this is a useful new perspective on aggregate fluctuations.

Future Research

The most important results of my research to date are basic stylized facts about aggregate fluctuations: seasonal cycles are quantitatively important; their properties are similar to those of business cycles; and countries with significant seasonal cycles are also ones with significant business cycles. Some of these facts tend to refute or support particular models of aggregate fluctuations, but for the most part they are not conclusive by themselves. Therefore, the most important implication of these results is to suggest that explicitly accounting for seasonality in macroeconomic modeling and empirical work is likely to improve our understanding of the economy.

The next step in my research is to develop specific, economic models that are capable of accounting simultaneously for the seasonal and business cycle facts about the economy as well as for possible connections between seasonal and cyclical fluctuations. Perhaps the most ambitious and far-reaching question is to understand why (indeed if) we should care about business cycle fluctuations but not about seasonal fluctuations.

[6] J. A. Miron, "Financial Panics, the Seasonality of the Nominal Interest Rates, and the Founding of the Fed," American Economic Review 76, 1 (March 1986), pp. 125-140; N. G. Mankiw and J. A. Miron, "The Changing Behavior of the Term Structure of Interest Rates," NBER Reprint No. 734, July 1986, and Quarterly Journal of Economics 101, 2 (May 1986); N. G. Mankiw, J. A. Miron, and D. N. Weil, "The Adjustment of Expectations to a Change in Regime: A Study of the Founding of the Federal Reserve," NBER Reprint No. 915, October 1987, and American Economic Review 77, 3 (June 1987); and R. B. Barsky, N. G. Mankiw, J. A. Miron, and D. N. Weil, "The Worldwide Change in the Behavior of Interest Rates and Prices in 1914," NBER Reprint No. 1115, March 1989, and European Economic Review 32, 5 (June 1988).

Economic Outlook Survey

First Quarter 1989

Victor Zarnowitz

According to the March survey of 17 professional forecasters taken by the NBER and the American Statistical Association, there was strong growth in real GNP over the first quarter of 1989. This will be followed by moderation in the current quarter and the next, and by sluggishness late in 1989 and during 1990. Consumer price inflation should peak at around 5 percent (annual rate) in mid-1989 and average 4.6 percent next year, presumably as a result of tight money policy and the anticipated slowdown. Interest rates similarly are expected to increase in the near future and then return to the levels observed late in 1988. The predicted declines in real growth rates will come later but will be much more drastic for business investment than for consumption. However, the risk of a recession, as assessed by most of the respondents, is increasing but still not very high.

Growth Rates Declining in 1989, Low in 1990

The median forecasts of the annual growth rates in the economy's output were 4.4 percent for 1989:1, about 2 percent for 1989:2 and 1989:3, 1.1 percent for 1989:4, and 1.4 percent for 1990:1. Real GNP is expected to gain 2.7 percent in 1988-9, which is somewhat less than the forecast from the December 1988 survey, and 1.5 percent in 1989-90.

Thus 1989 is expected to make a strong entry but a weak exit. About one-third of the panel expect growth of less than 1 percent in 1989:4, including two respondents who predict that real GNP will decline. The situation is very similar for 1989:1. However, only one survey participant forecasts a recession severe enough to cause output to fall on an annual basis in 1989-90. Output is predicted to grow between 1.5 and 3.2 percent for 1989 and between -0.4 and 2.9 percent for 1990. (The standard deviations are 0.5 percent and 0.9 percent, respectively.)

Few See a High Likelihood of a Recession

The mean probability that real activity will fall, as estimated by the forecasters, increases from 14 percent in 1989:2 to 31 percent in 1990:1. These figures are somewhat higher than their counterparts in the previous survey. A few respondents see much higher chances of a recession, but most estimates fall below the means.

The rate of unemployment is expected to creep up to 5.6 percent in 1990:1 and 5.8 percent for 1990 as a whole, according to the group's median forecasts. The means are very close, the standard deviations are 0.3 percent in both cases, and the respective ranges are 5.0-6.2 percent and 5.2-6.5 percent.

Inflation May Level Off Soon

The GNP implicit price deflator (IPD) is predicted to rise 4.5 percent in 1988-9, 4.6 percent in 1989:1-1990:1, and 4.3 percent in 1989-90. The consumer price index (CPI), which rose 4.1 percent in 1987-8, may rise by 4.8 percent in 1988-9 and by 4.6 percent in 1989-90. These average forecasts reflect little movement and certainly no acceleration of inflation. Most individual forecasts fall into the 4-5 percent interval, but there are always outliers; for example, the range for the deflator in 1990:1 is 3.7-6.1 percent. (For 1990 as a whole, the range is 3.7-5.8 percent.)

There is a concentration of high inflation forecasts in 1989:2 (for CPI) and 1989:3 (for IPD). A majority of the forecasters specify that inflation will be higher in 1990:1 than in 1989:1, but most of the differentials are small.

Probabilistic Forecasts

To assess the uncertainty associated with the point predictions, we asked the forecasters about the probabilities they attach to possible percentage changes in real GNP and the IPD. The distributions of the resulting means are as follows:

Relative Change in Real GNP	1988-9	1989-90
4.0 percent or more	9	7
2.0-3.9 percent	59	41
0-1.9 percent	27	38
Negative	5	14

Relative Change in IPD	1988-9	1989-90
8 percent or more	2	3
6.0-7.9 percent	12	13
4.0-5.9 percent	62	54
Less than 4.0 percent	24	30

The shift to lower real growth is very evident here. There is a rise in uncertainty about inflation but also a shift toward lower figures. This reverses the rise in inflation that was expected between 1988 and 1989 (as reported in last year's surveys).

Interest Rates Still Rising but Lower Next Year

The three-month Treasury bill rate will increase to 8.8 percent in 1989:3 but then decline and average 7.8 percent in 1990, according to the group's median forecasts. (In December, a lower and earlier peak of 7.7 percent in 1989:1 was predicted.) The distributions are

Projections of GNP and Other Economic Indicators, 1989-90

	1988 Actual	1989 Forecast	1990 Forecast	Percent Change 1988 to 1989	Percent Change 1989 to 1990
1. Gross National Product ($ billions)	4861.8	5211.0	5515.0	7.2	5.8
2. GNP Implicit Price Deflator (1982 = 100)	121.7	127.2	132.7	4.5	4.3
3. GNP in Constant Dollars (billions of 1982 dollars)	3995.0	4102.0	4164.0	2.7	1.5
4. Unemployment Rate (percent)	5.5	5.5	5.8	0.0[1]	0.3[1]
5. Corporate Profits After Taxes ($ billions)	160.9	173.0	178.0	7.5	2.9
6. Nonresidential Fixed Investment (billions of 1982 dollars)	487.2	506.5	507.4	4.0	0.2
7. New Private Housing Units Started (annual rate, millions)	1.49	1.47	1.47	-1.34[2]	-0.20[2]
8. Change in Business Inventories (billions of 1982 dollars)	42.5	30.0	28.0	-12.5[3]	-2.0[3]
9. Treasury Bill Rate (3-month, percent)	6.67	8.60	7.75	1.93[1]	-0.85[1]
10. Consumer Price Index (annual rate)	4.1	4.8	4.6	0.7[1]	-0.2[1]

Annual

	1988 Q4 Actual	1989 Q1	1989 Q2	1989 Q3	1989 Q4	1990 Q1	Percent Change Q4 88 to Q4 89	Percent Change Q1 89 to Q1 90
				Forecast				
1. Gross National Product ($ billions)	4989.9	5094.0	5173.0	5255.0	5328.0	5409.4	6.8	6.2
2. GNP Implicit Price Deflator (1982 = 100)	123.8	125.1	126.3	127.9	129.3	130.8	4.4	4.6
3. GNP in Constant Dollars (billions of 1982 dollars)	4029.2	4074.0	4095.0	4115.0	4126.0	4140.0	2.4	1.6
4. Unemployment Rate (percent)	5.3	5.3	5.4	5.5	5.6	5.6	0.3[1]	0.3[1]
5. Corporate Profits After Taxes ($ billions)	170.6	173.0	173.0	172.0	175.0	175.5	2.6	1.4
6. Nonresidential Fixed Investment (billions of 1982 dollars)	490.4	499.7	505.4	512.2	512.9	508.1	4.6	1.7
7. New Private Housing Units Started (annual rate, millions)	1.54	1.52	1.48	1.44	1.42	1.41	-7.79[2]	-6.91[2]
8. Change in Business Inventories (billions of 1982 dollars)	29.2	40.0	32.0	28.0	27.0	28.5	-2.2[3]	-11.5[3]
9. Treasury Bill Rate (3-month, percent)	7.70	8.45	8.75	8.80	8.40	8.00	0.70[1]	-0.45[1]
10. Consumer Price Index (annual rate)	4.0	4.6	5.0	4.8	4.8	4.7	0.8[1]	0.1[1]

Quarterly

SOURCE: The National Bureau of Economic Research and American Statistical Association, Business Outlook Survey, March 1989. The figures on each line are medians of seventeen individual forecasts.

[1]Change in rate, in percentage points.
[2]Possible discrepancies in percentage changes are caused by rounding.
[3]Change in billions of dollars.

still skewed toward higher figures; for example, the range for 1990:1 is 7.0-11.5 percent, and for 1990 as a whole the range is 6.7-9.6 percent.

The yield on new high-grade corporate bonds is expected to rise, but slowly, to 10.3 percent in the second half of 1989. It will average slightly less that 10 percent in 1990, with almost all individual forecasts falling in the 9-11 percent interval.

Slowdown Moderate in Consumption, Sharp in Nonresidential Investment

Real consumption expenditures are projected to grow 2.5 percent in 1988-9, 1.8 percent 1989:1-1990:1, and 1.6 percent in 1989-90. The forecasts imply less of a slowdown in consumption than in total output (or real income). This mainly reflects the expectation of a developing weakness in the business sector. The inflation-adjusted gains in nonresidential fixed investment are projected to decline from double digits last year to annual rates of 7.6 percent and 4.6 percent in the first two quarters of 1989, 5.4 percent and 0.5 percent in the last two quarters of 1989, and -3.7 percent in 1990:1. The annual averages are 4 percent for 1988-9 and only 0.2 percent for 1989-90.

Housing and Inventory Investment Fairly Stable

New private housing starts are predicted to average 1.5 (annual rates in millions) in 1989:1, 1.4 in 1990:1,

and slightly less than 1.5 in both years, 1989 and 1990. Real residential fixed investment is expected to gain 2.8 percent in 1988-9 and lose a little (-0.3 percent) in 1989-90.

The group forecasts a change in business inventories, in billions of 1982 dollars, of 30 for 1989 and 28 for 1990.

Small Gains in Industrial Production and Corporate Profits

Output of manufacturing, mining, and utilities should rise by 3.5 percent in 1988-9 but by only 1.4 percent in both 1989:1-1990:1 and 1989-90.

Corporate profits after taxes in current dollars are predicted to increase 7.5 percent on average in 1988-9 (not bad, but much lower than the year before). They are expected to gain only 2.9 percent in 1989-90.

Import Surplus Reduced

Net exports of goods and services in billions of 1982 dollars averaged -99 in 1988 (-101 in 1988:4). The median forecasts are -89 for 1989, -78 for 1990:1, and -70 for 1990. These figures imply that the trade deficit will continue to decline in real terms. The reduction that the forecasters expect to be achieved next year is relatively large, probably reflecting in part the depressant effect on imports of the expected retardation of growth in demand and output and in part a persistent strength of exports.

Government Expenditures and Policy Assumptions

Federal government purchases of goods and services in constant dollars are expected to grow weakly at 1.5 percent this year and to decline slightly next year. State and local purchases will rise more than federal purchases, and steadily: the median forecasts are 2.2 percent and 1.9 percent for 1988-9 and 1989-90, respectively.

Ten forecasters report that they have assumed no significant changes in tax policy; eight foresee increases in excise taxes and user fees. Five respondents see little or no change in defense outlays and ten expect decreases of 1-3 percent.

Estimates of monetary growth rates vary widely, from 1 percent to 6 percent for M1 and from 4 percent to 8 percent for M2 (using mid-points of the quoted ranges). Stable or strong oil prices are assumed by most respondents. The movements in the U.S. dollar are seen as either "moderate declines" or "stabilizing."

This report summarizes a quarterly survey of predictions by 17 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 and Deborah A. Nicholson of NBER, was responsible for tabulating and evaluating this survey.

George C. Eads

George C. Eads, vice president and chief economist of General Motors, is a new member of the Executive Committee of the Board of Directors of the NBER.

Born in Clarksville, Texas, Eads received his bachelor's degree in economics from the University of Colorado in 1964 and his M.A. and Ph.D. in economics from Yale University. He has taught at Princeton and Harvard Universities.

Eads joined General Motors in 1986. Previously, he had been the Dean of the School of Public Affairs at the University of Maryland, where he had been a member of the faculty since 1981.
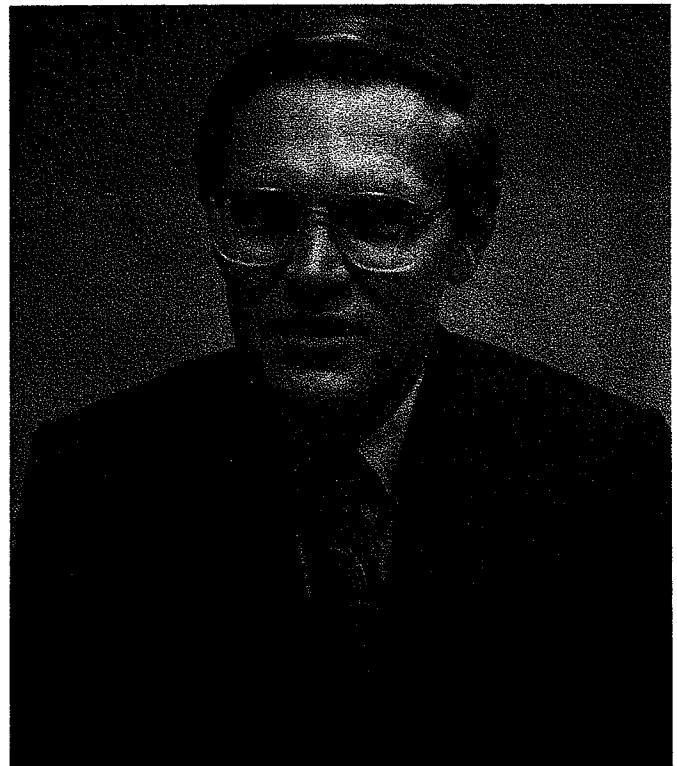
Between 1979 and 1981, Eads served as a member of President Carter's Council of Economic Advisers (CEA). Prior to joining the CEA, he founded and headed the Rand Corporation's research program in Regulatory Policies and Institutions. Before that, he served as executive director of the National Commission on Supplies and Shortages, as assistant director for Government Operations and Research of the Council for Wage and Price Stability, and as a special assistant to the Assistant Attorney General of the Antitrust Division of the U.S. Department of Justice. He also was a program manager for the National Science Foundation in Washington.

Eads has written or coauthored more than 40 arti-

cles and books. Among his most recent writings are "The Future of [Japanese] Industrial Policy" (with Kozo Yamamura); "Japanese Government Support of High Technology Industry: What Lessons for the United States?" (with Richard R. Nelson); and "Geography Is Not Destiny: The Changing Character of Competitive Advantage in Automobiles."

Eads and his wife, Maggie, have two children: Betsy and Geoffrey.

Kenneth A. Froot

Kenneth A. Froot, a faculty research fellow in the NBER's Programs in International Studies and Financial Markets and Monetary Economics, is Ford International Assistant Professor of Management at MIT. He is also an NBER Olin Fellow for 1988-9.
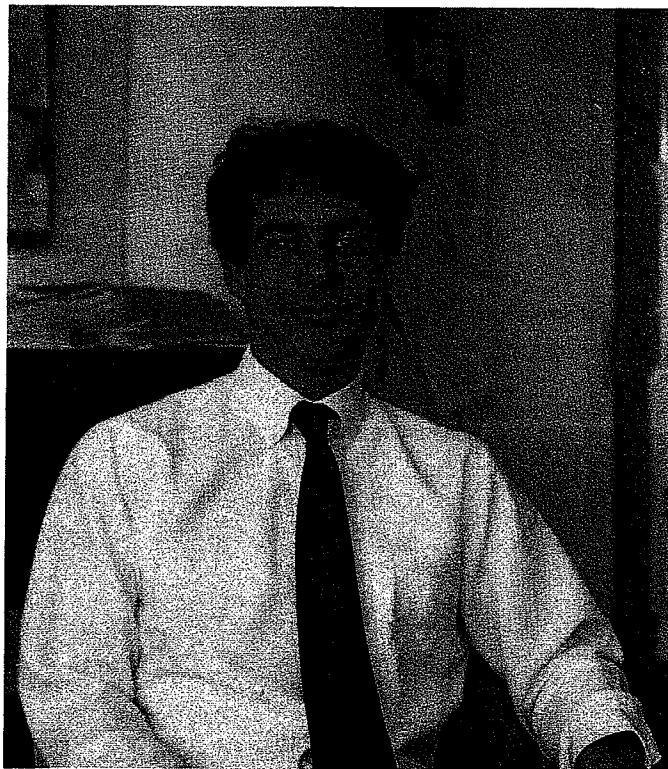
Froot received his B.A. in economics from Stanford University in 1980, and his Ph.D. from the University of California, Berkeley, in 1986. He has taught international and managerial economics, and macroeconomics at MIT's Sloan School since 1986.

During 1983-4, Froot served as a junior staff economist for international trade and finance at the Council of Economic Advisers. He also has been a consultant to and visiting scholar at the World Bank, the Federal Reserve Board, and the International Monetary Fund.

Froot's work in international economics and financial markets has been published in a number of books and professional journals. He, his wife Kathy, and their

son Mark live in Cambridge. His hobbies are playing the flute and keeping up with the deterioration of his 100-year-old house.

Marjorie B. McElroy

Marjorie B. McElroy, a member of the NBER's Board of Directors since 1986, is professor of economics at Duke University. She received a B.A. in economics from Pennsylvania State University in 1965 and a Ph.D. in economics from Northwestern University in 1969.

McElroy has taught at Duke since 1970. She also has been a visiting associate professor of economics at the University of Illinois and the University of Chicago, and is currently a visiting professor at the University of Virginia.

McElroy was appointed to a two-year term on the National Science Foundation Economics Advisory Panel in 1987. She is also a vice president of the Southern Economic Association. McElroy was an associate editor of *American Statistician* from 1981-7 and has written a number of journal articles in her fields of interest: demand systems, labor economics, applied econometrics, and financial economics.

McElroy is married to Edwin D. Burmeister, the Commonwealth Professor of Economics at the University of Virginia. They live in Durham, NC and Charlottesville, VA.

Jeffrey A. Miron

Jeffrey A. Miron, a faculty research fellow in the NBER's Programs in Financial Markets and Monetary Economics and Economic Fluctuations, is an assistant professor of economics at the University of Michigan. He is also an NBER Olin Fellow for the 1988–9 academic year.
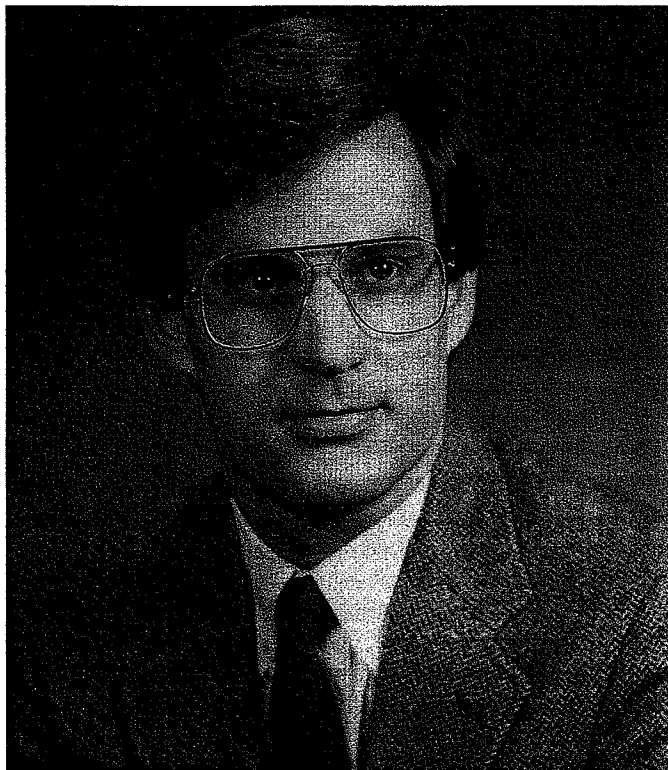
Miron received a B.A. in economics and mathematics from Swarthmore College in 1979, and a Ph.D. in economics from MIT in 1984. His work in macroeconomics and finance has been published in the *American Economic Review* and a number of other journals.

Miron's hobbies are running and cooking. He is engaged to be married this June.

Conferences

Financial Markets and Macroeconomic Stability

Over 100 economists met in Cambridge on December 16 and 17 for an NBER-sponsored Universities Research Conference on "Financial Markets and Macroeconomic Stability." The conference program, organized by NBER Research Associate Ben S. Bernanke of Princeton University, was:

Bruce N. Lehmann, NBER and Columbia University, "Fads, Martingales, and Market Efficiency" (NBER Working Paper No. 2533)
Discussants: Gikas Hardouvelis, Federal Reserve Bank of New York and Columbia University, and Sanford J. Grossman, NBER and Princeton University

John Y. Campbell, NBER and Princeton University, and Albert S. Kyle, University of California at Berkeley, "Smart Money, Noise Trading, and Stock Price Behavior" (NBER Technical Working Paper No. 71)
Discussants: George G. Pennacchi, University of Pennsylvania, and J. Bradford De Long, NBER and Boston University

Valerie A. Ramey, University of California at San Diego, "Money, Trade Credit, and Output: A Test of the Real Business Cycle Hypothesis"
Discussants: Russell Cooper, NBER and University of Iowa, and David Romer, NBER and University of California at Berkeley

George Constantinides, University of Chicago, "Habit Formation: A Resolution of the Equity Premium Puzzle"
Discussants: Stephen G. Cecchetti, NBER and Ohio State University, and Rajnish Mehra, MIT

Jeffrey M. Lacker, Robert J. Levy, and John A. Weinberg, Purdue University, "A General Equilibrium Model of Incentive-Compatible Financial Contracts: Excess Stock Price Volatility and the Value of Control"
Discussants: James Kahn, University of Rochester, and Bart Taub, Virginia Polytechnic Institute

Charles W. Calomiris, Northwestern University, and Charles M. Kahn, University of Illinois, "The Role of Demandable Debt in Structuring Optimal Banking Arrangements"
Discussants: Charles Jacklin, Stanford University, and Monica Hargraves, Brown University

R. Glen Donaldson, Brown University, "Panic, Liquidity, and the Lender of Last Resort: A Strategic Analysis"
Discussants: Gary Gorton, University of Pennsylvania, and Jeffrey A. Miron, NBER and University of Michigan

Edward J. Kane, NBER and Ohio State University, "How Incentive-Incompatible Deposit Insurance Funds Fail" (NBER Working Paper No. 2836)
Discussants: Dwight M. Jaffee, Princeton University, and Lawrence White, Federal Home Loan Bank Board

In an efficient market, there should be very little systematic change in the fundamental valuation of individual firms over intervals as short as a week. However, Lehmann finds sharp evidence of market inefficiency: that is, systematic tendencies for current "winners" and "losers" in one week to experience sizable reversals in returns over the subsequent week. That tenden-

cy reflects apparent arbitrage profits, which persist even after measured security returns are corrected for thin trading, bid-ask spreads, and plausible levels of transactions costs.

Campbell and Kyle study the volatility and predictability of annual U.S. stock returns for 1871-1986. They estimate an equilibrium model of stock price behavior in which "noise traders" (whose demand for stock varies exogenously) interact with risk-averse "smart money" investors (who trade stock in order to maximize their long-run expected utility, which is assumed to be exponential). The model defines the equilibrium stock price as the present value of expected dividends, discounted at the *riskless* rate of interest, less a constant risk premium and a variable noise trading term. Based on the data, Campbell and Kyle conclude that either the discount rate for dividends is low (4 percent or less) and the constant risk premium is large, or the discount rate is relatively high (5 percent or more) and noise trading, correlated with fundamentals, increases the volatility of stock prices.

Ramey compares the relative importance of technology shocks and transaction cost shocks in explaining fluctuations in real money balances. Her model recognizes that both money and trade credit provide transaction services. Ramey finds that shocks to the relative cost of using bank transaction services are substantially more important than technology shocks to the goods industry. Thus, it is doubtful that technology shocks are the main source of the money-income correlation.

The equity premium puzzle identified by Mehra and Prescott states that the difference between the expected rate of return on the stock market and the riskless rate of interest is too large given the small variance in the growth rate of per capita consumption. Constantinides proposes that the utility of consumption in each period is a decreasing function of "habit," in which habit is an exponentially weighted sum of past consumption. This property of preferences, known as habit formation, drives a wedge between the coefficient of relative risk aversion and the intertemporal elasticity of substitution in consumption. Habit formation resolves the equity premium puzzle and also sheds light on related questions about asset prices and the consumption function.

Lacker, Levy, and Weinberg study asset prices in a model with imperfect information and assets that are productive only when they are combined with the services of a "manager," who can conceal some of the produced output, at a cost. The marketed assets closely resemble traded "equity" claims: claimants receive the resale value of their claim plus a "dividend" that is a fixed share of realized output. An asset's price can be more volatile than the present discounted value of the underlying stream of dividends because of the premium that successive generations of managers are willing to pay for the right to control the asset.

Bank-issued demandable debt (bank notes and checking accounts) requires the holding of idle reserve balances and entails occasional bank suspensions and liquidations that would not occur under other forms of finance but also creates incentives for the banker and the depositors. Calomiris and Kahn note that by allowing depositors to withdraw their funds, demandable debt encourages depositors to monitor the bank and its performance, rewarding early recognition of bank difficulties. By forcing the liquidation of banks when a critical number of depositors have withdrawn funds, demandable debt provides discipline for the banker. Since offering demandable debt limits the banker's actions, it effectively reduces the cost of obtaining funds.

Donaldson develops a model in which panics are caused by the strategic behavior of agents who temporarily "corner" the supply of privately controlled cash reserves. This results in an abrupt decline in the dollar value of noncash assets and in turn produces a dramatic decrease in securities prices, an increase in interest rates, and a wave of "contagious" bank runs that are characteristic of panics. A lender of last resort can prevent panics by ensuring that the supply of cash is sufficiently elastic to prevent corners.

Kane defines an incentive-incompatible deposit insurance fund (IIDIF) as a scheme for guaranteeing deposits at client institutions that deploys defective systems of information collection, client monitoring, and risk management. He focuses on how principal-agent conflicts and asymmetries in the distribution of information lead to myopic behavior by IIDIF managers. Drawing on data developed in legislative hearings and investigations and in depositions, he documents that managers of IIDIFs in Ohio and Maryland knew well in advance of their funds' 1985 failures that clients were both economically insolvent and engaging in inappropriate forms of risk-taking. Staff proposals for publicizing and bringing these clients' risk-taking under administrative control were rejected repeatedly. Kane concludes that Congress and federal regulators have managed the massively undercapitalized Federal Savings and Loan Insurance Corporation in much the same way that Ohio and Maryland officials managed their funds.

Conference on Saving

An NBER Conference on Saving, organized by Research Associates B. Douglas Bernheim of Northwestern University and John B. Shoven of Stanford University, was held on January 6-7. The program was:

David F. Bradford, NBER and Princeton University, "Market Value versus Accounting Measures of National Saving" (NBER Working Paper No. 2906) Discussant: Joseph E. Stiglitz, NBER and Princeton University

James M. Poterba, NBER and MIT, "Dividends, Capital Gains, and the Corporate Veil: Evidence from OECD Nations "
Discussant: Robert E. Hall, NBER and Stanford University

Alan J. Auerbach, NBER and University of Pennsylvania, and Kevin Hassett, University of Pennsylvania, "Corporate Savings and Shareholder Consumption"
Discussant: Angus S. Deaton, NBER and Princeton University

B. Douglas Bernheim, John Karl Scholz, University of Wisconsin, and John B. Shoven, "Consumption Taxation in a General Equilibrium Model: How Reliable Are Simulation Results?"
Discussant: Joel B. Slemrod, NBER and University of Michigan

James Davies, University of Western Ontario, and John Whalley, NBER and University of Western Ontario, "Taxes and Capital Formation: How Important Is Human Capital?" (NBER Working Paper No. 2899)
Discussant: Sherwin Rosen, NBER and University of Chicago

David A. Wise, NBER and Harvard University, and Steven F. Venti, NBER and Dartmouth College, "The Net Effect of Tax-Deferred Retirement Accounts: Evidence from SIPP"
Discussant: Michael Rothschild, NBER and University of California at San Diego

Lawrence H. Summers, NBER and Harvard University, and Chris Carroll, MIT, "The Growth–Saving Nexus"
Discussant: N. Gregory Mankiw, NBER and Harvard University

Susan M. Collins, NBER and Harvard University, "Savings Behavior in Ten Developing Countries"
Discussant: Anne O. Krueger, NBER and Duke University

Robert J. Barro, NBER and Harvard University, "A Cross-Country Study of Growth, Saving, and Government" (NBER Working Paper No. 2855)
Discussant: James Tobin, Yale University

Martin Feldstein, NBER and Harvard University, and Philippe Bachetta, Harvard University, "National Savings and International Investment"
Discussant: Rudiger Dornbusch, NBER and MIT

Jeffrey A. Frankel, NBER and University of California at Berkeley, "Quantifying International Capital Mobility in the 1980s" (NBER Working Paper No. 2856)
Discussant: Maurice Obstfeld, NBER and University of Pennsylvania

Bradford argues that the National Income and Product Account (NIPA) measures of saving are seriously defective as measures of economic performance and as elements of the explanation for consumption behavior. The NIPA measures are on a cost basis, while economic analysis requires valuing assets at current market price. Also, the NIPA income and saving measures exclude possibly significant elements of the change (up and down) over time in the nation's wealth stock measured by market value. After reviewing the relationship between the market value of assets and financial accounting net worth, Bradford argues that shortcomings of the market value measure do not imply that the NIPA concept is superior. Although available data on market value (the balance sheets for the U.S. economy assembled by the Federal Reserve Board) have many shortcomings, the NIPA saving and wealth measures are not good proxies for market value measures.

Poterba investigates the influence of individuals' cash receipts from corporations on saving decisions. If households base their consumption decisions solely on the market value of their assets (including human wealth), then whether a firm pays dividends, repurchases shares, or retains earnings and reinvests them in new projects should not affect spending decisions. If households are myopic or face liquidity constraints, however, then cash transactions, such as dividend payments or share repurchase, may have a greater effect on consumption than corporate reinvestment. Poterba compared data on three countries—Canada, the United Kingdom, and the United States—to test for the influence of cash payout on consumption. To identify the effect of cash flow on aggregate consumption, he focuses on tax-induced changes in corporate dividend policy and "involuntary" shareholder realizations of capital gains in takeover transactions. The results for all three countries suggest substantively important effects of corporate payout on consumer spending. They imply that part of the decrease in the U.S. personal saving rate during the 1980s may be attributable to increased corporate payout and takeover activity.

For many years, economists have believed that transfers of income from corporations to shareholders can have real effects. Implicit in this view is the idea that shareholders cannot "pierce the corporate veil," that is, recognize wealth-neutral transfers for what they are. Auerbach and Hassett find that the aggregate marginal propensity to consume from corporate wealth is small relative to the propensities to consume from other forms of wealth. They suggest that this difference is likely to reflect differences in individual marginal propensities to consume (wealthy shareholders consuming at a lower rate), rather than the presence of a corporate veil.

The taxation of capital income may have a variety of detrimental effects, including the distortion of intertemporal decisionmaking and the reduction of saving and capital accumulation. Bernheim, Scholz, and Shoven ask if we know enough about the underlying parameters in large-scale general equilibrium models to have any confidence about the predicted effects of consumption taxes in these models. Their results are mixed. If the precise underlying parameters are known, then many aspects of the simulation will be accurate. In particular, the calculated welfare gain is roughly three times the size of its estimated standard error. Results based upon

pessimistic beliefs are much less encouraging. In this case, the welfare gain is only about one and a half times the size of its standard error.

Davies and Whalley ask how the analysis of the effects of taxes on capital formation changes when human capital is incorporated explicitly. They find that estimates of the intertemporal distorting costs of taxes are affected very little by including human capital. While removing these tax distortions increases savings more when human capital is endogenous and there is a move from an income tax to a consumption or wage tax, the net-of-tax rate of return on nonhuman capital is largely unchanged in the long run because of interasset substiution between human and nonhuman capital. Thus, static partial equilibrium analysis focusing on how human capital changes the analysis of tax distortions of savings can be misleading when compared to full dynamic equilibrium analysis that captures endogenous effects on interest rates through interasset substitution effects.

Using data from the Survey of Income and Program Participation (SIPP), Wise and Venti find that the typical American family has very little financial asset saving: the median of family financial assets including stocks and bonds was only $600 in 1985. (The household median was $1600.) The majority of saving for most families is in the form of housing. However, there is no evidence of substitution of IRAs for other saving, and no evidence that IRAs have been funded by borrowing. If the IRA limit were increased, their analysis suggests, almost two-thirds of the increase in IRA contributions would come from reduced consumption and almost one-third from reduced taxes. Underlying this finding is the fact that the typical family's IRA contribution was much greater than what the family had been saving prior to the introduction of IRAs, as judged by the accumulation of assets. Even the accumulated financial assets of most families were not large enough to support much transfer to IRAs, if any balance at all were to be maintained as precautionary saving for unexpected contingencies.

Summers and Carroll argue that both permanent-income, and to lesser extent, life-cycle theories are inconsistent with the grossest features of cross-country data on consumption, income, and saving. Accounting for the observed behavior of consumption and income requires an alternative theory that preserves the predictions about cross-sectional and high-frequency macro relationships but offers low-frequency predictions that are consistent with the data.

Collins examines saving behavior in ten developing Asian countries. Some of these countries (such as South Korea) currently have very high saving rates, but this is a recent development. There has been a dramatic and widespread rise in saving as a share of income since the early 1960s. Collins shows that the countries with the highest saving rates in the 1980s were also the ones with the fastest real growth rates during 1960–84 and the ones that underwent a large shift in their age distri-

butions—from over 40 percent of the population under the age of 15 to barely 30 percent. She also finds that most of the increase in aggregate saving has been by firms and households, and that the government does not account for the large increase in saving—at least not directly. Furthermore, in Korea older households have increased their saving even more than younger and middle-aged households. These findings call into question the life-cycle model for explaining trends in saving behavior.

Barro studies the effects on per capita growth, investment in physical and human capital, and population growth of various aspects of government policy—including public infrastructure services, maintenance of property rights, government consumption, and taxation. He uses a cross-country sample with information about the composition of government expenditures, proxies for economic freedom and property rights, and measures of political stability. Barro finds that government consumption and investment spending, and proxies for economic freedom, have the expected effects. Also, the interplay among population growth, investment in human capital (school enrollment), and the initial level of per capita income confirm theoretical predictions about the trade-off between the quantity and "quality" of children.

Feldstein and Bachetta report new estimates of the effect of international differences in saving rates on domestic rates of investment. They find that the proportion of domestic saving that remains in the domestic economy continued to be high in the 1980s although this "savings retention rate" may have declined as international capital markets became more fully integrated. They also suggest that the association between domestic saving and domestic investment cannot be interpreted as the result of endogenous budget deficits. Additional evidence on the dynamics of the saving-investment adjustment process indicates that domestic investment rates respond with a lag to shifts in domestic saving while domestic saving rates are not sensitive to shifts in desired domestic investment.

Frankel uses a new dataset of forward exchange rates for 25 countries to show that a continuing worldwide trend of integration of financial markets in the 1980s had all but eliminated short-term interest differentials for major industrialized countries by 1988. Only the *country premium* has been eliminated, however; this means that only *covered* interest differentials are small. Nominal and real exchange rate variability remain, and indeed were larger in the 1980s than in the 1970s. The result is that a *currency premium* remains, consisting of an exchange risk premium plus expected real currency depreciation. The existence of expected real depreciation means that, even if interest rates are equalized internationally when expressed in a common currency, large differentials in *real* interest rates remain. Investors have no incentive to arbitrage away such differentials. Because there is no force tying the domestic real interest rate to the world real interest rate, it follows that

there is no reason to expect any country's shortfalls of national saving to be completely financed by borrowing from abroad.

Fumio Hayashi, NBER and University of Pennsylvania, also attended the conference.

Labor Relations and the Firm: Comparative Perspectives

A conference on "Labor Relations and the Firm: Comparative Perspectives" was held on January 7–8 in Tokyo. The conference, sponsored jointly by the NBER, the Tokyo Center of Economic Research, and the Centre for Economic Policy Research, was organized by Masahiro Okuno-Fujiwara, University of Tokyo, and Takatoshi Ito, NBER and University of Minnesota. The program was:

David Begg, Dennis J. Snower, and Chris Martin, University of London, and Assar Lindbeck, University of Stockholm, "On the Persistence of Labor Market Shocks"
Discussants: Akira Ono, Hitotsubashi University, and Hiroshi Yoshikawa, University of Tokyo

Susan N. Houseman, University of Maryland, and Katharine G. Abraham, NBER and University of Maryland, "Employment and Hours Adjustments: A Sectorial Analysis"
Discussants: Konosuke Odaka, Hitotsubashi University, and Tadashi Yamada, NBER and University of Tsukuba

Yoshio Higuchi, Keio University, "Changes in Wage Differentials over the Business Cycle"
Discussants: Masanori Hashimoto, Ohio State University, and Isao Ohashi, Nagoya University

Richard B. Freeman, NBER and Harvard University, and Mark Rebick, Harvard University, "Crumbling Pillar? Declining Union Density in Japan"
Discussants: John B. Taylor, NBER and Stanford University, and Kazuo Koike, Hosei University

Isao Ohashi, "On the Determinants of Bonuses and Basic Wages in the Japanese Large Firms"
Discussants: Masanori Hashimoto, and Kuramitsu Muramatsu, Nanzan University

Takatoshi Ito, and Kyoungsik Kang, University of Minnesota, "Bonuses, Overtime, and Employment: Korea versus Japan"
Discussants: Akira Ono and John B. Taylor

Masahiko Aoki, Kyoto University, "On a Symmetry of Financial and Internal Controls at the Japanese Firm"

Discussants: Michael H. Riodan, Boston University, and David Ulph, Bristol University

Yoshitsugu Kanemoto, University of Tokyo, and W. Bentley MacLeod, Queen's University, "Optimal Labor Contracts with Noncontractible Human Capital"
Discussants: Hajime Miyazaki, Ohio State University, and Alistair Ulph, University of Southampton

Masahiro Okuno-Fujiwara, "On Labor Incentive and Work Norm in Japanese Firms"
Discussants: Hajime Miyazaki and Michael H. Riodan

Alistair Ulph and David Ulph, "Labor Markets and Innovation"
Discussants: Richard B. Freeman, and Haruo Shimada, Keio University

Lawrence F. Katz, NBER and Harvard University, and Ana L. Revenga, Harvard University, "Changes in the Economic Rewards to Higher Education: The United States versus Japan"
Discussants: Hiroshi Yoshikawa, University of Tokyo, and Susan N. Houseman

Begg, Snower, Martin, and Lindbeck examine the persistence of labor market shocks within the framework of the insider–outsider family of models. They distinguish between symmetric persistence, in which the magnitude of response is the same for positive and negative shocks of equal magnitude, and asymmetric persistence, in which there is a different response in upswings and downswings. Using annual U.K. data, they find significant differences in response to upswings and downswings. Specifically, small upswings lead entirely to higher wages. Larger upswings lead to both higher wages and new hiring. In contrast, downswings immediately lead to reductions in both employment and wages.

Houseman and Abraham find that U.S. manufacturing industries adjust employment levels to changes in demand significantly more than Japanese industries do. The adjustment of average hours of total labor input is significantly greater in U.S. manufacturing than in Japanese. In the United States, employment adjustment falls much more on production workers than on nonproduction workers, while in Japan the employment effects on production and nonproduction workers are not significantly different. However, female workers in Japan bear a disproportionate share of employment adjustment.

Higuchi explores changes in the tenure–wage slope over the business cycle. Labor mobility is lower in Japan than in the United States and other western countries, which suggests that Japanese employees are likely to be protected from external market developments. However, Higuchi finds that both the average wage and the tenure–wage slope are influenced not only by changes in each firm's profits but also by changes in the external labor market.

Freeman and Rebick examine the recent decline in union density in Japan. From 1974, when 34 percent of

employees were organized, to the present when 27 percent are organized, the fall in density has averaged 0.5 percentage points per year. They first consider structural explanations for this phenomenon, including the expansion of low-density industrial sectors, the increased labor force participation of women, and the increased use of part-time and temporary contract labor. These structural shifts account for only one-third of the drop in density. Most of the drop is explained by the decrease in union density among male, regular-contract workers *within* industries. Most of the non-structural decline was caused by a drop in the rate at which new unions are being organized (rather than an increase in the rate at which unions are going out of existence). This is similar to trends in the United States.

The bonus system plays a key role in explaining the Japanese labor market, particularly its flexible compensation. Ohashi proposes that bonuses are paid by firms to compensate employees for the intensity of their work in the last period. He finds that, although both bonuses and wages are strongly influenced by labor market conditions, the former is basically a reward for past work intensity and the latter is compensation for organizational elements.

Ito and Kang also examine bonuses and wages, both of which respond to economic conditions more in Korea than in Japan. The "overtime" component of the wage responds to economic conditions less than bonuses but more than wages.

The literature on contracting views the control of firm activities as layered hierarchically with stockholder's control at the apex. Aoki examines the symmetric structure that exists at Japanese firms between bank control over strategic decisions and management control over operating activities. This structure poses an anomaly to the contracting orthodoxy.

According to Kanemoto and MacLeod, the market for specific human capital is incomplete and institutions have evolved to deal with this problem. Since investment in human capital cannot be legally contracted, the optimal contract must include a lifetime employment (LTE) institution with both LTE workers and temporary workers. The optimal contract for an LTE worker is a promotion scheme under which the probability of getting promoted is (almost) 100 percent. When the demand for the firm's product fluctuates over time, there will be a trade-off between LTE workers and temporary workers.

Okuno-Fujiwara analyzes the role of a work norm in firms and society. A firm that establishes a cooperative norm can generate rents by persuading its employees to work harder. For this mechanism to operate, two aspects of Japanese labor relations must be present: first, job rotation and multifunctionality of workers make the evaluation of fellow workers' efforts easier, which is essential to management for identifying deviations from the existing work norm. Second, there is a possibility of dismissal even (and especially) for senior workers, contrary to the usual perception. This possibility creates an incentive to follow the work norm.

Ulph and Ulph explore the impact of different labor market institutions on the incentives for firms to undertake R and D. Their model predicts that allowing bargaining between producers and workers over the timing of an innovation never helps a country to innovate. It may lead to the loss of a patent by a country that otherwise might have won it. This would make the work force worse off than if it had simply allowed immediate introduction of the technology. Ulph and Ulph estimate a simple model of the determination of R and D expenditures for the United Kingdom. They find that union density has a negative effect on R and D expenditures in high-technology, high-profit industries. The extent to which bargaining is at the local rather than the national level has a marked negative impact, perhaps because the more local the bargaining, the more influence unions will have over the introduction of new technology.

Katz and Revenga examine movements in the structure of wages in the United States and Japan in the 1980s. They find that the earnings of college graduates have increased dramatically relative to those of less-educated workers in the United States since the late 1970s. Educational wage differentials for most demographic groups have increased slightly on average in Japan over the same period. Katz and Revenga find that larger product demand shifts away from industries that have traditionally employed less-educated workers (particularly durable goods manufacturing) and a smaller increase in the relative supply of college graduates in the United States than in Japan both help to explain the much sharper increase in educational wage differentials in the United States.

International Aspects of Taxation

An NBER Conference on International Aspects of Taxation, organized by Research Associates Joel B. Slemrod, University of Michigan, and Assaf Razin, Tel Aviv University and the International Monetary Fund, took place on February 23–25. The program was:

Hugh J. Ault, Boston College, and David F. Bradford, NBER and Princeton University, "An Overview of the U.S. System for Taxing International Income after the Tax Reform Act of 1986"
Discussant: Daniel J. Frisch, Institute for International Economics

Roger H. Gordon, NBER and University of Michigan, and James A. Levinsohn, University of Michigan, "The Linkage between Domestic Taxes and Border Taxes"
Discussant: John Whalley, NBER and University of Western Ontario

Assaf Razin, and Efraim Sadka, Tel Aviv University, "Integration of the International Capital Markets: The Size of Government and Tax Coordination" (NBER Working Paper No. 2863)
Discussant: Jack Mintz, Queen's University

John Douglas Wilson, Indiana University at Bloomington, "The Optimal Taxation of Internationally Mobile Capital in an Efficiency Wage Model"
Discussant: Lawrence F. Katz, NBER and Harvard University

Jean-Thomas Bernard, Université Laval (Quebec), and Robert Weiner, Brandeis University and Harvard University, "Multinational Corporations, Transfer Prices, and Taxes: Evidence from the U.S. Petroleum Industry"
Discussant: Lorraine Eden, Carleton University

James R. Hines, Jr., NBER and Princeton University, and R. Glenn Hubbard, NBER and Columbia University, "Coming Home to America: Dividend Repatriations by U.S. Multinationals" (NBER Working Paper No. 2931)
Discussant: Mark A. Wolfson, Harvard University

Joosung Jun, Yale University, "U.S. Tax Policy and Direct Investment Abroad"
Discussant: Michael Dooley, International Monetary Fund

Joel B. Slemrod, "Tax Effects on Foreign Direct Investment in the United States: Evidence from a Cross-Country Comparison"
Discussant: David G. Hartman, NBER and Data Resources, Inc.

Martin Feldstein, NBER and Harvard University, and Paul R. Krugman, NBER and MIT, "International Trade Effects of Value-Added Taxation"
Discussant: Avinash K. Dixit, Princeton University

Krister Andersson, Kenji Aramaki, A. Lans Bovenberg, and Sheetal K. Chand, International Monetary Fund, "Tax Incentives and International Capital Flows: The Case of the United States and Japan"
Discussant: Alan J. Auerbach, NBER and University of Pennsylvania

Jacob A. Frenkel, NBER, University of Chicago, and International Monetary Fund, Assaf Razin, and Steven Symansky, International Monetary Fund, "International Spillovers of Taxation" (NBER Working Paper No. 2927)
Discussant: Willem H. Buiter, NBER and Yale University

Ault and Bradford describe the basic legal rules that govern the taxation of international transactions. They focus on the changes made by the Tax Reform Act of 1986. In the tax legislative process, international tax policy has been a kind of stepchild: the international aspects of domestic tax changes often are considered late in the day and without full examination. As a result, the U.S. tax system has developed without much attention to international issues. Ault and Bradford attempt to step back and look at the system that has evolved from this haphazard process.

Gordon and Levinsohn study the optimal coordination between domestic taxation and both tariff and nontariff trade policies. They show that under optimal policy, when small open economies choose to tax domestic production rather than domestic consumption of particular goods, those economies also want to tax imports, or subsidize exports, of these goods. If each good can be taxed separately, no net trade distortions should remain in spite of the use of tariffs. If the set of tax instruments is more limited, perhaps because of excessive administrative costs of extra tax instruments, then trade will be distorted. If production is taxed but tariffs are not available, perhaps because of GATT restrictions, then nontariff barriers would decrease distortions, even if foreign firms receive the rents arising from the difference between domestic and foreign prices. These nontariff barriers likely would be higher than the optimal tariff barriers. Gordon and Levinsohn also examine IMF financial statistics for 30 countries from 1970–87 to measure the size and pattern of net trade distortions. The data suggest that net trade distortions in poorer countries are much smaller than tariff data alone would suggest. In richer countries, however, production taxes, such as a corporate income tax, serve to discourage trade.

Integration of international capital markets has become a key policy issue with the prospective integration of Europe in 1992. Razin and Sadka theoretically analyze the effects of relaxing restrictions on the international flow of capital on: the optimal provision of public goods; the structure of taxation; income redistribution policies; and the scope of tax coordination. They find that, with no administrative barriers to capital flows, the optimal policy equates the domestic rate of return to the world rate and taxes income from investment abroad and from investments at home at the same rate. Any partial relaxation of the restrictions on international capital flows improves welfare. The cost of public funds falls, and the supply of public goods rises, if restrictions on international capital flows are relaxed. The amount of income redistribution increases with the liberalization of the international capital market. Finally, some minimal degree of tax coordination (such as origin-based or source-based tax schemes) is essential for the existence of an equilibrium in an integrated economy.

Wilson investigates the optimal taxation of internationally mobile capital in a two-sector model with internationally traded goods. Drawing on the efficiency wage literature, he assumes that a worker supervision problem exists in the "primary sector," but not in the "secondary sector." To discipline workers, primary sector firms pay their workers higher wages than similar workers in the secondary sector receive. In some cases, there may be a role for commodity taxes or subsidies. However, Wilson shows that the case for subsi-

dizing capital investment in "good jobs" appears rather dubious.

Bernard and Weiner analyze transfer prices, using data on U.S. oil imports from 1973–84. They find that transfer and arm's-length prices differ significantly for oil originating in some countries, but not for all oil. The average difference represents 2 percent or less of the value of the crude oil imported by multinational companies each year. Further, the observed differences between arm's-length and transfer prices are not explained easily by average effective tax rates in exporting countries. These results provide little support for the claim that multinational petroleum companies set their transfer prices to evade taxes.

The foreign earnings of U.S. corporations typically are subject to taxation by both host foreign governments and the U.S. government. Hines and Hubbard analyze the tax incentives on foreign subsidiaries of American multinational corporations to their parent corporations in the United States who wish to repatriate profits. These incentives appear to be inconsistent with historical repatriation patterns from aggregate time-series data on the overseas operations of U.S. multinationals. To resolve this inconsistency, Hines and Hubbard examine data collected from tax returns for 1984 on financial flows from 12,041 foreign subsidiaries to their 453 U.S. parent corporations. They find that most subsidiaries paid no dividends to their parents in 1984, and that the U.S. government collected very little revenue on their foreign income while distorting their internal financial transactions.

Jun shows that U.S. tax policy can have significant effects on outflows of U.S. direct investment. He investigates various channels through which domestic tax policy can affect these investment flows. The evidence shows that U.S. tax policy toward U.S. domestic investment has an important effect on outflows of direct investment by influencing the relative net rate of return between the United States and foreign countries.

Slemrod examines the impact of U.S. and foreign taxation on foreign direct investment (FDI) in the United States. He first extends and updates the standard model of aggregate FDI in the United States and then disaggregates FDI by the country of the investing firm. This disaggregation allows a detailed examination of the effect on FDI of the rate of tax imposed by the investor's country and the impact of the home country's system of taxing foreign-source income (that is, whether it exempts or taxes foreign-source income). The results generally support a negative impact of U.S. effective tax rates on total FDI and transfers of funds, but not on retained earnings of foreign branches and subsidiaries. However, the results do not provide strong evidence that the tax responsiveness of investment from countries that exempt foreign-source income from domestic taxation differs substantially from the tax responsiveness of investment from countries that tax their residents' worldwide income.

Feldstein and Krugman discuss the effects of a value-added tax (VAT) in an open economy. A frequently heard view of American manufacturers and policy analysts is that a VAT would help U.S. exports because the tax is rebatable on American exports and levied on foreign imports. Economists generally reject this argument in favor of the proposition that a VAT with border taxes and rebates induces a real appreciation of the dollar that would leave the net prices received by producers and paid by U.S. consumers unchanged. Feldstein and Krugman reject both of these arguments. They point out that, in practice, a VAT would exempt housing and many services. As such, it would encourage American households to increase their consumption of services and decrease their consumption of tradable manufactured products, including imports. The reduction in imports eventually means a corresponding reduction in exports. A practical VAT thus is not neutral but tends to reduce both exports and imports.

Bovenberg et al. explore how the tax treatment of investment and saving affects international capital flows as well as national and global welfare. They evaluate the international effects of capital income taxes on portfolio investment in the United States and Japan. During the 1980s, these taxes encouraged capital flows to the United States both by favoring investment in that country and by discouraging relative savings in the United States.

Frenkel, Razin, and Symansky note large differences in tax rates and structures among the seven major industrial countries. They analyze the consequences of revenue-neutral conversions between income and consumption (VAT) tax systems. The effects of such changes in the composition of taxes depend critically on international differences in saving and investment propensities, which in turn govern the time profile of the current account of the balance of payments. The international effects of budget deficits and management of public debt also depend critically on whether the government manages its deficit through alterations in income or consumption taxes. Finally, the effect of harmonization depends critically on the intercountry differences in saving and investment propensities. These differences yield conflicts of interest in the tax harmonization program.

In addition to the authors and discussants, Geoffrey Carliner, NBER, and David Holland, Department of Finance, Canada, attended the conference.

Fourth Annual Conference on Macroeconomics

The NBER's Fourth Annual Conference on Macroeconomics, organized by NBER Research Associates Olivier J. Blanchard of MIT and Stanley S. Fischer of

MIT and the World Bank, was held in Cambridge on March 10–11. Over 70 economists participated in the following program:

Charles Bean, London School of Economics, and James Symons, University College, London University, "Ten Years of Mrs. T."
Discussants: William Nordhaus, NBER and Yale University, and Walter Eltis, National Economic Development Office, London

Frank Levy, University of Maryland, "Recent Trends in U.S. Earnings and Family Incomes"
Discussants: Kevin Murphy, NBER and University of Chicago, and Lawrence H. Summers, NBER and Harvard University

Christina Romer and David Romer, NBER and University of California at Berkeley, "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz"
Discussants: Anna J. Schwartz, NBER, and Benjamin M. Friedman, NBER and Harvard University

James H. Stock, NBER and Harvard University, and Mark W. Watson, NBER and Northwestern University, "New Indexes of Coincident and Leading Economic Indicators"
Discussants: Christopher A. Sims, NBER and University of Minnesota, and Victor Zarnowitz, NBER and University of Chicago

John Y. Campbell, NBER and Princeton University, and N. Gregory Mankiw, NBER and Harvard University, "Consumption, Income, and Interest Rates: The Euler Equation Approach Ten Years Later"
Discussants: Lawrence J. Christiano, NBER and Federal Reserve Bank of Minneapolis, and Albert Ando, NBER and University of Pennsylvania

Stephen Williamson, Federal Reserve Bank of Minneapolis, "Restrictions on Financial Intermediaries and Implications for Aggregate Fluctuations: Canada and the United States, 1870–1913"
Discussants: Mark Gertler, NBER and University of Wisconsin, and Lawrence White, Federal Home Loan Bank Board

Kevin M. Murphy, Andrei Shleifer, and Robert W. Vishny, NBER and University of Chicago, "Building Blocks of Market-Clearing Business Cycle Models"
Discussants: Edward C. Prescott, University of Minnesota, and Peter Diamond, MIT

Some commentators have proclaimed that Britain has undergone an "economic miracle" under Mrs. Thatcher. Inflation has been brought down to a low and relatively stable level and Britain has moved from the bottom of the productivity growth league to the top among OECD countries. However, there have been costs: unemployment has been high (although it has begun to fall at last) and the earnings distribution has widened markedly. Bean and Symons argue that during the 1970s income policies and neocorporatist machinery were used to maintain a cooperative, low-employment equilibrium in the face of considerable union power. In the 1980s, a shift toward direct measures at limiting union power, together with tight macroeconomic policies, led to increased unemployment. Its persistence throughout the decade was caused by the effect of prolonged unemployment on search behavior. The reduction in union power also helps to explain the acceleration in productivity growth. The craft nature of much of the British union movement has led to a multiplication of bargaining units within firms. Bargaining in isolation, a union can perceive overmanning and other restrictive practices as being in its interest, resulting in low wages and productivity. A fall in union power results in a reduction in these inefficiencies and leads to a rise not only in productivity but also in wages. Bean and Symons confirm that the productivity acceleration has been greatest where multiunionism is present. They also show how this explains the widening in pretax as well as aftertax earnings.

Levy reviews and proposes explanations for recent changes in the distributions of male and female earnings and of family incomes. Between 1973 and 1986, the proportion of prime age men earning $20,000–$50,000 (in 1987 dollars) declined while the proportions earning less than $20,000 and more than $50,000 both increased. Similarly, the proportion of families with incomes of $10,000–$50,000 declined while the proportions with incomes below $10,000 and above $50,000 both increased. By contrast, the earnings of prime age women generally improved; a smaller share now earn less than $10,000 and an increased proportion earn over $20,000. Levy suggests that the distribution of male earnings was shaped by the slow growth of labor productivity and a decline in manufacturing employment, which sharply reduced the relative earnings of young, less-educated men. Female earnings also were affected by slow productivity growth, but this was partially offset by increased occupational mobility. The family income distribution was shaped by the slow growth of individual earnings, a growing split between two-earner and female-headed families, and rising average incomes among elderly families.

Do monetary disturbances have important real effects? It is virtually impossible to answer the question without knowing whether monetary changes occur *because* of output movements or for independent reasons. However, a large amount of nonstatistical information can be used to identify episodes in which there were large monetary disturbances not caused by output fluctuations. The Romers investigate what can be learned about the effects of monetary shocks by using the historical record to isolate such episodes. They identify a series of episodes in which the Federal Reserve in effect decided to attempt to create a recession to reduce inflation; the decision to tighten policy in October 1979 represents the most recent and best-known of these shifts in policy. A shift to anti-inflationary policy led, on average, to a rise in the employment rate of two percentage points, and that effect was highly

statistically significant. Economic events in the wake of these policy shifts provide compelling evidence of the importance of monetary policy. The Romers reach three other major conclusions: first, the real effects of these monetary disturbances are highly persistent; there appears only a slight tendency for economic activity to return toward its preshock path. Second, the six shocks identified account for a considerable fraction of postwar economic fluctuations, which strongly suggests that aggregate demand disturbances as a whole are the dominant source of postwar output movements. Third, evidence from the interwar era also suggests that monetary disturbances have large real effects.

The system of Leading and Coincident Economic Indicators currently maintained by the U.S. Department of Commerce was developed over 50 years ago as part of the NBER's research on business cycles. Stock and Watson report the results of an ongoing NBER-sponsored project that uses recent developments in econometric methodology and computing technology to take a new look at this system. For a detailed description of the Stock-Watson research, see their article in the "Research Summaries" section of this issue.

Campbell and Mankiw propose that the time-series data on consumption, income, and interest rates are best viewed as generated by two types of consumers— one consuming permanent income and the other consuming current income. They show that: 1) expected changes in income are associated with expected changes in consumption; 2) expected real interest rates are not associated with expected changes in consumption; and 3) periods in which consumption is high relative to income are typically followed by high growth in income. Campbell and Mankiw argue that the failure of the strict permanent-income hypothesis —and, in particular, the excessive importance of current income for consumption—indicates that economists should not turn so readily to the permanent-income hypothesis when thinking about economic policy. This conclusion applies especially to the debate over the national debt. Since the Ricardian equivalence proposition relies on the permanent-income hypothesis, the failure of that hypothesis casts doubt on this proposition's empirical validity. The old-fashioned Keynesian consumption function therefore may provide a better benchmark for analyzing fiscal policy than does the model with infinitely lived consumers.

Williamson notes two important differences in monetary and banking arrangements between Canada and the United States from 1870–1913. First, Canada had a branch banking system with larger and better diversified banks than in the U.S. unit banking system. Second, Canadian banks could issue large denomination notes with no restrictions on their backing, while all U.S. currency was essentially an obligation of the U.S. government. Also during the period, the United States experienced recurrent waves of disruptive bank failures and banking panics, while bank failures were far less disruptive in Canada, and there were virtually no widespread banking panics. Williamson constructs a general equilibrium model with endogenous financial intermediation that captures these historical Canadian and American monetary and banking arrangements as special cases. With a unit banking restriction, banks have a positive probability of failing; a phenomenon corresponding to a bank run occurs in the event of a bank failure; and aggregate bank failures are negatively correlated with aggregate output. Without this restriction, banks diversify perfectly and they never fail. In an apparent contradiction of conventional wisdom, the unit banking restriction induces *less* volatility in output, prices, and intermediary liabilities, in a business cycle driven by shocks to the riskiness of investment. A restriction on the issue of private bank notes also makes key aggregates less volatile. The predictions of the model are supported by aggregate annual data for the United States and Canada.

Murphy, Shleifer, and Vishny compare "real business cycle" and increasing returns models of economic fluctuations. In these models, business cycles are driven by productivity changes resulting either from technology shocks or from movements along an increasing returns production function. They stress four crucial components that make it possible for both types of models to fit the data: durability of goods; specialized labor; imperfect credit; and elastic labor supply. When goods are durable, large output movements result from only small changes in productivity. Specialized labor and imperfect credit generate strong positive comovement of both outputs and labor inputs across sectors of the economy. Such comovement in fact is a feature of U.S. business cycles; it does not easily obtain with mobile labor and perfect credit. Finally, elastic labor supply generates large movements in employment response to small changes in real wage. Murphy, Shleifer, and Vishny conclude that the increasing returns model is easier to reconcile with the data than the real business cycle model.

As in past years, these papers and the discussions that followed them will be published by the MIT Press as *NBER Macroeconomics Annual 1989*. Its availability will be announced in a future issue of the *NBER Reporter*.

Stock Market Volatility and the Crash

The NBER held a conference on "Stock Market Volatility and the Crash" on March 16–18. Sanford J. Grossman, NBER and Princeton University, organized the following program:

Mervyn A. King, NBER and London School of Economics, and Sushil Wadhwani, London School of Economics, "Transmission of Volatility between Stock Markets" (NBER Working Paper No. 2910)
Discussants: Douglas W. Diamond, University of Chicago, and James M. Poterba, NBER and MIT

Robert H. Litzenberger, University of Pennsylvania, and Michael J. Barclay and Jerold B. Warner, University of Rochester, "Private Information, Trading Volume, and Stock Return Variances"
Discussant: Kenneth R. French, NBER and University of Chicago

Hans R. Stoll, Vanderbilt University, and Robert E. Whaley, Duke University, "Stock Market Structure and Volatility"
Discussant: Paul Pfleiderer, Stanford University

G. William Schwert, NBER and University of Rochester, "Stock Volatility and the Crash of 1987"
Discussant: Robert F. Engle III, NBER and University of California at San Diego

Kenneth J. Singleton, NBER and Stanford University, "Disentangling the Effects of Noise and Aggregate Economic Disturbances on Daily Stock Price Volatility"
Discussant: John Y. Campbell, NBER and Princeton University

Fischer Black, NBER and Goldman Sachs, "Mean Reversion and Consumption Smoothing"
Discussant: Robert Stambaugh, University of Pennsylvania

George Constantinides, University of Chicago, "Habit Formation: A Resolution of the Equity Premium Puzzle"
Discussant: Michael Brennan, University of California at Los Angeles

Robert J. Barro, NBER and Harvard University, "The Stock Market and Investment"
Discussant: Lawrence H. Summers, NBER and Harvard University

Ben S. Bernanke, NBER and Princeton University, "Clearing and Settlement during the Crash: A Perspective from the Theory of Financial Intermediation"
Discussants: Douglas W. Diamond, and Franklin Edwards, Columbia University

Lawrence Harris, University of California at Los Angeles and Securities and Exchange Commission, "The Economics of Cash Index Alternatives"
Discussant: Richard Bookstaber, Morgan Stanley

King and Wadhwani investigate why, in October 1987, almost all the world's stock markets fell together despite widely differing economic circumstances in the various countries. They suggest that "contagion" among markets occurs as rational agents attempt to infer information from price changes in other markets. This provides a channel through which a "mistake" in one market can be transmitted to other markets. Hour-

ly stock price data from New York, Tokyo, and London during an eight-month period around the crash support the contagion model. In addition, the magnitude of the contagion coefficients increases with volatility.

Litzenberger, Barclay, and Warner study the Tokyo Stock Exchange to learn more about the determinants of variances in stock prices. They find that when the Exchange is open on Saturday, the weekend variance is roughly 60 percent higher than when it is closed. However, weekly variances are not increased by Saturday trading because the increases in weekend volume and variance are offset by lower volume and variance on surrounding days. Thus Saturday trading changes the timing of trades, and variance is affected by private information revealed through trading. U.S. stocks traded in Tokyo, or Japanese stocks traded on the New York Stock Exchange, have increased trading hours, but the trading of stock on a foreign exchange is typically light relative to domestic volume. The increased trading hours are not associated with an increase in the variance of stock prices. This suggests that substantial volume is required for private information to be incorporated into stock prices and that there is no causal relationship between trading hours and variance in stock prices.

Stoll and Whaley find that the procedures for opening trading on the New York Stock Exchange appear to affect the volatility of returns. Returns are more volatile around the opening than they are around the close, and the additional volatility is not caused by the arrival of public information. It appears that the volatility is higher because the opening procedures fail to smooth out temporary price deviations arising from trading imbalances.

Schwert analyzes the behavior of volatility in stock prices using daily data from 1885 through 1987. He finds that the October 1987 stock market crash was unusual in many ways: in particular, stock price volatility jumped dramatically during and after the crash but quickly returned to lower, more normal levels. Schwert uses data on implied volatilities from call option prices and estimates of volatility from futures contracts on stock indexes to confirm this result.

Singleton investigates the relative contributions of noise and aggregate economic disturbances to volatility in stock prices. He predicts stock prices using the long- and short-term interest rates, volume, and an unobserved "noise" shock, and tests his findings against daily data for January 1982 through August 1987. Singleton finds that variation in interest rates explains at least 40 percent of the conditional volatility of stock returns over daily intervals. Trading volume does not explain any of the volatility unexplained by interest rates and the noise shock.

Black uses a conventional model with additive separable utility and constant elasticity to explain mean reversion and consumption smoothing. The model uses the price of risk and wealth as state variables but has only one stochastic variable. The price of risk rises

temporarily as wealth falls. Black also distinguishes between risk aversion and the consumption elasticity of marginal utility. He can use the model to match estimates of: consumption volatility, wealth volatility, mean reversion, the average growth rate of consumption, the average real interest rate, and the average market risk premium.

The equity premium puzzle identified by Mehra and Prescott states that the difference between the expected rate of return on the stock market and the riskless rate of interest is too large given the small variance in the growth rate of per capita consumption. In his paper, Constantinides proposes that the utility of consumption in each period is a decreasing function of "habit," where habit is an exponentially weighted sum of past consumption. This property of preferences, known as habit formation, drives a wedge between the coefficient of relative risk aversion and the intertemporal elasticity of substitution in consumption. Habit formation resolves the equity premium puzzle and also sheds light on related questions about asset prices and the consumption function.

Barro finds that for the United States—especially for long samples that begin in 1891 or 1921—lagged stock returns explain much of the growth in the rate of investment. Moreover, since 1921 the stock market return dramatically outperforms q (the ratio of the market's valuation of capital to the long-run cost of acquiring new capital). This is true even though the change in the q measure approximates the change in real stock prices plus other variables that ought to matter for investment. Barro suggests that an exogenous disturbance (such as an increase in the prospective rate of return on capital) shows up contemporaneously as an increase in stock prices and corporate profits and, with a lag of a year or more, as an expansion of investment expenditures and a further increase in profits. In examining the stock market crashes of 1929 and 1987, Barro finds that investment spending for 1930–2 performed worse than the stock market would have predicted, while spending for 1988 was surprisingly high. For Canada since 1928, a simple relationship between investment and stock returns (and corporate profits) looks similar to that for the United States. However, when the interaction between the two countries is considered, the U.S. stock market has more predictive power than the Canadian market for Canadian investment.

Bernanke reexamines the role of clearing and settlement systems in financial markets, focusing particularly on futures markets. He finds that the praise received by the Federal Reserve for its handling of the crisis situation in October 1987 is warranted. The Fed performed its proper function of "bailing out" the system from the effects of an extraordinary shock. However, Bernanke finds the vulnerability of the financial system to a major price move a puzzle. He suggests that relatively simple changes in futures contracts, for example, would eliminate the risk of system breakdown stemming from sharp price changes. In particu-

lar, a "limited liability" provision for futures contracts would reduce clearing and settlement risk.

Harris compares several instruments for holding and trading broad stock market risk: program trading; package trading; private index funds; open- and closed-end mutual index funds; index participations; futures; warehouse receipts; index options; and supershares. He discusses what factors might determine their acceptance and what impact they might have on market liquidity and volatility. He concludes that a securitized open-end index fund with provisions for continuous deposits and redemptions in-kind may be most successful. If accepted, it would increase liquidity and decrease transitory volatility in the cash index market.

Others participating in the conference were: Martin Feldstein, NBER and Harvard University; Andrew W. Lo, NBER and MIT; A. Craig MacKinlay, University of Pennsylvania; Eduardo S. Schwartz, University of California at Los Angeles; and Robert J. Shiller, NBER and Yale University.

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 Summer 1989 issue of the *Reporter* is June 1. If you have any questions about procedures for submitting materials for the calendar, please call Kirsten Foss Davis at (617) 868-3900.

May 11-12, 1989
Program Meeting: Labor Studies, NBER

May 12, 1989
Conference on Competition in Deregulated Airlines Markets, NBER

May 19-20, 1989
Conference on Political Economy, NBER

June 10-11, 1989
Far Eastern Meeting, Econometric Society

June 15-17, 1989
Conference on Capital Markets and Debt Management, Center for Economic Policy Research/Italian Macroeconomic Policy Group

June 19-20, 1989
International Seminar on Macroeconomics, NBER

June 21-24, 1989
North American Summer Meeting, Econometric Society

June 26-29, 1989
European Research Workshop on International Trade, Center for Economic Policy Research/Centre for Applied Research, Bergen

July 13-15, 1989
Australasian Meeting, Econometric Society

July 14, 1989
Program Meeting: Economic Fluctuations, NBER

August 1, 1989
Latin American Meeting, Econometric Society

August 14-17, 1989
Joint Statistical Meetings, American Statistical Association*

September 4-8, 1989
European Meeting, Econometric Society

September 13-15, 1989
Conference on Mismatch and Labor Mobility, Center for Economic Policy Research

September 14-15, 1989
Panel Meeting on Economic Activity, Brookings Institution

September 17-20, 1989
Annual Meeting, National Association of Business Economists*

October 4-7, 1989
19th (Biannual) Conference, Center for International Research on Economic Tendency Surveys

October 6-7, 1989
Conference on Economic Growth, NBER

October 8-11, 1989
82nd Annual Conference, National Tax Association–Tax Institute of America*

October 17, 1989
Round Table: Reducing the Risk of Economic Crisis, NBER

October 19-20, 1989
Conference on the United States and Japan in the 1990s, NBER

October 26-27, 1989
Program Meeting: Financial Markets and Monetary Economics, NBER

November 3-4, 1989
Conference on Research in Income and Wealth: International Economic Transactions, NBER

November 14, 1989
Conference on Tax Policy and the Economy, NBER

November 16-17, 1989
Program Meeting: Taxation, NBER

November 19-21, 1989
Annual Meeting, Southern Economic Association*

December 8-9, 1989
Universities Research Conference: Labor Studies, NBER

December 14-15, 1989
Micro Brookings Panel on Economic Activity Conference, Brookings Institution

December 15-16, 1989
Program Meeting: International Studies: "International Competitiveness," NBER

March 22-26, 1990
Conference on Financial Crisis, NBER

April 5-8, 1990
Conference on Aging, NBER

April 13-15, 1990
Conference on Economic Growth, NBER

April 19-20, 1990
Program Meeting: Taxation, NBER

May 4-5, 1990
Conference on Research in Income and Wealth: Measurement Issues in the Service Sector, NBER

September 23-26, 1990
Annual Meeting, National Association of Business Economists*

September 22-25, 1991
Annual Meeting, National Association of Business Economists*

September 15-18, 1992
Annual Meeting, National Association of Business Economists*

September 19-23, 1993
Annual Meeting, National Association of Business Economists*

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

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Bureau News

NBER Economists to Washington

President George Bush has tapped three more NBER economists to join his administration. NBER Research Associate John B. Taylor has been named to the Council of Economic Advisers (CEA); Faculty Research Fellow Lawrence B. Lindsey has been appointed Associate Director of the Office of Policy Development; and former NBER Research Associate Michael R. Darby has been nominated Undersecretary for Economic Affairs at the U.S. Department of Commerce.

Taylor is a specialist in macroeconomics and monetary policy. He has been a professor at Stanford University since 1984 and previously taught at Princeton and Columbia.

Lindsey has been an assistant professor of economics at Harvard University since 1984. Prior to that appointment, he spent three years on the staff of the CEA in Washington.

Darby has been Assistant Secretary for Economic Policy at the U.S. Department of the Treasury. Previous to that, he was a professor of economics at the University of California, Los Angeles.

Tayylor and Lindsey will be working closely with CEA Chairman Michael J. Boskin who was an NBER Research Associate and Director of the Bureau's Palo Alto office before being appointed to the Council.

Report on Immigration Available

The NBER recently published a Summary Report on "Immigration, Trade, and the Labor Market." This 40-page booklet, edited by Richard B. Freeman, summarizes the results of an NBER project financed by the Ford Foundation and completed last year.

After an introduction and overview by Freeman, George J. Borjas describes recent immigration to the United States. Robert H. Topel discusses the impact of immigration on local labor markets; Lawrence J. Katz looks at how trade affects U.S. labor markets; and John M. Abowd compares the effects of immigration and trade in the United States and Canada.

The Summary Report is free and may be ordered by writing to: "Immigration Report," Publications Department, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138. A more in-depth description of this research will be published by the University of Chicago Press in a volume of the same title. Its availability will be announced in a future issue of the *NBER Reporter*.

Freeman is the director of the NBER's Program in Labor Studies and a professor of economics at Harvard University.

Tax Program Meeting in Cambridge

Members and guests of NBER's Program in Taxation, which is directed by David F. Bradford of Princeton University, met in Cambridge on December 1-2. The agenda was:

Jonathan S. Skinner, NBER and University of Virginia, "Housing Wealth, Taxation, and Saving"
Discussant: James M. Poterba, NBER and MIT

Lawrence H. Goulder, NBER and Harvard University, "Tax Policy, Housing Prices, and Housing Investment" (NBER Working Paper No. 2814)
Discussant: John B. Shoven, NBER and Stanford University

James R. Hines, Jr., NBER and Princeton University, "Multinational Transfer Pricing and Its Tax Consequences: Where the Profits Are"
Discussant: Christophe Chamley, Boston University

Richard J. Zeckhauser, NBER and Harvard University, and Stephen Johnson, Harvard University, "Tax Burden, In-Kind Transfers, and Direct Government Provisions"
Discussant: Richard J. Arnott, Queen's University

Don Fullerton, NBER and University of Virginia, "If Labor Is Inelastic, Are Taxes Still Distorting?" NBER Working Paper No. 2810)
Discussant: Andrew B. Lyon, NBER and University of Maryland

Jane G. Gravelle, NBER and Congressional Research Service, and Laurence J. Kotlikoff, NBER and Boston University, "The Efficiency Gains from the 1986 Tax Reform Act: A New Look"
Discussant: Alan J. Auerbach, NBER and University of Pennsylvania

Anne Dryden Witte, NBER and Wellesley College; Kurt Beron, University of Texas at Dallas; and Helen V. Tauchen, University of North Carolina, Chapel Hill, "A Structural Equation Model for Tax Compliance and Auditing" (NBER Working Paper No. 2556)
Discussant: Joel B. Slemrod, NBER and University of Michigan

Skinner analyzes the potential cost of tax policy—and, in particular, the subsidy to owner-occupied housing—in terms of higher housing prices. During the 1970s, the inflation-adjusted price of a new house rose by more than 20 percent. That type of appreciation benefits current homeowners, but makes future generations worse off, because they must devote a larger fraction of saving to housing than their predecessors did. Furthermore, revenue from taxing capital income may fall as tax-preferred housing wealth crowds out taxable nonresidential wealth. In sum, the impact of tax policy on housing wealth can have important effects on long-run capital accumulation.

Goulder investigates the effects of the Tax Reform Act of 1986 on the performance of housing and other industries. He finds that in the short run, the recent cuts in corporate tax rates, elimination of investment tax credits, and scaling back of depreciation deductions together have negative implications for investment in nonresidential capital but positive effects on housing investment. This mainly reflects the fact that prior to the 1986 tax reforms, investment tax credits and favorable depreciation rules disproportionately benefited nonhousing industries; hence, their removal especially affects industries other than housing and helps "crowd in" housing investment. Over the longer term, however, the tax changes imply lower investment in housing as well as in other types of capital. The reduced housing investment stems from adverse effects of the reforms on aggregate output and real income.

Hines analyzes the regulations that apply to international transfers within multinational firms. Multinational corporations frequently move large volumes of goods and services across borders between their parent companies and foreign affiliates. These transactions, and the prices at which they take place, have important tax consequences for firms and governments, since tax rates often differ dramatically among countries. Firms have incentives to declare profits in low-tax locations while governments often do not know where profits were really earned. Hines finds that current tax rules define income sources in a way that is inconsistent with other aspects of the tax system. A consistent treatment would be very simple to apply in some cases and would allocate income largely according to costs.

Zeckhauser and Johnson examine the use of in-kind transfers to increase the supply of a good, such as housing, and thereby lower its price. Old producers of the good will suffer, while old consumers of the good will benefit. To minimize costs, in-kind transfer programs must use subsidy discrimination: directing government expenditures to new but not to old producers. In practice, investment tax credits or training subsidies for new professionals are two examples of subsidy discrimination. Direct government production is an extreme case of subsidy discrimination and may provide a way to avoid pushing up rents to existing producers. In-kind transfer programs currently are used in the United States and most other nations.

Fullerton compares previous attempts to define and measure "marginal excess burden" of increasing taxes on labor in order to fund a public project. One procedure defines "marginal excess burden" only as the distortionary effects of the tax. The additional wage tax is distorting—that is, makes consumers worse off than a lump-sum tax would—even when actual labor supplied is unchanged. However, the government's decision to fund the public project is made easier by the extra revenue generated by consumers who work more in order to offset their lost income. This "extra-revenue effect" offsets the distortionary effect of the tax. A second measure of "marginal excess burden" includes both the distortionary *and* the revenue effect of the tax, and is zero in the special case in which actual labor supplied is unchanged. This measure leads to the correct decision about whether to fund the public project but leaves the incorrect impression that the wage tax is not "distorting." Even though the wage tax *is* distorting, the spending decision is *not* affected by the tax.

The Tax Reform Act of 1986 greatly altered corporate tax wedges, according to Gravelle and Kotlikoff. Although overall tax rates were relatively unaffected by the act, tax wedges in most industries where substantial noncorporate production occurs resulted in an annual efficiency gain of at least $31 billion.

Witte and her coauthors estimate a model for taxpayers' reported income, tax liability, and the probability of an audit. They find that audits stimulate compliance, but not by much and not for all groups. Audits are more effective at inducing accurate reporting of subtractions from income than of additions to income. IRS activities other than audits also have significant effects on compliance. The authors also find that compliance is higher, if anything, in areas with less-educated and older taxpayers, a large proportion of households headed by females, and a mostly native-born population.

Also attending the meeting were: Jeremy I. Bulow, NBER and Stanford University; Geoffrey Carliner and Daniel R. Feenberg, NBER; Martin Feldstein and Louis Kaplow, NBER and Harvard University; Michael Graetz, Yale University; David G. Hartman, NBER and Data Resources, Inc.; J. Vernon Henderson, NBER and Brown University; Douglas Holtz-Eakin and R. Glenn Hubbard, NBER and Columbia University; Robert P. Inman, NBER and University of Pennsylvania; Jeffrey K. MacKie-Mason, NBER and University of Michigan; Alvin Warren and Bernard Wolfman, Harvard University; Randall D. Weiss, Joint Committee on Taxation; and Mark Wolfson, Harvard University and MIT.

Program in Productivity Holds Meeting

Members and guests of the NBER's Program in Productivity met in Cambridge on December 9 to discuss recent research. The agenda, organized by Program Director Zvi Griliches of Harvard University, was:

Martin N. Baily, NBER and the Brookings Institution, and Robert J. Gordon, NBER and Northwestern University, "Measurement Issues, the Productivity Slowdown, and the Explosion of Computer Power"

Franklin Allen, Gerry Faulhaber, and A. Craig MacKinlay, University of Pennsylvania, "Unbalanced Growth Redux: New Model, New Data"

Barbara Fraumeni, Northeastern University, and Dale W. Jorgenson, Harvard University, "The Accumulation of Human Capital"

Baily and Gordon ask how much of the productivity slowdown since 1973 can be explained by measurement errors. They focus on four case studies and conclude that measurement error cannot explain more than about one-fifth of the total slowdown in nonfarm business private output per hour since 1973.

Allen, Faulhaber, and MacKinlay use 1963–7 data on the capital market to measure productivity growth in the service sector. They argue that an index of capital market performance is a better measure of total productivity growth than conventional measures, which show that services perform relatively more poorly than other sectors do.

Fraumeni and Jorgenson estimate the output of the educational system, which they measure as the incremental effect on human wealth of participation in formal schooling. Human wealth is defined as the sum of lifetime labor incomes for all individuals in the U.S. population. Based on their calculations, the value of human wealth is 14 to 16 times greater than estimates based on the costs of education. They conclude that the lifetime income approach to measuring investment in human capital, when applied to education, yields far greater estimates of the investment in education than those previously available.

Also attending the conference were: Ernst R. Berndt, NBER and MIT; Jeffrey I. Bernstein, NBER and Carleton University; Iain Cockburn and Elizabeth Kremp, Harvard University; Melvyn A. Fuss, NBER and University of Toronto; Wayne B. Gray, NBER and Clark University; Bronwyn H. Hall, NBER and University of California at Berkeley; Fumio Hayashi, NBER and University of Pennsylvania; Charles R. Hulten, NBER and University of Maryland; Adam Jaffe, NBER and Harvard University; Frank R. Lichtenberg, NBER and Columbia University; Robert E. Lipsey, NBER and Queens College; Catherine J. Morrison, NBER and Tufts University; Ariel Pakes, NBER and Yale University; Joshua Rosett and Muriel Thalmann, NBER; Mark Schankerman, NBER and London School of Economics; Donald Siegel, U.S. Bureau of the Census; and Edward N. Wolff, NBER and New York University.

This report was prepared with the assistance of Joshua Rosett.

Economic Fluctuations Program Meeting

About 100 members and guests of the NBER's Program in Economic Fluctuations attended its tenth anniversary research meeting on February 10 in Palo Alto. Program Director Robert E. Hall and Research Associates Thomas J. Sargent and John B. Taylor organized the following program:

S. Rao Aiyagari and Lawrence J. Christiano, Federal Reserve Bank of Minneapolis, and Martin S. Eichenbaum, NBER and Northwestern University, "The Output and Employment Effects of Government Purchases"
Discussant: Lars Peter Hansen, NBER and University of Chicago

Kevin M. Murphy, Andrei Shleifer, and Robert W. Vishny, NBER and University of Chicago, "Increasing Returns, Durables, and Economic Fluctuations"

Russell Cooper, NBER and University of Iowa, and John C. Haltiwanger, University of Maryland, "Macroeconomic Implications of Production Bunching: Factor Demand Linkages"

Steven N. Durlauf, Stanford University, and Robert E. Hall, "Measuring Noise in Stock Prices"
Discussant: Robert J. Shiller, NBER and Yale University

David Card, NBER and Princeton University, "Unexpected Inflation, Real Wages, and Employment Determination in Union Contracts" (NBER Working Paper No. 2768)
Discussant: Robert E. Hall

Nobuhiro Kiyotaki, University of Wisconsin, and Randall Wright, University of Pennsylvania, "Fiat Money in Search Equilibrium"
Discussant: Robert E. Lucas, Jr., NBER and University of Chicago

Robert J. Hodrick, NBER and Northwestern University, Narayana Kocherlakota and Deborah Lucas, Northwestern University, "The Variability of Velocity in Cash-in-Advance Models" (NBER Working Paper No. 2891)
Discussant: John B. Taylor

Prakash Loungani, University of Florida, and Richard Rogerson, Stanford University, "Cyclical Fluctuations and Sectorial Allocation: Evidence from the PSID"

Discussant: David M. Lilien, University of California at Irvine

Aiyagari, Christiano, and Eichenbaum find that persistent increases in government spending have more of an effect on employment and output than temporary increases do. If changes in income do not affect leisure at all, then labor supply depends only on the current real wage and is not a function of the real interest rate. In this special case, the aggregate supply of output does not respond at all to changes in the interest rate, and the effects of temporary and permanent changes in government purchases are both zero. Where changes in income positively affect leisure, the aggregate supply of output increases as the interest rate increases, and permanent changes in government spending have an impact that is at least as strong as the impact of temporary changes.

Murphy, Shleifer, and Vishny consider increasing returns to scale in production as a possible explanation of the procyclical behavior of productivity. With increasing returns to scale, booms are associated with high productivity and high real wages while recessions are associated with low productivity and low real wages. Since consumer goods are durable, demand is highly elastic in the short run, as consumers can easily accelerate or defer purchases over time. The combination of elastic demand and downward-sloping supply makes it inefficient for firms to produce at a constant level. However, efficient output fluctuations are unlikely in an equilibrium in which, because of increasing returns, the coordinated effort of many firms is required to change industry output.

Cooper and Haltiwanger investigate the macroeconomic implications of nonconvexities in production. In the simplest case—a single storable good produced with a nonconvex technology in a Robinson Crusoe economy—the efficient production pattern involves periods of production and periods of idleness. Inventories can be used to help smooth consumption over time, but in general consumption will not be completely smoothed. Thus there will be fluctuations in production and consumption.

Durlauf and Hall present an alternative methodology for understanding the extent of misspecification in expectations-based models. They apply their methodology to the hypothesis that the market value of a stock is the present discounted value of expected future dividends. In particular, they ask whether the variance of model misspecification is large relative to the variance of stock prices. They find that model noise dominates fluctuations in stock prices. Therefore, understanding the noise component of stock prices is critical to an understanding of the stock market.

Card asks how changes in employment are related to changes in real wages. Using a large sample from the unionized sector of Canadian manufacturing, he finds support for nominal contracting models of employment (in which real wage changes trace out movements along a downward-sloping labor demand sched-

ule). He also finds that unexpected price changes occurring within a contract period generate unanticipated real wage changes. These lead to changes in employment that do not fade over time. Card's findings are consistent with a labor market model in which nominal wages are set in anticipation of future demand conditions, and firms are free to set employment in response to price changes.

Kiyotaki and Wright analyze how unbacked currency can function as a medium of exchange. They develop a general equilibrium barter model in which individuals with heterogeneous tastes exchange currency for goods. They show that an equilibrium exists where currency has positive value. In this equilibrium, individual traders who use currency have higher utility than those who barter, in part because they acquire their desired consumption goods more quickly. Finally, the use of fiat money stands up to variations in the model, such as some transactions costs, rate-of-return dominance, and taxation of currency.

Hodrick, Kocherlakota, and Lucas examine a class of rational expectations models that produce demand for money from the explicit solution of an economic agent's constrained maximization problem. They are interested in how predictions of the models about the endogenous stochastic processes for variables such as the velocity of circulation of money, the price level, and the nominal and real interest rates change with changes in the parameters of agents' objective functions. Some of the models work quite poorly, in the sense that their money demand functions are not sensitive to interest rates; in others, the elasticity of money demand with respect to the nominal interest rate is realistic. But even the more realistic models often are inconsistent with data from the U.S. economy regardless of the forcing processes, the preference specifications, or the precision of the agents' information about the future.

Lougani and Rogerson examine whether the observed correlation between the dispersion of sectorial growth rates and unemployment is evidence that intersectorial movements of labor account for much of total unemployment. Using disaggregated data from the Michigan Panel Study of Income Dynamics, they trace the movement of workers over time and are able to measure the amount of unemployment attributable to reallocating labor across sectors. They find that sectorial mobility is important in explaining total unemployment.

David Bizer of Johns Hopkins University assisted in the preparation of this article.

Financial Economists Meet

About 40 members and guests of the NBER's Program in Financial Markets and Monetary Economics met in Cambridge on February 24. The agenda was:

French and Poterba investigate the wide disparities in observed price–earnings ratios (P/Es) between the United States and Japan. At the end of 1988, the U.S. P/E was approximately 13, while the Japanese P/E was 54. Even after adjusting for accounting differences, principally differences in depreciation practices and intercorporate equity holdings, Japanese P/Es are roughly double those of U.S. firms. Moreover, the rapid increase in the Japanese P/E during the mid-1980s is difficult to reconcile with traditional "dividend discount" models of stock price valuation. Neither increases in Japanese dividends and earnings during this period, nor the variation in the required returns on equities, seem large enough to explain the rise in Japanese price-earnings ratios.

Cecchetti, Lam, and Mark examine the recent empirical finding that stock returns contain substantial negative serial correlation at long horizons. They argue that this is consistent with a model of an endowment economy with a representative agent where asset price movements depend on the desire of investors to smooth consumption. The authors find that when investors display only a moderate consumption-smoothing motive, their model easily can produce the amount of mean reversion present in historical data on returns.

Giovannini and Weil show that the parameters measuring risk aversion and intertemporal substitution affect consumption and portfolio allocation decisions in symmetrical ways. An elasticity of intertemporal substitution of one leads to myopia in consumption–saving decisions (the future does not affect the optimal consumption plan), while a coefficient of relative risk aversion of one gives rise to myopia in portfolio allocation (the future does not affect optimal portfolio allocation). The empirical evidence is consistent with the behavior of intertemporal maximizers who have a coefficient of relative risk aversion of one and an elasticity of intertemporal substitution different from one.

Knowing the marginal propensity to consume out of wealth is important for evaluating the effects of taxation on consumption, for assessing the possibility of multiple equilibriums because of aggregate demand spillovers, and for explaining observed variations in consumption. Kimball analyzes the effect of uncertainty on the marginal propensity to consume within the context of the permanent-income hypothesis. He finds that given plausible conditions of the utility function, income risk raises the marginal propensity to consume out of wealth. He also characterizes the marginal investment portfolio in response to changes in wealth.

Mishkin asks what the term structure (for maturities of 12 months or less) tells us about future inflation in ten OECD countries. He finds that for the majority of the countries in his sample, the term structure contains little information about the future path of inflation. However, in France the term structure contains a highly significant amount of information about future changes in inflation, while the term structures in both Germany and the United Kingdom provide some significant information, but not as much. For every country studied except the United Kingdom, however, there is a great deal of information in the term structure of *nominal* interest rates about the term structure of *real* interest rates. This suggests that, for most countries, researchers can examine observable data on the nominal term structure to provide them with information about the behavior of the *real* term structure.

Shiller surveyed investors in initial public offerings (IPOs) to learn about patterns of investor behavior that might be relevant to theories of underpricing. Respondents were asked for their perception of the allocation process, their concern with stockbroker or underwriter reputation, their theories of IPO underpricing, and their communications and information sources. His results support some existing theories of IPO underprising and also suggest different hypotheses: the impresario hypothesis, that underwriters deliberately underprice to obtain publicity and promote enthusiasm; an investor risk perception hypothesis; and a fairness-relationship hypothesis.

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Bordo is an NBER research associate and a professor of economics at the University of South Carolina.

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Summers is the Nathaniel Ropes Professor of Political Economy at Harvard University and an NBER research associate.

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**Alan J. Auerbach, Robert Hagemann,
Laurence J. Kotlikoff,** and **Giuseppe Nicoletti**
Working Paper No. 2797
February 1989
JEL No. 320

Demographic changes on the scale of those anticipated in most OECD countries have many economic