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NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.

WINTER 1980

Program Report

Pensions

John B. Shoven

The NBER research program in the economics of public and private pensions is directed by John B. Shoven of Stanford University. This research program has two main thrusts: the labor market aspects of pensions and the financial considerations of pensions. Project codirector Kim B. Clark, Harvard Business School, oversees the labor studies portion, while codirector Zvi Bodie, Boston University, has responsibility for the financial area. In addition to the labor and financial areas, the pension researchers are particularly interested in international comparisons of pension systems and in the particular problems of state and local public pensions in the United States.

From the labor market perspective, the program is concerned with the effect of pensions, and of particular pension plan characteristics, on labor mobility as well as on the decision to retire. Various studies address such questions as how a defined contribution versus a defined benefit plan can affect job tenure, hiring, and quits.

From the financial perspective, a number of topics present themselves as well. How adequate is pension funding? How sensitive are estimates of unfunded pension liabilities to actuarial assumptions? How do pensions and inflation interact? What is the relationship between a firm's financing and real investments and the funding and investment allocation of its pension plans? Are unfunded pension liabilities capitalized when the securities market values the firm? How do tax laws interact with pension funding and investment allocation? Does the accumulation of pension rights affect private saving?

Members of the pension program, approximately thirty scholars from across the country, gathered at the NBER Summer Institute in 1980. Their meeting purposely overlapped with meetings of the financial markets program, the taxation group, and those involved with labor studies. This produced a great deal of productive interchange

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This issue of the *Reporter* highlights the Bureau's project on pensions. Next, Jeffrey Sachs discusses his work on international economic growth; Robert Shiller discusses research on the causes of movements in stock price indexes; and Christopher Sims describes quantitative studies of the business cycle. After the quarterly Economic Outlook Survey are a section of biographical sketches and news of NBER conferences. With this issue of the *Reporter*, the NBER inaugurates a new service—the Conference Calendar. Next is other NBER news and reports and a section on NBER books. Short summaries of recent NBER Working Papers constitute the final section of the *Reporter*.

among members of the various research groups. In July, the pension program held a two-day conference in which six papers were presented. Myron Scholes, University of Chicago, discussed executive compensation, particularly the interaction between taxes and incentive programs. Irwin Tepper, Harvard Business School, looked at taxes and corporate pension policy. Richard Hemming, Institute for Fiscal Studies, discussed pension issues in the United Kingdom; while James Pesando of the University of Toronto presented an overview of Canadian pension issues. Jerry Hausman, MIT, presented a paper on pensions among government workers. Finally, Emily Andrews and Tom Woodruff of the President's Commission on Pensions Policy discussed data that they are generating and research that their group has commissioned.

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The President's Commission on Pensions Policy has already surveyed approximately 5000 households over two years, 1979–80, and collected information on wealth, income, and pension provisions for retirement. Such survey data should be extremely useful in the research of NBER pension project members.

In addition to plans for meeting next July in Cambridge, program members will meet annually at the Bureau's Palo Alto office beginning this January. Seven papers will be presented at the first of these annual meetings: "Pension Fundings and Allocation of Pension Investment," by Benjamin Friedman, Harvard University; "An Empirical Study of the Retirement Decision," by Steven Kutner, SRI International; "The Effect of Pensions on Retirement," by Gary Fields and Olivia Mitchell, Cornell University; "A Theoretical Rationale for Social Security," by Robert Merton, MIT; "Investigation of the Tepper-Black Funding and Allocation Theory," by Myron Scholes; "Current Issues in the Funding of Pensions," by Irwin Tepper; "Social Security, Pensions, and Saving," by Mordecai Kurz, Stanford University.

Still another aim of the project is to assemble a book, or almanac of facts, about pensions. Clark and Laurence Kotlikoff of Yale University are in charge of that project. Such a book is expected to be comprehensive, dealing with pension obligations, the structure of benefits, the character of pension assets, asset growth, pension coverage, and other data. Finally, preliminary plans exist for special studies of pensions and inflation and the economics of mandatory pensions.

Research Summaries

International Economic Growth

Jeffrey D. Sachs

The Western industrialized economies experienced a pervasive and sharp slowdown in economic growth in the 1970s. From 1973—the year of the first oil crisis—until 1979, real growth of GNP in the OECD countries averaged 2.6 percent per year, down sharply from the 1965–73 rate of 4.7 percent. The widespread character of the slowdown (all twenty-five OECD economies but Turkey had lower GNP growth rates during 1973–79) suggests that common external events, such as OPEC price increases, and various channels of interdependence among the developed economies are important ingredients in explaining international patterns of growth in the 1970s. Certainly we cannot fully understand the U.S. growth slowdown if we focus only on domestic economic variables. In collaboration with Michael Bruno of NBER and Hebrew University and David Lipton of NBER, I have investigated the roles of energy prices and other international linkages in recent economic growth. This report describes some of those efforts.

TABLE 1. Real Rates of Return on Corporate Capital, by Country, 1962-76

Year or period	Percent						
	Canada	France	Germany	Italy	Japan	United Kingdom	United States
1969	9.8	11.5	20.7	12.2	30.6	10.0	10.2
1970	6.6	11.5	18.2	11.5	28.1	8.7	8.1
1971	8.4	10.6	15.6	9.4	23.5	8.7	8.4
1972	9.4	12.3	13.4	9.9	20.2	8.6	9.2
1973	11.4	11.8	12.9	n.a.	15.7	7.2	8.6
1974	11.4	10.8	12.7	n.a.	13.1	4.0	6.4
1975	8.2	5.2	10.0	n.a.	13.9	3.4	6.9
1976	8.1	n.a.	11.4	n.a.	n.a.	3.6	7.9
<u>Average</u>							
1962-64	7.9	9.7	19.3	10.4	28.2	11.9	12.0
1965-69	9.6	10.0	19.5	11.4	27.9	10.6	12.2
1970-73	9.0	11.6	15.0	10.3	21.0	8.3	8.6
1974-76	9.2	8.0	11.4	n.a.	13.5	3.7	7.1

Energy Prices and Economic Growth

The dramatic rise in OPEC prices in 1973-74 and again in 1979-80 came after two decades of falling real energy prices. And just as the gentle decline in real energy prices during 1955-70 had facilitated high growth rates within the OECD, the jump in prices led by OPEC during the 1970s has been a major contributor to our recent economic problems. In addition to energy, other imported primary inputs to production have shown significant (though smaller) relative price increases in the 1970s, adding to the drag on growth. In a series of papers, Bruno and I describe how price increases of imported intermediate inputs in the 1970s contributed to the deep worldwide recession of 1973-75 and to slower growth since 1975.¹ Supply shocks such as the OPEC price increases have important effects on short-run output for *given* capital stocks, as well as on the rate of growth of capital itself. Perhaps the main theoretical challenge in modeling a rise in input prices lies in the proper integration of the Keynesian short-run effects with the longer-run classical responses.

Bruno has shown that the "factor price frontier" (FPF) is a very useful concept for thinking about the role of input prices in growth.² The FPF measures the various combinations of wages, profit rates, and raw materials prices that are possible with a given technology. When energy prices rise, wages and profits must give way, ac-

ording to the FPF. To the extent that real wage growth does not fall, profits must absorb more of an energy price shock. In general, real wage growth must fall in the short run if full employment is to be maintained. If real wage growth is rigid, unemployment results. Even where wage growth falls to the level consistent with short-run full employment, the profit rate will remain lower than before the energy price increase. This lower rate of profit will then depress capital accumulation and growth.

In a recent study, I investigated the response of wages and profits to the input price shocks of the 1970s, in the seven major OECD economies.³ In almost all countries, profitability was squeezed by the energy price increases in 1973-74, though more severely in countries with "stickiness" of real wage growth. Since real wages are fairly flexible downward in the United States, profitability here suffered relatively little in the 1970s. Table 1 presents some data from "Wages, Profits, and Macroeconomic Adjustment." Notice in particular the widespread decline in profitability (in all countries except energy-rich Canada), and the remarkable severity of the decline in Germany, Japan, and the United Kingdom. More recent data for Germany and Japan show a slight amelioration of this squeeze, but certainly no reversal. Not surprisingly, the largest declines in investment rates and capital stock growth have come in countries with the poorest profit experiences, as I show in that study.

This work is now being extended with Bruno and Lipton to include econometric estimates of the factor price frontier for a number of countries. Our preliminary results confirm the important contribution of rises in the prices of imported inputs to the recent decline in profitability around the world.

A second approach to studying the role of energy in economic growth is through large-scale theoretical models. I have recently implemented a computer simulation model to study energy and growth in an international

¹See M. Bruno and J. D. Sachs, "Macroeconomic Adjustment with Import Price Shocks: Real and Monetary Aspects," NBER Working Paper No. 340, April 1979; M. Bruno and J. D. Sachs, *Supply versus Demand Approaches to the Problem of Stagflation*, NBER Working Paper No. 382, August 1979, also forthcoming in *Weltwirtschaftliches Archiv*; J. D. Sachs, "Wages, Profits, and Macroeconomic Adjustment," *Brookings Papers on Economic Activity*, 2 (1979); M. Bruno, "The Factor Price Frontier and the Real Effects of Raw Materials Prices," in preparation; J. D. Sachs, "Energy and Growth under Flexible Exchange Rates: A Simulation Study," NBER Working Paper No. 582, November 1980, also forthcoming in Bhandari and Putnam (ed.), *The International Transmission of Economic Disturbances under Flexible Exchange Rates*.

²See M. Bruno, "The Factor Price Frontier and the Real Effects of Raw Materials Prices," in preparation.

³See J. D. Sachs, "Wages, Profits, and Macroeconomic Adjustment," *Brookings Papers on Economic Activity*, 2 (1979).

context.⁴ The model describes the impact of OPEC on two growing regions (the United States and Europe) that interact in commodity and capital markets. The behavioral relations in the model are all derived from the dynamic optimizing behavior of firms and households, under conditions of "rational expectations." Thus, the model provides a theoretically "pure" case for studying the energy price increases. Real world complications can, in many cases, be easily grafted onto the model. Because of the complexity of the model, special techniques for solving the system of equations are necessary, and these have been worked out in a joint effort with Lipton, James Poterba, and Lawrence Summers.⁵

The model yields a variety of results on economic growth after a supply shock and, more generally, on the channels of interdependence of growing economies. The simulation results show that the key factors determining the response to an OPEC shock are the patterns of real-wage setting, the savings behavior of OPEC, and the production technologies of the developed economies. Real wage rigidity in one region slows growth not only in that region but in the second region as well. A high OPEC saving propensity *moderates* the decline in growth in the two regions. As OPEC revenues are recycled into capital markets of the developed economies, real interest rates are depressed and investment demand is spurred. Finally, the nature of technology determines how sharply profits are squeezed when energy prices rise. At the risk of oversimplification, one might say that the more heavily energy prices depress profits rather than wages, the greater is the long-run negative effect on capital intensity in the economy (this result is closely tied to the capital-energy complementarity question raised by Jorgenson and others).⁶ The larger the long-run drop in capital intensity is, the sharper the short-run fall in investment and growth is.

Channels of Economic Interdependence

The common response of developed economies to external price shocks is just one source of the observed correlation of output movements among the developed economies. Other sources include direct interactions via trade flows, co-movements of policy instruments (particularly monetary policies), and the joint response of OECD economies to other types of external shocks, such as interest rate movements in world capital markets. Sorting out the importance of these various linkages is not only worthwhile as an intellectual endeavor, but is also crucial for better coordination of macroeconomic policies with other developed economies. For example,

⁴See J. D. Sachs, "Energy and Growth under Flexible Exchange Rates: A Simulation Approach," NBER Working Paper No. 582, November 1980.

⁵See D. Lipton, J. Poterba, J. D. Sachs, and L. Summers, "Multiple Shooting in Rational Expectations Models," NBER Technical Working Paper No. 3, August 1980.

⁶See, for example, Edward Hudson and Dale Jorgenson, "Energy Prices and the U.S. Economy," Discussion Paper No. 637, Harvard Institute for Economic Research, July 1978.

during 1975-78, the United States strongly urged a simultaneous expansion of demand in Germany, Japan, and the United States as the way out of the worldwide growth slowdown. Authorities abroad, however, disputed the U.S. contention that trade linkages among the larger economies were sufficiently important to require a common policy. Each economy, they argued, could go its own way. Along with my work on energy, I am attempting to quantify some of these additional sources of interdependence, with the ultimate goal of evaluating the merits of alternative forms of policy coordination.

With David Lipton, I have been elaborating a model of two-country growth to serve as a framework for studying interdependence.⁷ Indeed, a special version of the model underlies the energy simulation described earlier. In our thinking, the most subtle and pervasive channel for transmitting disturbances across economies is the integrated world capital market. To the extent that home and foreign financial claims are close substitutes, *ex ante* after-tax yields on home and foreign assets will be equalized. Investment flows will then guarantee that the physical marginal productivities of capital in each country will be equated to the world cost of capital and to each other.⁸ Since most forms of macroeconomic policy affect world interest rates, policy changes abroad can show up rapidly and strongly in the rate of domestic investment. This seems to be particularly true of fiscal policy. Our simulations reveal strong negative effects on home investment of many forms of foreign fiscal expansion that tend to raise the world interest rate.

These international capital market linkages help to explain the effects on OECD growth of the acceleration of output in the newly industrializing countries (NICs) such as Korea, Taiwan, and Brazil. Almost all analyses of the NICs stress the effects of their direct trade penetration into OECD markets. In our study, Lipton and I show that a far more important effect may arise as integrated world capital markets channel new investment into highly profitable NIC enterprises and away from OECD industries. In our model, the OECD clearly shares in the NIC growth, however, by running surpluses vis-a-vis the NIC economies, thus accumulating claims to the increased NIC capital stock.

Obviously, a great many empirical issues are raised by the question of the international transmission of output and investment fluctuations. In work now under way, I am focusing on one aspect of the problem, by asking whether macroeconomic policies themselves are tied closely enough across economies to provide a major channel for transmitting disturbances. Analysts in international economies have raised this question by asserting that flexible exchange rates guarantee a measure of independence of monetary policy. Is there evidence that monetary policies are now less closely linked than be-

⁷See D. Lipton and J. D. Sachs, "Accumulation and Growth in a Two-Country Model," NBER Working Paper No. 572, October 1980.

⁸Of course, differential tax treatment of capital income across economies may cause long-run divergences in physical marginal productivities of capital.

fore 1973, when floating rates emerged? Or, as a practical matter, has the same level of policy dependence been maintained in the recent period?

According to evidence that I have examined for the 1973-78 period, there is a significant increase in autonomy in national monetary policy that we might expect to lead to reduced business cycle transmission. During the fixed exchange rate period, for example, U.S. monetary policies clearly led those of other countries. After 1973, the link from the United States to Europe and Japan breaks down. Indeed, "surprises" in U.S. monetary policy seem now to be negatively correlated with policy surprises abroad. The obvious next step is to examine whether the decreased monetary policy covariation finds a counterpart in the reduced transmission of fluctuations in output.

The Causes of Movements in Corporate Common Stock Price Indexes

Robert J. Shiller

What accounts for the large and erratic movements in aggregate stock indexes such as the Dow Jones Industrial Average? In spite of decades of econometric research on financial markets, there is no general agreement about the nature of the shocks to the economy that produce these movements. We have, for the most part, only abstract theories suggesting the difficulty in discerning the causes of the movements. According to models of efficient markets, stock prices move because of new information. (As soon as information relevant to the pricing of securities becomes available, the market reevaluates the securities.) Intelligent investors have an incentive to react to new information quickly and with their sharpest judgment and attention. Thus, stock price movements may occur before information becomes widely disseminated or easily interpreted, and before any casual or academic observer sees an objective reason for the movement.

The efficient markets theories suggest that it is difficult to explain why the market rose or fell *today*. Still, it ought to be possible to find out after the fact what information influenced stock prices. One can consider two categories of information: (1) information about future dividends or earnings or (2) information about the rates of interest used to discount future dividends. (Dividends and earnings, as well as variables relating to discount rates, are ultimately observed.) My recent research has been the interpretation of movements in stock price indexes in terms of events that occur subsequently.

The simplest and most popular theory of aggregate stock prices attributes most of their movements to information about future dividends or earnings. In its extreme form, this theory asserts that real stock prices are the present value of real dividends discounted by a constant, real discount rate. In the case of some individual securities, we can observe that the information that caused a

change in price did indeed concern the prospective future dividends. For example, some individual stocks have been observed to decline rapidly in value before bankruptcy occurs. It is tempting, therefore, to generalize from these observations and to suppose that movements in aggregate stock prices are primarily the reflection of new information about future aggregate dividends. Many people have apparently reached such a conclusion. When asked to explain a particular decline in a stock market index, they may say that the earning prospects for corporations have declined because the economic outlook has worsened (a "recession is around the corner"), which will cause dividends to decline in the future. This explanation agrees with the popular notion, moreover, that movements in stock prices lead indexes of aggregate economic activity by a few months to a year, roughly the forecasting horizon.

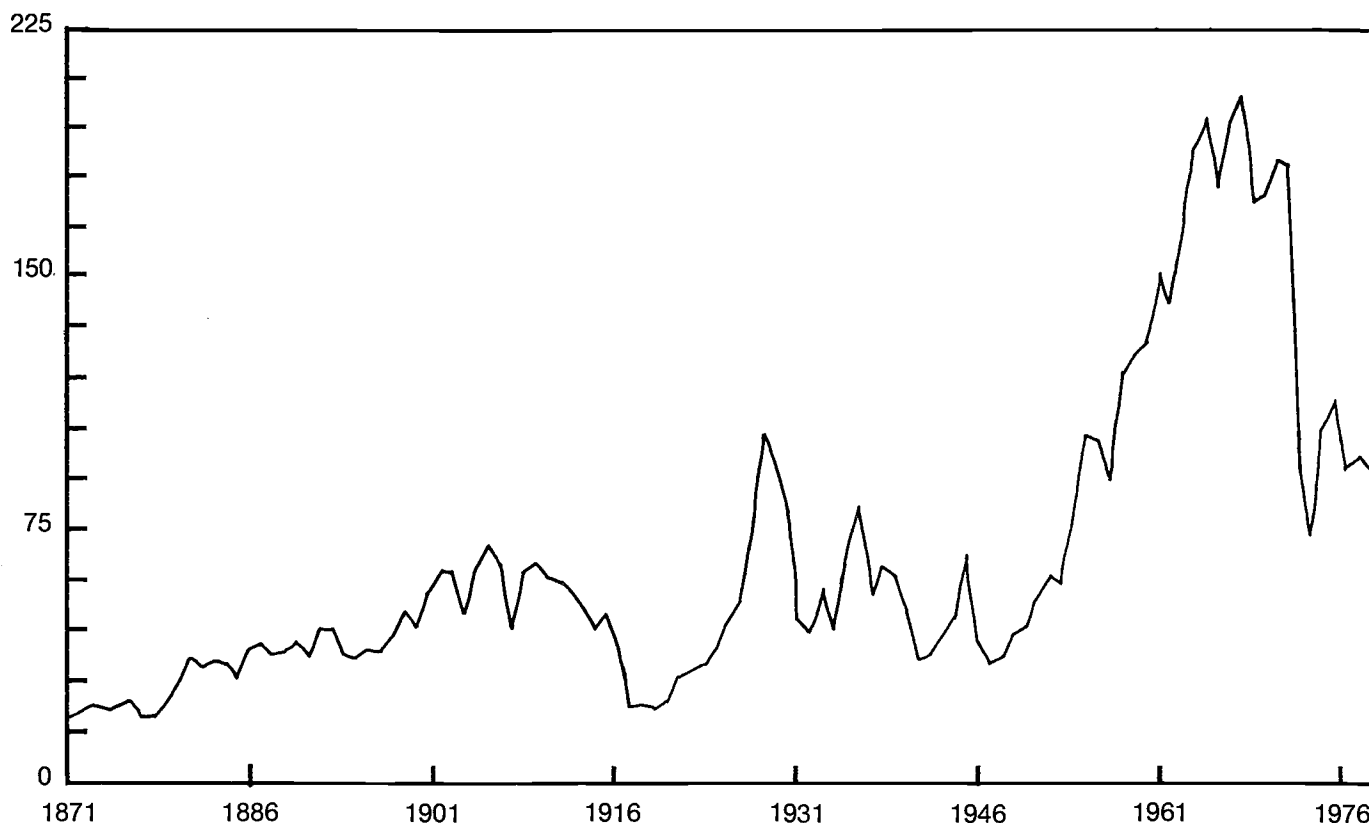
Such a theory is based, however, only on casual observation. One needs to know if there is any statistical evidence that movements in aggregate stock prices really do reflect new information about future aggregate dividends, or that such movements are an appropriate response to information about dividends (not too large or too small a response).

One form of evidence often cited is that no one seems to be able to clearly forecast (real) stock market returns. The real return on a portfolio of stocks is the change in the value of the portfolio, plus the total dividends on the stocks in the portfolio, divided by the value of the portfolio, adjusted for inflation. Tests reveal that such real returns cannot be forecast well; that is, the correlation coefficient with respect to any previously observed information is not very high and is not statistically significant unless long, historical time series are used. While one can show, using one hundred years of Standard & Poor's data, that real returns are correlated slightly but significantly positively with the lagged dividend-price ratio, this fact is considered by many people to be of questionable relevance to modern conditions and of minor interest, given the possible errors in early data.

Suppose we knew that real stock returns could not be forecast at all, and that prices were not on an explosive path. Then, real stock prices would be the present value of optimally forecast real dividends using a constant real discount rate. (One can prove this by solving the rational expectations difference equation subject to the terminal condition.) It seems quite reasonable to believe that prices are not on an explosive path, since the dividend-price ratio or earnings-price ratio shows no particular trend over the last century. Thus, it would follow that movements in stock prices are an appropriate and optimal response to new information about future dividends.

We do not know from the tests, however, that returns absolutely cannot be forecast. We know only that the correlation coefficient between short-term or annual returns and information is *small*. Unfortunately, a small correlation is also consistent with an alternative hypothesis that stock prices are contaminated by a large amount of noise that cannot be forecast well. For example, suppose stock prices equaled (1) the expected present value

Figure 1. Real Standard & Poor's Stock Prices, 1871-1980



Note: The Standard & Poor's Composite Stock Price Index for January divided by the Wholesale Price Index for 1871-1980.
SOURCE: Standard & Poor's Statistical Service and the U.S. Department of Labor, Bureau of Labor Statistics.

of real dividends that were optimally forecast plus (2) a noise term that followed a first-order autoregressive process with autocorrelation close to one. The noise might reflect market fads or moods of optimism or pessimism. If this noise dominated the stock price movements, then the real returns could not be forecast well. We could not provide significant statistical evidence that stock price movements can be forecastable without a long sample. This alternative hypothesis implies no impressive or quick profit opportunities. If fads take decades to end, then one cannot often observe them end.

Despite the difficulty of proving the correlation of stock returns with information, is it possible to establish whether movements in stock prices reflect new information about future dividends? In two NBER working papers, I have attempted to show that stock prices are too volatile to be explained by investors' optimal responses to new information about future dividends.¹ These papers propose and discuss tests of volatility that do not reduce to

regression tests and that are robust to data errors such as misalignment and changes in the composition of the index. Thus one can use long, historical time series to test the model and verify whether the volatility of the stock prices exceeds the bounds allowed by the observed variability in dividends.

The data series that are used in these tests are shown in figures 1 and 2. Figure 1 shows the Standard & Poor's Composite Stock Price Index since its beginning in 1871, divided by the wholesale price index scaled to 1979 = 1.00 (to form a "real" stock price series). This index, created by Alfred Cowles in 1938 and updated by Standard & Poor's Statistical Service, is representative of the entire New York Stock Exchange. The series looks a little different from the usual plot of the nominal series, and may be observed to have declined very rapidly in the 1970s. The rapid decline in the *real* stock price index is due to the high inflation during this period. Figure 2 shows the total dividends paid by the stocks in the Standard & Poor's Index divided by the same wholesale price index.

In looking at these plots, one observes first that both series (particularly the dividend series) seem dominated by a strong growth trend. Both real series grew over this century at about 25 percent per year. Compounded over 109 years, this implies that the series are roughly five times as big at the end as at the beginning. The two series

¹The basic argument that stock prices appear to be too volatile appears in R. J. Shiller, "Do Stock Prices Move Too Much to Be Justified by Subsequent Movements in Dividends?" NBER Working Paper No. 456 (forthcoming in the *American Economic Review*). The statistical foundations for the tests are advanced further and alternative hypotheses considered in R. J. Shiller, "The Use of Volatility Measures in Assessing Market Efficiency," NBER Working Paper No. 565 (forthcoming in the *Journal of Finance*, May 1981).

Real
Dividends

Figure 2. Real Standard & Poor's Dividends, 1871-1979



Note: Dividends accruing to stocks in the Standard & Poor's Composite Stock Price Index divided by the Wholesale Price Index, 1871-1979.
SOURCE: Standard & Poor's Statistical Service, Cowles Commission for Research in Economics, and the U.S. Department of Labor, Bureau of Labor Statistics.

also show correlated fluctuations about the growth path. As a percent of the growth trend, the fluctuations in price are somewhat bigger than the fluctuations in dividends. Many people are surprised at how stable the fluctuations of dividends are around their growth path. Even in the Great Depression of the 1930s, dividends were only briefly below the growth path. Of course, some will argue that while earnings series are volatile, dividends are relatively stable because firms attempt to stabilize them. Still, dividends are the money that investors actually receive. So, if firms can stabilize dividends for a hundred years, then the volatility of earnings is of no relevance to investors who price the shares.

If real prices are the present value of expected real dividends, then the price series ought to appear smoother in some sense than the dividend series.² (Present values are long, weighted moving averages, and moving averages have the well-known property of smoothing a series.) While the price series is, according to the efficient markets model, the moving average of expected dividends (rather than a simple moving average), one can still show that there is an upper limit to the standard deviation of

the change in price given the standard deviation either of dividends or of the change in dividends. Using the upper limit, it was found that changes in stock price indexes vary too much to be explained by a random receipt of information about dividend movements (around their long-run growth trend). The standard deviation of the fluctuation of the dividend series around its growth path would have to be at least five times as large as that observed in figure 2 in order to justify the standard deviation of the change in price observed in figure 1.

The statistical question that must be answered before we know the significance of the results is: are the standard deviations accurately measured in a sample of this size? It certainly appears possible to measure the standard deviation of the annual change in price since we have over a hundred observations on this variable with negligible correlation among them. We can then use this data to put a chi-squared lower bound on this standard deviation, which in turn implies a lower bound on the standard deviation of the dividend around its trend. The question that remains is whether it is possible that the standard deviation of dividends around this trend really is this high, and that the standard deviation of the sample is very understated. It is often suggested that the dividend series is really a random walk, so that the actual standard deviation of dividends is infinite. However, this particular

²The smoothness of the price series can be formally defined in terms of the spectrum as shown in R. J. Shiller, "The Volatility of Long-Term Interest Rates and Expectation Models of the Term Structure," *Journal of Political Economy*, 87: 1190-1219, October 1979.

possibility does not appear to be the most promising. Instead, the most promising model suggested to me to date is a "disaster" model in which there is a small probability of disaster in each period. The disaster might be a nationalization, punitive taxation of profits, conquest by a foreign power, or something else. Even though the disaster did not occur in the sample, its probability might have changed from year to year, causing the price to move. The problem with this model, however, is that the probability of disaster would have had to change a lot to justify the price movements. The standard deviation of the change in price is 18 percent of the trend. Thus, by my calculations, the standard deviation of the probability of disaster in any given year would have to exceed .05 if it is to account for that portion of the standard deviation of the change in price not explained by the sample standard deviation of dividends around the trend.

Further research will explore whether information about discount rates, rather than information about future dividends, might account for the bulk of stock price movements. In a preliminary paper with Sanford Grossman, we use the fact that the appropriate rate of discount for risk averse individuals is the marginal rate of substitution between present and future consumption.³ The marginal rate of substitution is measured using historical consumption data. Preliminary results indicate that the magnitude of stock price movements and the historical correlation between stock prices and aggregate economic activity might be explained in terms of such a theory, although the explanation seems to require a very large element of risk aversion.

³S. J. Grossman and R. J. Shiller, "The Determinants of the Variability of Stock Market Prices," NBER Working Paper No. 564 (forthcoming in the *American Economic Review*, May 1981).

Quantitative Studies of the Business Cycle

Christopher A. Sims

A number of economists have begun using statistical techniques for exploring the dynamic interactions of several variables without the heavy load of a priori restrictions required by standard, simultaneous equation methods.¹ These statistical methods are already shedding some interesting new light on at least one old macroeconomic controversy—the question of the validity of monetarist interpretations of money-income correlations.

The difference between the current value of a variable and the value forecast for it one period earlier is called the "innovation" in the variable. It can be thought of as the surprising part of the change in the variable. In a lin-

¹Among them are John Geweke of the University of Wisconsin, Cheng Hsiao of the University of Toronto, and Robert Litterman of MIT, in addition to myself.

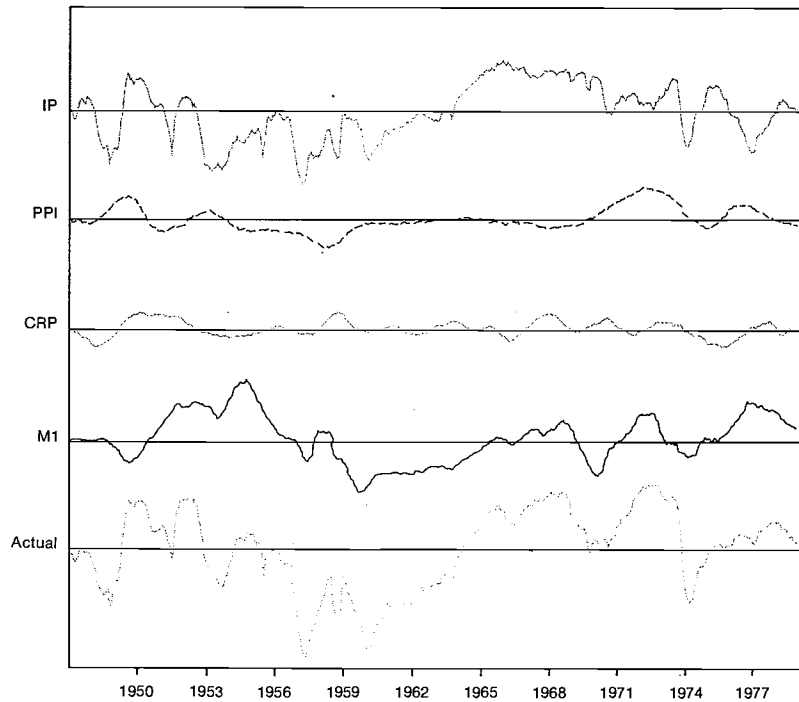
ear model, each variable can be expressed in terms of the current and past innovations in itself and all the other variables in the system. This description of the dynamics can be estimated without invoking claimed a priori knowledge to restrict the system, except for an assumption that there is some persistent pattern in the relation of current values of the variables in the system to their recent past values. The decomposition of variables into components due to innovations can be presented graphically in at least two intuitively appealing ways. One can display the components of the historical variation in the variables due to each of the historical time series of innovations, or one can display the estimated pattern of response of a variable to an innovation of typical size when everything else is held constant. Figure 1 shows a historical decomposition of postwar U.S. industrial production. The actual series is exactly the sum of the separate components displayed. Figure 2 shows the time path of response of industrial production to an interest rate innovation as estimated from postwar data in each of four countries.

Empirically oriented macroeconomists will see patterns in these charts that invite speculation and argument over the possible underlying economic behavioral mechanisms. This is precisely what a method like this, a descriptive statistical model, aims to invite. Conclusions with substantive economic implications require further analysis. One way to proceed is to build a model that completely characterizes the behavior of variables in the system and at the same time, provides a behavioral interpretation of each coefficient in the model—a fully identified model, in econometric jargon. Such models must ordinarily be quite simple, in the sense of containing small numbers of free parameters, in order to remain analytically tractable. More often than not, they miss important aspects of the dynamics uncovered by unstructured, descriptive methods. But an identified model will imply a decomposition of each variable into components made up of innovations, just as does an unstructured descriptive model. Comparing the decompositions, one can judge what is being missed by the identified model, how important the omission is, and perhaps how the identified model needs to be modified to be more realistic.

A fully identified model, though, inevitably involves arbitrary assumptions, as well as nonarbitrary but controversial ones. When a particular policy issue is in dispute, the best way to bring evidence to bear on it is to try to formulate the restrictions on dynamic interactions among variables implied by each of the contending points of view, without necessarily going on to formulate enough additional restrictions to produce a fully identified model. One can then test the restrictions relevant to policy, either with formal statistical tests or by informal examination of the descriptive decompositions to see if they satisfy the restrictions.

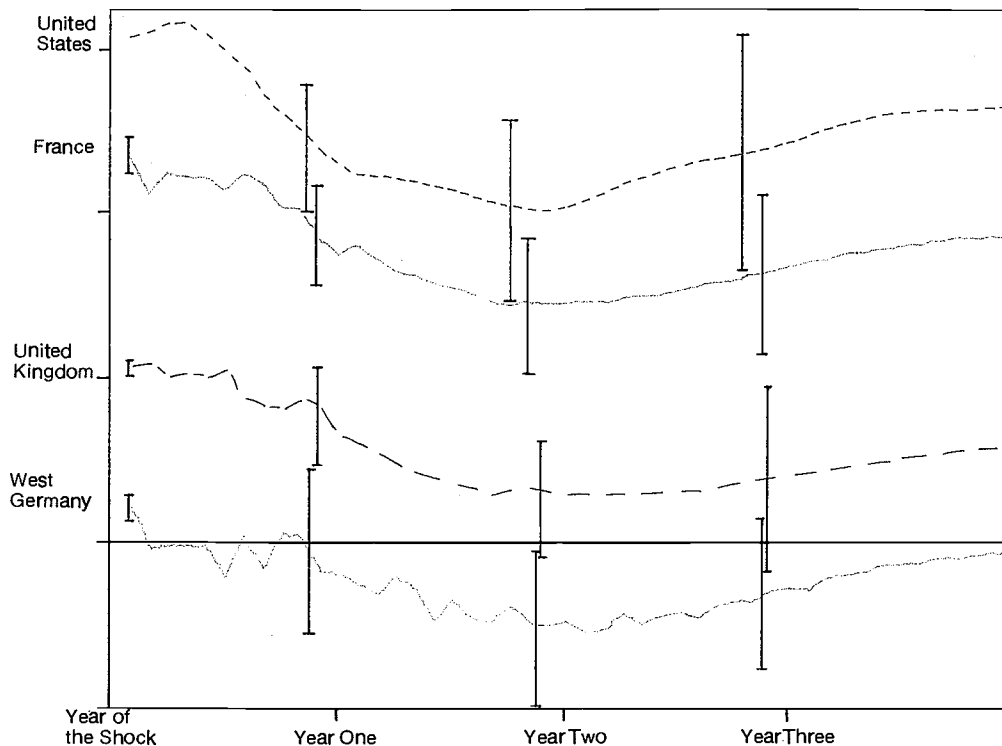
For example, most versions of monetarism would predict that innovations in the money stock arise largely from erratic shifts in monetary policy, not from passive response of the money stock to private sector disturbances. They would predict further that innovations in

Figure 1. Decomposition of Postwar Industrial Production into Components Associated with Innovations in Each of Four Variables



Note: The bottom line displayed, labeled Actual, is the historically observed deviation of the logarithm of industrial production (IP) from the trend path predicted on the basis of conditions at the end of 1947. Each of the four lines above shows the estimated model's prediction for the deviation of the logarithm of IP from trend if only the historically observed shocks to a single variable (that named at the left of the line) has occurred, with shocks in the other three variables held to zero. The distance between tick marks on the vertical axis is .20 on a logarithmic scale. The Actual line is exactly the sum of the other three lines. The model clearly attributes most actual variation in IP to shocks in IP itself and in CRP over this period. The variables are IP, industrial production; PPI, producer price index; M1, currency plus demand deposits; and CRP, rate on four-month-six-month commercial paper.

Figure 2. Response of Production to One-Standard-Deviation Shocks in the Interest Rate



Note: Each of the four lines displayed represents the response of the logarithm of industrial production to a one-standard-deviation shock in the interest rate, with the country to which the estimated response path applies indicated at the left of the line. The three vertical bars for each line represent two-standard-error confidence bands, estimated by Monte Carlo simulation. Along the horizontal axis, each tick mark represents one year, with the vertical axis representing one month before the period in which the shock occurred. The distance between tick marks on the vertical axis is .012 on a logarithmic scale.

the money stock should show a strong influence on industrial production and prices. These claims are supported by examination of three-variable (money, industrial production, and price level) systems estimated from postwar U.S. monthly data. In fact, the influence of innovations in production and prices on the money stock is so weak in this system that a statistical test of the hypothesis that there is no influence of this type at all (no feedback) is passed.² That such a test is passed is a necessary condition for regressions of production and prices on money stock to provide estimates of policy responses. The characteristics of this three-variable system then fit a monetarist interpretation of money-income correlations quite well.

But it has been known for some time that regressions of real balances on interest rate and income often give results that are reasonably interpreted as "demand for money" equations. Estimating demand for money this way amounts to assuming that there is negligible feedback from innovations in real balances to income and interest rates. Y. P. Mehra showed that the no-feedback assumption needed to justify these demands for money equations seems to be consistent with U.S. postwar data.³ This seems to contradict the results from the money, production, and price system.

Research I carried out during 1979-80 at NBER's Cambridge office shows that Mehra's finding reappears in European countries in the postwar period (though not in the interwar period in the United States). Money innovations do not produce an important component of variation in production in postwar data. This research also shows that there is remarkable consistency in the pattern of reaction of production and money stock to interest rate innovations, both across countries and between interwar and postwar periods in the United States. As can be seen from figure 2, production begins a sustained decline six months to a year after a positive interest rate innovation. The same pattern appears in interwar U.S. data. The money stock also declines after a positive interest rate innovation, though the decline in money begins immediately, building in size over many subsequent months.

At first sight, it may not seem hard to reconcile these results with a monetarist view. Monetarists would not doubt that money stock and interest rates are related; adding an interest rate to the system might, by attributing some of what is in fact policy induced variation in the money stock to interest rate innovations, simply muddy the true picture. This interpretation is difficult to sustain, however. For one thing, the interest rate does improve the model's forecasting accuracy substantially. At least for forecasting purposes, focusing attention exclusively on the money stock as a statistical indicator of monetary policy is evidently a mistake. For another thing, a large

fraction of variation in money stock is not associated with interest rate innovations—it appears that only movements in the money stock that follow interest rate innovations have substantial effects on production. If interest rate innovations simply represent financial market anticipations of changes in money stock policy, why should it be only the anticipated changes in money stock policy that have real effects? There is, in fact, a type of monetarist model based on rational expectations that predicts the opposite, that only unanticipated changes in the stock of money should have real effects.

A more plausible interpretation can be based on the fact that interest rates are simple transformations of asset prices. (The price of a one-period pure discount bond is one minus the one-period interest rate, for example.) There is a commonsense notion that the change in the price of a freely traded asset should be unpredictable: any prediction formula should be invalidated by speculators trying to exploit it. Recently, this notion has come under attack because perfectly unpredictable asset prices cannot occur in general equilibrium models without very special assumptions. Yet, asset price changes do often appear to be nearly unpredictable in statistical studies. I was able to show that general equilibrium models imply after all that asset price changes are unpredictable, if the price changes are measured over small enough time intervals.⁴

If the change in the interest rate is approximately unpredictable, last period's interest rate is approximately the best forecast of this period's interest rate. This means the interest rate is well approximated as the sum of its own innovations. It then follows that to the extent that there are correlations of interest rates with other variables, they must emerge as interest rate innovation components in the other variables, not the reverse. These conclusions reflect profit-maximizing speculative behavior. Financial market variables react without delay to new information. New information relevant to the future of production will be reflected immediately in the interest rate, even if it is not reflected immediately in the level of production. This would be expected to happen even if there were no policy induced variations in the interest rate, and hence is not in itself any evidence that policy induced variations in the interest rate are an important source of fluctuations in production.

We usually associate cyclical declines in production with drops in the interest rate, though. If the component of production of interest rate innovation reflects anticipations by financial markets of direct influences on production, why are positive interest rate innovations associated with subsequent declines in production? This is not at all implausible, it turns out. The short interest rate (which is what is used in the statistical analysis) represents the incentive to postpone current expenditures. When a temporary decline in aggregate production occurs, anyone making expenditures, consumer or investor, will be likely to face a temporary decline in his current

²See C. A. Sims, "Comparison of Interwar and Postwar Business Cycles: Monetarism Reconsidered," *American Economic Review*, 70: 250-57; also NBER Working Paper No. 430, January 1980.

³Y. P. Mehra, "Is Money Exogenous in Money-Demand Equations?," *Journal of Political Economy*, 86: 211-28.

⁴C. A. Sims, "Martingale-Like Behavior of Prices," NBER Working Paper No. 489, June 1980.

Economic Outlook Survey

Fourth Quarter 1980

Victor Zarnowitz

budget. If fluctuations in the level of planned expenditures are inefficient or unpleasant, the natural response to a temporary low budget is to attempt to borrow or to sell liquid assets. When many spenders try to do this at once, interest rates will rise until the incentive to postpone expenditure is strong enough so that the aggregate of spending plans matches the aggregate of available resources. It seems likely that a simple fully identified behavioral model embodying these ideas could reproduce much of the observed dynamics uncovered in the postwar empirical work.

If it is a mechanism along these lines that explains the observed interest rate effects on production, there is also a natural way to explain why, in sets of variables not including any asset prices, money stock innovations play so much more important a role. While textbook discussions of macroeconomics often treat the money stock as set by government policy, some economists and many policymakers have always argued that a great deal of actual variation in the money stock stems from passive response to business conditions. If money innovations were mostly passive responses, we might expect them to be closely related to innovations in portfolio valuations. In particular, upward jumps in the interest rate, corresponding to declines in bond values, might be expected to be followed with a small delay by downward adjustments in the money stock. In a model including asset prices, money stock appears to respond to innovations in asset prices; in a model containing no asset prices, the money stock may behave enough like an asset price to show substantial explanatory power and to show little feedback from innovations in other variables.

Of course these results have yet to be fully tested in the heat of the professional controversy they are likely to stir up. Furthermore, even if one accepts the explanation of the results I have been emphasizing, they raise more questions than they answer. The explanation interprets the dynamics as a reflection of speculative behavior. It indicates, therefore, that the stable dynamic patterns in the connection of interest rates and money stock to measures of real activity do not reflect causal impacts of monetary policy on real activity. But what are the real sources of business cycle fluctuations in that case? Neither a dominant role for erratic policy nor a dominant role for disturbances originating in the private sector is ruled out. Unraveling the true pattern of connections of policy instruments to cyclical behavior thus appears a more difficult—and interesting—problem than ever.

According to the median forecast from the latest survey of professional economic forecasters taken by the American Statistical Association and NBER, the recovery will continue, but weakly, in the first half of 1981 and will strengthen considerably in the second half. Inflation will average 9.4 percent in the coming year. Three months ago, the consensus forecast was that the recession would moderate greatly but continue through the year 1980. The unexpected weak upturn (or cessation of decline) in 1980:3 caused a general upward revision of the forecasts. The new upsurge in interest rates, however, soon raised doubts about the prospects for a sustained recovery.

Very Little Growth Early Next Year, More Thereafter

The median forecasts from the survey show real GNP increasing 1.6 percent at annual rate in 1980:4 and merely 0.8 of one percent in 1981:1. Later next year, real growth will be considerably higher, in the 3.2 percent–3.6 percent range. In 1981:4, output in 1972 dollars is expected to be nearly \$1,457 billion or 2.7 percent above the level of 1980:4. For the year 1981 as a whole, growth relative to 1980 will amount to only 1.2 percent.

During the near-term slowdown, unemployment will creep up to 7.8 percent of the labor force in 1981:1, then decline a little to 7.5 percent in 1981:4. All told, little change in the unemployment situation is expected.

Narrow Fluctuations in Inflation Rates

The annual inflation rate for the GNP implicit price index is estimated at 9.2 percent in 1980:4, down from 9.8 percent in 1980:3. Its values for the four quarters of 1981 are to be 10.2 percent, 8.8 percent, 9.2 percent, and 9.5 percent. There is no indication of any consistent drift in these averages and no promise of any significant relief from inflation. The individual forecasts are fairly concentrated about these averages. However, the distributions of the forecasts after 1981:1 are increasingly skewed in the direction of lower inflation rates.

The inflation forecasts for 1980–81 average 9.5 percent, those for 1980:4–1981:4, 9.4 percent (equal to the median estimate for 1979–80, too). If realized, this would be a remarkable stabilization of inflation, but at a level that is much too high.

Assumptions and Probabilities

Forecasters generally assume cuts in taxes on personal and corporate incomes in mid-1981. The survey estimates vary from \$20 billion to \$40 billion but cluster near the mid-point of the range. Some of the reductions may

Projections of GNP and Other Economic Indicators, 1980-81

	Annual				
	1979	1980	1981	Percent Change	
	Actual	Forecast		1979 to 1980	1980 to 1981
1. Gross national product (\$ bil.)	2368.8	2570.4	2852.5	+8.5	+11.0
2. GNP implicit price deflator (1972 = 100)	165.5	181.1	198.3	+9.4	+9.5
3. GNP in constant dollars (bil. 1972\$)	1431.6	1420.8	1438.1	-0.8	+1.2
4. Unemployment rate (percent)	5.8	7.2	7.65	+1.4 ¹	+0.45 ¹
5. Corporate profits after taxes (\$ bil.)	144.1	140.6	150.8	-2.4	+7.3
6. Plant and equipment expenditures (\$ bil.)	177.1	192.4	203.3	+8.6	+5.7
7. New private housing units started (ann. rate mil.)	1.74	1.27	1.48	-27.0	+16.5
8. Change in bus. inventories GNP accounts (\$ bil.)	18.2	-1.25	+7.6	-19.4 ²	+8.85 ²

	Quarterly							Percent Change	
	1980		1981				Q3 80 to Q3 81		
	Q3	Q4	Q1	Q2	Q3	Q4			
	Actual		Forecast						
1. Gross national product (\$ bil.)	2586.5	2653	2723	2808.5	2895	2983.5	+11.9	+12.5	
2. GNP implicit price deflator (1972 = 100)	183.23	187.3	191.9	196.0	200.4	205.0	+9.4	+9.5	
3. GNP in constant dollars (bil. 1972\$)	1411.7	1418	1420.3	1431.5	1443.4	1456.6	+2.2	+2.7	
4. Unemployment rate (percent)	7.6	7.7	7.8	7.7	7.6	7.5	0.0 ¹	-0.2 ¹	
5. Corporate profits after taxes (\$ bil.)	137.2	140	141.5	147	154	160.5	+12.2	+14.6	
6. Plant and equipment expenditures (\$ bil.)	191.2	193	195	199	205	214	+7.2	+10.9	
7. New private housing units started (ann. rate mil.)	1.41	1.35	1.35	1.45	1.52	1.60	+7.8	+18.5	
8. Change in bus. inventories GNP accounts (\$ bil.)	-16.8	-4.3	3.0	6.4	9.0	12.0	+25.8 ²	+16.3 ²	

SOURCE: American Statistical Association and National Bureau of Economic Research, Business Outlook Survey, November 1980. The figures on each line are medians of twenty-eight to thirty individual forecasts.

¹Change in rate, in percentage points.

²Change in billions of dollars.

be retroactive to January 1, 1981, and perhaps one third would benefit business directly. The assumptions on monetary policy and interest rates differ widely, reflecting great uncertainty on these matters and explaining an unusually large dispersion of the predictions for real GNP.

The probabilities of a decline in the economy's output were rated on the average at 36, 26, 17, and 16 chances in 100 for the four consecutive quarters of 1981. The corresponding proportions of survey membership actually predicting real GNP declines were 30 percent, 10 percent, 3 percent, and 3 percent, respectively.

It should be noted, however, that since the November survey there has been a stream of bad news that appears to have caused a considerable deterioration of near-term expectations. Thus, the frequency of forecasts of a new downturn may now be larger, the frequency of forecasts of a continuing (if sluggish) recovery, smaller.

Patterns of Spending

Business investment in plant and equipment is projected at \$192 billion in 1980, up 8.6 percent from 1979, and at \$203 billion in 1981, up 5.7 percent from 1980. This implies substantial declines in real terms for both years. However, in the second half of 1981 these investment expenditures are expected to start rising at annual rates averaging more than 15 percent, which is likely to result in some real capital formation.

Business inventories will fall slightly in 1980:4 but rise in each quarter of 1981 by amounts successively increasing from \$3 billion to \$12 billion (annual rates).

Housing starts will be depressed at the annual rates of 1.35 million units in this quarter and the next. They will then increase gradually to 1.6 million in 1981:4, which is not much better than the latest estimated level for October 1980.

Consumer outlays for durable goods will weaken in the next quarter but rise 10.7 percent in the year 1981 as a whole, which should yield a small real gain of 1.0 percent, or a little more. They will do somewhat better in the year-end comparison, 1980:4-1981:4, gaining about 12 percent.

When adjusted for inflation, corporate profits after taxes are also expected to worsen through the winter, before getting better later on. In current dollars, profits are predicted to reach \$160.5 billion annual rate in 1981:4, up 14.6 percent from 1980:4, of which perhaps some 5 percent would represent a real improvement.

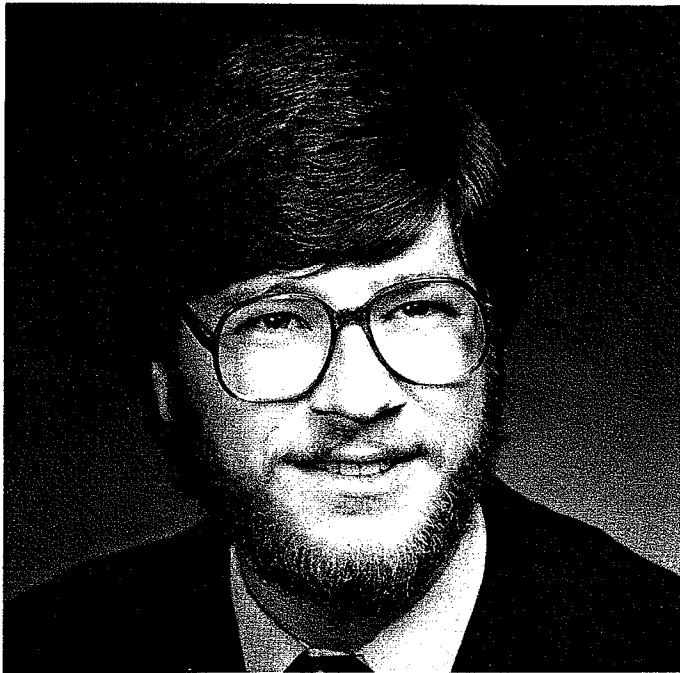
The largest increases, exceeding 17 percent, will be recorded for national defense purchases in both 1980 and 1981. Industrial production is to show relatively good gains next year, rising more than 6 percent between 1980:4 and 1981:4, apparently on the strength of the overall consumption expenditures, defense, and late improvements in fixed and inventory investment.

This report summarizes a quarterly survey of predictions by about fifty 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 Steven Kaplan of NBER, was responsible for tabulating and evaluating this survey.

NBER Profiles

Jeffrey D. Sachs

Jeffrey D. Sachs, an NBER faculty research fellow in the Program in International Studies, is an assistant professor at Harvard. Sachs received his B.A. *summa cum laude* from Harvard in 1976 and his Ph.D. from that institution in 1980. In 1978, he was one of only eight students from universities throughout the United States to be named a junior fellow of the Harvard Society of Fellows for a three-year tenure.



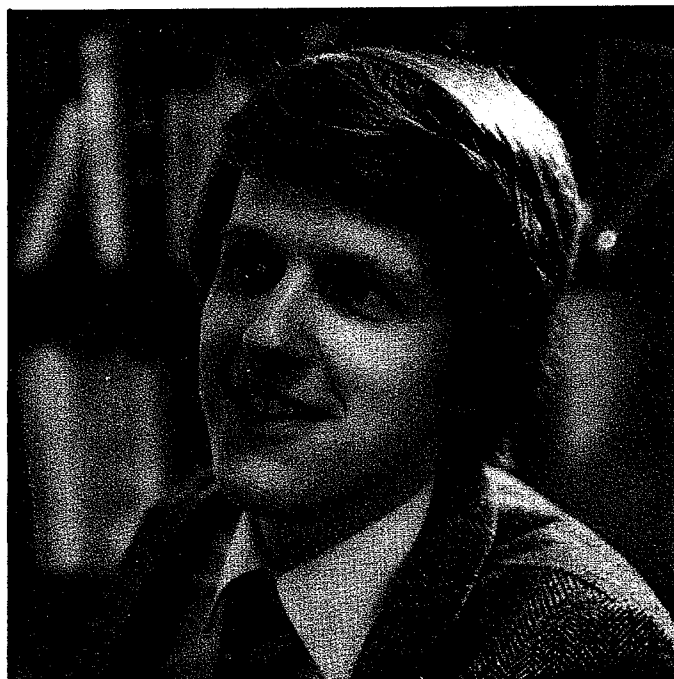
Sachs has had his work published in both American and European economic journals. A summary of his recent research appears in this issue of the *NBER Reporter*. In the fall of 1978, he was a visiting scholar at the Institute for International Economic Studies in Stockholm, and in the spring of 1979 and 1980, he was a research associate of the Falk Institute for Economic Research in Jerusalem. He is currently a member of the Brookings Panel on Economic Activity and is an affiliate of the Harvard Center for International Affairs.

Sachs and his wife, Sonia Ehrlich, reside in Boston. She is a pediatric intern at Boston City Hospital.

Robert J. Shiller

Robert J. Shiller was born in Detroit, Michigan, did his undergraduate work at the University of Michigan, and received his Ph.D. in economics from MIT in 1972. He taught at the University of Minnesota until 1974, and then spent one year as an NBER research fellow at the Cam-

bridge office. In 1975, he joined the department of economics at the University of Pennsylvania. Shiller was named an NBER research associate in 1979 and is now in residence for a second year at NBER's Cambridge office.

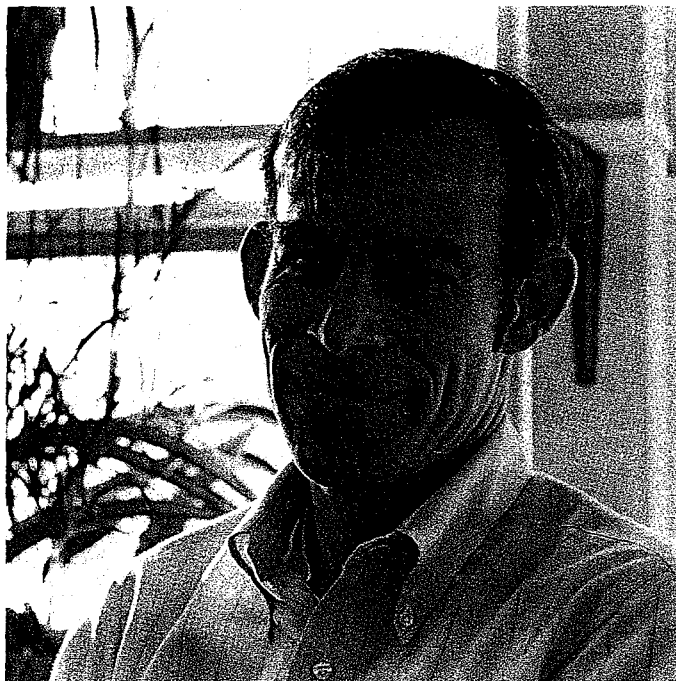


Shiller, who is associate editor of the *Journal of Econometrics*, has done research both in theoretical econometrics and in the application of econometric techniques to the study of financial markets. He has been involved in the development of the theory of rational expectations in macroeconomic models, but he also has been one of the major critics of the rational expectations approach. He is a member of the Bureau's Program in Financial Markets and Monetary Economics and the debt-equity project. Shiller's hobbies include nature study, long walks, and poetry. His wife, Virginia, is an intern in clinical psychology at Cambridge Hospital.

Christopher A. Sims

Christopher A. Sims, a research associate in NBER's Program on Economic Fluctuations, has been associated with the Bureau since 1970. Sims received his B.A. in mathematics and his Ph.D. in economics from Harvard University. In 1970, he began teaching at the University of Minnesota, where he is currently a professor of economics. Sims has been associated with the University of Minnesota continually since then and has been a visiting professor at Yale (1974) and MIT (1979-80).

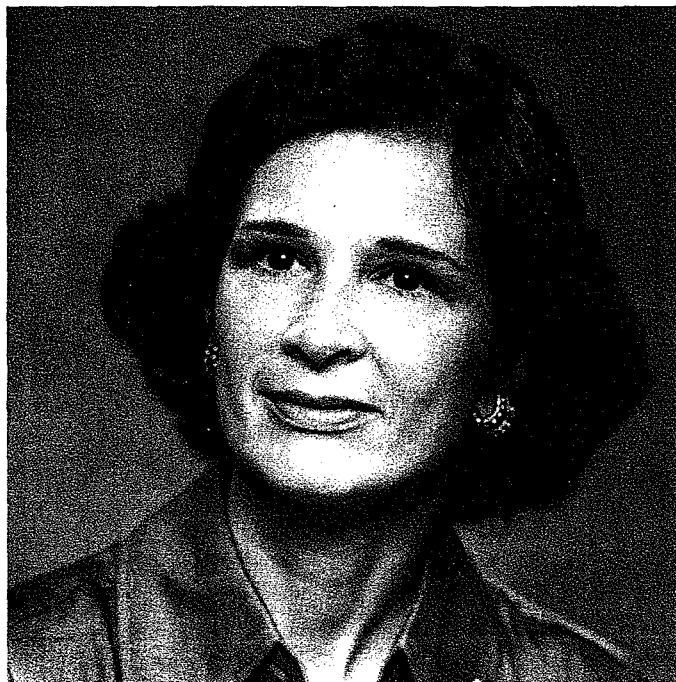
An active member of the Econometric Society and co-editor of *Econometrica*, Sims has written extensively on econometric theory, macroeconomic theory and policy, and wage-price-productivity problems. Since 1975, he has also served as senior advisor to the Brookings Panel on Economic Activity.



Sims's wife, Catherine, is a nurse and the couple has three children: Benjamin, Jody, and Nancy. In his leisure time, Sims plays soccer and the trombone.

Marina von Neumann Whitman

Marina von Neumann Whitman, vice president and chief economist of General Motors Corporation (GM), was elected to NBER's board of directors in the fall of 1980. Prior to joining GM, Whitman was on the economics faculty of the University of Pittsburgh (1962-79). On leave from that institution, she served as senior staff economist to the President's Council of Economic Advisers (CEA) from 1970-71 and as a CEA member from 1972-73.



A native of New York City, Whitman received a B.A. in government, *summa cum laude*, from Radcliffe College and her Ph.D. in economics from Columbia University. She has written numerous articles and books on international economics; her most recent (1979) book is titled *Reflections of Interdependence: Issues for Economic Theory and U.S. Policy*.

Whitman is a member of the Trilateral Commission and the Treasury Department's Advisory Committee on the Reform of the International Monetary System. She has been on the board of directors of the Council of Foreign Relations since 1977, and on the editorial board of *Foreign Policy* since 1974. In addition, Whitman serves as a director of Manufacturers Hanover Trust Co., Westinghouse Electric Corporation, and Procter and Gamble Co. She is married to Robert Freeman Whitman and has two children, Malcolm and Laura.

Conferences

Health Economists Gather in Stanford

Members and guests of NBER's Program in Health Economics met in Stanford, California; on July 30-31 to discuss various economic aspects of health status (as measured by mortality, morbidity, disability, and the like). The following papers were presented at the conference:

Determinants of Health

Jeffrey Harris, M.D., "Effect of Prenatal Medical Care on Perinatal Mortality"

Mark R. Rosenzweig and T. Paul Schultz, "The Behavior of Mothers as Inputs to Child Health: The Determinants of Birthweight, Gestation, and Rate of Fetal Growth"

Victor Fuchs, NBER, "Time Preferences and Health: An Exploratory Study"

Paul Taubman and Sherwin Rosen, NBER, "Healthiness, Education, and Marital Status"

Consequences of Ill Health

Willard Manning, Joseph Newhouse, and J. E. Ware, "On Improving Economists' Measures of Health Status; or Beyond Excellent, Good, Fair, Poor"

Robert A. Shakotko and Michael Grossman, NBER, "Disability and Post-Secondary Educational Choices"

Lee and Alexandra Benham, "Employment, Earnings, and Psychiatric Diagnosis"

David Salkever, "Child Health Levels: Implications for Parental Time Allocation and Earnings"

Health and Public Policy

Donald Shepard and Richard Zeckhauser, NBER, "Patient Heterogeneity and Public Policy"

Theodore C. Bergstrom, "Medical Care, Medical Insurance, and Survival Probability—The True Cost of Living"

The first two papers, by Harris and by Rosenzweig and Schultz, deal with fetal development and infant health. The Harris paper is particularly concerned with the relationship between prenatal care and the outcome of pregnancy. His empirical work is based on a sample of 6800 black women in Massachusetts who were pregnant for at least twenty weeks in 1975–76. Harris finds that prenatal care appears to reduce the risk of premature birth.

Rosenzweig and Schultz are also concerned with the outcome of pregnancies. They use a national sample of over 9000 legitimate births in the United States in 1967–69. Their most significant finding is that cigarette smoking by the mother has a large negative effect on birth weight.

In his paper, Fuchs focuses on adults aged 25–64 and argues that time preference (that is, unwillingness to delay gratification) is likely to be negatively correlated with schooling, investments in health, and health status. Fuchs uses data from a telephone survey of 500 men and women, and the survey results tend to confirm his hypothesis.

The Taubman–Rosen paper is concerned with the health of older males and its relationship to schooling and marital status. Using a sample of about 10,000 white men aged 58–63 in 1969 who were surveyed again in 1971 and 1973, the authors find large positive effects of schooling on health (as measured subjectively by the respondents themselves). Moreover, at each level of schooling, the death rate of married men is substantially lower than that of widowers, divorced, or single men.

The next four papers address the effect of health status on the demand for medical care, educational attainment, and labor market performance. The paper by Manning, Newhouse, and Ware considers two problems in the measurement of health: the time of measurement and the kind of measures used. Shakotko and Grossman are interested in the effect of health on years of schooling. They find no evidence that students with physical disabilities are less likely to pursue post-secondary education or receive fewer years of schooling.

The Benham and Benham paper reports some interesting associations between psychiatric disorders and labor market behavior. Controlling for other factors such as schooling, the authors find that the mentally ill, with the exception of those classified “neurotic,” have lower earnings and lower labor force participation than others. Salkever’s paper investigates the labor market behavior of parents of disabled children. He finds that mothers of disabled children are slightly less likely to be in the labor force than other married women; the effect of disabled children on the labor market behavior of their fathers is less clear-cut.

The Shepard–Zeckhauser paper considers the importance of the heterogeneity of the population—that is, differences among individuals in responses to treatments—for health policy. For example, in setting air pollution standards, whose health should be considered, the average person’s or the most susceptible person’s? Finally, Bergstrom discusses what properties are desirable and efficient in health insurance plans.

These papers will become part of the Bureau’s Conference Paper series. A conference volume containing revised versions of these papers will be published; its availability will be announced in a future issue of the *NBER Reporter*.

Washington Meeting on Inflation

An NBER Conference on Inflation, chaired by Robert E. Hall, director of the Bureau’s inflation project, was held in Washington, D.C., on October 10. Six nontechnical papers were discussed by the nearly 100 participants, drawn predominantly from the government sector:

Robert Barro, NBER and University of Rochester, “U.S. Inflation and the Choice of Monetary Standard”

Douglas Hibbs, Harvard University, “Public Concern about Inflation and Unemployment”

Thomas Sargent, NBER and University of Minnesota, “Historical Experiences in Halting Serious Inflation”

Stanley Fischer, NBER and MIT, “Economic Adaptations to Inflation”

Alan Blinder, NBER and Princeton University, “The Anatomy of Double-Digit Inflation in the Seventies”

Martin Feldstein, NBER and Harvard University, “Inflation, Capital Taxation, and Monetary Policy”

Four of the papers first analyze either the causes or the consequences of U.S. inflation and then discuss the effects of possible policies. Barro focuses on long-run monetary expansion as an underlying cause of inflation, and considers the possibility of a return to a gold standard or adoption of a monetary constitution (that is, a firm commitment that money grow at a constant, fixed, annual rate). Sargent looks at the post-World War I hyperinflations of Austria, Hungary, Poland, and Germany, all of which were ended quickly by deliberate and drastic fiscal and monetary measures without significant changes in unemployment. Blinder, on the other hand, believes that the double-digit inflation of 1974 and 1979–80 was the result of unexpected supply shocks (such as food and OPEC price rises). Since double-digit inflation went away by itself between 1974 and 1976, he feels that it will again, without contractionary monetary and fiscal policies. Finally, Feldstein is concerned with the consequences of inflation for capital formation. He discussed how both increased investment *and* price stability could be achieved by tight money, a high real interest rate, and tax incentives for investment.

Fischer’s paper deals with various adjustments the financial and other sectors have made to inflation, for example, variable rate mortgages, money market certificates, and indexed labor contracts. He emphasized that complete indexation of the economy would eliminate some of the problems caused by the partial indexation that now exists.

Hibbs’s paper is unique in that its orientation is more political than economic. Hibbs analyzes public opinion data collected from 1978–80 on relative concerns with

inflation and unemployment. He noted that the public, unlike economists, frequently prefers wage and price controls as a solution to inflation.

All of the papers will be available in NBER's Conference Paper series. There will also be an NBER Conference Report and a conference volume. Availability will be announced in future issues of the *Reporter*.

Economics of Compensation

Members of NBER's Program in Labor Studies and participants from forty-nine universities, government agencies, and other institutions gathered in Cambridge on November 20 and 21 for a conference on the economics of compensation. The ten papers presented, selected by conference chairman Sherwin Rosen, of NBER and the University of Chicago, covered a wide range of issues relating to labor markets and compensation.

Thomas A. MaCurdy, Stanford and NBER, "Taxation and Work Disincentives"

Discussants: Jerry Hausman, MIT and NBER, and Gary Chamberlain, Wisconsin and NBER

Frank Sloan, Vanderbilt, Roger Feldman, Minnesota, and Lynn Paringer, The Urban Institute, "Compensation Arrangements between Doctors and Hospitals"

Discussants: James Medoff, Harvard and NBER, and Giora Hanoch, Hebrew University and Columbia

Steven Woodbury, Pennsylvania State, "Estimating Preferences for Wage and Nonwage Benefits"

Discussant: Donald Parsons, Ohio State

Richard V. Burkhauser, Vanderbilt, and Joseph Quinn, Boston College, "Changes in Mandatory Retirement Rules on the Labor Supply of Older Workers"

Discussant: Ronald Ehrenberg, Cornell

Robert S. Smith, Cornell, "Pensions, Underfunding, and Salaries in the Public Sector"

Discussant: Richard Freeman, Harvard and NBER

Lorne Carmichael, Queen's University, "Firm Specific Human Capital and Seniority Rules"

Discussant: Masanori Hashimoto, Washington

Olivia Mitchell, Cornell, "Fringe Benefits and the Cost of Changing Jobs"

Discussant: William Alpert, Washington University

Mark C. Berger, Ohio State, "The Effect of the Baby Boom on the Earnings Growth of Young Males"

Discussant: Walter Oi, Rochester

Yannis Ioannides, Boston University, and Kenneth Chan, McMaster, "Layoff Unemployment, Risk Shifting, and Productivity"

Discussants: Daniel Hamermesh, Michigan State and NBER, and Edward Lazear, Chicago and NBER

Jerry Green, Harvard and NBER, "Wage-Employment and Contracting"

Discussants: Herschel Grossman, Brown and NBER, and Costa Azariadis, Pennsylvania

MaCurdy's paper focuses on how various tax schemes, over the long run, affect an individual's incentive to work. He constructs a model of work, consumption, and taxes that differs from previous work by incorporating a factor for lifetime preferences. His estimates, based on actual data from the Denver (Colorado) Income Maintenance Experiment, suggest that taxes may result in even larger disincentives to work than had been found in previous studies.

The paper by Sloan, Feldman, and Paringer is concerned with the determinants and effects of various compensation arrangements. The authors look at data from two hospital surveys and observe that the higher the "piece rate" paid by Medicaid or other insurance, the fewer physicians will work on a salary basis. In other words, a physician's choice of compensation method depends on the insurer's price schedule.

Woodbury discusses the preferences of workers for wages versus nonwage benefits. He finds that nearly two thirds of the shift in the wage-fringe mix in recent years is due to rising incomes and rising marginal taxes. Woodbury finds that wages and fringes are close substitutes, and he anticipates a continuing shift in the mix (of wages and fringes) as households' marginal tax rates rise.

Burkhauser and Quinn ask how changes in retirement rules, specifically the 1978 amendment to the Age Discrimination and Employment Act raising the mandatory retirement age to 70, have affected labor force participation among older men. They find a large impact on the men who face this age restraint, but the impact is smaller than anticipated. They also speculate that men are induced to retire more due to provisions in pension and similar plans than because of changes in the Social Security system.

Smith's work investigates whether wages are lower in firms where pension plans exist than elsewhere, and whether wages are higher in firms where the pension plan is underfunded (rather than fully funded). Using data from eighty-six public employers in Pennsylvania, Smith finds the expected negative relationship, nearly dollar for dollar, between salaries and pension promises, and a positive relationship of close to one between salaries and underfunding.

Carmichael is concerned with the type of labor contract that will lead to an optimal level of turnover within a firm, given that both workers and firms invest in human capital. He finds that contracts that incorporate seniority rules for layoffs and promotions are more efficient than contracts in which workers and firms share the cost of turnover, or contracts in which the party initiating the separation pays a penalty.

Mitchell's paper examines the empirical validity of the theoretical effect of fringe benefits on the cost of changing jobs. She finds the loss of pension coverage to be worth about \$3600 to the average male worker. Similarly, health insurance benefits are associated with a significant cost in changing jobs. All other fringes, she finds, are far less significant.

Berger investigates the effect of the baby boom on the earnings growth of young males. He finds that cohort

size (that is, the size of the peer group) has a negative impact on earnings growth. This negative impact worsens with schooling, experience, and the size of the cohort.

Ioannides and Chan consider how layoffs may result from implicit labor contracts. They find that layoffs can be optimal because they permit hours and employment to vary procyclically, while worker satisfaction varies countercyclically.

Finally, Jerry Green looks at optimal long-term wage and employment contracts. He finds that it is efficient for firms to control the choice of employment. The optimal contract, in sum, represents a compromise between productive efficiency and insurance (in the sense of minimizing risk).

These papers will be included in the NBER Conference Paper or Working Paper series, and a conference summary report containing a brief summary of each paper will be produced. Availability of these publications will be announced in future issues of the *Reporter*.

Conference Calendar

With this issue of the *Reporter*, NBER is inaugurating a new service—the Conference Calendar. Each future *Reporter* will include 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 Spring issue of the *Reporter* is March 16. If you have any questions about procedures for submitting materials for the calendar, please call Kirsten Foss at (617) 868-3974.

March 5-6, 1981

Conference on Social Experimentation, NBER

March 13-14, 1981

Time-Series Seminar, NBER/CEME

March 26-27, 1981

Financial Policies and the World Capital Market: The Problem of Latin American Countries, NBER

April 9-10, 1981

Brookings Panel on Economic Activity, Brookings Institution

April 22-24, 1981

Conference on Child Support, Poverty Institute/Wisconsin State Department of Health and Social Services

April 24-25, 1981

Conference on Public Policy, Carnegie-Mellon/Rochester

May 1, 1981

Program Meeting: Taxation, NBER

May 8, 1981

Program Meeting: Labor Studies, NBER

May 15-16, 1981

Inflation and Financial Markets, NBER

May 18-19, 1981

Symposium, National Tax Association*

June 18-19, 1981

International Seminar in Macroeconomics, NBER

August 24-28, 1981

Applied General Equilibrium Models, NBER

September 8-10, 1981

Conference on Exchange Rates, NBER

September 25-26, 1981

Conference on *Prices and Quantities*, Brookings/Yale/Columbia

Fall 1981

Hispanic Labor Force in the United States, Poverty Institute/Wisconsin State Department of Health and Social Services

October 2-4, 1981

R and D Conference, NBER

October 4-8, 1981

Annual Conference, National Tax Association*

October 13-15, 1981

Applied Time-Series Analysis, NBER/CEME/ASA/Census Bureau

November 4-6, 1981

Annual Meetings, Southern Economic Association*

November 12-13, 1981

Housing and Energy, Brookings Institution

November 20-21, 1981

Exchange Rates and International Macroeconomics, NBER

December 3-4, 1981

Conference on Wage Measurement, NBER (Income and Wealth)

December 17-18, 1981

Conference on Exchange Rates, NBER

December 28-30, 1981

Annual Meetings, American Economic Association*

March 18-21, 1982

The Classical Gold Standard, NBER

April 1982

Conference on Economic Fluctuations, NBER

June 21-22, 1982

International Seminar in Macroeconomics, NBER

June 28, 1982

Econometrics and Public Finance, NBER

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

September 22-24, 1982
Annual Conference, National Association of Business Economists*

October 24-28, 1982
Annual Conference, National Tax Association*

December 28-30, 1982
Annual Conference, American Economic Association*

October 2-6, 1983
Annual Conference, National Tax Association*

October 25-29, 1984
Annual Conference, National Tax Association*

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

Bureau News

Chinese Economists Visit

On November 26, a ten-member delegation from the Chinese Academy of Social Sciences (CASS) spent the afternoon at the Bureau's Cambridge office to learn more about NBER and its work. Bureau President Martin Feldstein and Vice President Charles McLure described the structure and operations of the Bureau, and research associates Alan Blinder and Benjamin Friedman discussed their work on wage-price controls and the debt structure of the U.S. economy, respectively. Daniel Hamermesh, a research associate in the Bureau's labor studies program, and Alan Siu, an NBER research analyst, also participated in the discussions.

The Chinese delegation was chaired by Xu Dixin, vice president of CASS and director of its Institute of Economics. The other members of the delegation were: Zhao Fusan, secretary general of CASS; Xu Shengwu and Dong Fureng, deputy directors of the Institute of Economics; Teng Weizao, vice president of Nankai University; Liu Suinan, deputy director of the Institute's State Planning Commission; Liao Jianxiang, director of Guangdong Provincial Institute of Philosophy and Social Sciences; Liang Wensen, deputy director of CASS's National Economy Research Section; Zeng Qixian, vice chairman of the economics department at Wuhan University; and Xiang Qiyuan, editor in chief of CASS's *Economic Research*. The group, which is making a tour of U.S. academic and scholarly institutions, was accompanied by Tan Jee-Peng, a technical interpreter, and Dr. Amy Wilson, representing the host organizations.

A smaller group of Chinese economists will visit the Bureau's offices in 1981 for extensive discussions about the NBER research program.

Exchange Rates and International Macroeconomics: A Call for Papers

On November 20 and 21, 1981, the National Bureau of Economic Research will hold a conference in Cambridge on Exchange Rates and International Macroeconomics. The program, being organized by Professor Jacob A. Frenkel of the University of Chicago and the NBER, will consist of seven papers with two formal discussants assigned to each paper. There will be no published proceedings, but papers will be included in the NBER Conference Paper series and summarized in the *NBER Reporter* and a special "Conference Summary Report."

The conference will be broad enough to accommodate a wide variety of issues relating in one way or another to international macroeconomics. Appropriate for the conference are papers dealing with the following topics: exchange rate determination; interactions between commodity prices and exchange rates; efficiency of the foreign exchange market; the role of information; labor market institutions and indexation; structural adjustment and international competitiveness; the economics of managed floating; rules for crawling pegs; stabilization policy and balance-of-payments adjustment; international capital markets; international reserves and world inflation; aspects of international monetary reform such as design of an optimal reserve investment and international consistency of national pegging arrangements; and the role of policy coordination. Other possible topics that can be interpreted as related to international macroeconomics will be considered. Priority will be given to empirically oriented research, but submission of theoretical papers on these topics is welcome also.

Papers will be selected on the basis of abstracts of about 500 words or, when possible, completed papers, with preference being given to papers by younger members of the profession. Any research that will not have been published at the time of the conference may be submitted. The deadline for submissions of abstracts and papers is June 20, 1981. Authors chosen to present papers will be notified by July 18. Finished papers must be ready for distribution to conference participants by October 1981. NBER will pay the expenses of those chosen to give papers at the conference. Abstracts and papers should be sent to: Professor Jacob A. Frenkel, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138.

Conference Papers Available

The papers presented at four recent NBER conferences are now available as part of the Bureau's Conference Paper series. (See previous issues of the *Reporter* for a listing of other available Conference Papers.) Beginning in 1981, most papers presented at NBER conferences and written by Bureau associates will become part of the Working Paper series rather than the Conference Paper series. Conference Papers sometimes include a formal discussion of the paper. They are issued so that research findings can be conveyed quickly, even in cases where a conference volume will later be produced.

Individual copies of Conference Papers are available free of charge to corporate associates and other supporters of the National Bureau. Others can receive copies by sending \$1.50 per copy to: Conference Papers, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138. Prepayment is required on orders totaling less than \$10.00. Please use the following numbers when ordering papers:

Taxation of Capital

53. "Inflation, Aggregate Demand, Capital Accumulation, and Productivity," by Liam P. Ebrill and Uri M. Possen
54. "Why Do Companies Pay Dividends?" by Martin Feldstein and Jerry Green (NBER Working Paper No. 413)
55. "Dynamic General Equilibrium Impacts of Replacing the U.S. Income Tax with a Progressive Consumption Tax," by Don Fullerton, John P. Shoven, and John Whalley
56. "The Decline in Aggregate Share Values: Inflation, Taxation, Risk, and Profitability," by Patric H. Hendershott
57. "Public Employee Pensions and U.S. Aggregate Savings Behavior," by Robert P. Inman and Laurence S. Seidman
58. "The Effect of Income Distribution and Redistribution on Lifetime Saving and Bequests," by Paul L. Menchik and Martin David
59. "Capital Taxation and Accumulation in a Life Cycle Growth Model," by Lawrence H. Summers

Public Regulation

(Some of these papers will appear in a forthcoming volume entitled *Studies in Public Regulation*, edited by Gary Fromm and published by MIT Press.)

60. "Income Distributional Concerns in Regulatory Policy-Making," by Robert Willig and Elizabeth Bailey
61. "Regulatory Performance in Surface Freight Transportation in Australia, Canada, Great Britain, and the U.S.A.," by James Nelson
62. "Regulation, Barriers to Exit, and Railroad Investment Behavior," by Richard Levin

63. "Political Economy of Federal Regulatory Activity: Water Pollution Controls in the Pulp and Paper Industry," by Robert Leone and John Jackson
64. "Theory and Practice in Public Regulation: A Current Overview," by Paul Joskow and Roger Noll
65. "Regulation and the Multiproduct Firm: The Case of Telecommunications in Canada," by Melvyn Fuss and Leonard Waverman
66. "Enforcing Administrative Rules," by Paul B. Downing and James Kimball
67. "Regulation of the Electric Utility Industry: A Historical Perspective and Empirical Study," by Greg Jarrell
68. "Open Entry and Cross Subsidy in Regulated Markets," by Kenneth Baseman
69. "Transition to Uncontrolled Crude Oil Prices," by David Montgomery
70. "Toward a Public Interest Theory of Regulation," by Richard Zerbe and Nicole Urban

International Macroeconomics

(These papers will be published in a special edition of the *European Economic Review* to be issued in 1981, edited by Georges de Menil and Robert Gordon. Discussion of each paper will be included in the journal.)

71. "Interpreting Econometric Evidence: The Behavior of Consumers' Expenditure in the United Kingdom," by James Davidson and David Hendry
72. "Disequilibrium Dynamics with Inventories and Anticipatory Price Setting: Some Empirical Results," by Jerry Green and Jean-Jacques Laffont (NBER Working Paper No. 453)
73. "Collapse of Purchasing Power Parities during the 1970s," by Jacob Frenkel (NBER Working Paper No. 569)
74. "Economic Policy and Private Investment since the Oil Crisis: A Comparative Study of France and Germany," by Patrick Artus, Pierre-Alain Muet, Peter Palinkas, and Peter Pauly
75. "On the Formation of Price Expectations: An Analysis of Business Test Data by Log Linear Probability Models," by Heinz Konig, Mark Nerlove, and Gilles Oudiz
76. "Relative Productivity Levels," by Laurits Christensen, Diane Cummings, and Dale Jorgenson

Econometric Studies in Public Finance

(Some of these papers have been published in the October 1980 issue of the *Journal of Public Economics*, edited by David Bradford and Anthony Atkinson.)

77. "On the Switch from Direct to Indirect Taxation," by Anthony B. Atkinson and Nicholas Stern in conjunction with Joanne Gomulka
78. "Social Security and the Choice between Full-Time Work, Part-Time Work, and Retirement," by Anthony Zabalza, Christopher Pissarides, and M. Barton
79. "International Differences in Social Security and Saving," by Martin Feldstein (NBER Working Paper No. 355)

80. "An Econometric Model of Tenure Choice and Demand for Housing as a Joint Decision," by Mervyn King
81. "Analysis of Re-Employment Probabilities for the Unemployed," by Tony Lancaster and Steven Nickell
82. "The Social Security Earnings Test, Labor Supply Distortions, and Foregone Payroll Tax Revenues," by Anthony Pellechio
83. "Labor Supply Responses to Tax Changes—A Simulation Exercise for the United Kingdom," by K. W. Glaister, A. McGlone, and D. Ulph
84. "Market Wages, Reservation Wages, and Retirement Decisions," by Roger Gordon and Alan Blinder (NBER Working Paper No. 513)
85. "Taxation and the Stock Market Valuation of Capital Gains and Dividends: Theory and Empirical Results," by Roger Gordon and David Bradford (NBER Working Paper No. 409)
105. "On Transactions and Precautionary Demand for Money," by Jacob A. Frenkel and Boyan Jovanovic, 1980 (NBER Working Paper No. 288)
106. "Personal Taxation, Portfolio Choice, and the Effect of the Corporation Income Tax," by Martin Feldstein and Joel Slemrod, 1980 (NBER Working Paper No. 241)
107. "An Empirical Analysis of the Fixed Coefficient 'Manpower Requirements' Model, 1960-70," by Richard B. Freeman, 1980 (NBER Working Paper No. 315)
108. "The Demand for International Reserves under Pegged and Flexible Exchange Regimes and Aspects of the Economics of Managed Float," by Jacob A. Frenkel, 1980 (NBER Working Paper No. 287)
109. "The Determination of Long-Term Interest Rates: Implications for Fiscal and Monetary Policies," by Benjamin M. Friedman, 1980 (NBER Working Paper No. 366)
110. "The Effect of Shifting Wealth Ownership on the Term Structure of Interest Rates: The Case of Pensions," by Benjamin M. Friedman, 1980 (NBER Working Paper No. 239)

Reprints Available

The following NBER Reprints, intended for nonprofit educational and research purposes, are now available (see previous issues of the *NBER Reporter* for titles 1-93):

94. "Comparison of Interwar and Postwar Business Cycles: Monetarism Reconsidered," by Christopher A. Sims, 1980 (NBER Working Paper No. 430)
95. "Family Background and Optimal Schooling Decisions," by Edward P. Lazear, 1980 (NBER Working Paper No. 141)
96. "The Narrowing of Black-White Wage Differentials Is Illusory," by Edward P. Lazear, 1979
97. "Taxation, Human Capital, and Uncertainty," by Jonathan Eaton and Harvey S. Rosen, 1980
98. "Accounting for Business Income under Inflation: Current Issues and Views in the United States," by Solomon Fabricant, 1978
99. "The Demand for Tax-Exempt Securities by Financial Institutions," by Patric H. Hendershott and Timothy W. Koch, 1980
100. "The Optimal Taxation of Foreign Source Investment Income," by Martin Feldstein and David Hartman, 1979
101. "Corporate Financial Policy and Taxation in a Growing Economy," by Martin Feldstein, Jerry Green, and Eytan Sheshinski, 1979
102. "Aggregate Land Rents, Expenditure on Public Goods, and Optimal City Size," by Richard J. Arnott and Joseph E. Stiglitz, 1979
103. "Equalizing Differences in the Labor Market," by Charles Brown, 1980
104. "The Exit-Voice Tradeoff in the Labor Market: Unionism, Job Tenure, Quits, and Separations," by Richard B. Freeman, 1980 (NBER Working Paper No. 242)
111. "Trade Policy as an Input to Development," by Anne O. Krueger, 1980 (NBER Working Paper No. 466)
112. "Fiscal Policies, Inflation, and Capital Formation," by Martin Feldstein, 1980 (NBER Working Paper No. 275)
113. "Output and Price Stability: An International Comparison," by John B. Taylor, 1980
114. "Unionism and the Dispersion of Wages," by Richard B. Freeman, 1980 (NBER Working Paper No. 248)
115. "The Effects of Taxing Foreign Investment Income," by David G. Hartman, 1980
116. "Foreign Investment and Finance with Risk," by David G. Hartman, 1979
117. "Taxation and the Effects of Inflation on the Real Capital Stock in an Open Economy," by David G. Hartman, 1979
118. "Imperfect Asset Substitutability and Monetary Policy under Fixed Exchange Rates," by Maurice Obstfeld, 1980 (NBER Working Paper No. 485)
119. "Strict Liability versus Negligence in a Market Setting," by A. Mitchell Polinsky, 1980 (NBER Working Paper No. 420)
120. "What Is Labor Supply and Do Taxes Affect It?" by Harvey S. Rosen, 1980 (NBER Working Paper No. 411)
121. "On the Impossibility of Informationally Efficient Markets," by Sanford J. Grossman and Joseph E. Stiglitz, 1980
122. "Stockholder Unanimity in Making Production and Financial Decisions," by Sanford J. Grossman and Joseph E. Stiglitz, 1980
123. "On the Choice between Property Rules and Liability Rules," by A. Mitchell Polinsky, 1980 (NBER Working Paper No. 286)

124. "Industrial Structure and the Nature of Innovative Activity," by Partha Dasgupta and Joseph E. Stiglitz, 1980
125. "Taxes, Saving, and Welfare: Theory and Evidence," by Charles E. McLure, Jr., 1980 (NBER Working Paper No. 504)
126. "Aggregate Dynamics and Staggered Contracts," by John B. Taylor, 1980
127. "Tax Neutrality and the Investment Tax Credit," by David F. Bradford, 1980 (NBER Working Paper No. 269)
128. "Survey Evidence on the 'Rationality' of Interest Rate Expectations," by Benjamin M. Friedman, 1980 (NBER Working Paper No. 261)
129. "Effects of the World Economic Crisis on the East European Economies," by Richard Portes, 1980
130. "Inflation and the Stock Market," by Martin Feldstein, 1980 (NBER Working Paper No. 276)
131. "Family Size and the Distribution of Real Per Capita Income," by Edward P. Lazear and Robert T. Michael, 1980 (NBER Working Paper No. 230)
132. "Real Income Equivalence among One-Earner and Two-Earner Families," by Edward P. Lazear and Robert T. Michael, 1980

These reprints are free of charge to corporate associates and other sponsors of the National Bureau. For all others, there is a charge of \$1.50 per reprint to defray the costs of production, postage, and handling. Advance payment is required on orders totaling less than \$10.00. Reprints must be requested by number, in writing, from: Reprint Series, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138.

Bureau Books

A new NBER volume, *From New Deal Banking Reform to World War II Inflation*, by Milton Friedman and Anna Schwartz, is now available from the Princeton University Press. This paperback reprints chapters 8-10 of Friedman and Schwartz's *A Monetary History of the United States, 1867-1960*, an NBER publication. These chapters describe changes made in the banking structure and monetary standard following the great contraction of 1929 to 1933, monetary policies after the New Deal, and the development of inflation during World War II. *From New Deal Banking Reform to World War II Inflation* is priced at \$4.95 and should be ordered directly from the Order Department, Princeton University Press, Princeton Pike, Lawrenceville, NJ 08648.

Now available from the University of Chicago Press is *Trade and Employment in Developing Countries: Individual Studies*, by Anne O. Krueger. The first in a three-volume series, this book examines the way trade policies in ten developing countries affect the level and composition of employment. The price of the Krueger volume is \$39.00. It should be ordered directly from the University

of Chicago Press, Order Department, 11031 South Langley Avenue, Chicago, IL 60628. An academic discount of 10 percent for individual volumes and a 20 percent discount for standing orders for all NBER books published by the University of Chicago Press are available to university faculty. Orders must be sent on university stationery.

NBER corporate associates will automatically receive the University of Chicago Press volumes, and other contributors to the National Bureau may order them at a discount from the Bureau's publications department.

Technical Papers Series

Another study in the NBER Technical Working Papers series is now available (see the Fall 1980 *NBER Reporter*, p. 25, for other titles). Like NBER Working Papers, these studies may be obtained by sending \$1.50 per paper to: Technical Working Papers, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138. Prepayment is required for all orders under \$10.00.

The Role of Economic Policy after the New Classical Macroeconomics

Willem H. Buiter

Technical Working Paper No. 6

November 1980

JEL Nos. 023, 133

This paper considers the implications of the rational expectations-New Classical Macroeconomics revolution for the "rules versus discretion" debate. The following issues are covered: (1) the ineffectiveness of anticipated stabilization policy; (2) noncausal models and rational expectations; and (3) optimal control in noncausal models—the inconsistency of optimal plans. I establish the robustness of the proposition that contingent (closed-loop or feedback) rules dominate fixed (open-loop) rules. The optimal contingent rule in noncausal models—the innovation or disturbance contingent feedback rule—is quite different from the state contingent feedback rule derived by dynamic stochastic programming.

Current Working Papers

Individual copies of NBER Working Papers are available free of charge to corporate associates and other supporters of the National Bureau. Others can receive copies of the Working Papers by sending \$1.50 per copy to Working Papers, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138. Please make checks payable to the National Bureau of Economic Research, Inc.

Journal of Economic Literature (JEL) subject codes, when available, are listed after the date of the Working Paper. Abstracts of all Working Papers issued since October 1980 are presented below. For previous Working Papers, see past issues of the *NBER Reporter*. The Working Papers are intended to make results of NBER research available to other economists in preliminary form, to encourage discussion and suggestions for revision before final publication. Working Papers are not reviewed by the Board of Directors of NBER.

Asset Prices, Substitution Effects, and the Impact of Changes in Asset Stocks

Carl E. Walsh

Working Paper No. 566

October 1980

JEL No. 311

In macroeconomic models, one standard result is that an increase in the stock of government debt has an ambiguous effect on aggregate demand. Models that derive this result assume that all assets are gross substitutes. However, some recent work with mean-variance portfolio models seems to imply that this assumption (that all assets are gross substitutes) does allow one to determine whether an increase in government debt is either expansionary or contractionary.

Only when money is riskless can an assumption of gross substitutability convey the direction of the impact of a change in government debt. The analysis I use to demonstrate this characterizes portfolio choice and equilibrium asset prices in a new way through the use of a distance function.

Two Notes on Exchange Rate Rules and on the Real Value of External Debt

Rudiger Dornbusch

Working Paper No. 567

October 1980

This report presents two unrelated, short papers on exchange rate rules and on the real value of the external debt. The paper on exchange rate policy uses the Taylor model of overlapping, long-term wage contracts to ask whether accommodating or PPP oriented exchange rate policies tend to stabilize output. In earlier work, I have shown that exchange rate indexing, while destabilizing prices, enhances the stability of output. That result is qualified here by a demonstration that the exchange rate not only affects aggregate demand directly but that it also operates on the price level through the cost of imported intermediates. It is shown that unless monetary policy is sufficiently accommodating, this latter effect

may dominate with the consequence that increased indexing of the exchange rate reduces output stability.

The paper on the real value of external debt poses the question of how to integrate external debt holdings in the traditional framework used to evaluate the effects on real income of changes in world prices. It is shown that integrating debt service liabilities in a comprehensive income measure makes real disposable income equal to the value of output less the real value of real interest payments on the external debt. Furthermore, with the CPI being the appropriate deflator for foreign debt, a rise in export prices raises income in proportion to exports, while a rise in import prices lowers real income in proportion to imports. The proper accounting of debt in a comprehensive income framework, noting the intertemporal budget constraints, thus restores the conventional treatment of the income effects of price changes.

Private Pensions and Inflation

Martin Feldstein

Working Paper No. 568

September 1980

JEL No. 310

Much of the recent discussion about the relation between pensions and inflation has emphasized the adverse impact that the unexpected rise in inflation has had on pension recipients and on the performance of pension funds during the past fifteen years. In contrast, this paper focuses on the way that pensions are likely to evolve in response to the expectation of continued inflation in the future and the uncertainty about the rate of inflation. The analysis concludes that continued inflation is likely to alter the form of private pensions (in the direction of *partial* indexing) and the nature of pension funding (away from long-term bonds) but that continued inflation is also likely to induce pensions to finance a growing share of retirement consumption.

The Collapse of Purchasing Power Parities during the 1970s

Jacob A. Frenkel

Working Paper No. 569

October 1980

JEL No. 431

During the 1970s, simple versions of the purchasing power parity doctrine performed dismally in explaining the relationship between prices and exchange rates. During that period, short-run changes in exchange rates bore little relationship to short-run differentials in national inflation rates, and divergences from purchasing power parities were cumulative. In this paper, I review and analyze the empirical record and attempt to explain

the causes of the divergences. Are the divergences due to specific developments in the U.S. dollar and the U.S. inflation, or are they due to large changes in intersectoral relative prices?

Even though the simple predictions of the purchasing power parity doctrine do not hold, national price levels have been linked to each other in the 1970s. One can argue that exchange rates, like other asset prices, have been highly volatile because they are more sensitive to expectations about the future than are national price levels. Therefore, during periods dominated by events that alter expectations, departures from purchasing power parities are likely to be the rule rather than the exception. This paper concludes with some policy implications. First, a policy of intervention in the foreign exchange market that ensures that exchange rates conform with purchasing power parities would be a mistake. Second, reducing costly and unnecessary variations in exchange rates requires the adoption of policies with more stable and predictable patterns.

Wage and Employment Determination under Trade Unionism: The International Typographical Union

J. N. Dertouzos and John N. Pencavel
Working Paper No. 570
October 1980

This paper represents the first empirical application of a model of trade union behavior that has been discussed in the literature for over thirty years. We examine the wages and employment of typographers to see whether they are the outcome of a process in which the union attempts to maximize an objective function containing wages and employment but is constrained because the employer's labor demand function requires a trade-off between these two variables. Our functional form assumptions permit investigation of some familiar special cases of union behavior. We find that the parameter implications of both the wage bill maximization hypothesis and the rent maximization hypothesis provide inferior explanations of the movement of wages and employment of these workers compared with our more general formulation.

International Trade, Indebtedness, and Welfare Repercussions among Supply Constrained Economies under Floating Exchange Rates

Bryce Hool and J. David Richardson
Working Paper No. 571
October 1980
JEL Nos. 480, 023, 131

At some time during the 1970s, almost all developed economies seemed to be supply constrained. Even much

of measured excess capacity was arguably redundant due to energy price shocks, environmental policy, and other structural flows. There has been little analytical work carried out on the macroeconomics of open economies under such supply constraints, and this paper attempts a beginning. It focuses on the international transmission of various macroeconomic shocks and on their implications for the current account, capital account, and exchange rate. The paper captures both the foreign repercussions and the terms-of-trade effects of various shocks.

We use an analytical model that assigns behavior to two regions, each with one nontradeable input, one tradeable output, and one tradeable financial asset. International exchange between the two regions is characterized by sequential "temporary equilibriums," each consistent with economically and institutionally constrained optimization, and with the failure of output and input markets to clear. International transactions take place in capital markets and in foreign exchange markets that clear continuously through flexible exchange rates.

We derive the abstract, reduced form of the model and then apply it empirically, using parameters and initial values that incorporate data and consensus beliefs about the United States and the rest of the world in the 1970s. The most important conclusions of this exercise are:

(1) Floating exchange rates fail to insulate either of two supply constrained economies from unanticipated shocks in the other. Yet, international transmission is perverse: the impacts on the two regions of any shock are oppositely signed.

(2) Exchange rates and the terms of trade between the supply constrained economies are highly sensitive to income policies and changes in technology-productivity trends, moderately sensitive to fiscal policy, and relatively insensitive to distributionally neutral wage-price guidelines. Wage-favoring income policies, liquidity financed fiscal expansion, tighter wage-price guidelines, and slackening of technology-productivity growth all cause depreciation of the domestic currency and deterioration of the terms of trade.

(3) These same shocks all prompt "internationalization" of commodity and financial markets. Export volumes and domestic indebtedness to foreigners grow substantially.

Accumulation and Growth in a Two-Country Model: A Simulation Approach

David Lipton and Jeffrey Sachs
Working Paper No. 572
October 1980
JEL No. 441

This paper analyzes saving and capital accumulation in a two-good growth model of two market economies in which economic agents optimize with perfect foresight. Our goal is a model in which short-run dynamics and the

steady state are soundly integrated. We stress the importance of asset markets as the link that transmits disturbances both internationally and intertemporally. While many components of the model can be found in the literature on optimal consumption, investment, and international growth, we provide a consistent synthesis. Our framework permits the analysis of structural adjustment in the global economy, and of the dynamic effects of a wide range of public policies.

Consistent Simple Sum Aggregation over Assets

David S. Jones

Working Paper No. 573

October 1980

JEL No. 311

This paper discusses the issue of consistent simple sum aggregation over assets within the context of investors maximizing their expected utility. The first part of the paper extends the Hicks and Leontief aggregation theorems of consumer choice to the problem of portfolio choice. Next, I derive necessary and sufficient conditions for consistent simple sum aggregation for Merton's (1973) continuous-time trading model of investor behavior. Finally, the results relating to the construction of consistent rate of return indexes for simple sum composite assets are presented.

Symmetric Substitution Matrices in Asset Demand Systems

David S. Jones

Working Paper No. 574

October 1980

JEL No. 311

In this paper, I derive the necessary and sufficient conditions for a symmetric asset substitution matrix for all distributions of rates of return. In this context, symmetry is essentially equivalent to the proposition that the von Neumann-Morgenstern utility function displays either constant absolute or constant relative risk aversion, depending upon whether the substitution matrix is defined in terms of arithmetic or geometric rates of return.

Monetary and Fiscal Policies in an Open Economy

Jacob A. Frenkel and Michael L. Mussa

Working Paper No. 575

October 1980

JEL No. 431

The central theme of this paper is that international linkages between national economies influence, in fun-

damentally important ways, the effectiveness and proper conduct of national macroeconomic policies. Specifically, this paper summarizes the macroeconomic policy implications of both the traditional approach to open economy macroeconomics and of more recent developments. As recent experience demonstrates, no country is immune from disturbances originating in the rest of the world, and no government can sensibly conduct its macroeconomic policy on the assumption that it operates in a closed economy. National economies are linked not only through the mechanism of the Keynesian foreign-trade multiplier but also through the complex of linkages implied by commodity trade, capital mobility, and the exchange of national monies. These linkages are not properties of a particular model but are implied from: (1) parity conditions and equilibrium requirements in goods and asset markets; (2) income and balance sheet constraints; (3) the absence of long-run money illusion; and (4) consistency of expectations that impose constraints on the conduct of macroeconomic policy in an open economy.

Taxation and Corporation Finance

Roger H. Gordon and Burton G. Malkiel

Working Paper No. 576

October 1980

This paper analyzes the effects of the federal tax structure on the financial and investment behavior of corporations. We first develop a model of corporate behavior given taxes, taking into account both uncertainty and costs of bankruptcy. Simpler models abstracting from bankruptcy costs had clear counterfactual implications. The forecasts from our model proved to be consistent with both the observed cross-sectional variation in debt-equity ratios and the time-series pattern of debt-equity ratios (data that were constructed in the paper).

We then attempted to measure the efficiency costs created by corporate tax distortions as implied by the model. The forecasted efficiency cost of the distortion favoring debt finance seemed to be quite large, while the tax distortion affecting investment seemed to be less important than others have claimed. The paper concludes with a study of the efficiency implications of various proposed corporate tax changes.

Inflation, Tax Rules, and Investment: Some Econometric Evidence

Martin Feldstein

Working Paper No. 577

November 1980

JEL No. 522

This paper presents econometric evidence on the effect of tax incentives on business investment in the United States in the period from 1953 through 1978. The analysis

emphasizes that the interaction of inflation and existing tax rules has contributed substantially to the decline of business investment since the late 1960s.

Because the investment process is far too complex for any simple econometric model to be convincing, I have estimated three quite different models of investment behavior. The strength of the empirical evidence rests on the fact that all three specifications support the same conclusion.

More generally, the analysis and evidence show that theoretical models of macroeconomic equilibrium should specify explicitly the role of distortionary taxes, especially taxes on capital income. The failure to include such tax rules can have dramatic and misleading effects on the qualitative as well as the quantitative properties of macroeconomic theories. (This paper was presented as the Fisher-Shultz Lecture at the Fourth World Congress of the Econometric Society, 29 August 1980, in Aix-en-Provence.)

The Reservation Wage of Unemployed Persons in the Federal Republic of Germany: Theory and Empirical Tests

Wolfgang Franz

Working Paper No. 578

October 1980

JEL No. 824

This study examines the determinants of the reservation wage of unemployed persons in the Federal Republic of Germany in 1976. The theoretical section presents the derivation of an optimal reservation wage and shows the source of an ambiguity in some explanatory variables. The data base is unemployed persons leaving the unemployment register within a given sample week. For any subset of them, we know their reservation wage and a set of personal characteristics. Other variables, such as the wage offer distribution and the demand-side variables, are obtained. Methodological problems, such as sample selection bias, are taken into account. As a result, individual characteristics and the wage offer distribution are dominant causes of the reservation wage, but demand-side variables and the entitlement to unemployment compensation play minor roles.

Social Security, Induced Retirement, and Aggregate Capital Accumulation: A Correction and Updating

Martin Feldstein

Working Paper No. 579

November 1980

JEL Nos. 321, 915

In a 1974 paper in the *Journal of Political Economy*, I discussed the theoretical ambiguity of the effect of Social Security on private saving and presented statistical

evidence that Social Security does, on balance, depress saving. Recently, an error was detected in the computer program that was used to construct the "Social Security wealth" variable. I have now corrected that error and re-estimated the original consumer expenditure equation. I have also updated the analysis by including the five years of additional data that have become available since the original study was completed. The new estimates, presented in the current note, continue to indicate that Social Security substantially depresses private saving. The point estimates of this effect are somewhat lower than before but nevertheless imply that Social Security depresses saving by about 50 percent of its current value. The estimated reduction in saving is more than two thirds of the concurrent "contributions" of employees and employers to the Social Security retirement and survivors' fund.

The Role of Economic Policy after the New Classical Macroeconomics

Willem H. Buiter

Working Paper No. 580

November 1980

JEL Nos. 023, 133

This paper considers the implications of the rational expectations–New Classical Macroeconomics revolution for the "rules versus discretion" debate. The following issues are covered: (1) the ineffectiveness of anticipated stabilization policy; (2) noncausal models and rational expectations; and (3) optimal control in noncausal models—the inconsistency of optimal plans. I establish the robustness of the proposition that contingent (closed-loop or feedback) rules dominate fixed (open-loop) rules. The optimal contingent rule in noncausal models—the innovation or disturbance contingent feedback rule—is quite different from the state contingent feedback rule derived by dynamic stochastic programming.

International Effects on the U.S. Capital Market

David G. Hartman

Working Paper No. 581

November 1980

JEL Nos. 441, 313

This paper presents evidence bearing on the question of international influences on the U.S. capital market. Both the examination of relative magnitudes of international asset holdings and the estimation of a simple partial-equilibrium capital market model indicate that such influences are potentially quite important. In particular, the effects of international flows on the long-term, new-issue corporate bond rate in the United States are highly significant. Since this interest rate is often seen as crucial in domestic investment decisions, this paper provides reason to believe that investment in the United States is significantly influenced by international capital transactions.

Energy and Growth under Flexible Exchange Rates: A Simulation Study

Jeffrey Sachs

Working Paper No. 582

November 1980

JEL Nos. 111, 723, 431

This paper offers a theoretical framework for studying the interactions of energy prices and economic growth. The incorporation of energy prices and quantities in a macroeconomic setting focuses on (1) the aggregate technology; (2) the interdependence of energy producers and consumers in the world economy; and (3) the asset markets as the channel through which energy price changes affect output and capital accumulation. While several existing studies consider aspects of these issues, none provides a synthesis. In this analysis, a theoretically sound model of an oil price increase in the world economy is presented, carefully treating the three topics listed above. The model is solved with computer simulation, as it is far too complex to yield analytical solutions.

Modeling Alternative Solutions to the Long-Run Social Security Funding Problem

Michael J. Boskin, Marcy Avrin, and Kenneth Cone

Working Paper No. 583

November 1980

JEL No. 915

This paper develops a simulation model of the Social Security system. Combining data from the 1975 Social Security Exact Match File (which merges individual records from the 1975 Current Population Survey with OASI earnings and benefit records) with a model of income growth, retirement and labor force participation patterns, life expectancy, age-earnings profiles, and other factors, we present estimates of a variety of information about the long-run financial status of the OASI system.

Estimates are developed for current legislation and for a variety of possible reforms of the aggregate, real present value of benefits, taxes, and deficit and of expected benefits, taxes, and net transfers for different population groups by age and income.

Among the more important findings derived with the simulation model are:

1. Under OASI alone, the long-run deficit amounts to \$632 billion in 1977 dollars. This is roughly the size of the regular, privately held national debt. This deficit occurs primarily because of the impending large increase in the ratio of retirees to workers early in the next century, despite already legislated large payroll tax increases.

2. The long-run deficit is quite sensitive to assumptions concerning productivity growth and the length of the retirement period. For example, a one-year increase in the latter (perhaps due to a gain in life expectancy) increases the real present value of the deficit by about \$250 billion.

3. Current retirees and older workers will be receiving a large multiple of taxes paid plus interest. Younger workers ultimately will not break even. The overall pattern of benefits, taxes, and transfers will depend heavily upon the time pattern of responses to the deficit and the form the response takes.

4. Several options exist for eliminating the deficit and even for freeing up OASI resources for other purposes. Delaying retirement by three years on average, relative to current patterns, will eliminate the deficit (mainly reducing total benefits paid); separating the transfer and annuity components of the system also offers potentially large reductions in the deficit (but implies that part of the sum will be used to finance an expanded transfer payment system from general revenues).

Self-Employment and Labor Force Participation of Older Males

Victor R. Fuchs

Working Paper No. 584

November 1980

This longitudinal analysis of the labor market behavior of older, urban white males in 1969, 1971, and 1973 focuses on changes from wage and salary employment to self-employment and changes from working to non-working status. In each two-year transition, approximately 5 percent of wage-and-salary workers switched to self-employment. They were primarily men who were previously self-employed or who were in wage-and-salary occupations with characteristics similar to self-employment, for example, managers and salesmen. For a blue-collar worker employed forty hours per week, the predicted probability of switching was close to zero. Controlling for a large number of economic and demographic variables, the self-employed were significantly more likely to continue to work, partly by reducing their work week to under thirty-five hours. Other significant predictors of continuing to work are good health, years of schooling, white-collar occupation, no expectation of a private pension, and a work week longer than fifty hours. Age is also important, especially at the eligibility ages set by Social Security.

International Transmission under Pegged and Floating Exchange Rates: An Empirical Comparison

Michael R. Darby
Working Paper No. 585
December 1980
JEL No. 430

This paper continues the investigation of the surprisingly slow and weak international transmission of inflation indicated by the Mark III International Transmission Model. The Mark IV Simulation Model is presented. This is a simplified version of the Mark III model that retains the transmission channels found significant in the Mark III and is suitable for simulation experiments. Separate versions of the Mark IV model describe the pegged and (dirty) floating exchange regimes. In order to be consistent with the stochastic processes governing policy variables in the sample period, policy experiments involved one percentage point increases in the disturbances of those processes for a single quarter; the behavior thereafter was governed by the estimated process. U.S. money shocks were immediately mimicked (in accord with the monetary approach) in Germany but only with a lag (specie-flow mechanism) in the Netherlands. Canada and the United Kingdom showed only Keynesian absorption transmission. Weaker transmission is generally found under floating exchange rates with a J-curve important in the dynamics. No significant international transmission was found in experiments involving money shocks in the United Kingdom and Germany and real government spending shocks in the United States, United Kingdom, and Germany. The money shock experiments indicated short-run money control in the United Kingdom and Germany, although less under pegged than floating rates.

The Effect of Federal Debt Management Policy on Corporate Bond and Equity Yields

V. Vance Roley
Working Paper No. 586
December 1980
JEL No. 313

In theory, federal debt management policy plays an important role in determining Treasury and private security yields. However, empirical studies have been unable to detect any significant effects of federal debt management. In large part, the insignificance of relative asset supply effects associated with federal debt management policy may result from the use of unrestricted reduced form models of interest rate determination. Using a disaggregated structural model of the markets for corporate bonds, equities, and four distinct maturity classes of Treasury securities, federal debt management policy is found to affect significantly Treasury and private security yields. Furthermore, the yields on corporate bonds and equities are influenced disproportionately.

Effects of Shifting Saving Patterns on Interest Rates and Economic Activity

Benjamin M. Friedman
Working Paper No. 587
December 1980
JEL Nos. 311, 313, 314

Americans consistently do most of their saving through financial intermediaries, but there have been and continue to be major shifts in people's reliance on specific kinds of intermediary institutions. In recent years, for example, individual savers have relied on life insurance companies. Moreover, legislative and regulatory actions currently under discussion would further alter the patterns of individual saving.

This paper assesses the potential effects of shifting saving patterns on interest rates and, via interest rates (and asset prices and yields more generally), on nonfinancial pension contributions financed by individuals, additional pension contributions financed by businesses, additional purchases of life insurance by individuals, and additional deposits in thrift institutions by individuals.

The paper's results indicate that such shifts, in plausible magnitudes, would have significant effects not only on interest rates and asset-liability flows but also on both the level and composition of nonfinancial economic activity. In particular, although the specific effects differ from one shift to another, each would disproportionately stimulate capital formation in comparison to other forms of spending.

Inflation, Taxation, and Corporate Behavior

Roger H. Gordon
Working Paper No. 588
December 1980
JEL Nos. 313, 323

During the past decade, the inflation rate has been very high by historical standards, but the U.S. tax law has yet to adjust to this fact. My purpose is to investigate to what degree the lack of indexing of the corporate and personal income taxes by itself should have caused a change in corporate investment and financial policy, and in capital gains or losses to existing owners of corporate equity. In studying these questions, I model corporate financial and real decisions simultaneously, unlike models in other recent studies.

The principal conclusions in this paper are: (1) the doubling of corporate debt-value ratios can easily be rationalized solely by the interaction of inflation and the tax laws; (2) the stock market and the level of investment behaved much less favorably than would have been forecast by focusing solely on the increased inflation rate; and (3) more pessimistic expectations, perhaps in combination with increased risk, would provide a consistent rationale for observed behavior.

Unanticipated or Actual Changes in Aggregate Demand Variables: A Cross Country Analysis

Michael R. Darby

Working Paper No. 589

December 1980

JEL No. 023

This paper generalizes the Barro approach to explaining real income growth as the solution of a Lucas aggregate supply function and an aggregate demand function with nominal money, real government spending, and real exports as arguments. The resulting real income equation involves lagged transitory income and short distributed lags on the shocks (innovations) in the three aggregate demand variables. This equation was estimated using quarterly data from 1957 through 1976 for the United States, United Kingdom, Canada, France, Germany, Italy, Japan, and the Netherlands. While the data are not inconsistent with the model's restrictions, it is found that with the exception of the United States, unanticipated and actual changes in aggregate demand variables are equally poor as explanations of real income growth. Although these results can be rationalized by greater measurement errors in the foreign data, they are sufficiently surprising to warrant further investigation and cautious application of Barro's approach to the Lucas aggregate supply function.

A Model of the Black Market for Dollars

**Daniel Valente Dantas, Clarice Pechman,
Roberto de Rezende Rocha, Demetrio Simões,
and Rudiger Dornbusch**

Working Paper No. 590

December 1980

This paper develops an analytical framework for discussing the determinants of the premium for dollars in the black market in Brazil. While the specific details of the model were chosen with the Brazilian case in mind, the structure of the model is quite general and suitable for application to black markets for currency elsewhere.

The building blocks of the model are three. A capital-asset-pricing approach is used to derive an asset demand for dollars, or equivalently a real yield premium in market equilibrium. The current account of the black market is specified in terms of the sources and uses in the flow market for dollars, mainly smuggling proceeds and flows associated with tourism. The model is closed by incorporating official exchange rate policy and the assumption of rational expectations.

In comparative static applications, the model has the properties of models of the exchange rate oriented to the current account. Unanticipated current account improvements due, for example, to increased export taxes that promote smuggling lead to a decline in the premium. Asset market disturbances, such as increased inflation

uncertainty or increased variability in the official real exchange rate policy, are shown to have ambiguous effects on the premium. In applying the distinction between anticipated and unanticipated disturbances, it is shown that the current expectation of a future maxi-devaluation leads to an immediate rise in the premium, with a subsequent decline when the maxi-devaluation actually takes place. The paper concludes with a discussion of seasonal patterns in the premium. It is shown that for disturbances that are always anticipated, there is no jump in the premium, but a gradual adjustment that precedes the actual seasonal change in the current account.

Monetary Policy and International Competitiveness

Willem H. Buiter and Marcus H. Miller

Working Paper No. 591

December 1980

JEL No. 431

One of Dornbusch's models is adapted to analyze the consequences for output and competitiveness of certain aspects of the United Kingdom's medium-term financial strategy and some other policy actions. These actions include the announcement of a sequence of reductions in the target rate of monetary growth, an increase in VAT, and a move to make the U.K. banking system more competitive. The impact of a discovery of domestic oil is also modeled. We consider the consequences of varying the degree of inertia in the underlying rate of inflation and of different rates of international capital mobility. A real interest rate equalization tax stabilizes the real exchange rate but not the level of output. Once-and-for-all changes in the *level* of the nominal money stock to accommodate changes in the demand for real money balances prevent overshooting of the real exchange rate and fluctuations in output. They may, however, undermine the credibility of an announced policy of monetary disinflation.

Oil, Disinflation, and Export Competitiveness: A Model of the "Dutch Disease"

Willem H. Buiter and Douglas D. Purvis

Working Paper No. 592

December 1980

JEL No. 431

This paper examines three possible sources of deindustrialization in an open economy: monetary disinflation, an increase in the international price of oil, and a domestic oil discovery. The analysis is conducted using a model that incorporates different speeds of adjustment in goods and asset markets. In the model, prices of domestic goods respond only sluggishly to excess demand, while the exchange rate (and hence the price of imported goods) adjusts quickly.

Monetary disinflation leads to reduced real balances, higher interest rates, and a lower nominal exchange rate. In the short run, this causes a real appreciation and a decline in domestic manufacturing output.

Perhaps surprisingly, an increase in world oil prices can create similar effects even for a country that is a net exporter of oil. Although the direct effect of an oil price increase for such a country is an increase in the demand for the domestic manufacturing good, that effect may be swamped by a real appreciation created by the increased demand for the home currency. This corresponds rather closely to the recent experiences of several oil and gas exporting countries and is commonly referred to as the "Dutch Disease." In our analysis, however, this is only a transitional phenomenon.

Domestic oil discoveries, although necessarily finite in nature, generate permanent income effects in demand that last beyond the productive life of the new oil reserve. Initially, current income is above permanent income, leading to an improvement in the trade account; this is eventually reversed when permanent income exceeds current income. A wide variety of output response patterns are possible.

Symmetry Restrictions in a System of Financial Asset Demands: A Theoretical and Empirical Analysis

V. Vance Roley

Working Paper No. 593

December 1980

JEL No. 311

The symmetry restriction in a system of financial asset demands has frequently been employed to reduce the number of independent parameters to be estimated. The theoretical implications of the symmetry restriction are examined in this paper, and it is found that symmetry implies a particular type of risk-averse portfolio behavior. The symmetry restriction is also examined empirically, and the evidence supports symmetry only in cases where coefficients on cross-asset yields are insignificantly different from zero.

Taxes and Corporate Capital Structure in an Incomplete Market

Robert A. Taggart, Jr.

Working Paper No. 594

December 1980

JEL No. 521

This paper extends Merton Miller's 1977 analysis of corporate capital structure decisions to the case of incomplete capital markets. As in Miller's model, aggregate demand for corporate leverage is curtailed as interest

rates on taxable bonds rise. Unlike Miller's model, however, capital structure is not a matter of indifference to all equilibrium shareholders. Market incompleteness and tax arbitrage restrictions combine to prevent marginal rates of substitution from being equalized for all investors, and hence their preferences are not unanimous. In addition, costs associated with debt induce a tendency for lower cost firms to issue a larger proportion of total corporate debt.

On Expectations, Term Premiums, and the Volatility of Long-Term Interest Rates

James E. Pesando

Working Paper No. 595

December 1980

JEL No. 313

This paper first identifies how large the range of ex ante yields on long-term relative to short-term bonds must be if term premiums are to account for a significant fraction of the variance of the holding period yields on long-term bonds. I then extend Shiller's bound to the case of a time-varying term premium and readily identify the variance in the term premium necessary to salvage the efficient markets model if the variance of these holding period yields exceeds the bound implied by the rational expectations model. The role of transaction costs is noted, and the possibility is explored that evidence of excess volatility need not imply the existence of unexploited profit opportunities under the rational expectations model.

Accelerated Depreciation and the Efficacy of Temporary Fiscal Policy: Implications for an Inflationary Economy

Andrew B. Abel

Working Paper No. 596

December 1980

JEL No. 321

The effect on investment of temporary changes in tax rates depends on the age profile of depreciation deductions. If the depreciation allowance schedule is accelerated, then temporary cuts in the corporate tax rate could reduce investment. Inflation causes the age profile of real depreciation deductions to become accelerated and thus could make temporary tax cuts have a contractionary effect on investment. Two currently proposed reforms are shown to exacerbate this effect. Under these proposals, temporary tax cuts are likely to have opposite effects on investment in short-lived and long-lived capital, thereby complicating the conduct of countercyclical fiscal policy.

Variable Cost Functions and the Rate of Return to Quasi-Fixed Factors: An Application to R and D in the Bell System

M. Ishaq Nadiri and Mark A. Schankerman
Working Paper No. 597
December 1980

We formulate a variable cost function model in which certain inputs are treated as quasi-fixed and develop a simple statistical test of whether optimization occurs for the quasi-fixed inputs. It is shown how empirical estimates of the variable cost function can be used to obtain a characterization of the underlying long-run cost function, with specific reference to the cost elasticity and the elasticities of substitution. We then present a model of the returns to R and D in the context of a regulated firm and show how to estimate the net rate of return to R and D from the variable cost function.

The model is applied to aggregate data for the Bell System for the period 1947-76. The empirical results suggest substantial long-run economies of scale at the aggregate level. The formal envelope test indicates that the Bell System's use of capital and R and D minimized costs during the postwar period, but this conclusion is seriously qualified by evidence that the power of the test in this application is low. Finally, we estimate the net rate of return to R and D in the Bell System in the range of 25-40 percent, which is somewhat higher than available estimates for manufacturing industries.

The International Financial Market and U.S. Interest Rates

David G. Hartman
Working Paper No. 598
December 1980
JEL Nos. 311, 313, 441

This paper examines the linkages between the Euro-dollar and U.S. domestic financial markets. Despite the fact that these markets are characterized by rapid arbitrage of interest rate differentials, it is shown that using weekly data allows the isolation of significant fluctuations being transmitted between markets in both directions. That is, financial markets in the United States are affected significantly by foreign events, and the Euro-dollar market is significantly affected by events occurring in the United States.

Since a moderate amount of arbitrage occurs within a week's time and because there is no way to determine the source of any disturbances that affect both interest rates simultaneously, it is impossible to reach precise conclusions about the causes of historical variation in the rates. However, this paper provides evidence that, at most, 40 percent of the variation in Eurodollar interest rates over the 1975-78 period can be traced to domestic U.S. sources and that between about one fifth and two thirds of the variation in domestic rates can be traced to foreign sources.

Macroeconomic Policy, Exchange Rate Dynamics, and Optimal Asset Accumulation

Maurice Obstfeld
Working Paper No. 599
December 1980
JEL No. 431

This paper studies exchange rate determination and the external adjustment process in a small economy consisting of infinitely lived, utility-maximizing households. Agents are assumed to consume a single good, to derive utility from holding domestic money, and to have access to a world market in loans for consumption. Both saving behavior and money demand are derived from explicit, intertemporal maximization.

The paper's main results are as follows. A central bank purchase of foreign exchange has no real effects when central bank reserves earn interest at the world rate and the proceeds are distributed to the public. In contrast, an increase in the monetary growth rate does have real effects: it gives rise to a current-account surplus that leads, in the long run, to higher levels of consumption and foreign claims. Finally, the model developed here implies that an increase in government spending may lead to a surplus on current account. A deficit may ensue when government spending produces a public good having a high marginal value to consumers.

Social Insurance and Consumption: An Empirical Inquiry

Daniel S. Hamermesh
Working Paper No. 600
December 1980
JEL Nos. 820, 910

The main stated purposes of social insurance programs have been the maintenance of consumption by people suffering from misfortunes and the stabilization of employment. Despite this, most recent research on unemployment insurance (UI) and old age insurance has focused on secondary labor market effects, with only a few studies looking at stabilization and none considering the effects on consumption. In this study, we examine how UI will affect the consumption of recipients. For some individuals, UI will help remove the constraints on consumption during periods of reduced income that arise from insufficient savings and imperfect capital markets; while for others, the UI benefits merely augment the entire lifetime consumption stream. The model enables us to estimate what fractions of the population fall into these two categories. If individuals are also constrained in the allocation of their reduced consumption, then propensities to consume out of UI will differ from those out of nonrecipients' income.

The model is tested on aggregate time-series data covering forty-one consumption categories for 1959-78:II, and on over 14,000 individuals from the 1972-73

Consumer Expenditure Survey. In both data sets, we find that no more than half of the UI benefits are consumed as if the recipients' consumption were constrained during times of unemployment. In both samples, spending out of UI benefits is disproportionately on luxuries, although UI recipients spend greater shares of their income on necessities. The results imply that a large part of social insurance payments does not go to prevent serious imbalances in individuals' lifetime consumption profiles.

Real Effects of Anticipated and Unanticipated Money: Some Problems of Estimation and Hypothesis Testing

Willem H. Buiter

Working Paper No. 601

December 1980

JEL No. 132

This paper addresses two issues that arise in the estimation of the real effects of anticipated and unanticipated money. First, it is shown that identification of the effects of unanticipated (or unperceived) monetary growth on real output is possible only if the a priori restriction is imposed that monetary growth does not depend on unanticipated (or unperceived) output. Second, it is shown that anticipated money can enter "semi-reduced form" output equations of the kind estimated by Barro through three additional channels not allowed for in existing empirical work. These are (1) past and present anticipations of future monetary growth (the inflation tax channel), (2) expectations of monetary growth in a given period conditioned at various preceding dates (the Fischer-Phelps-Taylor effect), and (3) past and present revisions in forecasts of monetary growth (the Turnovsky-Weiss effect). The presence of the first of these would mean that alternative open-loop monetary growth rules have real effects. The presence of the other two implies that monetary feedback rules can have real effects.

International Price Behavior and the Demand for Money

Arthur E. Gandolfi and James R. Lothian

Working Paper No. 602

December 1980

JEL Nos. 134, 311, 431

Oil prices, commodity prices, and American monetary policy, the last operating through a variety of channels, have all figured prominently in explanations of the international inflation process in the late 1960s and early 1970s. Our major purpose in this paper is to test these various hypotheses. We do so in the context of a reduced form, rational expectations price equation that we estimate using quarterly data for the period 1955 through 1976 for the United States and seven other industrial countries.

The principal conclusion that emerges from this exercise is that movements in domestic money in these countries served as the key link in the inflation process. The factors that produced these monetary changes, however, differed among countries. Price shocks of various sorts were clearly of secondary importance.

The other important set of conclusions concerns the demand for money. In place of a traditional stock adjustment model, we used GLS with a second-order correction for autocorrelation. We believe this produced more plausible estimates of the parameters of the long-run demand function and of the adjustment process itself.

How Close to an Auction Is the Labor Market? Employee Risk Aversion, Income Uncertainty, and Optimal Labor Contracts

James N. Brown

Working Paper No. 603

December 1980

JEL No. 824

Section I of this paper develops a model of income insurance in the labor market. The model differs from those of previous analyses in its focus on quantitative implications regarding the degree to which wages diverge from marginal value products, both in time-series and in cross-sectional data. Sections II and III present empirical evidence consistent with these implications. The main empirical finding is that of short-term divergence, but long-term equality between wages and marginal value products. The labor market appears to differ from an auction market only in the short run, but this short-run divergence considerably reduces the potential variability of employees' realized wealth.

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