A Symposium Sponsored By
The Federal Reserve Bank of Kansas City

MONETARY POLICY ISSUES IN THE 1980s

Monetary Policy Issues in the 1980s

A Symposium Sponsored by the Federal Reserve Bank of Kansas City

Jackson Hole, Wyoming
August 9 and 10, 1982

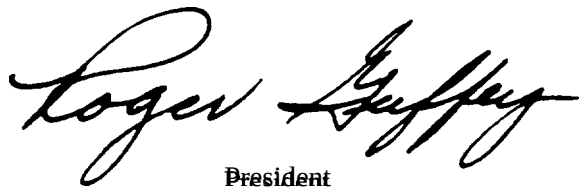
Contents

Foreword

A symposium on matters relating to the formulation and implementation of monetary policy is particularly timely. The environment for monetary policymaking has become extremely complicated in recent years, and it promises to become even more so in the near future. Among the significant developments complicating the conduct of policy are the rapid innovations taking place in the financial community and the on-going process of deregulation in financial institutions and markets.

In view of the challenges these and other developments pose to the conduct of monetary policy, it is particularly important that the Federal Reserve understand alternative points of view. One important source of expertise on these matters is academic economists and officials at foreign central banks. We also value the input of economists in the financial community who follow our policies closely and analyze their effects on financial markets. We believe it is useful to bring together recognized authorities from these areas so we in the Federal Reserve can benefit from their analyses and counsel.

The Federal Reserve Bank of Kansas City hosted this symposium, entitled "Monetary Policy Issues in the 1980s," on August 9 and 10, 1982, at Jackson Hole, Wyoming. I hope the following proceedings of this symposium will be of interest to all those wishing to learn more about this timely issue.



President

Federal Reserve Bank of Kansas City

The Contributors

Alan S. Blinder, professor of economics, Princeton University. In addition to his duties as a member of the Princeton faculty, Dr. Blinder has held editorial positions with two professional journals and has written or co-authored four books and numerous journal, newspaper, and magazine articles. He is a senior adviser to the Brookings Panel on Economic Activity, a fellow of the Econometric Society, and a research associate with the National Bureau of Economic Research.

Phillip Cagan, professor of economics, Columbia University. Before joining the faculty of Columbia University in 1965, Dr. Cagan taught at the University of Chicago and Brown University. He has been a visiting professor at the Carnegie Institute of Technology. Dr. Cagan is also a research associate with the National Bureau of Economic Research. He has written a number of articles on the monetary aspects of economic policy.

Richard N. Cooper, Maurits C. Boas Professor of International Economics, Harvard University. Dr. Cooper has divided his career between academic work and government service. He was a senior staff economist with President Kennedy's Council of Economic Advisers and has held positions as deputy assistant secretary of state for international monetary affairs and as under secretary for economic affairs. Dr. Cooper was a professor of economics at Yale University for 11 years. He has also served as a member of the Brookings Panel on Economic Activity.

Richard G. Davis, senior economic adviser, Federal Reserve Bank of New York. Dr. Davis joined the domestic research department at the

New York Fed in 1960, working his way through several research and advisory jobs to his present post. He has written numerous articles on doniestic monetary topics, monetary aggregates, and banking for the New York Fed's ***Quarterly Review*** and for other professional journals. Dr. Davis has served as a member of the Brookings Panel on Economic Activity and as a lecturer at several universities and colleges.

Hermann-Josef Dudler, director, Deutsche Bundesbank. Dr. Dudler is the head of the Money, Credit, and Capital Market Division of the Bundesbank. He was educated at Cologne University and the London School of Economics, and he became assistant professor at Cologne. Dr. Dudler has served as an economist with the Economics Ministry in Bonn and as a visiting economist with the International Monetary Fund in Washington, D.C. Before joining the Bundesbank, he was head of the Monetary and Fiscal Policy Division in the Economics and Statistics Department of the Organization for Economic Cooperation and Development.

Charles Freedman, chief of the Department of Monetary and Financial Analysis, Bank of Canada. Before joining the Bank of Canada, Dr. Freedman was assistant professor of economics at the University of Minnesota. He came to the Bank in 1974 and was named to his present position in 1979. He is a member of the editorial board of the ***Canadian Journal of Economics*** and the ***Bank of Canada Review.*** He is a research affiliate of the National Bureau of Economic Research, and a member of the executive council of the Canadian Economics Association.

Benjamin M. Friedman, professor of economics, Harvard University. Before joining the Harvard faculty in 1972, Dr. Friedman worked in the New York office of Morgan Stanley & Co. He has worked in consulting and other positions for the Federal Reserve Board and the Federal Reserve Banks of Boston and New York. Dr. Friedman's recent research has focused on financial markets and their effect on the economy, the economic effect of financing government deficits, and other topics related to U.S. monetary policy. He is a senior adviser to the Brookings Panel on Economic Activity and associate editor of the ***Journal of Monetary Economics.*** He is program director of the financial markets and monetary economic's group of the National Bureau of Economic Research.

Robert J. Gordon, professor of economics, Northwestern University. As a research associate at the National Bureau of Economic Research, Dr. Gordon was co-organizer of the NBER's annual International Seminar on Macroeconomics. Before joining the Northwestern faculty, he taught at Harvard and the University of Chicago. He is a senior adviser to the Brookings Panel on Economic Activity and a member of the executive committee of the American Economic Association. His published works include articles on inflation, unemployment, and productivity.

Donald D. Hester, professor of economics, University of Wisconsin-Madison, and chairman, Social Systems Research Institute. A professor at the University of Wisconsin since 1968, Dr. Hester has served as a consultant to the Federal Home Loan Bank Board, the Federal Reserve Board, and the Secretary of the Treasury. His principal interests are bank portfolio behavior, macroeconomic theory and policy, and econometrics. Dr. Hester's published work includes four books and numerous journal articles. He is an associate editor of the ***Journal of Money, Credit, and Banking.***

Edward J. Kane, Everett D. Reese Professor of Banking and Monetary Economics, the Ohio State University. Before coming to Ohio State University, Dr. Kane taught at five universities in the U.S. and abroad. He has consulted for the FDIC, the Federal Home Loan Bank Board, and the Federal Reserve System among others. He currently serves on the editorial boards of the ***Journal of Finance,*** the ***Journal of Money, Credit, and Banking*** and three other professional journals. Dr. Kane is a research associate of the National Bureau of Economic Research, a past president of the American Finance Association, and a former Guggenheim Fellow.

Raymond E. Lombra, professor of economics, Pennsylvania State University. Dr. Lombra served as senior staff economist with the Board of Governors of the Federal Reserve System until 1977, when he joined the faculty of Pennsylvania State University. He has written a number of articles in money demand, money supply, interest rate determination, and other policy-related issues. Dr. Lombra has also served as a consultant to Congress and the Federal Reserve System.

Bennett T. McCallum, professor of Economics, Carnegie-Mellon University. Dr. McCallum began his career as a professor of economics after receiving a chemical engineering degree, a master's in business adminstration and his Ph.D. in economics. He has served on the board of editors of three professional journals and has written numerous journal articles on economic modeling, rational expectations, and other areas. He is a research associate of the National Bureau of Economic Research and a consultant to the Federal Reserve Bank of Richmond.

Allan H. Meltzer, John M. Olin Professor of Political Economy and Public Policy, Carnegie-Mellon University. A respected researcher and author in the field of money and capital markets, Dr. Meltzer has served as a consultant to the President's Council of Economic Advisers, the U.S. Treasury, and foreign governments and their central banks. He has written six books and more than 100 articles, emphasizing monetary theory and the transmission mechanism for monetary policy. He has held several visiting professorships here and abroad. Dr. Meltzer is a founder and co-chairman of the Shadow Open Market Committee and the Shadow European Economic Policy Committee.

Frederic S. Mishkin, associate professor of economics, University of Chicago. Dr. Mishkin's research interests include topics ranging from rational expectations to illiquidity and consumer behavior. He has written two books and a number of articles in these and other areas. He served as an economist for the Board of Governors of the Federal Reserve System and as a member of the Brookings Panel on Economic Activity. He is currently a research associate with the National Bureau of Economic Research and a member of the editorial board of the ***American Economic Review.*** He is currently a Sloan Foundation Fellow.

James L. **Pierce,** professor of economics, University of California, Berkeley. Dr. Pierce has pursued a well-rounded economics career in teaching, government service, research, and consulting. He has taught at Yale University and is a former associate director of the Federal Reserve Board of Governors Division of Research and Statistics. He is a member of the board of directors of the National Bureau of Economic Research and a member of the Brookings Panel on Economic Activity. Dr. Pierce has acted as consultant to several agencies of the state of

California, as well as the Federal Trade Commission and the Federal Reserve Board.

William Poole, professor of economics, Brown University. Dr. Poole has worked as a senior economist with the Board of Governors of the Federal Reserve System. He has served as adviser and consultant to the Federal Reserve Bank of Boston, a senior adviser to the Brookings Panel on Economic Activity, and an associate editor of the ***Journal of Money, Credit, and Banking.*** He is a research associate with the National Bureau of Economic Research.

Robert H. Rasche, professor of economics, and chairman of the economics department, Michigan State University. Dr. Rasche has written on a wide variety of topics in his career. He has served as a consultant to Control Data Corporation, Wharton EFA, Inc., and the Federal Reserve Bank of St. Louis. His research in econometric modeling includes involvement in the FRB-MIT monetary research project, publication of papers describing aspects of the model, and predicting the money multiplier. He is a member of the Shadow Open Market Committee.

John B. Taylor, professor of economics, Princeton University. Dr. Taylor has taught at Columbia University as well as at Princeton. He has served as a consultant to the Federal Reserve Bank of Philadelphia and was a senior staff economist on President Carter's Council of Economic Advisers. He is a member of the editorial board of the ***Journal of Monetary Economics*** and a research associate of the National Bureau of Economic Research.

Ronald L. **Teigen,** professor of economics, University of Michigan. Dr. Teigen has long experience as a teacher and researcher at the University of Michigan, and as a visiting scholar in Norway, Sweden, Switzerland, West Germany, and the United States. In West Germany, he was Richard Merton Visiting Professor at the University of the Saarland. He has served as deputy assistant director for fiscal analysis of the Congressional Budget Office. He has published a number of works discussing monetary issues, especially in the area of money supply and demand. He served as associate editor of the ***Journal of Finance*** for four years.

James Tobin, Sterling Professor of Economics, Yale University. In his more than **30** years at Yale, Dr. Tobin has served as director of the Cowles Foundation and as chairman of the Economics Department. He was awarded the Nobel Prize in Economics in 1981 for his work in portfolio theory. He has received several honorary degrees and published several books and many journal articles. Dr. Tobin was a member of President Kennedy's Council of Economic Advisers. He is a senior adviser to the National Bureau of Economic Research and the Brookings Panel on Economic Activity. Very active in professional organizations, he has served as president of the American Economic Association, the Econometric Society, and the Eastern Economic Association.

Carl E. **Walsh,** assistant professor of economics, Princeton University. Before joining Princeton's faculty, Dr. Walsh was a lecturer in economics at the University of Auckland in New Zealand, and a visiting lecturer at the University of California, Berkeley. He has most recently served as a visiting scholar at the Federal Reserve Bank of Kansas City. Dr. Walsh is also a faculty research fellow with the National Bureau of Economic Research. His research interests include asset pricing models and the effects of alternative monetary policies on financial relationships.

Formulating Monetary Policy in the 1980s

Introductory Remarks
Ronald L. Teigen

The first three papers on the conference program deal with important issues which the monetary authorities must face as they determine the course which policy is to take. These issues are the appropriate relationship between monetary and fiscal policies, the role of expectations in policymaking, and the possibilities and need for coordination of policy among countries.

Questions relating to the monetary policy-fiscal policy nexus have rarely seemed more timely — indeed, perhaps more urgent — than at present, with the Federal Reserve attempting on average to conduct a rather tight monetary policy as a means of realizing conservative growth targets for its aggregates and wishing to keep policy on a steady course to engender and confirm expectations that inflation will be reduced, while at the same time the Federal budget is shifting from a deficit of about $60 billion annually to one which some analysts predict will reach $135 billion or more in fiscal 1983. Is it surprising that we find ourselves in such a situation? Is it obviously the case that coordination between the monetary and fiscal authorities is lacking, and could clearly be improved? Some novel and interesting ideas on these questions will be presented by Alan S. Blinder in the program's first paper.

I have already mentioned the word "expectations" in my brief remarks on the relationship between monetary policy and fiscal policy. There is probably no livelier set of issues in macroeconomics today than those concerning the role of expectations, both at the theoretical and practical levels. The idea of efficacious discretionary policy in particular has come under heavy attack with the advent of the rational expectations theory, which made itself felt in macrotheory and policy discussions around the middle of the 1970s. The basic proposition of

this view—that expectations on economic variables should be formed using all available information, including knowledge of the structure of the system which determines those variables—must certainly be seen as an important innovation and advance in macroeconomic theory. Yet, in its most extreme form, the proposition is used as a basis for arguing that discretionary stabilization policy is totally impotent. Sharp divisions of opinion on particular aspects of this debate continue to exist, but certainly there is a great deal more skepticism today among economists concerning the usefulness of discretionary policy than there was, say, 10 or 15 years ago. However, the pendulum now seems to be swinging away from the extreme rational expectations view and its implications for modeling and for analysis. Our second paper will indicate in some detail where this debate stands and some possible new directions. It is by John B. Taylor.

We live in a world made up of interdependent economies. We tell our students that the demise of the Bretton Woods fixed-exchange-rate system made it possible for policymakers to concern themselves much more exclusively with domestic problems than previously was the case. In the imperfect real world, however, it is apparent that we are a long way from complete policy interdependence. One need only refer for example to the recent Versailles summit meeting and the concerns expressed there about the effects abroad of current U.S. monetary and fiscal policies to realize that this is so. In this real world, policy innovations, especially those originating in a large economy such as the United States, may still entail important consequences—at least in the shorter run—for its smaller neighbors and trading partners. These consequences are examined in the third paper on the program, by Charles Freedman.

2
Issues in the Coordination of Monetary and Fiscal Policy

Alan S. Blinder

I. Introduction and Summary

Now, as often in the past, there are complaints from all quarters about the lack of coordination between monetary and fiscal policy. Indeed, the feeling that monetary and fiscal policies are acting at cross purposes is quite prevalent. This attitude, I think, reflects dissatisfaction with the current mix of expansionary fiscal policy and contractionary monetary policy, which pushes aggregate demand sideways while keeping interest rates sky high. This, too, has frequently been so in the past.

Figure 1 offers a rough impression of the recent history of monetary-fiscal coordination. It plots the change in the high-employment surplus (as a crude indicator of the thrust of fiscal policy) on the horizontal axis and the change in the growth rate of Mi (as a crude indicator of monetary policy) on the vertical axis for the years 1961-1980. The scatter of points does not leave the impression of a strong negative correlation, as might be expected from well-coordinated policies. But even by these lax standards, the projected points for the early 1980s (falling money growth rates with widening high-employment deficits) will—if realized—be exceptional.

The clear implication of the current debate is that greater coordination between the fiscal and monetary authorities would be better. There

I am grateful to Benjamin Friedman, John Taylor, James Tobin, William Poole, and other conference participants for helpful discussions, to Albert Ando and Rick Simes for use of the MPS model, and to the National Science Foundation for financial support.

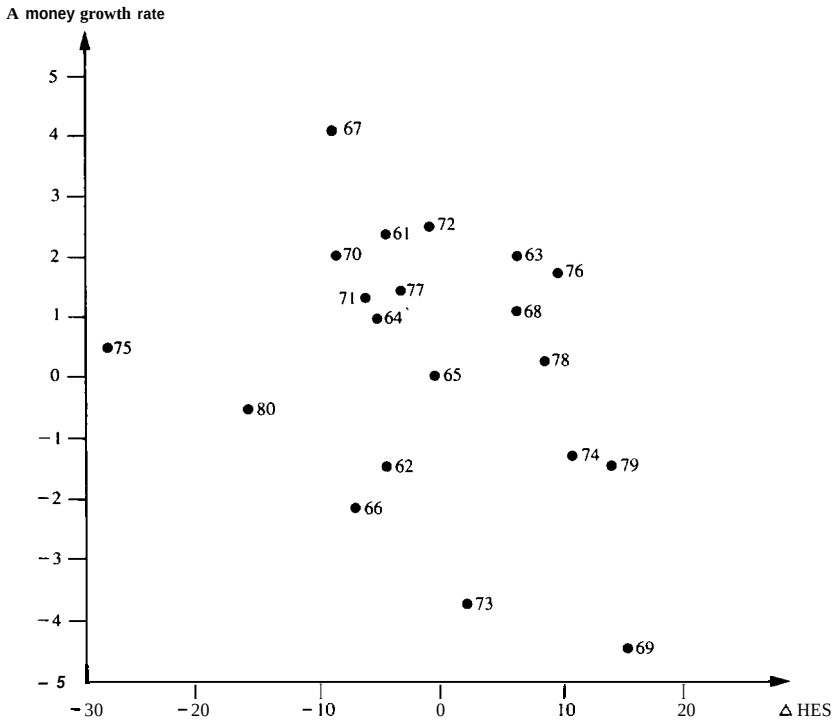


FIGURE 1

is so much unanimity on this point that even an observer as distrustful of government as Milton Friedman (1982) has urged that the Federal Reserve be brought under the control of the administration.

This paper tries to take a fresh look at the coordination issue. Among other things, it raises the possibility that greater coordination might actually make things worse! The paper takes as its objectives to raise questions, to clarify issues, and to stimulate discussion rather than to provide answers. Where answers are suggested, they should not be interpreted as etched in stone.

Section II, which follows this summary, focuses on the potential gains from greater coordination between monetary and fiscal policy. The first part uses the traditional targets — instruments approach to examine the possibility that coordination might not be tembly important because the authontieshave more instruments than they need to achieve the goals of stabilization policy. A variety of considerations, however, argue against the empirical relevance of this possibility.

Since greater monetary-fiscal coordination is often equated with looser money and tighter fiscal policy, the second part of this section appeals to two econometric models of the economy to estimate the quantitative importance of the so-called mix issue. The empirical results suggest that the effects of changes in the monetary-fiscal mix may not be as large as many suppose.

The final part of Section II deals with expectational effects that arise from the government budget constraint, here interpreted to state that the current mix of policies has important implications for the range of policy combinations that will be available in the future. I show that the government budget constraint allows more degrees of freedom than some of the recent literature suggests and argue that some authors have overplayed the role of expectational effects which, while present, may not be dominant.

Section III turns to the reasons for lack of coordination and shows that our attitudes toward the non-coordination problem may be quite different, depending on .why policies were not coordinated to begin with. Here I argue that there are plausible circumstances under which it may be better to have uncoordinated policies. An analogy will explain why this may be so.

Consider the problem of designing a car in which student drivers will be taught to drive. The car will have two steering wheels and two sets of brakes. One way to achieve "coordination" is to design the car so that one set of controls — the teacher's — can always override the other. And it may seem obvious that this is the correct thing to do in this case. But now suppose that we do not know in advance who will sit in which seat. Or what if the teacher, while a superior driver, has terrible eyesight? Under these conditions it is no longer obvious that we want one set of controls to be able to ovemde the other. Reasoning that a stalemate may be better than a violent collision, we may decide that it is best to design the car with two sets of competing controls which can partially offset one another.

Using the two previous sections as background, Section IV discusses alternative fiscal-monetary arrangements ranging from perfect coordination to complete lack of coordination. The focus here is clearly at the "constitutional" level: what kind of coordination system would we like to devise? The game — theoretic aspects of having two independent authorities are stressed, and I offer a general reason to expect that uncoordinated behavior will result in tight money and loose

fiscal policy even when both parties would prefer easy money and tight fiscal policy!

Finally, Section V considers the old "rules versus discretion" debate from the particular perspective of this paper. Rules are viewed as ways to resolve the coordination problem and to alter the fiscal-monetary mix. I conclude that the celebrated k-percent rule for money growth is unlikely to score highly on these criteria, and suggest two other rules that might do better.

II. Targets, Instruments, and the Gains from Coordination

A. Targets and Instruments

The traditional targets and instruments approach of Tinbergen and Theil provides a useful framework for thinking about monetary-fiscal coordination, because the coordination problem is basically one of an effective shortage of instruments. Were there, for example, as many fiscal instruments as targets, the administration might not have to worry about coordinating its actions with those of the central bank.

As we know from Tinbergen and Theil, simply counting up instruments and targets is not enough; we need to know how many independent instruments we have, and this depends on both the model of the economy and the precise list of targets. For example, a plausible set of targets for stabilization policy might be the level of output (Y), the price level (P), and the share of GNP invested (I/Y). If the fiscal instruments are government spending (G) and the personal income tax rate (t), then, provided that supply-side effects of tax cuts are big enough, we may have just the number of instruments we need — but only if monetary policy is perfectly coordinated with fiscal policy. Lack of coordination will make a suboptimal outcome inevitable.

But what if we add a third fiscal instrument: investment incentives such as accelerated depreciation or an investment tax credit? Then, at least in principle, fiscal policy can go it alone: it can achieve the desired levels of the three targets regardless of what monetary policy does.

Now, the notion that monetary policy is a redundant instrument may not sit well within the Federal Reserve System. Nor should it, for there surely are additional targets. For example, we may want to shift the mix of investment spending away from housing and toward business fixed investment. To this end, we may want to keep interest rates high to discourage residential construction while simultaneously providing

strong tax incentives for industrial capital formation. In fact, precisely this policy mix has been advocated by Feldstein (1980a) and others and appears to have been put in place by the Reagan administration.[1] A second example is the foreign exchange rate which is strongly influenced by the level of short-term interest rates and hence by central bank behavior.

The likelihood that we have surplus instruments at our disposal is further diminished by a number of other considerations. One is that there may be many more targets than the three traditional ones. For example, the use of tax-and-transfer policies may also be influenced by important distributional and allocative objectives. The same may be true of government expenditures; and defense spending involves a host of other complex criteria. In addition, the mix between monetary and fiscal policy may be influenced by regional or sectoral objectives, or perhaps just by a desire not to force one region or sector to bear too much of the burden of stabilization policy. For example, a desire not to devastate the housing industry may be a reason not to rely entirely on restrictive monetary policy to limit aggregate demand. Like fiscal policy, monetary policy also has important allocative effects.

In fact, the situation is a good deal worse than this because the instruments themselves may be targets. It may be, for example, that the government has an explicit objective for the ratio of G/Y which limits the use of G as a stabilization tool. Or perhaps sizable movements in policy instruments entail significant costs of their own — costs which preclude moving all the way to the global optimum.

Timing considerations make it still less likely that we have more instruments than we need. Policy instruments like G and M may have rather different effects on target variables in the short and long runs. For example, both probably have strong (and rather similar) effects on unemployment in the short run, but little if any effects in the long run. This makes it crucial to coordinate monetary and fiscal plans as they unfold through time.

Uncertainty may also reduce the effective number of instruments. For example, we may feel less uncertain about the effects of particular monetary-fiscal combinations than we do about the effects of individual instruments in isolation. If so, then coordination becomes that much more critical.

---

1. The irony of having such a subtle policy mix advocated by those who deride "fine tuning" is almost overwhelming.

The conclusion seems to be that, while it is logically possible that we have more instruments than we need, the real world seems to be characterized by a shortage of instruments in the relevant empirical sense. Consequently, we should expect failure to coordinate fiscal and monetary policy to lead to losses of social welfare.

B. The Capital-Formation Issue

As I mentioned at the outset, concern that our current policy mix will prove damaging to capital formation seems to be the potential loss of social welfare that is at the heart of contemporary worries about monetary-fiscal coordination.

Because of their effects on investment, each of the tools of demand management also has long-run implications for aggregate supply. Put most simply, fiscal expansion probably pushes up real interest rates, thereby inhibiting capital formation and slowing the growth of aggregate supply. Monetary expansion should have the opposite effects on interest rates and investment. Therefore, it is argued, a tighter fiscal policy and a looser monetary policy would provide a climate more conducive to investment and growth. But just how large are these effects in practice?

To get a serious quantitative answer, I see no place to turn but to the much-maligned large-scale econometric models. Otto Eckstein and Christopher Probyn (1981) recently reported the results of a simulation exercise with the DRI model in which the actual fiscal and monetary policies of the 1966-1980 period were replaced by a mix of policies less expansionary on the fiscal side and more expansionary on the monetary side.

The period in question was one in which DRI's version of the full-employment deficit averaged about $27 billion, varying between about zero and $64 billion. In the alternative scenario simulated by Eckstein and Probyn, the full-employment budget was roughly balanced every year, and monetary policy (defined by nonborrowed reserves) was adjusted to maintain approximately the same time path for the unemployment rate. How different would the economy's evolution have been under this alternative monetary-fiscal mix?

According to the DRI model, the investment share in GNP would have been about one-half percentage point higher in a typical year of the simulation, leading to a cumulative increase in the capital stock over the 15-year period of about 5.3 percent. As a consequence,

potential (and hence actual) real GNP in 1980 would have been about 1.6 percent higher than in the historical record. The GNP deflator in 1980 would have been 2.6 percent lower, which translates to an average reduction in the annual inflation rate of about 0.2 percentage points.

As Robert Solow once remarked, the nice thing about large-scale econometric models is that they always have an answer for every question. What we want to know, of course, is whether the DRI model's answer to this particular question is roughly correct. This, unfortunately, is unknowable. The next best thing is to get another large-scale model to answer the same question, and then compare the responses. Fortunately, Albert Ando kindly volunteered to run more or less the same policy change on the MPS model. Some modifications had to be made because of the different structures of the two models. (Examples: Neither full-employment GNP nor the full-employment deficit is a variable in the MPS model; the simulation period was 1967-1981 instead of 1966-1980.) But an effort was made to come as close as possible to duplicating the Eckstein-Probyn policy of tighter budgets and looser money with no effect on unemployment.

The MPS results were generally less sanguine about the potential gains from a switch in the policy mix. For example, the share of business fixed investment in GNP was only about 0.3 percentage point higher in a typical year of the easy-money, tight-fiscal simulation with the MPS model. Correspondingly, the gains in real output were smaller: real GNP in the final year of the simulation was just 1 percent higher (versus 1.6 percent with the DRI model).

Bigger differences emerged on the price side of the model. Whereas the DRI simulation said that the GNP deflator would be 2.6 percent lower by the end of the 15-year period, the MPS model put the deflator 0.5 percent higher. The difference here seems to stem from the divergent behavior of the money supply in the two models. According to the DRI model, the "easier money" policy actually leads to a slightly lower money supply, whereas the MPS model shows the money supply increasing slightly.

Beauty is in the eye of the beholder. But these effects, while generally favorable, seem quite modest to me, especially when you realize that the swing in fiscal policy was extremely substantial. Under the historical stabilization policy mix, the cumulative increase in the national debt during this 15-year period was more than $350 billion for

DRI and about $450 billion for **MPS.** Under the hypothetical policy with a balanced full-employment budget, the debt would have declined by about $45 billion according to DRI and by about $19 billion according to **MPS.**

Thus, according to these models, an enormous change in the policy mix would have caused only a modest increase in real output. And the two models cannot even agree on whether prices would have increased or decreased as a result.

C. The Government Budget Constraint and Expectations

Dynamic constraints across choices of policy mixes arise from the so-called government budget constraint, the accounting identity that insists that every budget deficit must be financed by selling bonds either to the public or to the Fed. This identity points out that today's fiscal-monetary decisions have implications for the number of bonds that will have to be sold to the public today, and thus for the feasible set of fiscal-monetary combinations in future periods.[2]

For example, suppose an expansionary fiscal policy today leads to a large deficit that is not monetized. Future government budgets will therefore inherit a larger burden of interest payments, so the same time paths of **G,** t, and **M** will lead to larger deficits. What will the government do about this? That depends on its reaction function. For example, large deficits and high interest rates might induce greater monetary expansion in the future (the possibility emphasized by Sargent and Wallace, 1981). Alternatively, it might induce future tax increases (the case stressed by Barro, 1974), or cuts in government spending (the apparent hope of Reaganomics). Yet another possibility is that the government will simply finance the burgeoning deficits by issuing more and more bonds.[3]

All of these are live options and have differentimplications for the long-run evolution of the economy. In fact, under rational expectations, they may have different implications for the current state of the economy.

---

2. The former has been stressed by, among others, Christ (1968) and Blinder and Solow (1973). The latter has been stressed by, among others, Auerbach and Kotlikoff (1981) and Sargent and Wallace (1981).

3. The stability of the economy under this last policy has been called into question. More on this later.

Consider, as an example, the effects on consumer spending of a tax cut financed by issuing new bonds. Such a tax cut today enlarges current and prospective future budget deficits, thereby requiring some combination of the following policy adjustments:

1. increases in future taxes;
2. decreases in future government expenditures;
3. increases in future money creation;
4. increases in future issues of interest-bearing national debt.

To the extent that the current decisions made by individuals and firms are influenced by their expectations about the future, each of these alternatives may have different implications for the effects of the tax cut today.

For example, if people believe that a tax cut financed by bonds simply reduces today's taxes and raises future taxes in order to pay the interest on the bonds, then consumption may not be affected. This is essentially Barro's (1974) argument.

Alternatively, people may believe that the policy will eventually lead to greater money creation. If so, the inflationary expectations thereby engendered may affect their current decisions in ways that are not captured by standard behavioral functions. This is essentially the point made by Sargent and Wallace (1981) in arguing that tight money may be inflationary.

Still different reactions would be expected if people thought the current deficit would lead to lower government spending or to more bond issues in the future. The theoretical possibilities are numerous, limited only by the imagination of the theorist.[4]

Rational expectations interact with the government budget constraint in an important way. People's beliefs about the future consequences of current monetary-fiscal decisions are conditioned by their views of the policy rules that the authorities will follow. To the extent that these beliefs affect their current behavior, different policy rules actually imply different short-run policy multipliers under rational expectations.

A key question for policy formulation is: how important are these expectational effects in practice? This seems to depend principally on

---

4. For a more detailed discussion of this issue, see Feldstein (1982).

how forward-looking current economic decisions really are. Take the tax cut example again. Under the pure permanent income hypothesis (PIH) only the present discounted value of lifetime after-tax income flows affects current consumption.[5] So expectations about future budget policy should have important effects on current consumption. But if short-sightedness, extremely high discount rates, or capital market imperfections effectively break many of the links between the future and the present, then current consumption may be rather insensitive to these expectations and rather sensitive to current income. Even under fully rational expectations and the pure PIH, consumption may depend largely on current income if the stochastic process generating income is highly serially correlated. These are issues about which knowledge is accumulating; but much remains to be learned. The evidence to date does not lead to the conclusion that long-term expectations rule the

The other two places where expectations about future fiscal and monetary policies might have significant effects on current behavior are wage and price setting and investment.

Investment, of course, is the quintessential example of an economic decision which is strongly conditioned by expectations about the future. Even Keynes knew this! But, once again, there are some real-world considerations that interfere with the strictly neoclassical view of investment as the unconstrained solution to an intertemporal optimization problem. One is that capital rationing may interfere with a firm's ability to run current losses on the expectation of future profits. A second is that management may use ad hoc rules such as the payback period criterion in appraising investment projects. A third is that management may be more shortsighted than it "should be." A fourth is that there may be — and probably is — a strong accelerator element in investment spending, which ties the current investment decision much more tightly to the current state of the economy than neoclassical economics recognizes. As in the consumption example, each of these things diminishes the importance of the future to current decision making and thereby renders expectational effects less important.

---

5. Indeed, under the hypothesis advanced by Barro (1974) — that each generation has an operative bequest motive based on the next generation's lifetime utility — the period from now to the end of time is relevant.

6. See, for example, Blinder (1981), Hall and Mishkin (1982), Hayashi (1982), or Mankiw (1981). Bernanke (1981) is more optimistic about the PIH.

Wage and price setting is another important example. Ad hoc rules which adjust wages or prices in accordance with "the law of supply and demand," or which are mainly backward looking, render expectational effects rather unimportant. But rules which are based on forward-looking considerations (such as expected future excess demand) make expectational effects crucial. Again, this is an area where we must learn much more before we can make any definitive judgments.[7]

A word on uncertainty seems appropriate before leaving this topic. It seems to me that people probably attach great uncertainty to their beliefs about what future government policies will be. If so, the means of their subjective probability distributions may have far less influence on their current decisions than the contemporary preoccupation with rational expectations would suggest. For example, how much influence does the two-week-ahead weather forecast have on your decision about whether or not to plan a picnic on a given date?

Similarly, the importance of expectations for macroeconomic aggregates is diminished by the likelihood that different people hold different expectations about what future government policies are likely to be.[8] If some people believe today's tax cuts signal higher future taxes, some believe they signal higher future money creation, and some believe they signal lower future government spending, then expectations about the future may have meager current effects in the aggregate.

The conclusion seems to be that, while we should not forget about expectational effects operating through the government budget constraint, neither should we get carried away by them. There is no reason to believe that they are the whole show.

III. Reasons for Lack of Coordination

Is more coordination necessarily better? At first blush, this question seems to admit only an affirmative answer. But further reflection suggests that things are not quite so clear.

If the central bank and the government agree on what needs to be done, but a coordinated approach cannot be promulgated because of

---

7. For an interesting discussion of foward-looking versus backward-looking wage contracts and how we might distinguish between them empirically, see Taylor (1982b).

8. Divergent expectations have been emphasized recently by, among others, Phelps (1981) and Frydman (1981).

perverse behavior by one of the two authorities, then it is clear that coordination must improve things. Indeed, the type of coordination we want is also clear: the sensible policymaker must dominate the perverse one. Would that things were so simple!

So let us ask why, in reality, fiscal and monetary policies are sometimes so poorly coordinated. If we assume that both authorities are basically sensible, then lack of coordination can stem from one of three causes (or, of course, from combinations of the three):

1. The fiscal and monetary authorities might have different objectives; i.e., different conceptions of what is best for society.
2. The two authorities might have different opinions about the likely effects of fiscal and/or monetary policy actions on the economy; i.e., they might adhere to different economic theories.
3. The two authorities might make different forecasts of the likely state of the economy in the absence of policy intervention. Divergent forecasts could result either from different economic theories (as in 2 above) or from different forecasts of exogenous variables.

In each case, if we were certain about which of the two authorities was correct, then we would know what to do about the coordination problem. We would simply put all the policy levers in the hands of the authority with the proper objective or correct theory or accurate forecast, just as we would want the instructor, not the student, to have ultimate control over the learn-to-drive car.

But, in fact, we rarely know this in any particular case. And we certainly have no basis for setting out a general, constitutional rule predicated on one or the other authority "always" being right. As a consequence, we may conclude, as in the student driver example, that the best strategy is to give some power to each authority, but at the same time to give each some ability to cancel out the actions of the other.

Let us examine each of the three possible reasons for lack of coordination in turn, using the simple targets-instruments framework. To keep the discussion as elementary as possible, I assume (for this section only) that there are two targets and two instruments.

A. A Framework

In Figure 2 there are two targets: the gap between actual and potential real output ($y - y^*$), which serves as a proxy for both unem-

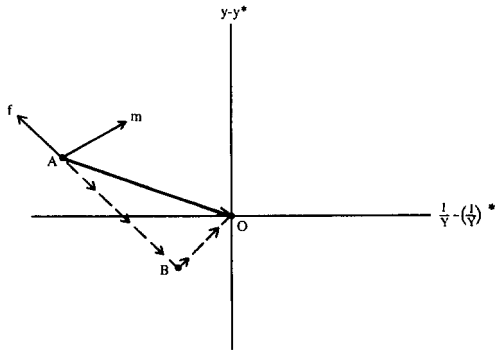


FIGURE 2

ployment (via Okun's law) and inflation (via the short-run Phillips curve), and the share of investment in GNP (I/Y). Similarly, there are two instruments: monetary and fiscal policy. Point A indicates the position which the economy is forecast to attain if neither policy instrument is changed. If the origin is interpreted as the global optimum, then real output is too high and the investment share is too low.

The vectors m and f, emanating from point A, indicate the effect of a unit expansionary move of the monetary and fiscal instrument, respectively. Expansionary fiscal and monetary policies each raise output (thereby lowering unemployment and raising inflation), but monetary expansion raises investment while fiscal policy expansion lowers it. The line from A to O shows that a fully coordinated fiscal and monetary plan can in this case achieve the global optimum. And the dotted lines from A to B and from B to O indicate the two pieces of the coordinated policy plan: fiscal restriction pushing the economy from A to B and monetary expansion pushing from B to O.

Having outlined this ideal situation, let us now consider the various reasons for lack of coordination.

B. Different Objectives

First, assume that the monetary and fiscal authorities agree both on the relevant economic theory and on forecasts for all the important exogenous variables. They disagree only over the objectives of economic policy.

Figure 3 adds one new wrinkle to Figure 2. The target of the fiscal authority is assumed to be point F, while the central bank wants to push

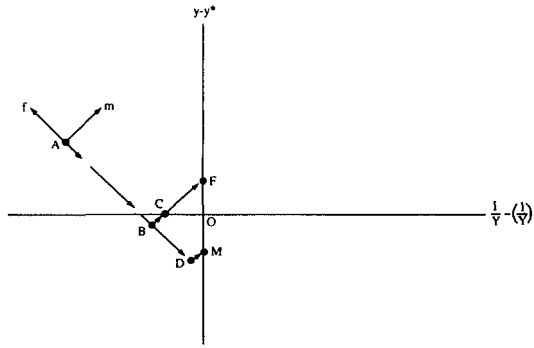


FIGURE 3

the economy to point M, which has a lower level of real activity, instead. If the administration is given control over both instruments, then point F will result along the path ABF. But if the central bank is dominant, then point M will result along the path ADM. Monetary policy will be less expansive and fiscal policy more restrictive.

But what will happen if neither authority is in complete control? That is difficult to say. One possibility — though certainly not the only one — is that the central bank will put the monetary portion of its optimal plan (line DM) into effect while the government follows the fiscal portion of its own optimal plan (line AB). This is certainly an instance that we would call "lack of coordination." But is the outcome so bad?

Figure 3 shows that the economy will reach point C, which is a kind of compromise between point F (the administration's target) and point M (the Fed's target). If the true social optimum — whatever that means! — remains point O, then the "uncoordinated" outcome may conceivably be superior to either of the two "coordinated" outcomes.

But, you may object, would it not be better still if the fiscal and monetary authorities jointly agreed to pursue point O? Of course. But this objection misses the point. When there is true disagreement about what best serves the commonweal, how can we expect a joint decision to be reached except as a political compromise? And why should we think this political compromise will be any better than point C?

The solution, of course, is simple to state and impossible to achieve. We want policymakers to agree on truly optimal targets and then to

pursue them in a coordinated manner. But this is a counsel of perfection which gives us no guidance in any particular instance. If fiscal and monetary policymakers agree to pursue inappropriate goals, the policy we get, while well coordinated, may leave us unhappy.

C. Different Models of the Economy

Similar issues arise if the Fed and the administration agree on the objectives and the forecasts, but disagree about how fiscal and monetary instruments affect the economy. To cite a not-too-hypothetical example, suppose a supply-side administration believes that it can expand the economy by tax cuts without harming investment while a monetarist central bank believes that deficits crowd out private investment.

Figure 4 depicts what may happen in such a case. The fiscal authority believes that movements of the two instruments in the expansionary direction have the effects indicated by vectors t (tax cut) and m (money supply increase). Its optimal plan shoots for point O by combining expansionary monetary policy (line DO) with a tax hike (line AD). But the monetary authority believes the relevant policy multipliers are as indicated by vectors t and m, and so feels that path ABO is the way to reach point O. Along ABO, fiscal policy is less contractionary and monetary policy is less expansionary than along ADO.

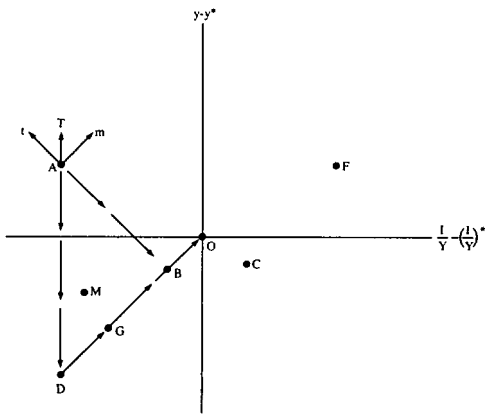


FIGURE **4**

What will happen? Once again there are many possibilities. If the fiscal authority's concept of the optimal plan is promulgated, we will get point O if its model is correct but point F if the Fed's model is correct. On the other hand, if the Fed's optimal plan is accepted, we will get point O if it has the correct model but point M if the administration's model is correct.

An "uncoordinated" system, in which the Fed pursues its version of optimal monetary policy while the administration pursues its version of optimal fiscal policy, leads to point C if the Fed has the correct model and point G if the government has the correct model. Coordination is obviously better only if a probability blend of points O and F (representing domination by the fiscal authority) or of points O amd M (representing domination by the monetary authority) is clearly superior to a probability blend of points C and G. It is by no means inevitable that this must be true.

D. Different Forecasts

The case in which the fiscal and monetary authorities agree on both the goals for economic policy and the model of the economy — a remote possibility, it must be admitted — requires no further analysis. Since it is the discrepancies between the targets and the state the economy would attain with no change in policy that really matter, the formal analysis of the case of different targets applies here directly. We need only read Figure 3 backwards and view ABF and ADM as two paths that emanate from different initial points but lead to the same terminal point.

As before, the principle is obvious but impossible to implement: we want to give all the power to the policymaker with the correct forecast. Good luck! Alternatively, if neither policymaker has a monopoly on knowledge, we want a weighted average forecast with appropriate weights. But who decides on the weights, gets both authorities to use them, and then makes sure that neither party shades his forecast to make the weighted average come out more to his liking?

E. Conclusion

Where does all this leave us? It seems that whenever fiscal and monetary policy appear to be uncoordinated we must ask ourselves: who is right? If there is one clearly correct policymaker, then the right thing to do is to achieve coordination by giving it control over all the

policy levers. But if this is not the case, as it often will not be, we are left with no clear a priori argument that more coordination is better.

This should not be a foreign notion in a country that has always prided itself on its constitutional system of checks and balances. Dispersion of power is one safeguard against misuse of power, in economic policy as elsewhere. We know that checks and balances can sometimes lead to stalemate or to conflicts between different branches of government, but in many cases we view this as a reasonable price to pay for protection against abuse of power. Is economic policy so different?

One plausible viewpoint is that the fiscal authorities, being elected officials, have the right social welfare function, and so their targets for policy should be accepted. This seems a tenable attitude in a democracy. But consider the following possibility. Suppose the body politic, in its 1914 wisdom, realized that the President and Congress would be unduly swayed by short-run considerations, and so created the Fed as a counterweight to make sure that the long run did not get ignored. Then we might not want to accept blithely the social welfare function of each newly-elected administration.

Besides, even if we accept the validity of the administration's objectives, we are still in a muddle over what to do if we simultaneously believe that the Fed has a better model of the economy and is better (or at least more honest) at forecasting. Can we then force the Fed to reveal its model and forecasts to the administration? Freedom of information argues that we should try, but past experience suggests that we may not succeed. But in any case, how can we be sure that the administration will accept the Fed's model of the economy?

I think we must face up to the obvious, though uncomfortable, conclusion. When no one can be sure what is the right thing to do, no one can ensure us that a unified fiscal-monetary policy authority will do better than the two-headed horse we now ride.

IV. Alternative Models of Coordination

With the previous two sections as background, this section considers a variety of models of fiscal-monetary coordination (or lack thereof). Two questions occupy our attention here: What kinds of outcomes are likely to arise from alternative interrelationships between the fiscal and monetary authorities? And are these outcomes socially attractive or not? The focus in this section is clearly at the "constitutional" level,

that is, not the kinds of coordination mechanisms, if any, we would like to put in place.

A. A Single, Unified Policy Maker

At one end of the spectrum is the case of a single, unified stabilization authority with control over all the relevant instruments, whether fiscal or monetary. This system could most plausibly be achieved in the United States (and in other democracies) by subordinating the central bank to the administration, as in Friedman's (1982) suggestion.[9] But whether this would be a better system than what we have now depends on the considerations outlined in the previous two sections.

(1) How severe is our shortage of instruments in the relevant empirical sense? The greater the shortage, relative to the targets we are pursuing, the greater the potential gains from better coordination.
(2) How uncertain are we about the proper goals and methods of stabilization policy and about which of the two authorities has sounder views on these questions? The greater the uncertainty, the more risky it is to put all our eggs in one basket.

On balance, it is far from clear that these considerations lead to support for Friedman's suggestion. If we take output (or unemployment), the price level (or the inflation rate), and the fraction of GNP invested as the three principal target variables, then the shortage of instruments may not be a serious one. As pointed out in Section II, the fiscal authorities can, in principle, use control over government purchases, personal income tax rates, and investment incentives, such as depreciation allowances and the investment tax credit, to push all three of these target variables to their desired levels, regardless of what monetary policy is doing. It may be that the more serious coordination problem is getting the disparate elements of the fiscal team to work together.

On the other hand, it would seem that uncertainty about which policies are best is pervasive in these days of macroeconomic agnosticism. Debates over the appropriate goals for policy and the effects of policy changes on the economy are perhaps more heated now than at any time since the early days of the Keynesian revolution. While my

9. It is hard to conceive of the other route: putting all the fiscal policy instruments in the hands of the central bank.

own feeling is that the extent of contemporary agnosticism is not quite merited by the evidence, this is a minority view. And I rather doubt that we would want a constitutional convention today to place all authority over macroeconomic policy in the hands of either the devoutly supply-side administration or the putatively monetarist Federal Reserve.

It seems unlikely that the model of a single, unified monetary-fiscal authority is descriptive of actual policy making arrangements in the United States. The only econometric study of fiscal-monetary coordination in the U.S. that I know of, by Goldfeld and myself **(1976)** some years ago, concluded that "the abstraction of a single authority conducting stabilization policy in the United States is just that — an abstraction with little or no empirical validity" (p. **792).** Using the MPS model to assess the effects of policy on real GNP, we found a slight positive correlation between the effects of fiscal and monetary policy over the whole 1958-**1974** period. But this was the net result of a substantial positive correlation while Republican presidents were responsible for fiscal policy and a negative correlation during the Kennedy-Johnson years.

One final observation on the fully-coordinated case is pertinent in this contest. A single, unified policymaker with an entire portfolio of fiscal and monetary instruments to manage may find it optimal to couple expansionary monetary policy with contractionary fiscal policy, or vice versa, just as an investor may find it optimal to buy one share long and sell another short.

Thus, the fact that we sometimes see fiscal and monetary policy tugging aggregate demand in opposite directions is not evidence that the two policies are uncoordinated. For example, Figure **2** offered an example in which a properly coordinated policy package requires contractionary fiscal policy and expansionary monetary policy. While the example is a simple one of certainty and an equal number of targets and instruments, the basic lesson is probably very robust and holds — though not so sharply — in an uncertain world with a shortage of instruments. It suggests that policy may sometimes appear uncoordinated when it is not.

This point is neither academic nit-picking nor a theoretical curiosum. For example, the policy mix that many economists advocate right now combines a more expansionary monetary policy with a more contractionary fiscal policy in the coming years: This is offered as an example of well coordinated monetary and fiscal policy while the

current policy mix (tight money with loose fiscal policy) is supposed to illustrate lack of coordination. Clearly, coordination does not imply correlation.

B. Two Uncoordinate Policymakers

At the opposite end of the coordination spectrum comes the case of two independent authorities, one in charge of fiscal policy and the other in charge of monetary policy, with neither one dominating the other. This model may approximate actual policymaking arrangements in the contemporary United States.[10]

When the two policymakers are at loggerheads, a policy mix of tight money and loose fiscal policy frequently results, with deleterious effects on interest rates and investment.[11] What outcome does theory lead us to expect when fiscal and monetary policy are in different hands and the two parties cannot (or do not try to) reach agreement?

A natural way to conceptualize this situation is as a two-person nonzero-sum game. And a natural candidate for what will emerge, it seems to me, is the Nash equilibrium.[12] Why the Nash equlibrium? Both policymakers understand that they do not operate in a vacuum. Each presumably understands that he is facing an intelligent adversary with a decision making problem qualitatively similar to his own. Furthermore, this is a repeated game; each policymaker has been here before and assumes that he will be here again. It seems natural that each would assume that the other will make the optimal response to whatever strategy he plays. If so, each will probably play his Nash strategy.

Let us see how the Nash equilibrium works out in a moderately realistic example. (See the payoff matrix in Figure 5.) I assume that each policymaker has two available strategies: contraction or expansion. I also assume that they order the outcomes differently, but know each other's preference ordering. Specifically, the fiscal authority

---

10. In reality, things are more complicated still because the President and Congress often disagree over national economic policy. A model of three stabilization authorities may be better.

11. The opposite policy mix — tight budgets and easy money — while conceivable, seems to be rarely encountered.

12. The Nash equilibrium concept is defined as follows. Each player does what he would if he knew what the other player was going to do. It is an equilibrium in the sense that the two resulting strategies are consistent with one another; once the game is played, neither player has any desire to change his decision. Not all games have a unique Nash equilibrium. The fiscal-monetary game to be considered here does.

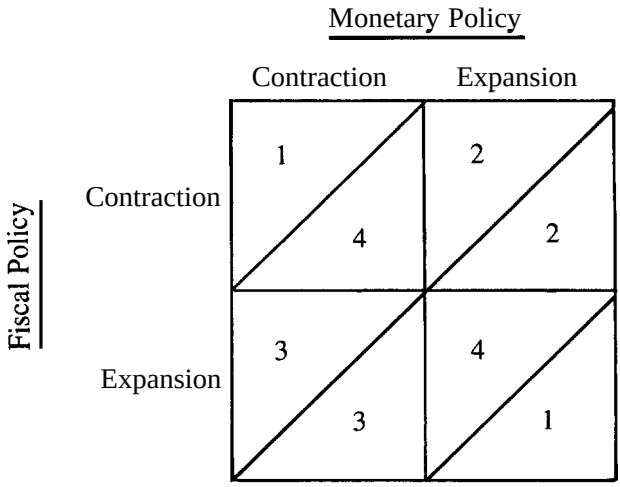


FIGURE 5

(whose preference ordering appears below the diagonal in each box) is assumed to favor expansionary policy. From its point of view, the solution where both play "expansion" is best (rank 1) and the solution where both play "contraction" is worst (rank 4). The monetary authority (whose ordering appears above the diagonal) wants to contract the economy to fight inflation, and so orders these alternatives in the opposite way. However, as between the two outcomes which combine expansion and contraction, I assume that the two players agree that easy money with a tight budget is a better policy mix than tight money with a loose budget.

This explains the entries in the payoff matrix (Figure 5). Now where is the Nash equilibrium? If the Fed plays "expansion," the Administration will also play "expansion," and the Fed will wind up with its least-preferred outcome (the lower righthand box). So the Fed will play "contraction." Knowing this, the Administration's best strategy is "expansion," so the outcome will be the lower lefthand box. Clearly, this is the only Nash equilibrium for this game. It also seems to be the most plausible outcome of uncoordinated but intelligent behavior.

But notice something interesting about this outcome. Both the Fed and the fiscal authority agree that the upper righthand box — easy money plus tight fiscal policy — is superior to the Nash equilibrium. Under full monetary-fiscal coordination, they might well select this

policy mix. But, if they cannot reach an agreement, then the Nash equilibrium — a Pareto-inferior outcome — is likely to arise. Here is a case in which some degree of coordination — at least enough to avoid the inferior Nash equilibrium — is better than none even if we cannot decide which authority has the right social welfare function.[13]

If this example is typical, then switching from a system of two uncoordinated policymakers to one with a single, unified policymaker might yield substantial gains. And there is good reason to think that it is typical, because Nash equilibria in two-person non-zero-sum games are very often not Pareto optimal.

The problem, of course, is that achieving greater coordination is more easily said than done. The two authorities have reasons for disagreeing — reasons which may not be easily ironed out. However, this example illustrates that full coordination (which is probably impossible in any case) may not be critical. What we need in this case is no more than an agreement to consult with one another enough to avoid outcomes that both parties view as inferior. Maybe this is not too much to ask.

However, things become far less clear if one policymaker lacks knowledge of either the preferences or the economic model of the other. Then there is no particular reason to think the Nash equilibrium will result, and other solutions become equally plausible. For example, each player may simply pursue his global optimum, ignoring-the decision of the other.[14] There are other possibilities as well.

C. Leader-Follower Arrangements

An alternative model of fiscal-monetary coordination, intermediate between the two extremes, is a leader-follower arrangement according to which policymaker A goes first and then policymaker B decides what to do in view of the prior decision by A.

This scenario may sound moderately descriptive of current U.S. institutions in that fiscal policy first determines the budget deficit and then monetary policy decides how much of this deficit to monetize. However, things are a bit more complicated because monetary policy

---

13. The example analyzed here is a case of what game theorists call the Prisoners' Dilemma.

14. In the simple example of Figure 5, this pair of strategies also leads to the Nash equilibrium. But this is not generally true. A more complicated example in which the Nash and other alternative solutions differ is offered in the Appendix.

decisions are made much more frequently (monthly?) than fiscal policy decisions (annually?), so sometimes the Fed is the leader.

Under a leader-follower arrangement, the follower runs the show, albeit subject to some constraints placed on him by the leader's prior decision. If the follower has enough instruments at his disposal, these constraints may not be binding. In this case, the leader-follower system is equivalent to having a single stabilization authority (the follower). But if the follower does not have enough instruments, then the constraints imposed by the leader are real ones and may preclude the attainment of the (follower's) first-best optimum.

For this reason, the leader-follower system may work very differently depending on whether the Fed or the government is the leader. I have noted above that, at least in principle, a fiscal authority interested in targeting y, P, and I/Y can achieve its aims regardless of what monetary policy does. Under these ideal circumstances, the leader-follower system with the Fed as leader is equivalent to giving full control to the fiscal authorities.

However, the central bank enjoys no such luxury. Its three traditional instruments (reserve requirements, open market operations, and discount policy) probably give it only one independent instrument for stabilization purposes. If so, a leader-follower arrangement with the Fed as follower is not at all equivalent to vesting full control in the Fed. This asymmetry, it seems, is something of which the Fed is fully aware. It may be why Chairman Volcker smiles so infrequently.

Even without this asymmetry, the outcome will depend on who leads and who follows. Suppose, first, that the fiscal authority is the leader. It sets government spending, taxes, and transfers where it wants them, in full knowledge that these decisions will evoke some response from the Fed. In the case of the simple game in Figure 5, the administration can predict with confidence that the Fed will play "contraction" regardless of the fiscal-policy decision. So it will surely play "expansion." We get the Nash equilibrium once again.

By a similar line of reasoning, it is easy to see that the same Nash equilibrium will arise if the Fed is the leader and the administration is the follower. However, this is not a general result. In general, the two leader-follower solutions are different, and each differs from the Nash equilibrium.[15]

---

15. See the example in the Appendix.

Under a leader-follower arrangement, the follower's attitudes clearly influence the leader's decision because when the leader makes his decision he takes into account the anticipated response of the follower. For example, fear of the high interest rates that the Fed might cause probably led Congress to adopt a less expansive budget this year than it otherwise would have chosen.

In a dynamic framework, still more possibilities for policy interactions arise. The follower knows, for example, that his decision in period 1 will influence the circumstances facing, and thus the decision made by, the leader in period 2. He will probably take this into account in making his period 1 decision.[16] At least potentially, this dynamic interaction can reduce the loss from lack of coordination by getting the leader to adopt policies more in tune with the objectives of the follower. Continuing the same example, by keeping a tight rein on credit the Fed exercises a kind of discipline (albeit a minor one) over fiscal policy so long as Congress abhors high interest rates and believes that deficits will not be monetized at the margin. This pushes fiscal decisions more in the direction favored by the Fed. The follower is not a toothless tiger even if he has but one instrument and many targets.

D. One Party Follows a Non-Reactive Rule

One way for the leader to avoid being manipulated by the follower is to adopt a non-reactive policy rule, such as the famous k-percent rule for monetary policy. The key word here is not "rule" but "non-reactive." If the Fed (the follower) knows that the government (the leader) is following a fiscal rule that reduces spending whenever interest rates rise, it can induce the government to cut spending by pushing up interest rates. But no such possibilities arise if the government follows a non-reactive rule.

While many fiscal rules (balancing the budget, balancing the high-employment budget, etc.) have been suggested, none of them seem to be non-reactive. No one, to my knowledge, has advocated a k-percent rule for government spending or for tax receipts, though some of the suggestions for constitutional restraints on spending come close.[17]

---

16. And, of course, the leader understands this when he makes his period 1 decision! No wonder game theory is so hard.

17. Indeed, it may be possible to view the Reagan economic program as a non-reactive fiscal rule that will cut the ratios of government spending and tax receipts to GNP, regardless of the consequences for interest rates, unemployment, and inflation.

However, the most frequently suggested rule for the conduct of monetary policy is non-reactive. And the desire to free the Fed from the pressure to monetize budget deficits may be one of the major motivations behind this rule.

If one policymaker follows a non-reactive rule, then policy is — by definition — perfectly coordinated. One way to think about non-reactive rules is as a way to give up some freedom of action (the loss of one or more stabilization policy instruments) in return for greater policy coordination. If the non-coordination problem is big enough, it may actually make sense to do this. To extend a well-worn metaphor, if one of your hands will simply fight with the other, it really may be better to tie one hand behind your back.

V. Some Examples of Monetary-Fiscal Rules

Let us consider some specific rules that have actually been suggested for monetary and/or fiscal policy. Are these rules likely to increase or decrease policy coordination? Are they likely to improve the fiscal-monetary mix? How are they likely to function in the short run, when the emphasis is on stabilization, versus in the long run, when the emphasis is on growth?

A. Hard-Core Monetarism

The most famous and most widely-discussed suggestion for fiscal and monetary rules can be attributed, more or less accurately, to Milton Friedman. Under Friedman's suggested regime, which I will call "hard-core monetarism," the Fed would keep the money supply growing at some constant rate and the government would fix its spending and tax-transfer schedules according to allocative considerations. Both would refuse to deviate from these rules for cyclical reasons. Notice that under this regime both policymakers would be following non-reactive rules.

One new element has entered the debate in recent years. Some years ago, Solow and I (1973) showed that a policy of holding the money supply constant and financing all deficits by issuing bonds could destabilize the economy, whereas financing deficits by money creation probably led to a stable system. This finding, while derived in a very simple and special case with fixed prices, has proven to be remarkably robust. Tobin and Buiter (1976) established a parallel result for a full-employment economy with perfectly flexible prices. Pyle and

Turnovsky (1976) and others showed that analogous results obtain in models intermediate between these two extremes, such as models with an expectations-augmented Phillips curve.

Recently, McCallum (1981, 1982), Smith (1982) and Sargent and Wallace (1981) have re-emphasized the importance of this result for the hard-core monetarist policy rule. Though using rather different models, each has made the same point: that the system is liable to be dynamically unstable under a policy that holds both fiscal policy (defined in various ways by the different authors) and the money supply (or its growth rate) constant.

The mechanism behind these results is not hard to understand. Suppose some shock (such as an autonomous decline in demand in a Keynesian model) opens up a deficit in the government budget, and the hard-core monetarist regime is in force. Bonds will be issued to finance the deficit. With both interest rates and the number of bonds increasing, interest payments on the national debt will be increasing. But this increases the deficit still further, requiring even larger issues of bonds in subsequent periods, and the process repeats. If the real rate of interest exceeds the rate of population growth, then the real supply of bonds per capita will grow without limit. Consequently, unless bonds are totally irrelevant to other economic variables, as in the non-Ricardian view of Barro (1974), the whole economy will explode.[18]

So the stabilizing properties of the hard-core monetarist rule are open to serious question, to say the least. What about its longer-run effects?

As a long-run defense against inflation, the monetarist rule seems to be very effective. Although academic scribblers can, and have, constructed examples of continuous inflation without money growth, my feeling is that policymakers can justifiably treat these models as intellectual curiosa and proceed on the assumption that a maintained money growth rate will eventually control the rate of inflation.

But what about capital formation and real economic growth? When a recession comes, the hard-core monetarist rule takes no remedial action. If there is an important accelerator aspect to investment spending, the slack demand will retard capital formation. At the same time,

---

18. In a complex system, many more things are going on than I can describe in a single paragraph. For example, income and prices are changing, with important consequences for the budget deficit. Yet the basic mechanism described here seems to come shining through in all the models.

the issuance of new government bonds to finance the budget deficits that recession brings will push up interest rates. And this, too, will retard investment spending. The likely result is that hard-core monetarism will not create a climate conducive to investment unless long-run predictability of the price level is a more important determinant of investment than I think it is.[19]

It seems to me that much of the concern over fiscal-monetary coordination derives from concern over the implications of the policy mix for investment. If so, then hard-core monetarism, which eliminates the coordination issue by eliminating policy, does not look to be a very good solution.

B. Bondism

As McCallum (1981) first pointed out, a potentially better monetary-fiscal rule was actually suggested by Friedman in his earlier "A Monetary and Fiscal Framework for Economic Stability" (1948), but subsequently abandoned. For lack of a better name, Gary Smith (1982) has suggested that we call the policy "bondism" because it treats bonds in much the same way as monetarism treats money.

Under the old Friedman policy, both fiscal and monetary policy would be governed by rules, but the monetary rule would be reactive. In particular, Friedman suggested that government spending and tax rates be set in accordance with allocative considerations, as in the monetarist rule, but that all deficits be financed by money creation. Both McCallum (1981, 1982) and Smith (1982) observed that this policy regime is equivalent to the "money financing" scenario in Blinder and Solow (1973), and hence probably leads to a stable system. On this score alone, it has much to recommend it over monetarism.

But there is more to the story. Consider what would happen when, for example, a deficiency of aggregate demand brought on a recession. Falling incomes would open up a budget deficit, and this would automatically induce the Fed to open the monetary spigots. The economy would get a strong anti-recessionary stimulus from monetary policy. And I do mean strong. Think about the empirical magnitudes involved. In the current U.S. economy, a 1 percentage point rise in the

19. Or unless inflation itself is damaging to investment via, for example, the deterioration of the real value of depreciation allowances. This last factor has been stressed in a number of places by Feldstein. See, among others, Feldstein (1980b).

unemployment rate adds about $25 billion to the budget deficit. But the "money" that would be issued to finance the deficit would be high-powered money. Adding $25 billion in new bank reserves is a colossal injection of money; it would increase total bank reserves by nearly 50 percent! Thus the old Friedman rule would seem to be an incredibly powerful stabilizer.[20]

How does it score on the more long-run criteria? The fact that recessions would automatically engender easy money under the "bondist" policy augurs well for capital formation. So does the notion that cyclical disturbances would probably be quite muted. The one potential worry is over inflation. The rule can conceivably lead to a lot of money creation in a hurry, with subsequent inflationary consequences. But if the fiscal part of the rule keeps the high-employment budget balanced, and if the economy fluctuates around its high-employment norm, this should not be a major worry. Monetary expansions should subsequently be reversed by monetary contractions.[21] If the rule is believed, even large injections of money should not raise the spectre of secular inflation.

Finally, note that the old Friedman rule completely eliminates the possibility that monetary and fiscal policy might act at cross purposes. Under the rule, monetary policy is expansionary if and only if fiscal policy (defined by the automatic stabilizers) is expansionary. Also, the game-theoretic considerations raised in Section III cannot arise because neither policymaker has any decision to make.

While I have never been an advocate of rules, it seems to me that all this adds up to a clear conclusion: the old Friedman rule ought to get serious quantitative attention.

C. Sop-Core Monetarism

The rule just discussed would make fiscal policy nonreactive and monetary policy reactive. A symmetric approach would call for a rule in which monetary policy is nonreactive but fiscal policy reacts in a

---

20. Maybe too powerful. This exercise in casual empiricism, in conjunction with the fact that the effects of high-powered money on income come with a distributed lag, raises worries that the rule might actually destabilize the economy by overreacting to disturbances. The theoretical papers mentioned earlier deny this possibility, but they ignore distributed lags. The issue seems worth investigating.

21. This statement is predicated on defining high employment as approximately the natural rate. With a Humphrey-Hawkins type definition of high employment, the old Friedman rule can lead to inflationary disaster.

countercyclical fashion. John Taylor (1982a) has mentioned just such a possibility as a way to put a meaningful countercyclical policy regime in place without creating expectations that inflationary shocks will be accommodated. Under this regime, monetary policy would adhere to a k-percent rule but fiscal policy would be used for countercyclical purposes. The latter could be done either by rules or by discretion.

What can we say about this policy regime? Not much, of course, until it has been given more theoretical and empirical scrutiny. But a few observations can be made.

First, the coordination problem is definitionally solved. With no monetary policy, it can hardly be in opposition to fiscal policy. Second, the game-theoretic aspects of stabilization policy would necessarily disappear. The government could hardly try to "game" a k-percent rule.

Would cyclical stabilization be strong enough? That cannot be answered in the abstract, since Taylor's policy mix does not specify the strength of the fiscal stabilizers. But it does not seem likely that they would be as strong as the stabilizing forces in Friedman's "bondist" rule.

Finally, there is the long-run capital formation issue. Reducing the severity of recessions, I believe, can only do good things for investment. But doing so with fiscal policy probably means that interest rates would be pushed up by the countercyclical policy.[22] So there could conceivably be a tradeoff between short-run stabilization and long-run growth.

Appendix

This appendix considers a monetary-fiscal policy game in which each authority has three strategies: to expand aggregate demand, to contract aggregate demand, or to do nothing. The outcomes are ranked from 1 to 9 in the payoff matrix in Figure 6, with the rankings of the fiscal authority again below the diagonal and the monetary rankings above.

Circles indicate the best fiscal response to each monetary strategy and squares indicate the best monetary response to each fiscal strategy.

---

22. This could be avoided if expansionary fiscal changes took the form, say, of liberalizing depreciation allowances or raising the investment tax credit. But the personal income tax and certain government expenditures appear to be the prime candidates to bear the stabilization burden.

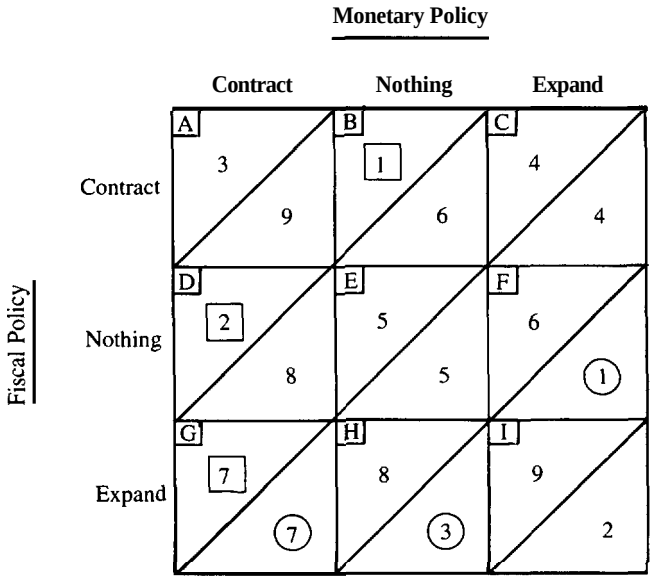


FIGURE *6*

It is clear that box G, in the lower lefthand corner, is the only Nash equilibrium. As in the 2 by 2 example in the text, monetary policy is contractionary and fiscal policy is expansionary. We can also see that the Nash equilibrium is Pareto dominated by a variety of other outcomes: boxes B, E, C, and F.

If the Fed is the leader and the government is the follower, the solution is box F; this is the best the Fed can do if constrained to the fiscal reaction function (the boxes with circles). By similar reasoning, we see that box B will arise if the government leads and the Fed follows. In this example, either leader-follower equilibrium is superior to the Nash equilibrium (though the leader has more to gain).

Another possible outcome of complete lack of coordination is that each authority ignores the other and shoots for its global optimum. In the example, that would mean that each does nothing and box E results. This outcome Pareto dominates the Nash equilibrium, but is in turn Pareto dominated by box C (in which fiscal policy is contractionary while monetary policy is expansionary).

References

Auerbach, Alan J. and Laurence J. Kotlikoff (1981), "National Savings, Economic Welfare, and the Structure of Taxation," NBER Working Paper No. 729, (August).

Barro, Robert J. (1974), "Are Government Bonds Net Wealth?," ***Journal of Political Economy*** (November/December), pp. 1095-1117.

Bernanke, Ben S. (1981), "Permanent Income, Liquidity, and Expenditure on Automobiles: Evidence from Panel Data," mimeo, Stanford University, (September).

Blinder, Alan S. (1981), "Temporary Income Taxes and Consumer Spending," ***Journal of Political Economy*** (February), pp. 26-53.

Blinder, Alan S. and Stephen M. Goldfeld (1976), "New Measures of Monetary and Fiscal Policy, 1958-1974," ***American Economic Review,*** 66, pp. 780-796.

Blinder, Alan S. and Robert M. Solow (1973), "Does Fiscal Policy Matter?", ***Journal of Public Economics,*** pp. 319-337.

Christ, Carl F. (1968), "A Simple Macroeconomic Model with a Government Budget Constraint," ***Journal of Political Economy,*** 76 (January/February), pp. 53-67.

Feldstein, Martin S. (1980a), "Tax Rules and the Mismanagement of Monetary Policy," ***American Economic Review,*** 70 (May), pp. 182-186.

_____ (1980b), "Fiscal Policies, Inflation, and Capital Formation, ***American Economic Review,*** 71 (September), pp. 636-650.

_____ (1982), "Government Deficits and Aggregate Demand," ***Journal of Public Economics, 9,*** pp. 1-20.

Friedman, Milton (1948), "A Monetary and Fiscal Framework for Economic Stability," ***American Economic Review,*** 38 (June), pp. 245-264.

_____ (1982), "Monetary Policy: Theory and Practice," ***Journal of Money, Credit, and Banking,*** 14 (February), pp. 98-118.

Frydman, Roman (1981), "Individual Rationality, Decentralization and the Rational Expectations Hypothesis," mimeo, New York University.

Hall, Robert E. and Frederic S. Mishkin (1982), "The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households," *Econometrica.*

Hayashi, Fumio (1982), "The Effect of Liquidity Constraints on Consumption: A Cross-Sectional Analysis," NBER Working Paper No. 882, (April).

Mankiw, N. Gregory (1981), "Hall's Consumption Hypothesis and Durable Goods," mimeo, MIT (January).

McCallum, Bennett T. (1981), "Monetarist Principles and the Money Stock Growth Rule," ***American Economic Review,*** 71 (May), pp. 134-138.

_____ (1982), "Are Bond-Financed Deficits Inflationary? A Ricardian Analysis," mimeo, Carnegie-Mellon University (May).

Phelps, Edmund S. (1981), "The Trouble with 'Rational Expectations' and the Problem of Inflation Stabilization," mimeo, Columbia University (October).

Pyle, David H. and Stephen J. Turnovsky (1976), "The Dynamics of Government Policy in an Inflationary Economy: An 'Intermediate Run' Analysis," ***Journal of Money, Credit, and Banking,*** 8 (November), pp. 411-437.

Sargent, Thomas J. and Neil Wallace (1981), "Some Unpleasant Monetarist Arithmetic," ***Quarterly Review,*** Federal Reserve Bank of Minneapolis, 5 (Fall), pp. 1-17.

Smith, Gary (1982), "Monetarism, Bondism, and Inflation," ***Journal of Money, Credit, and Banking,*** 14 (May), pp. 278-286.

Taylor, John B. (1982a), "Establishing Credibility: A Rational Expectations Viewpoint," ***American Economic Review,*** 72 (May), pp. 81-85.

———— (1982b), "Rational Expectations and the Invisible Handshake," in forthcoming volume in honor of Arthur Okun.

Tobin, James and Willem Buiter (1976), "Long-Run Effects of Fiscal and Monetary Policy on Aggregate Demand," ***Monetarism,*** J.L. Stein (ed.), North-Holland, pp. 273-309.

3
Discussion

William ***Poole***

In writing this paper Alan Blinder accepted a difficult charge: the issue of coordination of monetary and fiscal policy is much discussed at a shallow level but it is hard to know how to write a scholarly paper on the subject. Although I have numerous criticisms to offer, the paper is without question a stimulating one that breaks new ground in the analysis of policy coordination issues.

Blinder has chosen a theoretical approach rather than a historical and institutional one. His paper is not about actual policy, but about a framework within which actual policy in the United States or any other country might be analyzed. Given this theoretical outlook, it would have been better if he had not attached labels such as "Administration" and "Federal Reserve" to the players in his models. He should have referred simply to "policy authority A" and "policy authority B." He should have avoided making off-hand comments about the preferences and attitudes of the Administration and Federal Reserve, since he offers no supporting discussion for these comments and the paper is not really about actual policy and actual policymakers.

Targets and Instruments

Blinder begins, quite naturally, with the conventional targets and instruments framework. He makes the important point that there are many fiscal policy instruments, such as taxes and subsidies, in addition to overall levels of government spending and taxes. And I am sure that he would not object to adding regulatory instruments to the list. With these instruments fiscal policy has enormous capacity to affect resource allocation and distribution.

That fiscal policy has allocative and distributional effects is not a

matter of dispute. But what about monetary policy? Here there is an important long-runlshort-run distinction. At the level of abstraction of this paper, it seems sensible to argue that in the long-run monetary policy affects nominal magnitudes and fiscal policy real magnitudes. In the long-run, these separate effects make the coordination issue moot. The results in the DRI and MPS simulations reported by Blinder reflect, I suspect, the fact that investment and growth are not much affected by monetary policy because of the long-run near neutrality of money. There is, though, an ambiguity here because there can be an interaction between inflation and the tax system that depresses investment. But the fact that the tax system need not be neutral with respect to inflation leads me to label the real effects of higher money growth in the long-run a fiscal policy phenomenon rather than a monetary policy phenomenon.

Even if the coordination issue disappears in the long run due to the neutrality of money, there is still a short-run coordination issue that needs discussion. For there to be a coordination issue the policy ineffectiveness proposition in the rational expectations macro literature must fail. More conventionally, it must also be assumed that countercyclical stabilization policy is feasible in spite of policy lags and the inaccuracies of economic forecasts. If stabilization policy is not feasible Blinder has no paper. Even though I personally have grave doubts about the feasibility of successful countercyclical policy, for present purposes I will take the possibility as given and will go on from there.

For the most part, Blinder's analysis within the targets and instruments framework is sound. I have, however, two comments.

Blinder questions the relevance or importance of expectational effects. My analysis is different. It is not that the rational expectations hypothesis fails but rather that it is extremely difficult for policymakers to change expectations. We have an excellent current U.S. example: the 1982 tax bill reversed about one quarter of 1981's tax cut. People are well aware of the fact that tax cuts advertised to be permanent do not always turn out that way, and tax increases advertised as temporary do not always turn out that way either. In most countries the economic and political forces responsible for secular trends and cyclical responses in government policy are very deeply entrenched. When a fundamentally new policy is introduced, expectations may appear to be irrationally sticky — that is, to reflect old policies for an "unreasonably" long period of time. Thus, my analysis is that it is not that

expectational effects are unimportant but rather that it is very difficult to change expectations quickly because it is so difficult to change policy in fundamental ways.

My second comment concerns Blinder's paragraph where he argues that "the real world seems to be characterized by a shortage of instruments in the relevant empirical sense." I disagree—the problem is that the government has too many objectives rather than too few instruments.

Explaining Non-Coordination

In the third section of the paper Blinder discusses three reasons why separate policy authorities may not be well coordinated. They may have different objectives, different economic models, and different forecasts. My concern about the analysis in this section is that the checks and balances justification for separate policy authorities is incomplete and perhaps wrong.

In terms of the economic theory of economic policy there can be no justification for separate policy authorities. For economic analysis to say anything about alternative governmental organizations we must be able to provide a preference ordering for the different outcomes under different policy organizations. That requires that we take the different preferences of members of the society and somehow aggregate those preferences into a social utility function. Having done that, a single coordinated policy authority will always be able to reach a result at least as good as separate policy authorities.

Precisely the same argument holds with respect to differences of opinion on economic models and economic forecasts. For example, the optimal economic forecast is obtained from a weighted average of independent forecasts with the weights depending on the forecasting accuracy of the independent forecasts. Policy administered by a single authority on the basis of this optimal composite forecast must be at least as good as the policy results obtained from independent policy authorities.

Having said all this, I nevertheless have considerable sympathy with Blinder's notion that there is a checks and balances argument for independent policy authorities. But the argument must flow from political theory rather than economic theory. What is involved, I suppose, is that we are never sure that the electoral process will return to power officials who are successful according to some social welfare

criterion and fail to return to power officials who are not successful. And what happens when the voters misjudge the person who is elected? There is the old refrain, "If only I had known, I never would have voted for the bum."

The issue here is the restraint of power rather than the optimal use of power. Multiple and partially independent policy authorities provide this restraint. The checks and balances system limits the damage from electoral mistakes.

Gaming

The most interesting and innovative part of the paper involves the application of game theory to the problem of understanding what happens in a world of separate policy authorities.

To apply the game theory approach to policy formulation in the United States we will need at least three players—the Administration, the Congress, and the Federal Reserve System. In addition, it is worth emphasizing that much of the gaming we observe involves attempts by each authority to force some other authority to take unpleasant action. A major advantage of a unified authority is that responsibility is clear and gaming to shift blame is much more difficult. In contrast, policy coordination is usually not a problem when pleasant policies are involved. Each authority naturally wants to corner the kudos, but is ordinarily willing to share the credit with other authorities if necessary to obtain the implementation of popular policies.

In the classic prisoners dilemma, communication between the prisoners can lead to a superior result from their point of view. However, in economic policy, when the problem arises from the need for unpleasant action it is not clear that consultation among policy authorities is sufficient to produce the superior result. There seem to be cases in which no one wants to be associated with unpleasant policies even if the responsibility is shared by all policy authorities.

The difficulty here is that we are accustomed to thinking of policy authorities as acting to maximize a social welfare function which depends on how they define the "public interest." In fact, the actions of policy authorities are all too often determined by the private interest, including interest in reelection, of the authorities themselves rather than by any notibn of the public interest. Even shared responsibility among authorities for unpleasant policies in the public interest may not be sufficient to overcome the private interest an individual authority may have in a different policy.

Perhaps hidden by Blinder's game theoretic structure is the fact that different policy authorities need coordination precisely because they represent different political and economic constituencies. The views of different authorities are not self-contained but are derived from these constituencies. The possibility that consultation among independent authorities may lead to a superior result tends to hide the problem that there may not be ***any*** effective political mechanism to provide the consultation and coordination among competing constituencies required to realize the superior solution. Pareto moves are frequently stymied by the apparent impossibility of finding a mechanism through which winners can compensate losers. Once we look behind the policy authorities to the constituencies they represent, the game theoretic approach displays the structure of the problem very clearly. It is disquieting to contemplate the possibility that in many cases there just may not be any effective political mechanism to coordinate competing constituencies.

Finally, Blinder's discussion of nonreactive policy rules is entirely within the context of his analysis of gaming issues. It is worth emphasizing that advocates of nonreactive rules have 'traditionally not been interested in issues of coordination and gaming but rather in expectational issues and in the restraint of government power. Blinder does not give much weight to the expectational arguments, as noted earlier, and seems to prefer a system of checks and balances based on dispersed power (which inevitably raises gaming and coordination issues) rather than on rules that limit power.

Conclusions

I have gotten a lot out of reading and thinking about this paper, even though Alan Blinder may feel that I got the wrong things out of it. I have concluded that in the purely economic theory of economic policy there is no normative case for a divided policy authority. I also believe that the much discussed problem of a lack of coordination between monetary and fiscal policy is really not as serious a matter of economic theory as the volume of discussion would lead one to believe because the effects of monetary policy are primarily nominal and the effects of fiscal policy primarily real.

The real issues involve political theory. I end with some questions: In our democratic and pluralistic society, how much difference does the ***form*** of governmental institutions make? Does it really matter whether

or not the central bank is independent? Might not our apparent lack of policy coordination reflect the preferences and/or schizophrenia of the voters and the public choice mechanism rather than the nature of our governmental organization? If I may borrow Blinder's automobile analogy for a different purpose, might we not be in a car with multiple steering wheels, brakes, and accelerators without fully realizing it?

4
Discussion

James Tobin

Alan Blinder's paper is a very interesting and provocative ***tour d'horizon*** of the issues regarding coordination of fiscal and monetary policies. These issues are salient today, when these two branches of macroeconomic policy seem to be working at cross purposes, yielding a mix that no one regards as satisfactory. The consequences of our present separation of powers and responsibilities, compared with centralized authority, have not received sufficient attention from economic analysts. Blinder's paper clarifies the issues and uncovers some interesting possibilities — for example, that under some circumstances separation may do better than centralized authority and, on the other hand, that nonoptimal mixes of monetary and fiscal policy may result, like the superpower arms race, from a "prisoner's dilemma" game between two authorities with differing objectives. That Blinder does not reach any firm conclusions is becoming modesty, given the exploratory stage of the subject.

In addressing the question of coordination, Blinder inevitably is drawn into discussion of other issues of macroeconomic policy, issues which though related to coordination are important whether policy authority is unified or divided. I refer in particular to old issues of rules versus discretion and of fixed versus reactive rules and to the old question of the adequacy of instruments relative to goals. I begin my comments with the latter question.

Are There Enough Tools?

In his discussion of this question, Blinder begins with an optimistic answer, based on the apparent multiplicity of tools, especially fiscal tools. Later he qualifies the answer, mainly on a kind of Say's Law

suspicion that with every added tool policymakers will find, or will be charged with, an additional goal. I would emphasize another reason for pessimism, namely that our fiscal and monetary instruments do not have significantly differential effects on the macroeconomic variables whose values are our major objectives, namely unemployment and inflation. In the terminology of the Tinbergen-Theil model, the instruments are virtually collinear in their effects on those two objective variables; consequently we cannot, by manipulation of the monetary-fiscal mix, no matter how many instruments we can enumerate, obtain the desired combination of goals, say full employment and price stability. Even if this is not a permanent long-run problem it is a congenital weakness of macroeconomic policy in short and intermediate runs of great economic and political importance.

Blinder knows this too, and that is why he lumps unemployment and inflation into a single goal in the diagrams of his Section III. There neither the fiscal nor the monetary authority can control the division of the demand effects of its policies between prices and outputs. That division depends on the short-run elasticity of supply with respect to nominal demand, on the short-run Phillips tradeoff, and'is the same whether spending is varied by monetary means, by fiscal means, or otherwise. The fiscal and monetary policymakers are limited to choosing where they would like to be on the economy's price-quantity tradeoff curve, and to balancing that indissoluble compound of outcomes against a separable goal, the investment share of output.

However, before the unwary reader reaches Section III, he or she might be led to believe that we have enough independent instruments, perhaps even enough fiscal tools without any monetary measures at all, to attain all three objectives, output, price, and capital formation. For this reason and for the more important reason that much current discussion of macroeconomic. policy, by its official authors and by other commentators, appears to ignore the problem, I would like to discuss it further.

In what ways might monetary and fiscal policies affect differentially the price/output response of the economy?

For the last 10, 15, or 35 years economists and policymakers have been frustrated by their inability to break the stubborn connection of output and price levels or of unemployment and inflation by any combination of the conventional monetary and fiscal tools of macrostabilization. Right now, most people mournfully agree, if we want

more output and employment in 1983 than the standard forecast we will have to accept a higher price level, a higher year-to-year inflation statistic. The division of response between prices and outputs to variation of net demand pressure is a durable structural feature of the economy. Monetary and fiscal measures affect that structure, if at all, only in the long run; differential effects are small and slow. After all, that is precisely why many of us have long believed that an additional nonredundant independent instrument is needed — incomes policy, Kennedy guideposts, TIP, whatever.

I am aware of the wedge between monetary and fiscal vectors introduced by their open-economy effects in a regime of floating exchange rates. A tight money-easy budget mix is, at least temporarily, less inflationary for the same unemployment outcome. It appreciates the currency and lowers import and export prices. I do not think this differential effect is quantitatively of great importance for the U.S., especially if feedbacks from the rest of the world are taken into account. Clearly the effect is in any case small for the OECD countries as a group and vanishes for the world as a whole.

Differential expectational effects of alternative policy mixes are another possibility. Blinder more or less dismisses these after his interesting discussion of them in Section II. What about longer-run effects via the investment-capital-productivity-wage nexus? The econometric model simulations Blinder reports he finds rather disappointing, as do I. Anyway I have always been a bit suspicious, at least agnostic, regarding the facile assumption that acceleration of productivity growth is, besides being-desirable ***per*** se, counterinflationary. How will the eventual improvements in real wages be split between money wage increases and price decreases? We don't have a good theoretical or empirical story.

Maybe the policy mix affects the price level, inflation rate, and unemployment rate at which the economy settles down in long-run natural-rate equilibrium. There are some interesting policy tradeoffs involved here. But they mainly have to do with the path of nominal aggregate demand, not with the mix of instruments that supports the path. There may be some role for government job-creating programs and for other measures, fiscal and maybe monetary, that affect the composition of aggregate demand.

How about "supply-side" effects other than those associated with capital formation? Labor supply, work effort, managerial and entrepre-

neurial performance? Many of the same doubts raised above would apply. These too would take a long time and have uncertain effects on nominal, as opposed to real, magnitudes.

Is There Enough Coordination?

Even if the fiscal and monetary authorities cannot affect the macroeconomic price-output supply curve, there is still, indeed there is ***a fortiori,*** the interesting issue of coordination. The two authorities may disagree about the terms of tradeoff, about where on it they would like to be, and about where the economy will end up under various fiscal and monetary policies. Acting independently, they may choose policy mixes that are nonoptimal by either preference set, especially if goals other than unemployment and inflation are valued. I find it highly credible that fiscal-monetary tug-of-war has over the years, spectacularly right now, led to a mix that penalizes capital formation and growth. Now the mix penalizes distributional equity as well, because the regressive tax and transfer "reforms" adopted to stimulate investment and saving are nullified by the other constituents of the policy mix.

Blinder suggests that uncoordinated policy decisions may score better than coordinated policy. This may occur if the authorities differ about models and forecasts, while reality is some probability mix of their views of the world. As I see it, this is an example of the benefits of diversification. As Bill Brainard showed long ago, when you are uncertain of the effects of instruments, you should diversify and use in some degree all the instruments available even if their number exceeds the number of targets.

Nevertheless I vote for coordination. Diversification does not necessitate decentralization, i.e., the establishment of independent centers of power each with its own bag of tools. If it did, why stop at two? Why not give each member of the FOMC a monetary instrument to control — a Bank discount rate, certain open market operations, this or that reserve requirement, one or another deposit interest ceiling? Let the Senate decide outlays, the House taxes, and the Treasury investment tax credits and depreciation allowances? One answer clearly is that there are costs and wastes in running at crosspurposes policies virtually identical in effects. We don't want to diversify across outcome preferences, anyway not with the accidental weights that weapon assignments would give the various controllers. We do want to take rational

account of the uncertainties of models, forecasts, and policy effects, but in the light of a single authoritative set of preferences over outcomes. A central policymaker can weigh these uncertainties and risks, given all the available information — the Federal Reserve's model, forecasts, and estimates of policy effects along with those of CBO, OMB, private econometricians, and sages who use pants seats and envelope backs.

Outcome preferences are essentially political. In my view they are choices that elected officials must ultimately make — in our constitutional system that means some mysterious blend of President and Congress. I have difficulty understanding the political legitimacy of the outcome preferences of the Federal Open Market Committee, much beyond the extent the Committee and its Chairman can persuade the Congress and President of their validity. The governors are far removed from responsibility to the electorate, and the bank presidents even farther. Yet I do not doubt that, like other central banks, the Fed would be very influential even if its technical independence were sacrificed to coordinated making of monetary and fiscal policy by President and Congress.

After all, monetary policy decisions are the most momentous macroeconomic decisions the federal government makes. As the Fed has become more monetarist, these decisions have become more determinative. As the structure of the banking and financial system is made more monetarist by abandonment of interest rate ceilings even on transactions money, this becomes more and more true. Moreover, let us not forget that the Fed is the "follower" in Blinder's terminology. To put the point another way, the Fed is up at bat at least 12 times to the budget-makers' once.

It seems to me anomalous that when the budget is planned and eventually voted, the process is completely detached from the gentle and amateurish surveillance the Congress exercises over monetary policy. On the one hand there are budget and tax committees; on the other hand there are banking and finance committees. Never the twain shall meet. In the course of the budget process the Congress considers and adopts a view concerning the economic forecast, because that affects budget estimates. To a lesser degree the Congress also considers the macroeconomic effects of the budget, though I am not sure they have even the signs of the relevant multipliers right all the time. Monetary policy, so decisive for the course of the economy and the

budget itself, is taken to be an uncontrollable external factor, like OPEC or Japan or demography The possibility that the policy mix might be changed does not really get considered. It seems to me that the President and Congress should agree as to the desired path of, say, nominal GNP over the coming fiscal year, and that both the budget and the monetary policy should be in a coordinated manner committed to that target.

Are There Enough Rules?

Blinder's concluding section contains interesting material on policy rules, fixed or reactive. This is an old and complex set of issues, to which Blinder is led by the observation that the coordination problem would be solved or evaded if one or both policymakers were bound by rules and thus prevented from gameplaying. I do not have time or space to enter the big debate about rules. I confine myself to three remarks. First, I do not think that rules should be adopted simply in the interest of coordination; there are better ways to achieve coordination. Second, I think policy rules are a myth of economic theorists' simplified models. It is in practice impossible, politically in a democracy, economically in a dynamic and uncertin world, to prescribe in advance for all contingencies the behavior of future Presidents, legislators, and central bankers. It is in practice dangerous, and therefore not credible, that responsible officials will not react to the circumstances of the day as they and their constituents perceive them. It is in practice impossible to draw a line between responsive, "feedback" rules and discretion. Third, the damage which this economy and that of the United Kingdom are suffering because of self-imposed fixed rules, and self-imposed blindness to their economic effects, should make us very skeptical about proceeding further on this path.

The Role of Expectations in the Choice of Monetary Policy

John B. Taylor

There has probably never been a consensus among economists about the role of expectations in formulating monetary policy. Today two widely different views seem to dominate policy research and practice. One view, which I will refer to here as the "new classical macroeconomic" view, is that expectations overwhelm the influence of monetary policy, so that even a sudden change in policy, if expected, will have no real effect on the economy. Sometimes simply, but not quite accurately, called "rational expectations," this view implies that a dramatically quick disinflation could be achieved without recession, and also that monetary policy is ineffective in stabilizing output and employment. The other view, which I will refer to here as the "Keynesian" view, is that expectations matter little, either because they are exogenous, or because people are backward-looking and do not adjust to expectations of policy change. This view is embodied in most econometric models now used for policy evaluation in practice. It implied that unemployment could be permanently reduced by an increase in inflation, and more recently that accommodative monetary policies could prevent recessions by tolerating negligible and temporary increases in inflation.[1]

The research reported here was supported by a grant from the National Science Foundation at Princeton University and at the National Bureau of Economic Research and was partly completed at the Research Department of the Federal Reserve Bank of Philadelphia. I am grateful to Alan Blinder, David Bradford, Phillip Cagan, Roman Frydman, Robert Gordon, Brian Horrigan, Frederic Mishkin and Joseph Stiglitz for helpful discussions.

1. Some brief discussion of the reasons for my calling these two views "new classical" and "Keynesian" is probably in order. The terminology is not entirely satisfactory because these names have been used in other contexts and have many connotations. However, the term "new classical macroeconomics" seems appropriate because it has already been used by Lucas and Sargent (1978) and others in reviewing macroeconomic developments and because it emphasizes a similarity with the classical economists who freauentlv relied on the flexible-price market-clearing assumptions. Usage of the term "rational expectations" to refer to this view, though widespread, is inaccurate because rational expectations methods have been used in other contexts, as will be described below. The term "Keynesian" seems appropriate because Keynes himself emphasized the random exogeneity of expectations in Chapter 19 of the General Theory and because the major Keynesian econometric models use backward-looking expectations in their analysis.

The main theme of this paper is that both these views are incorrect and can be seriously misleading to policymakers. In developing this theme, I will review some of the criticism which has been raised against these two views, and also attempt to advance a new view of the role of expectations that is emerging from current research. I argue that the new view offers policymakers a promising alternative to the other two views. This new view recognizes that infrequently-changed contractual and institutional arrangements are an important part of the workings of a modern economy, but that forward-looking expectations influence how these arrangements are set up, and how they adjust over time. Expectations cannot be ignored, but neither can the wage and price setting mechanisms through which the economy adjusts. Since this alternative view mixes elements of both the Keynesian and new classical schools, there is a sense in which it is a compromise or consensus view. It would be inaccurate for me to characterize it this way, however, for strong criticism of the approach has already emerged from proponents of both the Keynesian and new classical macroeconomics. In general, the approach has led to policy implications that are quite unlike either the Keynesian or new classical prescriptions. For some questions, the answers seem closer to those of the Keynesians. For others, the answers seem closer to the new classicals. Perhaps more importantly, the approach has also generated econometric policy evaluation models for monetary policy that are quite different from those appearing in earlier work on rational expectations or used by Keynesian economists today. These developments are described below.

In discussing these views, it will be useful to narrow the focus on two objectives of monetary policy. One is the short-run objective of disinflation — bringing the rate of inflation down to a lower level — which is of central concern in the U.S. and other countries today. The other is the long-run objective of keeping the rate of inflation near this new lower level, while at the same time stabilizing the fluctuations of unemployment and output. Of course, this short-run versus long-run dichotomy is artificial. Indeed, expectations about the success of achieving the long-run goal have implications for success in the short-run goal; if people expect a resurgence of inflation soon after the economy recovers from a disinflation, then the disinflation process itself will be more disruptive as these expectations prevent the adjustment of interest rates and other prices.

The paper proceeds as follows. First, I present a brief historical overview of recent research on expectations in macroeconomics. An attempt is made to outline the general implications of the empirical work which has aimed to test the new classical macroeconomic view. I then go on to review the theoretical and empirical research which underlies the new approach to expectations advanced here. Several theoretical models using this approach were introduced independently by different researchers in the mid-1970s and have already been extended in a number of directions. Empirical work began later, but is now being pursued at the micro and macro levels. Testing of the newer approach is still underway.

Second, I review a number of criticisms of the new approach that have been raised by Keynesian and new classical economists. Some of the criticisms have resulted from semantic confusions, but most are substantive and require careful consideration.

Third, I illustrate, using some of my own research, how the new approach leads to workable empirical policy evaluation models that answer questions about the role of expectations. Though these expectations models are still under development, actual policy simulations are useful for assessing their potential as a policy evaluation tool. Using a quantitative model of union wage setting in the U.S., the maximum speed of disinflation which can occur without a recession is calculated under alternative assumptions about indexing and about the composition of contracts in the U.S. labor force. For these calculations, expectations are assumed to be rational. Deviations from rationality caused either by credibility problems or by difficulties in learning about policy would require further adjustment. Despite rational expectations, the speed is considerably slower than that implied by a new classicial view. Disinflating more quickly than the speed calculated here would cause a recession. The results of this simulation are then compared with the results of the current disinflation effort in the U.S. In addition to showing how the new view of expectations generates conclusions which are quite different from Keynesian and new classical models, these simulations are suggestive of some of the credibility problems that arise during the transition period of a disinflation. They also illustrate how policy evaluation of such substantive issues might proceed quantitatively.

In the final section I consider some of the long-run issues. Though the new approach indicates that quick short-run disinflation efforts are

likely to be costly in terms of recession, it also suggests that a long-run policy of less accommodation to inflation than experienced in the U.S. in the 1970s, can lead to price stability and, while not eliminating business cycle fluctuations entirely, can keep them reasonably small. The choice of how accommodative policy should be is ultimately a value judgement. But the claim that a less accommodative policy could eventually lead to a relatively attractive position on the tradeoff between output and price stability, relies heavily on the role of expectations. The simulations and more general arguments that show that a costly disinflation — such as the one we are now observing — is not inconsistent with endogenous forward-looking expectations, are therefore an important part of the case for less accommodative policies.

I. Monetary Economics and Rational Expectations: An Overview

It is now over ten years since an explicit method of analyzing endogenous or consistent expectations was introduced to macroeconomics under the name rational expectations.[2] The original motivation came from the research of Edmund Phelps and Milton Friedman, which had uncovered an important difference between the long-run and the short-run in the tradeoff between inflation and unemployment.[3] Focusing on the Phillips curve — the graphical characterization of the short-term procyclical behavior of prices and wages observed for over a hundred years — Phelps and Friedman showed how simple economic principles would be violated if the curve was extrapolated to the long-run: a permanent increase in inflation would not lead to a permanent increase in production. Their explanation was, of course, based on expectations. The short-run stimulating effects associated with a rise in prices and the depressing effects associated with a fall in prices could not last in the long-run. Firms and workers would come to expect these movements and adjust their behavior accordingly. The fact that the Phelps-Friedman prediction seemed to come true so vividly in the 1970s clearly sheds serious doubt on the view that expectations are exogenous. But while the Phelps-Friedman theory was explicit about the long-run, it was only sketchy about what caused

2. Lucas (1972a, 1972b)
3. Phelps (1967), and Friedman (1968).

the short-run business cycle correlations which generated Phillips' original regression estimates.[4]

A. The new classical macroeconomics

In introducing rational expectations to the problem, Robert Lucas had the main objective of developing a detailed theory of the short-run process which was as explicit as the Phelps-Friedman theory about the long-run. Such detail — however abstract and technical — is of course necessary for quantitative policy analysis and for empirical work. The models introduced by Lucas are explicit about many things in addition to expectations. They are explicit that prices and wages are perfectly flexible and that markets clear at every date. And they are explicit that the mechanism generating the inflation-unemployment correlations is information-based: confusion about relative versus aggregate price movements cause firms to produce more and hire more workers when the aggregate price level rises. This is not an implausible theory and it certainly fits the longer-run facts of inflation and unemployment better than the pre-Phelps-Friedman inflation-unemployment tradeoff. The basic idea has been extended and used in many other applications.'

Because this theory had been laid out so explicitly, it has been possible to test the hypothesis and the predictions in many different ways, and indeed an enormous research effort has gone into performing such tests. Although the evidence seemed favorable at first, this effort has recently begun to uncover serious problems about the empirical validity of the informational-based Phillips curve, at least for the U.S. in much of the postwar period. Sargent (1976) found only weak explanatory power from unanticipated price movements, and Fair (1979) found that the effects were insignificant in the 1950s and 1960s, and of the wrong sign in the 1970s. Barro's (1977b) empirical work, which focused on unanticipated money rather than prices, seemed more consistent with the theory, but later work has shown the results to

---

4. See Phillips (1958). Adaptive expectations might explain business cycle correlations, but some explanation is needed for why people would persistently adjust their expectations slowly when facing recurrent events. Adaptive expectations are a reasonable assumption following a new event, but to the extent business cycles are recurrent events this assumption needs further justification.

5. Sargent and Wallace (1975), Barro (1977a) for example. Interesting applications of these informational concepts to problems in monetary economics other than the Phillips curve include King (1982), Walsh (1982), and Weiss (1980).

be sensitive to variations in the assumptions. Most recently, for example, Mishkin (1982) has shown that anticipated money matters as much or more than unanticipated money. Perhaps, more bothersome is the empirical work by Barro and Hercowitz (1980) and Boschen and Grossman (1981) that misperceived money changes, as distinct from unanticipated money changes, do not stimulate production as the misperceptions model suggests they should. Another problem is the finding of Hercowitz (1980) that unanticipated money has little association with price dispersion as predicted by the information-based models.[6]

More recent attempts to demonstrate the validity of the new classical macroeconomics are Thomas Sargent's (1980, 1981) widely-publicized studies of historical examples of quick disinflation efforts in different countries. These examples are meant to show that instantaneous adjustment is at least possible. Sargent documents how the central European hyperinflations in the early 1920s ended very abruptly once budget reforms were put in place, and although recessions frequently accompanied or followed these disinflations they might be attributed to other sources. Garber (1982) has examined the recession following the German hyperinflation in detail, and considers whether it was directly due to the disinflation. One problem, of course, with hyperinflation examples is that most contractual or institutional rigidities break down during a hyperinflation (presumably to the detriment of microeconomic efficiency); hence there are no barriers to quick price and wage adjustment. Such examples do not seem relevant to more moderate inflations which have persisted for several years and where contractual rigidities have remained.

Recognizing this criticism Sargent has also examined the experience of France in 1926 when the Poincare government was elected with a broad mandate to institute budget reforms and stop the inflation which had persisted since World War I. Sargent shows that this more moderate inflation did stop abruptly after fiscal reforms were instituted, but does not examine the effects on the real economy.

In the upper panel of Figure 1 a plot of the wholesale price index in France during 1919-1927 is shown along with a measure of the money

6. Early worries that the theory did not explain the dynamics or persistence of the business cycle were cleared up theoretically by Blinder and Fischer (1981) and Lucas (1975), by adding other explicit sources of persistence, such as inventories or other types of capital. However, if the theory has trouble explaining the impulse effect, these propogation effects have nothing to propogate.

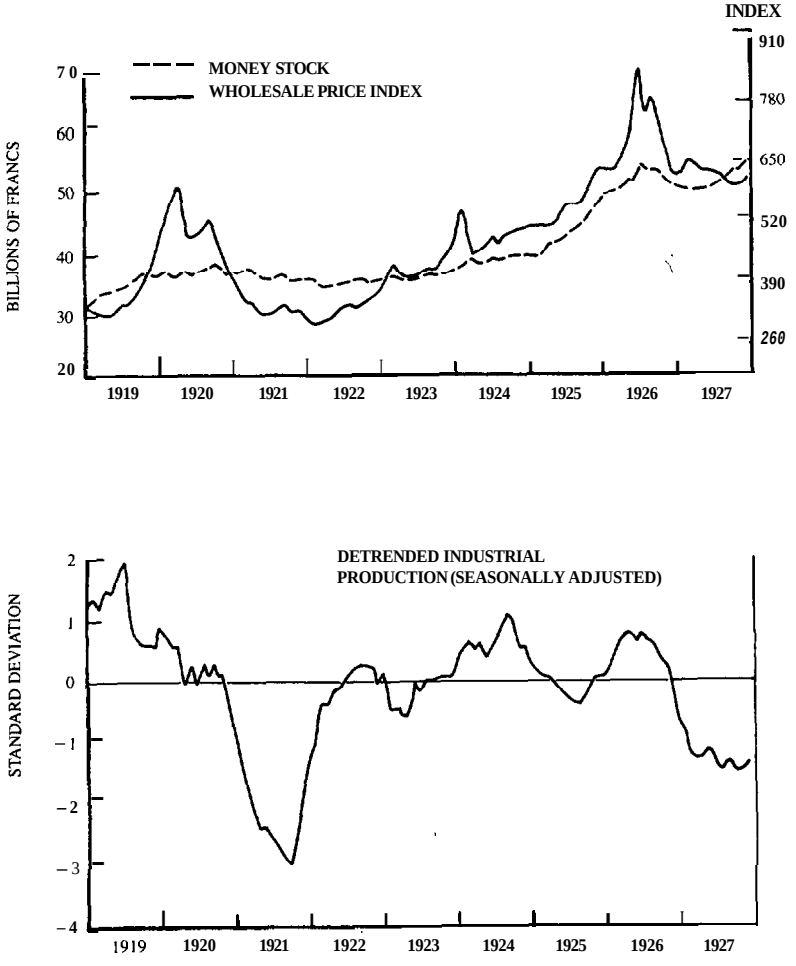


FIGURE 1. MONEY, PRICES, AND DETRENDED PRODUCTION IN FRANCE 1919-1927 (MONTHLY DATA)

SOURCE: ROGERS (1929) pp. 57, 176, 291

supply. In the bottom panel detrended industrial production is shown. It is clear from Figure 1 that a recession did accompany the disinflation which began in the summer of **1926** when the Poincare government came to power. Industrial production did not return to trend levels until more than two years after the disinflation began, after which it continued to rise for another year before the start of the great depression.

In fact the Sergent committee, which was set up in **1926** to recommend measures to end the French inflation, warned that such a recession would be likely. The experience with disinflation only six years earlier (again see Figure **1)** was probably enough to worry the committee. Ralph Hawtrey, a firm believer in endogenous expectations (see Hicks, 1969), wrote a paper in **1932** on the French disinflation which had the main purpose of showing that the French return to gold in **1926** was ultimately a major cause of the great depression. More important for our purposes was that he was puzzled that the disinflation did not lead to an even larger recession. His explanation was that nominal wages had lagged so far behind prices in **1925** and early **1926** that the real wage was very low throughout much of the period of disinflation. In addition he argued that much of the decline in aggregate demand which the monetary crunch generated was reflected in a decline in imports because the franc was pegged at a level that made foreign goods very expensive by historical purchasing power standards.

It seems clear that some evidence that the recession following the French disinflation was due to other causes is necessary before we can be confident that the market-clearing perfectly flexible wage model is adequate to describe that situation. This reconsideration of the facts seems to suggest that the French disinflation is more consistent with the contract-based expectations models than with the information-based models.[7]

The similarity between the flexible-price, market-clearing assump-

7. Nominal wages were stabilized in 1927, perhaps because the recession led to distress conditions which broke informal contracts or perhaps because depressed demand conditions led to a bidding down of nominal wages. The nominal wage index for hourly wages in Paris, in the provinces, and in the coal mining industry was as follows (Mitchell (1976)):

	Coal Mining	Paris	Provinces
1924	66	63	68
1925	69	68	73
1926	83	84	84
1927	92	84	86
1928	90	86	90
1929	100	100	100
1930	108	109	106

tions of the information-based models and the assumptions of the classical economists, such as Pigou, from whom Keynes and Keynesians are separated, has led to the term "new classicial macroeconomics" to refer to these models.[8] In fact a proliferation of names has arisen to describe these models in the many reviews in the literature? "monetarism mark II," "rational expectations with misperceptions," "the hard-line approach," and "the competitive market approach." All these terms are synonymous with the new classical macroeconomics, which features market-clearing, flexible-prices, and information-based explanations of the Phillip's curve.

B. A New Approach

At about the same time that the Lucas information-based theory was being tested and extended, a new approach to the same Phillip's curve policy issues was being developed by another group of researchers.[10] This new approach relied heavily on the techniques and ideas developed in the new classical research, and was motivated by the same aims: to improve quantitative policy evaluation in macroeconomics.[11] But rather than describing price movements using the market-clearing assumptions, these models contain explicit mechanisms to describe how prices (or wages) are determined. Recall that in the information-based models the working assumption is that there are no long-term contracts which set nominal wages or prices beyond a market-clearing period.[12] The new models are contract-based in that there is a finite period of time when a nominal wage or price is set and transactions are

8. Lucas and Sargent (1978).

9. See, in that same order: Tobin (1981), Okun (1980), Fellner (1980), and Diamond (1982).

10. See Gray (1976), Fischer (1977a), Phelps and Taylor (1977), Taylor (1979), for example. Some of the other research which is part of this new approach is described below. It should also be mentioned that this approach is being pursued in the open economy macroeconomic field. See Dornbusch (1982), for example.

11. The original motivation for this work was probably the striking policy ineffectiveness result of Sargent and Wallace (1975). However, even in the early contract-based papers other issues were raised about stabilization policy. Phelps and Taylor (1977) for example, noted that the monetary authorities might have to "penalize the economy in the short-run for the sake of beneficial system effects." This possibility which now seems very real could not have occurred in backward-looking Keynesian models.

12. Perhaps a quarter for the time period in the discrete models is appropriate. This seems to be the shortest time period used in the major empirical tests of the model (e.g., Barro and Rush (1980) and Sargent (1976)). If markets are assumed to clear within the quarter, then a fixed wage which lasts more than one quarter is simply ruled out by assumption.

assumed to take place at that price. There is no presumption that a formal contract is involved; nominal wages or prices could be set as part of an informal arrangement. These models give rise to a quite different mechansim for price and output fluctuations than those introduced by Lucas, and their properties and policy implications are much different. One difference which has attracted some attention is that anticipated and perceived changes in the money supply can affect output and employment. Tests of these models are not yet at the advanced stage of the tests of the information-based models. It is not yet clear that the contract-based models will need relatively minor revision, complete overhaul or replacement.[13]

In the terminology of this paper, these models are not "Keynesian" in that expectations are not exogenous or purely backward-looking. While there are of course expectational errors in these models, the expectations mechanism is endogenous and generally consistent with the economic events described by the models. But the most essential feature of these models is that the sticky prices are forward-looking; price and wage setting is anticipatory and expectations of future events matter for current wage and price decisions. This is not true either of fixed (for all time) prices, nor of exogenous but moving prices, nor even of the "tatonnement" prices which react to the current state of excess demand but are backward-looking. In the new kind of models, it is assumed that labor unions and corporations adjust their nominal wage bargaining to expectations about future wage, price, and demand conditions.

It may be helpful to think of this new forward-looking aspect of wage and price setting in terms of another type of decision which brings with it future commitments: capital investment. The economic aspects of a decision to set an hourly wage rate or a weekly salary are not unlike a decision to buy capital equipment. The useful life of business equipment is not much longer than the three-gear life of the typical labor union contract. A wage decision has implications for the firm's profits via the expectations of other wages, the prices of other inputs, the price of output, and the state of demand. Similarly, a

13. Tests by Ashenfelter and Card (1982) have found empirical difficulties with the distributed lag shape in the more rudimentary contract models. It is not yet clear whether such problems exist in more realistic contract models which reflect actual distributions of workers by different contract lengths. They also find inconsistencies with cross equation relationships which may be similar to those discussed by Barro and Rush (1980) for information-based models.

worker's expected return from working under a set nominal wage is affected by expectations of price and the wages of other workers. Moreover, if demand conditions are expected to be high during the contract period, the terms of the bargain might be tilted in the worker's direction.

The forward-looking aspects of wage and price decisions do not eliminate the problem of slow or gradual adjustment when conditions change. Because wage decisions have a finite duration, actions taken in the past have implications for today. Again the analogy with capital is helpful. Equipment purchased in the past affects the actual capital stock today and hence influences the demand for new equipment given a desired capital stock tomorrow. Hence, while decisions are made by looking at the future, there is an implicit but necessary element of backward-looking. The persistence generated by past wage decisions can be quite drawn out if wage contracting is nonsynchronized or staggered and wages are set taking expectations of other wages into account.

II. Reservations about the New View of Expectations

A number of criticisms of the contract-based expectations models have recently been raised. Before presenting empirical illustrations of how these models might be used in practice, some reaction to these criticisms is in order. We consider three criticisms here (1) price and especially wage decisions are not forward-looking, (2) contracts which set a fixed nominal wage and let demand determine employment at that wage are not optimal, and **(3)** contract length is endogenous and will adjust when the policy rule changes.

A. Forward-looking

Okun (1981) argued that wage contracts would not be forward-looking because "forecasting the wages of other firms is complex and costly," and because communicating the forecast to workers would be difficult.

The costs of gathering information to make forecasts raises questions about optimization in general. Firms need to forecast future demand for their products and because of long lead times in designing new facilities, being as accurate as possible in such forecasts has large payoffs. Why should it be more costly to forecast future wages than to forecast other variables? In fact, well developed wage surveys are now

available on a current basis to assist firms in this process. Many of these surveys provide information about wages over the next year or more. Communicating forecasts of future wages in competing industries, or future prices and demand conditions, may be difficult in the adverse surroundings of a collective bargaining negotiation. There is an obvious advantage to the firm to convince the workers that the prevailing wage'and price level will be lower during the contract period than the firm actually is forecasting. But for precisely this reason, most unions do not rely on the internal forecasts of firms. They either hire their own economic forecasters or insist that the negotiations be based on a consensus economic forecast coming from the major private forecasting firms.

Testing for forward-looking behavior is very difficult because any forecast of the future must be based on what is observable.[14] However, some criticism may be due to semantic confusion. Forward-looking in the contract-based models usually means only that future variables, like next year's prevailing wage, are important for the wage decision. This in itself seems unobjectionable: if the prevailing wage is expected to be $10 an hour then the wage settlement will obviously be less than if the prevailing wage is expected to be $20 per hour. However, the models also assume that the forward-looking is accomplished by rational forecasting. This does need further testing, and is likely to be more accurate during normal times with recurrent events than when the structure of the economy is changing quickly.

B. Inefficient Contracts

In an influential paper Barro (1977a) argued that the contract-based macro models rely on contracts which are inefficient. In Barro's words:

> The crucial element and the aspect that accurately marks this approach as "non-market-clearing" analysis — is the nonexecution of some perceived mutually advantageous trades (where trades may include side payments). In the context of voluntary exchange on spot markets, it would not generally be possible to exhaust all perceived mutually advantageous trades unless all prices were "flexible." However, long-term contracts [of the Azariadis (1975) variety] permit a separation between mutually

14. McNees (1979) performed tests which seemed to indicate that there was more backward-looking than forward-looking. On the other hand, recent work by Meyer and Webster (1982) indicates that forward-looking predominates.

advantageous exchange and short-run price flexibility — it becomes possible to retain the former while abandoning the latter.

Barro is correct in arguing that the early micro-theoretic work on implicit contracts implies efficient arrangements between firms and workers. More recent work based on moral hazard and asymetric information summarized by Hall (1980) has shown that these contracts can lead to inefficiencies, but these are not of the type that fixed nominal wage contracting generates for the economy as a whole. All the implicit contract research has been conducted in real terms (that is, explaining why the real wage is rigid) while most macroeconomic inefficiencies can be traced to sticky nominal wages.

As Fischer (1977b) noted in response to Barro, however, contracts in the real world resemble very closely the contracts assumed in the contract-based macro models. This response should not be taken lightly. At the least, it implies that rnicroeconometric work using contract data is feasible. It also suggests that a better way to model market adjustment might be through the use of such contracts, rather than through explicit market-clearing. Market-clearing models offer no explanation of how the market-clearing price is determined. Perhaps forward-looking wage and price setting rules are efficient ways for markets to "clear" when the economy-wide wage price vector cannot be called out. But this is an unsettled issue at this time.

There is a type of inefficiency which develops at the macro level when we consider that the economy adjusts through the interaction or many individual contracts between firms and workers. It is easiest to see this inefficiency by supposing that the contracts are designed to guarantee small movements in relative wages, rather than real wages. The optimal contracts call for reduced work when demand at the firm is low and more work when demand at the firm is high, as part of this relative wage guarantee. In the aggregate, such contracts generate a nominal wage rigidity.

Suppose there is a drop in the money supply. Real balances measured in terms of wages will fall, interest rates will rise, and there will be a slump in demand. According to each of the micro contracts, there will be a drop in employment. Eventually a series of relative wage adjustments will bring about a fall in the nominal wage and demand will rise again. This simple description is not unlike the mechanism which underlies the contract-based explanation of the positive correlation between nominal variables and real variables. The

details of the adjustment depend on the length of the contracts, how sensitive new negotiations are to demand conditions, and on the degree of forward-looking.

C. Endogenous Contract Length

Lucas and Sargent (1978) have raised doubts about the contract models because they assume that contract length would not adjust when economic conditions change. Similarly, indexing provisions in the contract might change. This criticism is also correct. But in most contract-based expectations models the assumption is made for convenience, and sensitivity analysis can be done to see how the results might be affected by changing the contract length. Recent work by Parkin (1982) based on earlier work by Mussa (1977) and others has carefully developed the micro-economic foundations of one of the contract-based models, and can relate contract length to adjustment cost parameters.[15] Empirical evidence, however, suggests that while contract length does vary over time, the changes are gradual and not obviously related to policy changes. Evidently, the costs of negotiation are still quite high relative to the gains for individual firms or union groups from more frequent negotiations.[16]

III. The Role of Expectations during Disinflation

Calculating the right speed of deceleration of the money supply — or one step removed, nominal GNP — during a planned disinflation, is a difficult but extremely important problem for monetary policymakers. Treating expectations correctly is clearly crucial for such a calculation. The new classical macroeconomic models suggest that the rate of disinflation can be quite rapid — with no harmful side-effects — if only

---

15. Blanchard (1981) and Calvo (1982) have recently studied the microeconomic behavior of profit maximizing firms in a staggered price setting environment. Buiter and Jewitt (1980) have examined the effects of different combinations of real versus nominal anticipatory wage setting, obtaining results useful for sensitivity analysis. Begg (1982) has also examined the microeconomics of staggered nominal wage setting.

16. The length of U.S. major union contracts has not changed very much in recent years according to the data used in the model described in Taylor (1982). Christofides and Wilton (1982) have found evidence of contract length in Canada shortening in 1975 as the variance of inflation increased. This type of effect is predicted in the models of Canzoneri (1980) and Gray (1978) where contract length or indexing is endogenous.

the decline in money growth is made credible enough."[17] With no contracts or sticky prices, expectations of future inflation can be brought down instantaneously, and the economy-wide wage-price vector can be stopped abruptly according to these models. The Keynesian approach, as I have characterized it here and as it is embodied in most econometric models, cannot deal with the expectations question systematically, since the expectations mechanisms are backward-looking.

Preliminary quantitative models incorporating the theoretical ideas of the new approach to macroeconomic expectations described here can be used to address such questions. It will be helpful to illustrate this type of analysis with an example, and for this purpose I used a model of union wage contracting that I had recently studied (see Taylor (1982)). The model is oriented to detailed contract data of the major union sector of the U.S. and might be used to answer the following question: Assuming that expectations are rational, that the monetary deceleration program is credible, and that there are no anticipated relative wage adjustments necessary,[18] what is the maximum rate of deceleration of nominal wages which can occur without an increase in unemployment? The answer to this question can then be used to calculate the maximum rate of money growth reduction which can be obtained without a recession. The deceleration cannot be too fast because with long term contracts and deferred increases, there will be an overhang of predetermined nominal wages. Hence, a quick deceleration will result in a reduction in real money balances which will tighten credit markets, raise interest rates, lower demand, and increase unemployment. Gradualist proposals for moderate decelerations are sometimes based on such arguments. But quantitative estimates of what gradual reductions mean in terms of money growth statistics would certainly seem helpful.

The calculations described in Taylor (1982) are based on the assump-

17. If policy is not credible then the problem is much more difficult. Sargent (1981) has suggested that the recession which has accompanied the disinflation in the United Kingdom may be due to lack of credibility in that the public sector borrowing requirement was projected to be so large that inflationary money growth would return in the future. However, Miller (1980) has shown that the Thatcher government budget deficits were projected to decline over time if measured on an inflation adjusted basis. Meyer and Webster (1981) have attempted to approach the credibility problem systematically in models with perfect price flexibility using Bayesian or least squares learning. Cukierman (1981) has attempted to incorporate government announcements in measures of credibility.

18. Such as a reduction in the relative wage of automobile or steel workers.

tion that the ***major*** union sector dominates nominal wage movements in the U.S. economy. That assumption is certainly open to dispute since unionized workers constitute only about one-fifth of the labor force in the U.S. Implicit in these calculations is that the nominal wages of all other workers are simply indexed to the effective wage in the major union sector. The results reported here consider a modification of that assumption, by assuming that all other workers in the economy set their nominal wages for one year, and are fully integrated with the union sector. That is; unionized workers and their employers keep track of the wages of non-unionized workers, and visa versa. One would expect that, since the average contract length of the union sector is much larger than the one-year period we assume for the non-union sector, this modification would permit a faster deceleration.

Table 1 reports the results of the simulations. Starting from an inherited steady inflation of 10 percent, the simulations assume that an announced monetary disinflation begins in year 1 and that the new target inflation rate is **3** percent. The maximum rate of deceleration consistent with continued real growth of employment and output is shown in the table for four different assumptions. In the first column it is assumed that there is no indexing and that the major union sector leads. This cooresponds to the simulations reported in my earlier work. Clearly the rate of deceleration is quite slow for the first two years, when it begins to fall off rapidly. With 30 percent indexing of the two and three year contracts the deceleration is only a bit faster. The assumption on indexing — that there are only annual escalator adjustments with no adjustments in the first year — is perhaps more sluggish than in reality.

Alternative results are reported in the third and fourth columns of Table 1 where the rate of deceleration of wages is calculated for the entire labor force. As one would expect, here the deceleration is more pronounced in the first year, and wage growth comes down quite rapidly in the second and third years. Again with indexing, inflation comes down more quickly, but the differences are minor. The details of each settlement for workers signing contracts of different lengths is presented in Tables 2 through 5. These represent the kinds of union settlements one should expect during a rationally expected disinflation. Note that the deferred increases in the third year of the three year contracts are down significantly even during the early stages of the disinflation.

TABLE 1

Alternative Assumptions about Wage Contracts and Corresponding Disinflation Paths

(percent change in average wage at annual rate)

Year/ -Quarter	Major Union Sector (no indexing)	Major Union Sector (30% indexing)[2]	All Workers[1] (no indexing)	All workers' (30% indexing)'
1:1	10.00	10.00	9.91	9.89
1:2	10.00	10.00	9.74	9.70
1:3	9.98	9.98	9.48	9.41
1:4	9.96	9.96	9.08	8.96
2:1	9.93	9.92	8.65	8.49
2:2	9.81	9.79	8.13	7.93
2:3	9.48	9.44	7.52	7.30
2:4	9.13	9.07	6.85	6.62
3:1	8.77	8.71	6.03	5.82
3:2	7.52	7.46	5.18	5.01
3:3	5.32	5.27	4.36	4.24
3:4	3.97	3.94	3.63	3.57
4:1	3.64	3.62	3.24	3.22
4:2	3.15	3.15	3.02	3.02
4:3	2.93	2.93	2.96	2.97
4:4	3.02	3.02	3.01	3.01
5:1	3.00	3.00	3.00	3.00
5:2	3.00	3.00	3.00	3.00
5:3	3.00	3.00	3.00	3.00
5:4	3.00	3.00	3.00	3.00

Notes: [1]Assumes that all workers not in major union sector change wages annually.

[2]Assumes that the second year of all two-year contracts and the second and third year of all three-year contracts have escalator clauses equal to 30% of the previous year's inflation rate.

TABLE 2

Major Union Sector: Current and Deferred Settlements

***(No* indexing)**

Year/ Quarter	*1 Year Contracts*	*2 Year Contracts*		*3 Year Contracts*		
		1st Year	*2nd Year*	*1st Year*	*2nd Year*	*3rd Year*
1:1	10.0	10.0	9.6	10.0	9.6	6.4
1:2	10.0	10.0	9.3	10.0	9.3	5.1
1:3	9.9	9.9	8.7	9.9	8.7	4.0
1:4	9.8	9.8	7.7	9.8	7.7	3.4
2:1	9.6	9.6	6.4	9.6	6.4	3.2
2:2	9.3	9.3	5.1	9.3	5.1	3.0
2:3	8.7	8.6	4.0	8.6	4.0	3.0
2:4	7.7	7.5	3.4	7.5	3.4	3.0
3:1	6.4	6.4	3.2	6.0	3.2	3.0
3:2	5.1	5.1	3.0	4.4	3.0	3.0
3:3	4.0	4.0	3.0	2.7	3.0	3.0
3:4	3.4	3.4	3.0	.9	3.0	3.0
4:1	3.2	3.2	3.0	3.2	3.0	3.0
4:2	3.0	3.0	3.0	3.0	3.0	3.0
4:3	3.0	3.0	3.0	3.0	3.0	3.0
4:4	3.0	3.0	3.0	3.0	3.0	3.0

Note: The entries indicate the current settlement in the one year contracts, and in the first year of the two and three year contracts. The deferred settlements are listed in the second year of two year contracts, and in the second and third year of three year contracts. The rates of change are from one quarter to the next, reported in percent at an annual rate.

TABLE 3
Major Union Sector: Current and Deferred Settlements
(30% **indexing)**

Year/ Quarter	*1 Year Contracts*	*2 Year Contracts*		*3 Year Contracts*		
		1st Year	*2nd Year*	*1st Year*	*2nd Year*	*3rd Year*
1:1	10.0	10.0	6.6	10.0	6.6	3.6
1:2	10.0	10.0	6.3	10.0	6.3	2.5
1:3	9.9	9.9	5.7	9.9	5.7	1.8
1:4	9.8	9.8	4.8	9.8	4.8	1.8
2:1	9.6	9.5	3.6	9.5	3.6	2.0
2:2	9.3	9.2	2.5	9.2	2.5	1.9
2:3	8.7	8.6	1.8	8.6	1.8	2.0
2:4	7.6	7.4	1.8	7.4	1.8	2.1
3:1	6.3	6.3	2.0	5.9	2.0	2.1
3:2	5.1	5.1	2.0	4.3	1.9	2.1
3.3	4.0	4.0	2.0	2.6	2.0	2.1
3:4	3.4	3.4	2.1	1.0	2.1	2.1
4:1	3.2	3.2	2.1	3.2	2.1	2.1
4:2	3.0	3.0	2.1	3.0	2.1	2.1
4:3	3.0	3.0	2.1	3.0	2.1	2.1
4:4	3.0	3.0	2.1	3.0	2.1	2.1

Note: See Table 2

TABLE 4

All Workers: Current and Deferred Settlements

***(No* indexing)**

Year/Quarter	*1 Year Contracts*	*2 Year Contracts*		*3 Yepr Contracts*		
		1st Year	*2nd Year*	*1st Year*	*2nd Year*	*3rd Year*
1:1	9.6	9.6	7.8	9.6	7.8	4.8
1:2	9.2	9.2	7.1	9.2	7.1	4.1
1:3	8.7	8.7	6.4	8.7	6.4	3.6
1:4	8.1	8.1	5.6	8.1	5.6	3.2
2:1	7.8	7.3	4.8	7.3	4.8	3.1
2:2	7.1	6.3	4.1	6.3	4.1	3.0
2:3	6.4	5.1	3.6	5.1	3.6	3.0
2:4	5.6	3.7	3.2	3.7	3.2	3.0
3:1	4.8	4.8	3.1	2.1	3.1	3.0
3:2	4.1	4.1	3.0	0.4	3.0	3.0
3:3	3.6	3.6	3.0	−1.3	3.0	3.0
3:4	3.2	3.2	3.0	−3.1	3.0	3.0
4:1	3.1	3.1	3.0	3.1	3.0	3.0
4:2	3.0	3.0	3.0	3.0	3.0	3.0
4:3	3.0	3.0	3.0	3.0	3.0	3.0
4:4	3.0	3.0	3.0	3.0	3.0	3.0

Note: See Table 2

TABLE 5

All Workers: Current and Deferred Settlements

(30% **indexing)**

Year/Quarter	*1 Year Contracts*	*2 Year Contracts*		*3 Year Contracts*		
		1st Year	*2nd Year*	*1st Year*	*2nd Year*	*3rd Year*
1:1	10.0	10.0	6.6	10.0	6.6	3.6
1:2	10.0	10.0	6.3	10.0	6.3	2.5
1:3	9.9	9.9	5.7	9.9	5.7	1.8
1:4	9.8	9.8	4.8	9.8	4.8	1.8
2:1	9.6	9.5	3.6	9.5	3.6	2.0
2:2	9.3	9.2	2.5	9.2	2.5	1.9
2:3	8.7	8.6	1.8	8.6	1.8	2.0
2:4	7.6	7.4	1.8	7.4	1.8	2.1
3:1	6.3	6.3	2.0	5.9	2.0	2.1
3:2	5.1	5.1	2.0	4.3	1.9	2.1
3.3	4.0	4.0	2.0	2.6	2.0	2.1
3:4	3.4	3.4	2.1	1.0	2.1	2.1
4:1	3.2	3.2	2.1	3.2	2.1	2.1
4:2	3.0	3.0	2.1	3.0	2.1	2.1
4:3	3.0	3.0	2.1	3.0	2.1	2.1
4:4	3.0	3.0	2.1	3.0	2.1	2.1

. Note: See Table 2

TABLE 6

Recent Changes in Alternative Measures of Money Wages, 1980:1–1982:2

(Quarterly percent change at annual rates unless otherwise stated)

	Hourly Earnings	*Effective Wage Major Unions*		*Contract Wage in Major Union Settlements*			
				No Indexing		*With Indexing*	
Year/Quarter	*Index*	*Quarterly*	*Annual*	*1st Year*	*Life of Contract*	*1st Year*	*Life of Contract*
80:1	8.6	1.6		10.8	9.2	6.5	4.7
80:2	9.7	3.3	9.8	11.2	10.0	6.7	4.4
80:3	9.2	3.5	10.0	12.7	11.3	9.5	5.4
80:4	10.3	1.3	9.7	11.5	9.8	7.2	5.3
81:1	9.7	1.7	9.8	6.9	6.3	7.6	6.1
81:2	8.2	3.2	9.7	12.8	10.5	7.7	6.7
81:3	8.4	3.3	9.5	11.8	9.3	4.9	4.6
81:4	7.0	1.5	9.7	9.1	8.1	9.0	4.6
82:1	6.6	.9	8.9	7.9	7.5	.5	.3
82:2	6.2						

Source: Current Wage Developments, various issues. The annual effective wage change for the major unions is given by the average of the 4 quarters ending in the current quarter.

According to these results, if velocity is constant in terms of the nominal wage[19] then money growth should not be reduced any more quickly than the columns in Table 1. Taking the best case, with the non-union workers interacting with the union workers and with indexing, the rate of decline in money growth is gradual but it speeds up as the disinflation continues and then slows down again: 1 percent in the first year, 2½ percent in the second year, 3 percent in the third year, and ½ percent in the fourth year. Taking the least optimistic calculation, the decline is negligible in the first year, almost 1 percent in the second year, a whopping 5 percent in the third year, and 1 percent in the fourth year. In both cases the deceleration takes about four years.

Keeping with the same expectational assumption, these results indicate that a faster decline in wage growth than presented in these tables will cause a recession. It needs to be emphasized, however, that these expectational assumptions might be too optimistic. We suspect that rational expectations is a reasonable assumption for recurrent events, but for unique events it is more suspect. Moreover, the relatively small reduction in money growth at the start of the disinflation could raise credibility about future reductions in money growth and cast further doubt on the rational expectations assumption.

What do these calculations imply about the role of expectations compared with the new classical and Keynesian models? Relative to the new classical models, which under the same expectational assumptions suggest that wage inflation could drop from 10 percent to 3 percent in the first quarter, the results are quite different. This approach suggests that such a drop would cause a large recession. But relative to the backward-looking Keynesian models the results are different as well. These models suggest that steady full-employment, implicit in the simulation paths in Tables 1 through 5, would not reduce inflation at all. According to those models inflation would still be at 10 percent at the end of 5 years if there was no increase in unemployment.

It is helpful to compare the results of such simulations with money wage growth during the current disinflation. In Table 6 various measures of wage inflation are presented for the recent period. In all cases

---

19. It would be an easy matter to incorporate a money demand function in the model and calculate the reduction in velocity which would accompany the reduction in expected inflation. This reduction in velocity would imply that money growth would have to be faster during part of the disinflation period than the growth rates reported in the Tables. If the real wage is steady then money balances could be deflated by the price level to get the same results.

the measures of inflation are rates of change from one quarterly average to the next, measured at annual rates as in the model simulations. Wage disinflation began in the first quarter of 1981 according to the average hourly earnings index adjusted for overtime and inter-industry shifts. Since then, wage inflation has fallen from near 10 percent to about 6¾ percent in 1½ years. Comparing this path with the columns in Table 1 indicates that this deceleration was faster than could be sustained while maintaining full employment, especially in the first year. Hence, according to this very preliminary comparison, the high unemployment rates we have experienced during this disinflation are consistent with this type of expectations model.[20] The extra reduction in wage inflation could be resulting either from unemployment-induced concessions (early negotiations) or attempts to bid down relative wages.

IV. The Role of Expectations and Accommodation of Inflation

The snapshot view of a disinflation in the simulations of the previous section leaves two important questions unanswered. First, how did we get to the double digit inflation rates at which these disinflation simulations start? Second, how do we prevent a return to higher inflation after the disinflation ends? The answer to these difficult questions must center around the old question of what causes the monetary authorities to increase the rate of growth of money and credit which makes episodes of inflation possible. Clearly this question has not been settled by economists, but the answer, at least for most modern developed economies where revenue from money creation represents a trivial portion of government tax receipts, must have to do with the accommodation or validation of inflation.

The new classical macroeconomists view the accommodation issue solely in terms of accommodating the ***expected*** rate of inflation. The clearest exposition is in Barro and Gordon (1981). The monetary authorities will suboptimally validate inflation according to this view because people expect them to. If they stop validating, then an unexpected and misperceived drop in money growth causes a drop in production because suppliers are misperceived into thinking only their

20. The effect of the automobile and trucking concessions is seen clearly in the last entry of the second column of Table 6. No wage adjustment occurred for the 460,000 workers covered by the auto and trucking contracts, and these workers moved from the third to the first quarter for the average computed in Table 6. They represent 70 percent of the workers negotiating during the first quarter.

own wages and prices have fallen relative to expectations. A recession then develops. As these models indicate, a socially preferred solution would be for policymakers not to accommodate at all. However, this view is dependent on the misperceptions mechanism being an accurate model. The research discussed in Section I sheds doubt on this for the United States.

The Keynesian view of accommodation is that if the monetary authorities do not validate exogenous increases in prices — such as OPEC, large wage bargains, or agricultural shocks — then a recession will develop. As reviewed in the mid-1950s by Haberler:

> If monetary policy does stand firm [is not accommodative], wages (or some wages) will be pushed up anyway. As a consequence unemployment will appear and the monetary authorities are then confronted with the dilemma either to "create" a certain amount of unemployment or to tolerate at least from time to time a rise in the price level.

Events in the 1970s might indicate that the last sentence should finish with "inflation rate" rather than "price level." In any case, the Keynesian models are still giving the same answers to these questions. Although the Phillips curve has been augmented, the expectations effect of an accommodative policy on wage and price behavior, once it becomes expected, has been ignored.

Some of the contract-based rational expectations models have been designed especially to address this accommodation issue. In these models the issue is not only whether expectations should be validated as in the new classical models but also whether the existing contracted trend in wages and prices should be validated. Because both factors must be considered, the answer is more complex than with either of the other two views of expectations. It should be noted, however, that the rational expectations assumption is probably more accurate for such issues than for the question of a one-time disinflation, because many price and wage shocks are recurrent phenomena.

Because these models have both the inertia of sticky prices and expectations, one might expect that a compromise amount of accommodation would be implied — less accommodation than the Keynesian models but more than the new classicals. The issue here is a quantitative one. Research with some empirical models with contracts and rational expectations suggests that the answer might be a lot closer to

the new classical than to the Keynesians.[21] Clearly more empirical work can and should be done.

V. Concluding Remarks

In this discussion of the role of expectations for monetary policy, I have emphasized what I feel are serious empirical problems with both the new classical and Keynesian macroeconomics, and I have tried to describe the general features of a new approach which I feel can provide an improvement. The new approach combines elements of both views, but as evidenced by serious criticism of the approach from proponents of these views, it is not a compromise view let alone a synthesis of these views.

The quantitative policy implications of the new approach which I outlined — that a very gradual and expected monetary deceleration could reduce inflation without disrupting real growth, that such a gradual deceleration raises serious credibility problems in its early phases, that a sudden disinflation would cause a big recession, even if expected, and that less accommodation of inflation in the future is a move in the right direction — are meant to be examples of how the approach can be applied to policy problems. Other researchers using these methods have drawn and will continue to draw their own conclusions. But in emphasizing differences between this new approach, and that of the new classicals and the Keynesians it is impossible to hide the similarities. In particular, the new approach owes much to the innovative empirical and theoretical methodology introduced by the new classical macroeconomics. As Tobin (1981) has recently written, "The ideas of the [new classical macroeconomics] are too distinctive and powerful to be lost in the shuffle. They are bound to shape whatever orthodoxy emerges."

---

21. According to calculations with the empirical models in Taylor (1979) and Taylor (1980), less accommodative policies than we have experienced in recent years would appear to be desirable. Blinder (1981) has made similar theoretical calculations using the Fischer (1977a) model. His results generally depend on the values of the parameters of the Fischer model. It is worth stating here that while the new models' answer to the accommodation issue seems close to the new classicals, the new models also imply that stabilization policy is effective on real variables which is quite unlike the new classicals. See Taylor (1981) for further discussion on this point.

References

Ashenfelter, 0 . and D. Card (1982), "Time Series Representations of Economic Variables and Alternative Models of Labor Market," unpublished paper, Princeton University.

Azariadis, C. (1975), "Implicit Contracts and Underemployment Equilibria," ***Journal of Political Economy,*** 83, pp. 1183-1202.

Barro, R.J. (1977a), "Long-Term Contracting, Sticky Prices, and Monetary Policy," *Journal* ***of Monetary Economics,*** 3, pp. 305-16.

———— (1977b), "Unanticipated Money Growth and Unemployment in the United States," ***American Economic Review,*** 67, pp. 101-15.

Barro, R.J. and D.B. Gordon (1981), "A Positive Theory of Monetary Policy in a Natural Rate Model," unpublished paper, University of Rochester.

Barro, R.J. and Z. Hercowitz (1980), "Money Stock Revisions and Unanticipated Money Growth," ***Journal of Monetary Economics,*** 6, pp. 257-267.

Barro, R.J. and M. Rush (1980), "Unanticipated Money and Economic Activity," in S. Fischer (ed.) ***Rational Expectations Models and Economic Policy,*** University of Chicago Press for The National Bureau of Economic Research.

Begg, D.K.H. (1982), "Rational Expectations, Wage Rigidity and Involuntary Unemployment: A Particular Theory," ***Oxford Economic Papers,*** 12, pp. 23-42.

Blanchard, O.J. (1981), "Price Desynchronization and Price Stickiness," unpublished paper, Harvard University.

Blinder, A.S. and S. Fischer (1981), "Inventories, Rational Expectations, and The Business Cycle," ***Journal of Monetary Economics,*** 8, pp. 277-304.

Blinder, A.S. (1981), "Monetary Accommodation of Supply Shocks Under Rational Expectations," ***Journal of Money Credit and Banking,*** 13, pp. 425-438.

Boschen, J.F. and H.I. Grossman (1981), "Tests of Equilibrium Macroeconomics using Contemporaneous Monetary Data," NBER Working Paper No. 558R, October.

Buiter, W.H. and I. Jewitt (1980), "Staggered Wage Setting without Money Illusion: Variations on a Theme of Taylor," NBER Working Paper No. 545.

Calvo, G. (1982), "On the Microfoundations of Staggered Nominal Contracts: A First Approximation," unpublished paper, Columbia University.

Canzoneri, M.B. (1980), "Labor Contracts and Monetary Policy," ***Journal of Monetary Economics,*** 6, pp. 241-256.

Christofides, L.N. and D.A. Wilton (1982), "The Determinants of Contract Length: An Empirical Analysis Based on Canadian Micro Data," unpublished paper.

Cukierman, A. (1981), "How to Quantify Credibility and Its Effects — A Suggestion," Working Paper No. 4-81, Foerder Institute for Economic Research, Tel Aviv University.

Diamond, P.A. (1982), "A Search Equilibrium Approach to the Micro Foundations of Macro Models," Wicksell Lectures.

Dornbusch, R. (1982), "PPP Exchange-Rate Rules and Macroeconomic Stability," ***Journal of Political Economy,*** 90, pp. 158-165.

Fair, R.C. (1979), "An Analysis of a Macroeconomic Model with Rational Expectations in the Stock and Bond Markets," *American Economic Review*, 67, pp. 539-552.

Fellner, W.J. (1980), "The Valid Core of Rationality Hypothesis in the Theory of Expectations," *Journal of Money Credit and Banking*, 12, pt. 2, pp. 763-787.

Fischer, S. (1977a), "Long Term Contracts, Rational Expectations, and The Optimal Policy Rule," *Journal of Political Economy*, 85, pp. 191-206.

Fischer, S. (1977b), "Long-Term Contracting, Sticky Prices, and Monetary Policy," *Journal of Monetary Economics*, 3, pp. 317-323.

Friedman, M. (1968), "The Role of Monetary Policy," *American Economic Review*, 58, pp. 1-17.

Garber, P. (1982), "Transition from Inflation to Price Stability," in *Carnegie-Rochester Conference Series on Public Policy: Monetary Regimes and Protectionism*, Vol. 16, pp. 11-41.

Gray, J.A. (1976), "Wage Indexation: A Macroeconomic Approach," *Journal of Monetary Economics*, 2, pp. 221-36.

_____ (1978), "On Indexation and Contract Length," *Journal of Political Economy*, 86, pp. 1-18.

Harberler, G. (1956), "Monetary and Real Factors Affecting Economic Stability: A Critique of Certain Tendencies in Modern Economic Theory," *Banco Nazionale del Lavoro Quarterly Review*, 9, (September), reprinted in R.A. Gordon and L. Klein (ed.), *Readings in Business Cycles*, Irwin, 1965.

Hall, R.E. (1980), "Employment Fluctuations and Wage Rigidity," *Brookings Papers on Economic Activity*, pp. 91-123.

Hawtrey, R.G. (1932), "French Monetary Policy," in *The Art of Central Banking*, R.G. Hawtrey (ed.), pp. 1-40.

Hercowitz, Z. (1980), "Money and Relative Price Dispersion in the United States," Working Paper No. 433, National Bureau of Economic Research.

Hicks, J. (1969), "Automatists, Hawtreyans, and Keynesians," *Journal of Money Credit and Banking*, 1, pp. 307-17.

King, Robert G. (1982), "Monetary Policy and The Information Content of Prices," *Journal of Political Economy*, 90, pp. 247-279.

Lucas, R.E., Jr. (1972a), "Econometric Testing of the Natural Rate Hypothesis," in O. Eckstein (ed.), *The Econometrics of Price Determination*, Board of Governors of the Federal Reserve System.

_____ (1972b), "Expectations and The Neutrality of Money," *Journal of Economic Theory*, 4, pp. 103-124.

_____ (1975), "An Equilibrium Model of the Business Cycle," *Journal of Political Economy*, 83, pp. 1113-44.

Lucas, R.E., Jr. and T.J. Sargent (1978), "After Keynesian Economics," in *After the Phillips Curve: Persistence of High Inflation and High Unemployment*, Conference Series No. 19, Federal Reserve Bank of Boston.

McNees, S. (1979), "The Phillips Curve: Forward or Backward Looking?" ***New England Economic Review,*** July/August, pp. 46-54.

Meyer, L. and G. Webster (1981), "Rational Expectations and Monetary Policy: An Application of Least Squares Learning," ***Carnegie-Rochester Conference Series on Public Policy,*** forthcoming.

——— (1982), "Wage Determination and Inflation: The Modeling of Expectations and Inertia," Working Paper No. 41, Department of Economics, University of Washington.

Miller, M. (1981), "The Medium Term Financial Strategy: An Experiment in Coordinating Monetary and Fiscal Policy," ***Fiscal Studies,*** 2, pp. 50-60.

Miskin, Frederic S. (1982), "Does Anticipated Monetary Policy Matter? An Econometric Investigation," ***Journal of Political Economy,*** 1, pp. 22-51.

Mitchel, B.R. (1976), ***European Historical Statistics, 1750-1970,*** Columbia University Press, New York.

Mussa, M. (1977), "The Welfare Cost of Inflation and The Role of Money as a Unit of Account," ***Journal of Money Credit and Banking,*** 9, pp. 276-286.

Okun, A. (1980), "Rational Expectations with Misperceptions as a Theory of the Business Cycle," ***Journal of Money Credit and Banking,*** 12, part 2, pp. 817-825.

——— (1981), ***Prices and Quantities: A Macroeconomics Analysis,*** Brookings Institution.

Parkin, M. (1982), "The Output-Inflation Tradeoff when Prices are Costly to Change," Research Report 8209, Department of Economics, University of Western Ontario.

Phelps, E.S. (1967), "Phillips Curves, Expectations of Inflation and Optimal Unemployment Over Time," ***Economica,*** 34, pp. 254-81.

Phelps, E.S. and J.B. Taylor (1977), "Stabilizing Powers of Monetary Policy Under Rational Expectations," ***Journal of Political Economy,*** 85, pp. 163-190.

Phillips, A.W. (1958), "The Relation Between Unemployment and The Rate of Change of Wage Rates in The United Kingdom, 1861-1957," ***Economica,*** 25, pp. 283-299.

Rogers, J.H. (1929), ***The Process of Inflation in France, 1914-1927,*** Columbia University Press, New York.

Sargent, T.J. and N. Wallace (1975), " 'Rational' Expectations, The Optimal Monetary Instrument and The Optimal Money Supply Rule," ***Journal of Political Economy,*** 83, pp. 241-54.

Sargent, T.J. (1976), "A Classical Macroeconometric Model for the United States," ***Journal of Political Economy,*** 84, pp. 207-238.

——— (1980), "The Ends of Four Big Inflations," Working Paper No. 158, Federal Reserve Bank of Minneapolis.

——— (1981), "Stopping Moderate Inflations: The Methods of Poincare and Thatcher:' unpublished paper, University of Minnesota.

Taylor, J.B. (1979), "Estimation and Control of a Macroeconomic Model with Rational Expectations," ***Econometrica,*** 47, pp. 659-680.

———————— (1980), "Aggregate Dynamics and Staggered Contracts," ***Journal of Political Economy,*** 88, pp. 1-23.

———————— (1981), "Stabilization, Accommodation, and Monetary Rules," ***American Economic Review Papers and Proceedings, 7*** I, pp. 145-149.

———————— (1982), "Union Wage Settlements During a Disinflation," unpublished paper, Princeton University.

Tobin, J. (1981), "The Monetarist Counterrevolution Today — An Appraisal," ***Economic Journal,*** 91, pp. 29-42.

Walsh, Carl E. (1982), "Interest Rate Volatility and Monetary Policy," Federal Reserve Bank of Kansas City, Research Working Paper No. 82-03.

Weiss, Laurence (1980), "The Role for Active Monetary Policy in a Rational Expectations Model," ***Journal of Political Economy,*** 88, pp. 221-233.

6
Discussion

Phillip Cagan

John Taylor's work takes an appealing middle ground between the extreme positions of rational expectations with flexible prices and wages and of no expectations at all. The assumption of flexible prices appears to disregard important market inflexibilities, while an absence of expectations appears to be contradicted by market phenomena. One such phenomenon is the rise in nominal interest rates over the past 15 years to levels that can only be explained by expectations of continuing inflation, and another is the sizable shifts in the Phillips Curve during the 1970s. I believe Taylor's model offers great promise, but for a slightly different purpose than he emphasizes. His paper stimulates me to say how I think we should view these issues and what direction further research should take.

Recognition of expectations has been a welcome antidote to the simple Phillips Curve tradeoff, but they create problems for economics as a model-building science. Expectations are not readily explained by the maximizing framework on which practically all economic theory is based. This may perhaps be overlooked in dealing with demanders' and suppliers' individually determined expectations of specific prices, but it is a serious matter in macro models where the outcome crucially depends on everyone's expectations, all of which depend on each other. I do not see that the assumption of rationality provides much of an answer. At present, when opinions differ widely on the business outlook, what are rational expectations supposed to be?

Certainly not very precise, for one thing. In bond yields, for example, the expectation of inflation appears to be an extrapolation of past trends with a large risk premium. I have yet to see evidence in the market that expectations are much more than extrapolations of past trends, aside from natural disasters like the threat of war or aside from forecasts of Federal Reserve behavior a few days ahead (that new industry supplied by former Fed employees). Most expectations may be described as the projection of an existing permanent component and an unknown transitory component. If the public uses statistical

methods to distinguish the permanent from the random transitory component, this gives rise, as Brunner, Cukierman, and Meltzer (1980) remind us, to good old adaptive expectations. Of course, a first-order adaptation will not do, because it ignores serial correlation in the expectational error, and no one is so stupid as to follow an escalating inflation from below indefinitely. So we need to recognize more complicated adaptations, as well as another modification which I suggest in a moment. Adaptive expectations of the permanent component in variables need not be biased and so can satisfy that technical requirement of rational expectations, but they still may be unable to anticipate future permanent changes.

Adaptive expectations, however complex, are backward looking. Taylor's model is based on forward-looking expectations, though constrained by inflexible wages determined by contracts. Let me question forward-looking expectations indirectly by way of the credibility issue, which Taylor mentions and which we hear much of in policy discussions these days.

It seems plausible that the "credibility" of a policy would have a major influence on expectations, and I have in past writings joined in the chorus paying homage to credibility. But, granted its current popularity among economists and dramatic implications, what has credibility done for us as an explanatory device? Consider that we do not know how to measure it, certainly do not know how to produce it, and have only the foggiest notion of whether or to what degree it is absent or present. It does, however, promise the wonders of disinflation without pain. In Taylor's model, as in others, credibility influences expectations of future inflation and therefore controls the effect of the future on newly negotiated contracts.

Does the current anti-inflationary monetary policy possess this credibility? Apparently not. Current bond yields belie it (as of August 10, 1982) by not implying a declining inflation rate over the maturity of the bonds. According to Taylor's model, our present unemployment means either that monetary deceleration has proceeded too rapidly or that credibility is lacking. Many economists seem to think it is the latter. But we have an announced policy of disinflation, and the administration seems determined to persist — at least until the next election, which admittedly raises the spectre of time inconsistency. If we have not yet achieved credibility for our anti-inflationary policy with back-to-back recessions and disaster in the union strongholds of

autos and steel and satellite industries, I shudder to think what more could be done: But I want to suggest a different point—that changes in policy almost never have credibility until they are viewed as permanent, and that takes time.

We are all aware—as is Taylor—that if the problem of unemployment reflects a deceleration that is too fast, a slower deceleration would then give hardly any visible support to the announced policy of deceleration. A related problem concerns velocity during disinflation. An anticipated disinflation will reduce velocity, thus increasing the appropriate amount of monetary growth. An optimal disinflationary policy might not initially call for much of a monetary decline. But how is an announced policy of disinflation to be made credible without visible support? If credibility requires not just good intentions but visible support, and disinflation without pain requires credibility, the two may not be compatible.

Suppose short-run changes in policy cannot be made credible and that, except for clearly foreseen nonpolicy developments, expectations extrapolate the past. In that case, expectations in Taylor's model are all backward looking. Without a change in aggregate demand growth, the staggered contracts simply maintain the prevailing inflation rate. Deceleration is possible only by squeezing profit margins and reducing employment. Nominal wages will decelerate gradually, but the process necessarily involves unemployment.

It should in principle be possible to test for the existence of forward-looking expectations and by inference the existence of credibility. Some of us have been trying to estimate whether the present deceleration of prices is the same or faster according to past short-run Phillips Curves. If it were faster this time, the explanation might be that the present disinflationary policy has more credibility. But we still need to distinguish between forward-looking expectations and increases in the parameter on current demand (that is, the effect of current demand on wages and prices). Taylor's model seems to be a more sophisticated framework for comparing the two alternative paths of the variables with the actual path. This is indeed an important issue and I would stress the desirability of constructing tests of it.

One of the different and attractive implications of Taylor's model which he has emphasized is that a steady rate of deceleration in nominal aggregate demand will produce a delayed deceleration in wages, even without forward expectations, thus recommending that

demand should decelerate more slowly at first but be expected to decelerate more rapidly later. If such a sophisticated path of policy is ignored by expectations, there will be a recession at first with a delayed effect on wages. I see impressionistic support for this pattern in the late 1950s. Despite continued efforts toward disinflation in the late 1950s and despite the recession of 1957-58, the inflation seemed entrenched. But then in the aftermath of the second recession of 1960-61, wages suddenly decelerated to usher in a half decade of price stability. A similar pattern would suggest a sudden deceleration of wages in the business recovery of 1983, though now of course we start from a higher rate of increase.

If wages are to decelerate during a recovery in aggregate demand, forward-looking expectations and credibility must of course be playing some role. But the credibility need not be attributed to talk about a change in policy; it can result from two recessions, bleak prospects for many entire industries, and the fact that wages and prices are seen to be decelerating. In other words, a gradual reduction of the expected permanent component of inflation based on hard experience.

If my view is right that the process involves largely extrapolative expectations, it has the incidental implication that we are wasting our time exhorting the Federal Reserve to improve its image of credibility. All it has to do is to continue decelerating average monetary growth, whether anyone believes it will continue or not!

I can summarize my suggestions — it is yet too tentative to be an argument — by saying that expectations are formed with the future in mind, but they are largely extrapolative, and that periods of a change in policy must fight against this extrapolation of past trends. Credibility plays a role only in the long run by hardening the belief in the persistence of past trends, so that a change in trends takes time to become the new expected trend. Such long-run credibility can be very important; if prices have been stable, it can generate market resistance to incipient inflationary movements. It may be worth considering that a possible advantage of a gold standard — and perhaps the only advangtage — is such dynamic stability of prices. The fixity of exchange rates may be an important element. Everyone thinks that Swiss monetary authorities have credibility, yet they hold down their inflation rate only with repeated struggles. Would not they and others have an easier time if they could tie their currency to a stable dollar? But such stability cannot be achieved by simply *saying* we will maintain the gold stand-

ard. It has to happen.

As a final point, let me qualify my earlier suggestion that expectations are adaptive. Expectations depend not only on extrapolation of the past, but also on the expectations of others. Individuals' expectations have a gravitational pull for each other. It is hard to be a maverick. But this inhibits change, because the weight of expectations affects the outcome. The pull of new developments must attract a certain following before a general change of view can occur, but at some threshold views suddenly shift. Bond yields often tend to hover around a particular level and to ratchet to new levels in rather sharp movements. (Keynes' view of the bond market as based on an expectation of the "normal" level of yields is pertinent here.) The bond market collapse of late 1979 and early 1980 is an example. I see that movement as an adaptation to past inflationary developments that became rapid once it got underway; whatever effects were to be produced by the October 1979 change in monetary policy could not have been known by the market until later, though it may have contributed to a disturbing uncertainty. Another possible example is the sudden collapse in 1970 of the fairly stable Phillips Curve existing during the 1950s and 1960s. Thus the speed with which expectations adapt to past developments may be .subject to a nonlinear process. We have a long way to go to succeed in modeling expectations.

Reference

Brunner, K., A. Cukierman, and A. Meltzer (1980), "Stagflation, Persistent Unemployment and the Permanence of Economic Shocks," ***Journal of Monetary Economics,*** 6 (October), pp. 467-92.

7
Discussion

Frederic S. Mishkin

Taylor's paper is a useful and balanced discussion of the implications of forward-looking behavior for how monetary policy should be conducted. However, he might leave the reader with a misleading impression that the nonmarket clearing, rational expectations approach that he advocates is an outlying position that is not widely accepted. To the contrary, a high, and I think growing, percentage of economists adheres to this position, although not necessarily to all the details of Taylor's model. This is occumng because as more empirical evidence accumulates, it tends to be favorabe to forward-looking expectations formation, but is much less so to the other implications of the new classical macroeconomic models: the importance of misperceptions to the business cycle, the absence of effects from anticipated policy, and the required degree of price-wage flexibility. The policy prescriptions in John Taylor's paper thus deserve to be taken very seriously by policymakers.

Obviously, I am sympathetic to John's approach, and I suspect that I am just the kind of discussant that he would like to have hired for this conference. Instead of trying to find a set of criticisms to level against this paper, I would rather try to give a little more perspective to the approach and expand on some of its policy implications.

The approach that Taylor advocates is very much in the research tradition of Keynesian macroeconometric modeling. It involves estimating a structural econometric model which has a wage and price setting sector where markets do not clear in the short run. However, the policy implications of his approach are much closer to those of the "new classical macroeconomics" than to the "Keynesian.'" To see this, we should look at the response of these different approaches to the basic question of concern to policymakers right now. Is the fight against inflation worth pursuing and should monetary policy be less accommodative than it has been in the past? Advocates of the Keyne-

1. These are Taylor's labels

sian approach usually respond in the negative. With exogenous expectations and hence an exogenous distributed lag pattern in wage and price setting behavior, Keynesian models imply that a significant lowering of the inflation rate requires many years of substantial output loss and unemployment. Also, the prevention of inflation with nonaccommodating monetary policy will be quite costly for similar reasons. Because the output loss is so large, it is not clear whether the welfare gains from reducing or preventing inflation are worth the huge social cost in terms of high unemployment and low output. The new classical macroeconomics, on the other hand, leads to the position that inflation should be fought with contractionary monetary policy. In these models, the cost of fighting or preventing inflation can be extremely small. In fact, if the contractionary policy is expected, then the elimination of inflation can be immediate with no output loss. The nonmarket clearing, rational expectations approach of Taylor also indicates that the current inflation should be reduced with contractionary monetary policy and future policy should be less accommodating. The simulations in his paper show us that the reduction in inflation can be achieved with no output loss, although the path to price stability takes longer than in the new classical models. Thus, Taylor's and the new classical macroeconomics approach are in complete agreement on this critical issue.

The nonmarket clearing and new classical macroeconomics approach are also in complete agreement on the importance of the credibility of monetary policy to its effectiveness in fighting inflation. They both imply a negligible cost to reducing the inflation rate only if the contractionary monetary policy is known in advance, is believed, and is then actually carried out as expected. Achieving credibility is an extremely critical element to a successful monetary policy. This is obviously easier said than done and it is hard to believe that it can be achieved overnight. This is why the simulation results in the paper are overly optimistic on the low cost of reducing the inflation rate. Some output loss will probably occur when reducing the inflation rate because of the time it would take to establish credibility. But the main point of Taylor's research and that of the new classical macroeconomists is that this cost will be far lower than has been suggested by the Keynesian approach.

How we can achieve credibility quickly is not an easy question. The case of the hyperinflations that Sargent (1980) discusses are not very

helpful. There, credibility was achieved by the threat of foreign military intervention if contractionary policies were not pursued. Holding a gun to a person's head is always a quick way to establish credibility, as every mugger knows, but it is not a feasible solution to the situation that currently exists in the United States. On the other hand, we can make several suggestions that might help our policymakers make their anti-inflationary policy more credible. The current unusually high volatility of M1 growth has been strongly criticized by many members of the economics profession.[2] Although there is no convincing evidence that short-run fluctuations in money growth lead to significant business cycle fluctuations, money growth volatility might render the Fed's monetary policy less effective. The problem is that this volatility makes it harder to ascertain whether the Federal Reserve will deviate from its inflation fight. My feeling is that it is this resulting uncertainty that has led to the sometimes vehement attacks on the Federal Reserve's current policy. One issue that this raises for Taylor's simulation results is that the paths of monetary policy he suggests might not be easily believed because they involve only a very small decline in money growth at first, with a sharper deceleration later. A more substantial decline in money growth initially may be necessary to establish credibility in the Federal Reserve's anti-inflationary policy.

Clearly, the Reagan administration also has an important role in establishing monetary policy credibility, and so far they do not get a high grade on this score. The inability of the Reagan administration to get the budget deficits under control may be a factor in the current high nominal and real interest rates. The resulting pressure on the Federal Reserve creates the suspicion that it might try to lower these rates by printing money and that it may revert back to its old policies and reignite the inflationary fires. A less expansionary fiscal policy might go a long way to making the Federal Reserve's job easier and to establishing the credibility it needs to eliminate inflation quickly without substantial output loss.

References

Meltzer, Alan, (1982), "For the Affirmative: Is the Federal Reserve's Monetary Policy Misdirected? Resolved: That the Federal Reserve's Current Operating Procedure for Controlling Money Should be Replaced," *Journal of Money Credit and Banking, 14* (February), pp. 127-3 .

---

2. For example, see Meltzer (1982) and Rasche (1982).

Rasche, Robert H. (1982), "For the Affirmative: Is the Federal Reserve's Monetary Policy Misdirected? Resolved: That the Federal Reserve's Current Operating Procedure for Controlling Money Should be Replaced," ***Journal of Money Credit and Banking,*** 14 (February), pp. 120-24.

Sargent, Thomas J., "The End of Four Big Inflations," Federal Reserve Bank of Minneapolis, Working Paper No. 158.

Discussion

Robert J. Gordon

The current episode of monetary disinflation in the United States is generating a valuable new set of time series data for the testing of alternative theories of aggregate supply. John Taylor's paper serves two purposes, both providing a doctrinal overview of two extreme opposing positions, which he calls "Keynesian" and "new classical," and illustrative numerical simulations using his own approach, which he describes variously as "this new alternative view" and "a compromise or consensus view." With typical modesty, Taylor has avoided giving his own name to the approach that he invented, but I need not feel so inhibited and will henceforth label it "Taylorian."

If true, the Taylorian view would have dramatic implications. The simulations in Tables 1 through 5 exhibit alternative paths of disinflation, ***all of which occur without the creation of a single layoff or the loss of a single dollar of real GNP during the transition period.*** Taylor's demonstration that painless disinflation is compatible with the U.S. type of three-year staggered wage contract system is extremely ingenious but ultimately unconvincing. For if disinflation-without-pain were part of the economy's set of feasible outcomes with its existing monetary and contractual institutions, there would be no reason for the actual process of U.S. disinflation since 1979 to have been accompanied by an increase in the unemployment rate from 6 to 10 percent. To repeat the language that Barro has applied to agents in Keynesian models, Taylorian agents in 1980-82 have failed on a massive scale to "realize perceived gains from trade." The jarring discrepancy between real-world behavior and the hypothetical scenarios makes me doubt that his approach can now or ever be dubbed a "consensus view."

The Overview of Alternative Doctrines

The doctrinal landscape painted by Taylor is sparsely populated and one-dimensional. He depicts a straight line along which the protagonists can be arrayed as if the line were divided into segments, num-

bered left-to-right from 1 to 10, with Keyn'esians variously described as if they occupy the region 1 to 3, the new classical proponents at 10, and the Taylorian view somewhere in between. Judging from the penultimate sentence, "...the answer might be a lot closer to the new classical than to the Keynesians," Taylor seems to imagine himself as residing at 7 or 8.

The Taylor overview is underpopulated in its omission of the substantial body of recent research that occupies the territory between, say, 3 and 7 on his linear scale, and one-dimensional in its failure to refer to the wide variety of experience among industrialized nations in the postwar era, not to mention earlier historical eras. In fact, rather than a one-dimensional line segment as a descriptive image, I prefer to think of a grid with the extent of price flexibility along one axis and national identity along the other, and with plotted points suggesting substantial price inertia and backward-looking expectation formation in a country like the United States (which might register 3 or 4 on my scale), and prompt adjustment with forward-looking expectations formation in a country like Japan (which might register 7 or 8).

The mechanism of expectation formation in Keynesian models is labeled as both "exogenous" and "backward looking."[1] Since the term "Keynesian" is used at the outset as the approach "embodied in most econometric models now used for policy evaluation in practice," it is accurate to describe the expectations mechanism in those models as "backward looking," i.e., adaptive, but not as "exogenous." For at least two decades the wage-price sector of virtually every econometric model in the Keynesian tradition has included lagged wages, prices, or both, in the wage equation. It makes no difference for the reduced forms of these models whether the lagged wage and price variables are entered directly, or whether the specification includes an unobservable expected price or wage variable that is promptly defined to depend entirely on lagged actual values. The first practice is preferable, since the second imposes an autoregressive restriction on the formation of expectations that unrealistically excludes other important lagged demand and supply variables from influencing price and wage expectations (Sims, 1980).

The backward vs. forward distinction generates the central difference between Keynesian and Taylorian models. The former cannot

1. **"These models are not 'Keynesian' in that expectations are not exogenous or purely backward looking" (p.** 11).

produce a disinflation without the creation of temporary economic slack, whereas forward-looking Taylorian agents are capable (as in the paper's simulations in Tables 1 through 5) of disinflation-without-pain. While valid, this distinction has the effect in Taylor's overview of lumping together all Keynesian models and overlooking the enormous diversity of estimated responses and coefficients that appear in the literature. On the 1-to-10 scale the far left is occupied by models developed in Cambridge (U.K.) in which wage changes are exogenous and the aggregate price level mimics changes in the exogenous wage without any influence of demand (Godley and Nordhaus, 1972). At the other extreme, say 5 or *6* on the linear scale, are my own backward looking models for the U.S., which are capable of generating a decline in the inflation rate of five percentage points within only two or three years after a five-percentage-point monetary growth slowdown (Gordon, 1982b; Gordon-King, 1982). And responses are even faster in some other nations with less wage inertia than in the U.S., as emphasized in comparative macroeconomic research by Branson-Rotemberg (1980), Sachs (1979), and myself (1982a, 1982c).

Further, my model includes the foreign exchange rate as an additional channel, besides economic slack, by which policymakers can influence the inflation rate. As a formal matter my model can generate a disinflation without slack, as can the Taylorian model, if the authorities use monetary policy to manipulate the exchange rate and fiscal policy to maintain an equilibrium unemployment rate. I do not stress this possibility, however, because I believe that fiscal multipliers are too weak and uncertain in size and timing to allow such a disinflationary strategy actually to be carried out (the disinflation would not be painless in a global sense since unemployment and slack would simply be exported abroad).

Substantive Issues in the Taylorian Approach

The distinctive feature of the Taylorian model is its dual emphasis on multi-period staggered contracts and on forward-looking expectation formation. He rightly views the existence of staggered contracts as undermining the new classical prediction that price changes respond instantaneously to anticipated changes in nominal demand. But he wrongly imposes a false symmetry by arguing that "the Keynesian approach. . . cannot deal with the expectations issue systematically," as if to imply that, because of their backward-looking constructs, Keyne-

sians ignore expectations with as little justification as new classical economists ignore multi-period contracts.

But there are three good reasons to justify the backward-looking orientation of Keynesian models. First (as Taylor has recognized elsewhere but does not discuss here), "disinflation-without-pain" scenarios require that agents accept as fully credible all announcements by the monetary authority of its future policy. Second, Taylor implicitly assumes a one-to-one link between future announced decelerations in monetary growth and in nominal GNP, ignoring the uncertainty produced by the Congressional budget process and by mysterious shifts in the demand for money (as occurred both in 1975-76 and in 1981-82). Consider a wage-setting agent committed to following the behavior set out in Taylor's calculations. If velocity increased faster than in the forecast, nominal GNP in wage units would also increase and could imply some combination of higher profits and a lower real wage, and/or higher employment of additional workers, than in the simulations. At the opposite extreme, a slower increase in velocity would imply some combination of lower profits and a higher real wage, and/or lower employment with the possibility of layoffs. Since velocity surprises tend to be serially correlated, an agent may be tempted to wait until they actually occur rather than precommit himself to behavior that may later prove to be suboptimal.

The third problem with forward-looking behavior, however, is the most crucial and helps to explain the failure of the real-world U.S. economy to realize the perceived gains from trade that Taylor's disinflationary strategy exhibits, in contrast to the "high pain" outcome that has actually occurred. This problem involves the decentralization of decision making and the resulting unwillingness of any individual agent to accept with complete confidence that all other agents will accurately read the lines written out in Taylor's precisely detailed deflationary screenplay. An accurate line-reader who accepts a sudden reduction in the rate of wage change will suddenly find himself accepting a lower real wage, should other workers fail to play their assigned roles. Yet each other worker has an incentive to leave the cast of the production, hoping that loyal line-reading behavior by at least some workers will reward his own disloyalty with a higher real wage. This incentive to disloyalty is a classic case of the economist's "free rider" problem.

In contrast to the unrealistic hopefulness of the Taylorian simulations is the hard-minded realism of Keynesian backward-looking simula-

tions, which might be dubbed the "Missouri" or "show-me" approach. While admitting that expectations are relevant for every aspect of economic behavior, the sensible Keynesian recognizes that agents are likely to wait until they see evidence of current (not future) price deflation and economic slack before agreeing to wage moderation and concessions. The much publicized wage concessions in the United States in 1981-82 have, after all, occurred in industries where bankruptcy is a real and present threat, not in situations where economic agents worked out in Taylorian fashion the future consequences for profits and real output of present policies (Mitchell, 1982). The rate of wage change slowed down *after*, not before, unemployment rose, the exchange rate appreciated, and the real price of oil began to decline. In fact, Taylor provides no evidence that a forward-looking expectation mechanism has ever existed, and it is hard to see where such evidence would come from. For instance, correlations between current wages and future values of the unemployment rate would be open to multiple interpretations, including reverse causality.

Viewed with reference to my three objections to Taylor's forward-looking assumption, the section called "forward looking" in his paper addresses secondary issues. In particular, Okun's argument that forecasting is complex and costly is not convincing. As Taylor recognizes, it is cheap to refer to wage surveys. Yet the use of wage surveys inherently introduces inertial and backward-looking characteristics into the wage-adjustment process.

Conclusion

On empirical grounds Taylor rightly rejects the new classical macroeconomics. Yet he symmetrically dismisses, without evidence or footnotes, all of Keynesian macroeconomics, thus lumping together a wide variety of research including obsolete approaches in which wages and prices are exogenous, and modern time-series econometric research which exhibits substantial responsiveness of the aggregate U.S. inflation rate to monetary policy and which attempts to explain cross-country differences in this degree of price adjustment. Taylor seems to be so convinced by his own research that painless disinflation is feasible that he states that the two main objectives of monetary policy are to bring down the inflation rate in the short run and to keep the inflation rate near this new lower level in the long run. He never

considers the possibility that, because real-world disinflation involves a large loss of output, a prior question for the monetary authority is whether to disinflate at all. As month after month in 1982 goes by with high and rising unemployment throughout the industrialized world, and with a degree of economic slack unprecedented since the Great Depression, it is not too early to suggest that forward-looking approaches to macroeconomics may have forfeited their claim to credulity. As I look at the time path of inflation and unemployment in the United States as it has emerged over the past two years, the outcome seems closest not to Taylor's screenplay, nor to my own relatively optimistic econometric work, but to the backward-looking Phillips-curve adjustment loop displayed for illustrative purposes in the current edition of my ***Macroeconomics*** textbook (p. 235), written in the fall of 1979.

References

Branson, William H., and Julio Rotemberg (1980), "International Adjustment with Wage Rigidity," ***European Economic Review,*** 13 (May), pp. 309-32.

Godley, Wynne A.H., and William D. Nordhaus (1972), "Pricing in the Trade Cycle," ***Economic Journal,*** 82 (September), pp. 853-82.

Gordon, Robert J. (1982a), "Why U.S. Wage and Employment Behavior Differs from that in the U.K. and Japan," ***Economic Journal,*** 92 (March), pp. 13-44.

——————— (1982g), "Inflation, Flexible Exchange Rates and the Natural Rate of Unemployment," in M.N. Baily, ed., ***Workers, Jobs, and Inflation,*** Brookings, pp. 88-157.

——————— (1982), "The Wage and Price Adjustment Process in Six Large OECD Countries," Conference Volume, ***The Evolving International Financial System,*** forthcoming.

———————, and Stephen R. King (1982), "The Output Cost of Disinflation in Traditional and Vector Autoregressive Models, ***Brookings Papers on Economic Activity,*** Vol. 13 (No. 1), pp. 205-244.

Mitchell, Daniel J.B. (1982), "Recent Union Contract Concessions," ***Brookings Papers on Economic Activity,*** Vol. 13 (No. 1), pp. 165-202.

Sachs, Jeffrey (1979), "Wages, Profits, and Macroeconomic Adjustment: A Comparative Study," ***Brookings Papers on Economic Activity,*** Vol. 10 (No. 2), pp. 269-319.

Sims, Christopher A. (1980), "Macroeconomics and Reality," ***Econometrica,*** 48 (January), pp. 1-48.

Rejoinder

John B. Taylor

As with some of the other criticisms reviewed in my paper, Robert Gordon's strong attack on macroeconomic approaches that emphasize both contracts and forward-looking behavior deserves careful consideration. Moreover, his raising this criticism further illustrates the reasons for my caution against interpreting such approaches as forming a consensus at this time.

Gordon's first and most dramatically exposited criticism of the forward-looking contract approach is based on what he calls the "jamng discrepancy" between the events in the U.S. during 1980-1982—the painful disinflation—and the simulations of a model which I chose for the purpose of illustrating this approach in my paper. I see no such discrepancy. In fact, one reason for reporting the simulations was to show, as I summarized in the paper, that "the high unemployment rates we have experienced during this disinflation are consistent with this type of expectations model." The actual disinflation seems to have been much more abrupt than would be required to avoid such high unemployment according to the model. As I stated, "The deceleration was faster than could be sustained while maintaining full employment." Moreover, it seems to me that the disinflation which has occurred during 1980-1982 has been achieved at least partially through forward-looking expectations effects working simultaneously with the depressed economic conditions. It seems that backward-looking expectations-augmented Phillips Curves would not have predicted the rapid deceleration of nominal wage growth during 1981-1982.[1] This is why some economists have suggested that the Phillips curve might

1. I think it is still too early to rigorously assess the predictive accuracy of these models during the current period. Moreover, the models differ widely, and some which emphasize rate of change effects may have predicted more successfully than others.

have an inflection point at high unemployment rates. An alternative to the inflection point argument is simply that ***expectations*** of relatively high unemployment rates in the next few years, and ***expectations*** of relatively low inflation has been a factor in wage determination.

Gordon emphasizes the credibility problem in this criticism of the forward-looking expectations approach. Phillip Cagan also mentions the problem in his comments on my paper. There are good reasons to suspect that workers and firms might not believe that the monetary authorities will reduce money growth in the future. In fact, one of the aims of the simulations reported in my paper is to show that the deceleration in nominal GNP or money growth is so slow at the start that it strains people's credibility. Rather than ignoring credibility problems, this research illustrates why credibility is such a serious problem. In terms of Gordon's general criticism of forward-looking expectations, I think the credibility problem is much more serious during periods of transition from one policy to another, and I have studied this problem in a previous paper.[2] Many of the applications of rational expectations are explicitly concerned with a comparison of economic conditions under alternative policy regimes, rather than with economic conditions during a transition from one regime to another. The research I referred to in the latter part of my paper on alternative rules for monetary accommodation is an example of this. For these types of application — where economic events can be expected to be recurrent — the rational expectations approach seems reasonable.

But even during a transition period it is unclear to me why, as Gordon argues, a purely backward-looking expectations scheme would be preferred to one which deals explicitly with the credibility problem and thereby mixes elements of forward- and backward-looking behavior. The implication of research on transitions to rational expectations equilibria is not that we can retreat to a scheme where expectations can be modeled adaptively with fixed coefficients. This point is clearly illustrated in the paper by Meyer and Webster referred to in my paper. Similar objections can be raised to Gordon's criticism that in a decentralized economy it is unreasonable to assume that economic agents expect that other agents are forward-looking as is implicit in most rational expectations applications. The problem is much more serious for unusual or unique events than it is for recurrent events.

---

2. J.B. Taylor, (1975), "Monetary Policy during a Transition to Rational Expectation," *Journal of Political Economy*, 83, pp. 1009-21.

Moreover, a satisfactory method of dealing with the problem is unlikely to be found in purely backward-looking schemes. Evidence for this can be found in the research of Robert Townsend[3] which has experimented with generalized rational expectations methods to deal with the problem.

In addition to his criticism of macroeconomic modeling with forward-looking contracts, Gordon makes several serious misinterpretations of statements in my paper. First, contrary to Gordon's claim, nowhere in the paper is there a statement that I have "dismissed all of Keynesian macroeconomics." I explicitly used the term Keynesian only to refer to an approach to expectations, not to all of macroeconomics. Second, there is no statement in the paper that monetary policy should only be concerned with price stability. As stated in the paper, the long-run objective of monetary policy is "stabilizing the fluctuations of unemployment and output" as well as price stability. In fact, much of the research on forward-looking contracts discussed in the paper is concerned with a particular characterization of the tradeoff between the two goals. Third, Gordon's ranking of alternative macroeconomic theories on a 1 to 10 scale misinterprets these theories by considering only one type of implication of the theories. His ranking scheme is one-dimensional. My paper tries to emphasize that some of the conclusions of forward-looking contract models are closer to the "new classicals" while others are closer to the "Keynesians." Because he focuses on only one conclusion (doubts about the effectiveness of accommodative policies) while ignoring another conclusion (confirmations about the effectiveness of employment stabilization), his summary evaluation is very misleading.

---

3. R.M. Townsend, (1983), "Equilibrium Theory with Learning and Disparate Expectations: Some Issues and Methods," in R. Frydman and E.S. Phelps (Ed.) *Individual Forecasting and Aggregate Outcomes: "Rational Expectations" Examined.*

9
The Effect of U.S. Policies on Foreign Countries: The Case of Canada

Charles Freedman

I. Introduction

Since the introduction of the new techniques of monetary policy implementation by the Federal Reserve in October 1979, U.S. interest rates have been higher on average than previously and much more volatile. The changes in policy techniques and the associated interest rate developments have been widely discussed and analyzed in the United States, both inside and outside the Federal Reserve System. Somewhat less attention has been paid to the implications of these developments for other countries, although a section of the Federal Reserve Staff Study on New Monetary Control Procedures was devoted to the "external perspective" and the subject has arisen in various international meetings.

In this paper I examine some of the effects of U.S. interest rate movements on exchange rate and interest rate developments in other countries and the problems that the U.S. movements can pose for monetary policy in a small open economy such as Canada. In the first section I present a very brief review of the movements of U.S. interest rates and those of interest rates and exchange rates in a number of foreign countries over the past three years. I conclude that, in general, foreign interest rate movements have not been tightly linked to U.S. interest rate movements although during certain sub-periods some foreign interest rates have responded directly to U.S. rate movements. This response has been particularly noticeable at times of strong downward pressure on the value of the foreign currency.

The views expressed in this paper are those of the author and no responsibility for them should be attributed to the Bank of Canada. I am indebted to a number of my colleagues at the Bank of Canada for discussion of the ideas in this paper. However, none of them bears any responsibility for errors in the analysis.

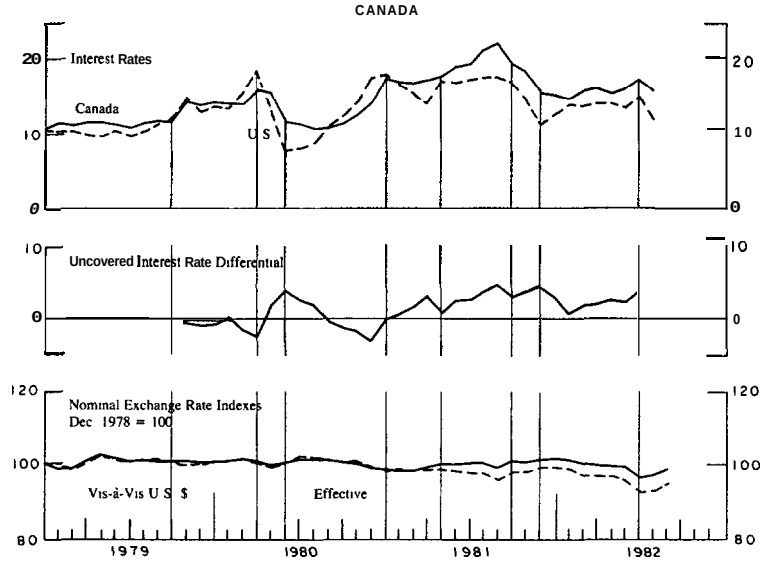
The following section focuses on the options available to a small open economy attempting to achieve a monetary aggregate target in the face of fluctuations of U.S. interest rates. The appropriate response of interest rates in the small country depends on whether the movements in U.S. nominal rates reflect movements in real rates or movements in inflationary expectations and whether the participants in the foreign exchange market interpret them correctly. In most circumstances, the small open economy should move its domestic interest rates by some fraction of the movement in U.S. rates in order to achieve the target for its monetary aggregate.

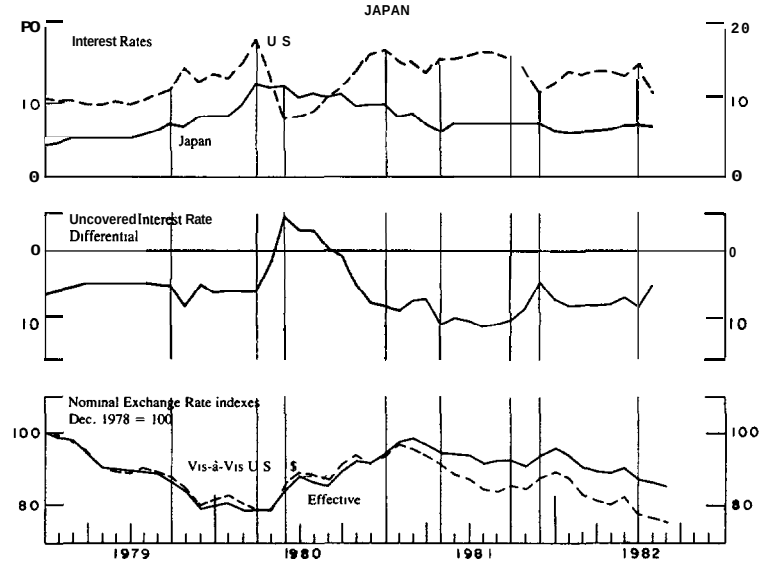
I then analyze the more basic question of whether a monetary target ought to be maintained unchanged when there are significant changes in foreign interest rates and look at the possible role of the exchange rate in the setting of policy. Most of the theoretical articles on this question have formulated the problem in the context of the Poole framework in which the policy maker knows the parameters of all the structural equations. In contrast, the argument for a monetary aggregate target derives, in my view, from the fact that there are many areas of the economic structure about which we can have little confidence in our knowledge. The question of whether and how to use the exchange rate in the policy process then hinges on whether one has reasonable confidence in one's knowledge of the response of the economy to certain kinds of shocks (e.g., an increase in U.S. interest rates). In such a case one might implement a policy in which the exchange rate plays a role; even if not optimal such a policy will at least be better than that of simply adhering unchanged to the monetary aggregate target. For other shocks, however, one might well feel that the lack of knowledge is such that one is unable to improve on the simple policy. Two crucial issues remain: first, how to distinguish between these cases and, second, if one does have reasonable confidence in one's understanding of the response to certain shocks (say a foreign interest rate increase), precisely how to integrate the exchange rate into the policy process.

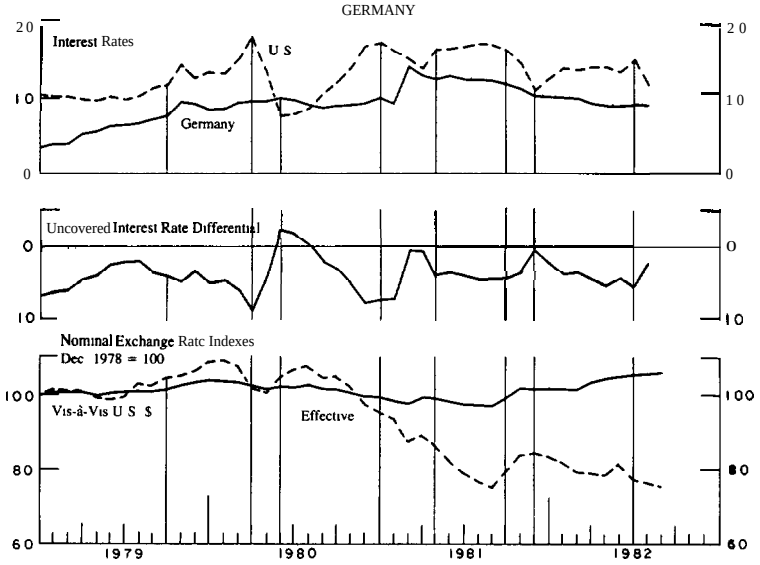
II. Some stylized facts

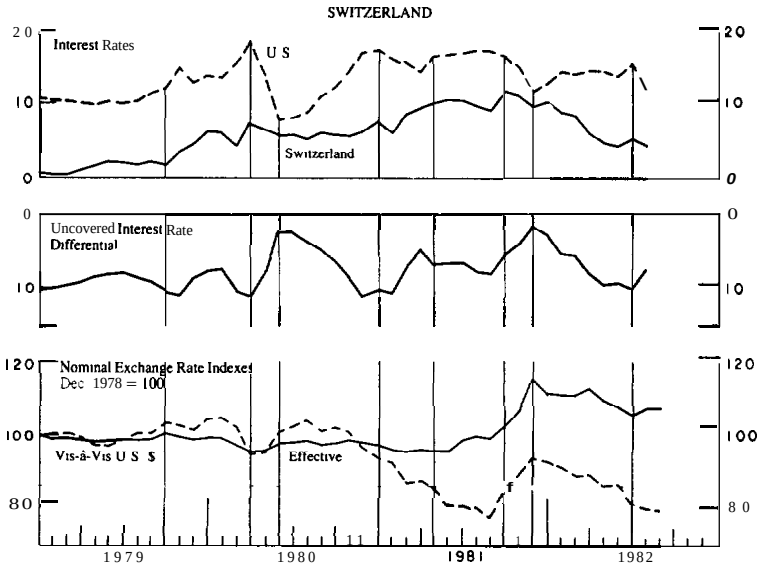
The attached charts display for a number of countries (Canada, Japan, Germany, Switzerland, United Kingdom, France) the movements of domestic short-term interest rates (the 90-day rate), uncovered interest rate differentials vis-à-vis the United States, and nominal U.S. dollar and nominal effective exchange rate indexes since the end

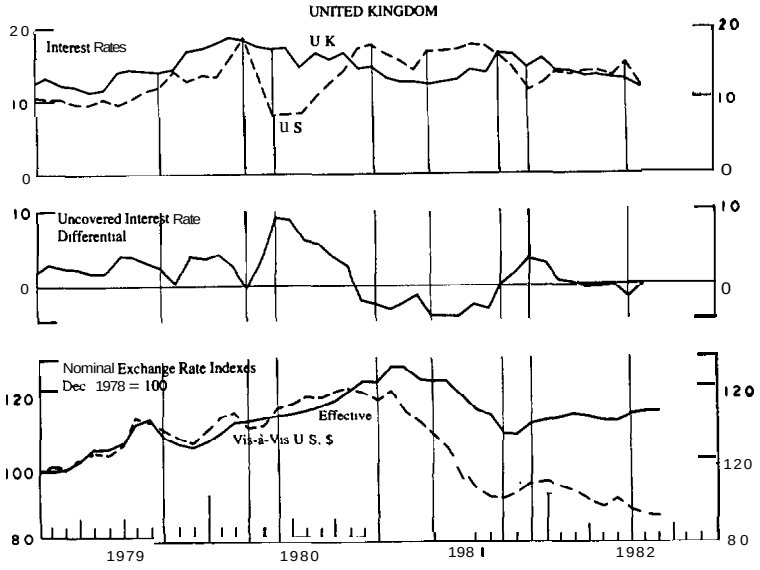
SHORT-TERM DOMESTIC ONEY MARKE RATES AND
NOMINAL AND EFFECTIVE EXCHANGE R TE INDEXES

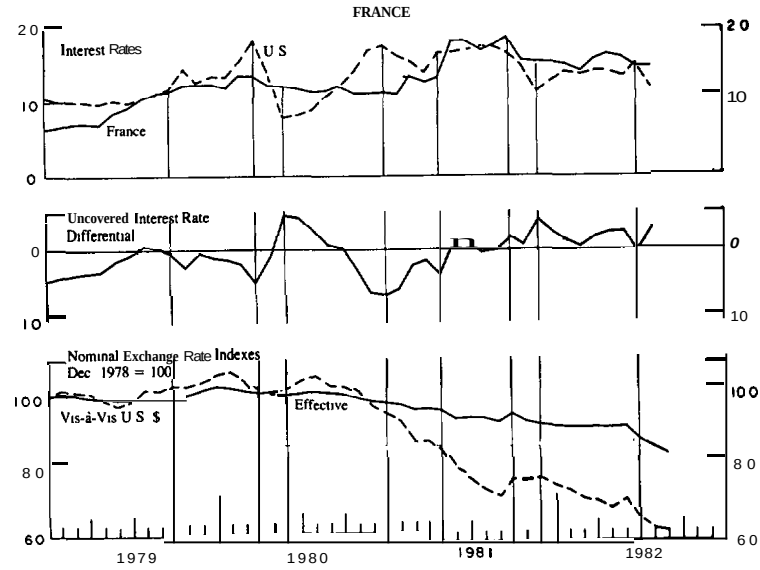





GERMANY
Interest Rates
U S
Germany
Uncovered Interest Rate Differential
Nominal Exchange Ratc Indexes
Dec 1978 = 100
Vis-à-Vis U S $
Effective
1979
1980
1981
1982


SWITZERLAND
Interest Rates
U S
Switzerland
Uncovered Interest Rate
Differential
Nominal Exchange Rate Indexes
Dec 1978 = 100
Vis-à-Vis U S $
Effective
1979
1980
1981
1982


UNITED KINGDOM
Interest Rates
U K
U S
Uncovered Interest Rate Differential
Nominal Exchange Rate Indexes
Dec 1978 = 100
Effective
Vis-à-Vis U S. $
1979
1980
1981
1982


FRANCE
Interest Rates
U S
France
Uncovered Interest Rate Differential
Nominal Exchange Rate Indexes
Dec 1978 = 100
Vis-à-Vis U S $
Effective
1979
1980
1981
1982

of 1978.[1] For purposes of analysis the swings in U.S. rates can be divided into a number of periods: (1) end of 1978 to September 1979, relatively stable rates; (2) September 1979 to March 1980, sharp increase in U.S. rates from about 11 percent to 18 percent; (3) March 1980 to May 1980, extremely sharp decline in U.S. rates from 18 percent to 8 percent; (4) May 1980 to December 1980, gradual rise from 8 percent to 17½ percent; (5) December 1980 to April 1981, fall and subsequent rise of about 3 percentage points; (6) April 1981 to, September 1981, very stable rates; (7) September 1981 to November 1981, decline from about 17 percent to 11½ percent; (8) November 1981 to June 1981, upward dendency in interest rates. Admittedly these divisions are very crude but they do enable us to carry out a rough-and-readyanalysis of the response of the foreign interest rates to U.S. rates in the various sub-periods.[2]

In the first episode in which U.S. interest rates rose (September 1979 to March 1980) all the countries being examined (Canada, Switzerland, Germany, Japan, United Kingdom, France) followed U.S. rates up to a greater or lesser degree. Since this was a period of sharply rising oil prices and of increasing inflation rates in most countries, these upward movements were in line with the requirements of domestic policy. In some cases, such as Germany and France, the rise was less than in the United States and the uncovered differential moved in favor of United States whereas in others, such as Japan, the differential vis-à-vis U.S. rates remained virtually constant. Towards the end of this period, as U.S. rates peaked, all currencies weakened noticeably vis-à-vis the U.S. dollar. Most countries responded to the very sharp fall of U.S. rates in the spring of 1980 in a very muted fashion and therefore saw their uncovered differentials and the values of their currency rise vis-à-vis the U.S. In the next period of U.S. interest rate increase (May 1980 to December 1980) Canada was the only country to respond by raising its rates significantly. The others either increased their rates slightly or allowed them to fall somewhat. Uncovered

1. The exchange rate data are monthly averages of daily rates. Although the interest rate data used are as of month-end and not the more desirable average of daily rates they nonetheless serve to show the major swings of interest rates. The timing of the swings is not as precise, however, as would be needed for more detailed analysis. A more detailed discussion would also incorporate international differences in inflation rates and in inflationary expectations into the analysis of exchange rate movements.

2. This brief overview is not intended to explain in detail the movements in every country but rather to give a very broad description of behavior of foreign interest rates vis-i-vis U.S. interest rates. There are clearly many factors influencing the exchange rate that are not touched in this brief survey.

differentials moved sharply in favor of the United States and the U.S. dollar strengthened markedly except vis-a-vis the pound and the yen.

In the early part of 1981 when U.S. rates fell from 17% percent to 14¼ percent and then moved back up quickly to 17 percent, both Germany and Switzerland posted markedly higher domestic rates, responding in part to the decline in the value of their currencies in the previous period and to the continuing downward pressure on their currencies vis-6-vis the dollar. The other countries showed relatively little upward movement or some downward movement over this subperiod. In the face of fairly flat U.S. rates over the later spring and summer of 1981 rates remained more or less unchanged in Switzerland, Germany, Japan, in the case of latter in spite of the sharply declining value of the yen. In Canada, the United Kingdom and France, rates moved up over the period to counter downward pressure on their currencies arising from factors unrelated to interest rate differentials, such as the election in France, the movement of oil prices for the pound, and direct investment outflows in the case of the Canadian dollar.

During the period of declining U.S. rates between September and November 1981, short-term rates fell in all the countries under study except Japan, although the declines were smaller than those in the United States. The resulting increases in differentials vis-6-vis U.S. rates led to a strengthening of all currencies except the French franc. The rise in U.S. rates in the period between November 1981 and June 1982 was accompanied by a somewhat smaller increase in rates in Canada but declines in rates elsewhere despite the strength that the widening differentials gave to the U.S. dollar. In part, this lack of response to U.S. rates was related to the spreading international recession which resulted in more emphasis being placed on real side developments and less on external considerations in the determination of short-term interest rates.

One can derive a number of conclusions from this very brief overview. First, there is no automatic response to U.S. interest rate developments in other countries. Even Canada, whose rates have followed those of the United States most closely, has had divergent patterns some of the time and has shown significant movements over the period in the uncovered interest rate differential vis-6-vis the United States. Other countries have had long periods in which rates did not respond to movements in U.S. rates or moved in the opposite direction

to those in the United States.[3] Second, it is likely that the overall level of interest rates was considerably higher, on average, as a result of the higher level of U.S. rates over the period. This is particularly true during 1981 and 1982. Third, the tendency to follow U.S. rates seems most marked in the first cycle (mid 1979 to spring 1980) than in later cycles. This is mainly related to the fact that policy concerns were similar in the major countries during this period. Fourth, the response to U.S. rates by the European countries and Canada becomes more marked at times of substantial downward pressure on the value of their currencies. Such downward pressure on its currency seems to have been less of a consideration for Japan, perhaps because of Japan's significantly better inflationary performance over the period. Fifth, although interest rate differentials clearly play an important role in influencing exchange rate movements, other factors dominate them at times. These include both noneconomic factors (e.g., the election in France, East-West relations for the mark) and economic factors (e.g., the price of oil for sterling, direct investment capital flows in Canada). Sixth, except in the case of Canada and to a lesser extent Japan, where the two indexes move fairly closely together, effective exchange rate indexes are much less volatile than are the U.S. dollar exchange rates. At times when the U.S. dollar shows generalized strength vis-à-vis European currencies the fact that the latter tend to move together limits the movement in the effective exchange rate. In the case of Canada, where 70 percent of its trade is with the United States, the U.S. dollar rate clearly plays a much more important role.

III. Possible responses to U.S. interest rate movements in a small open economy with a monetary aggregate target

As shown above, Canadian interest rates were more influenced by swings in U.S. rates than were those of the European countries and Japan. I now turn to a more careful examination of the policy options available to a small open economy such as Canada, which is faced with volatile movements in the rates of a large neighboring country, such as the United States. In this section, I assume that the small country has set a target growth rate for its monetary aggregate and analyze the implications for that aggregate of changes in U.S. rates under various

3. A similar conclusion was reached in Wallich and Haas (1982) who report that recent data "do not support the notion of interest rates tightly linked internationally."

interest rate responses in the small country. In the next section, the analysis is broadened to examine the question of whether the small country ought to try to achieve its monetary target in the face of foreign disturbances and whether it can use the exchange rate as an information variable or intermediate target in those circumstances.

Consider the case of a small open economy (SOE) with a large traded goods sector whose prices are closely tied to world prices[4] and with financial markets closely linked to those in other countries. Assume that this country has implemented a policy of targeting on a monetary aggregate and that the authorities adjust the short-term interest rate in order to achieve such a target by sliding along the demand for money curve.[5] Suppose that the large country (or world) interest rate rises. The two polar responses of the small country would be to leave its domestic short-term rate unchanged or to move it lock step with world rates. An intermediate response would be to move the domestic interest rate in the same direction as world rates but by a lesser amount. The implications of these options for the SOE can be analyzed for three cases — first, the rise in the large country nominal interest rate reflects a real interest rate increase consequent upon a tightening of monetary policy, say as part of a stronger anti-inflationary policy; second, it is recognized to reflect an increase in inflationary expectations without any change in real rates; third, the higher interest rates reflect higher inflationary expectations but the exchange market responds to them as if they represented an increase in real rates.[6]

1. The nominal rate increase in the large country reflects an increase in real rates.

Suppose the SOE chooses to hold its interest rates unchanged in the face of the rise in nominal and real rates in the large country. There will be a decline in the value of the currency of the SOE. The size of the decline will depend on'market expectations as to the duration of the

---

4. The prices of Canadian exports are closely although not perfectly tied to world prices. It is also the case that Canadian exports can be significantly affected by changes in aggregate demand in other countries, especially the United States. See Freedman and Longworth (1980).

5. This is the technique used in the United States before October 1979 and still in use in Canada. The monetary aggregate used in targeting is assumed to have a reasonable degree of interest elasticity.

6. The analysis in this section draws heavily on earlier work done by my colleague Pierre Duguay.

period of high real interest rates and its implication for long-term monetary policy in the large country. The longer the period of high foreign real rates is expected to last, the sharper the decline in the value of the domestic currency. Furthermore, the greater the decline in longer-term monetary growth rates signaled by the intensified anti-inflationary policies in the large country the greater the effect on the exchange rate.

The depreciation of the domestic currency in the SOE results in a corresponding upward movement of the prices of traded goods and of those goods competing with traded goods. To the extent that wages are explicitly or implicitly indexed there will be a rise in wage inflation which will feed into the price of non-traded goods. Furthermore, for a transitional period, the real exchange rate of the SOE will have risen[7] and therefore, with lags, there will be an increse in the demand for its goods abroad and a decline in the demand for foreign goods at home.[8] In addition, to the extent that the increase in measured price inflation results in a rise in expected inflation, constant nominal interest rates will imply a fall in real interest rates that will result in an increase in domestic demand for goods. Both the price effects and any subsequent positive output effects will lead to an increase in the quantity of money demanded. If the target growth of the aggregates was initially being met, it will now be exceeded as a result of the price and output developments set off by the rise in foreign interest rates. This will entail a rise in domestic interest rates in order to bring money back to its target growth rate (or range). Thus, we conclude that leaving domestic interest rates unchanged when the foreign interest rate rises will lead to an upward movement in the monetary aggregate that will require an eventual rise in domestic interest rates.

The other polar policy option is to match precisely the rise in foreign rates. This will prevent downward pressure on the external value of the currency from developing.[9] Thus there will be no tendency for mea-

7. The exchange rate is defined as the number of units of domestic currency per unit of foreign currency. Hence a rise in the exchange rate corresponds to a depreciation of the currency.

8. Depending on the strength of the changes in relative prices it may or may not offset the reduction in exports from the SOE related to the decline in aggregate demand in the large country resulting from the higher real interest rates. The possibility that the SOE may suffer an output decline sufficiently large as to outweigh the expansionary effects on money demand of the rise in prices is ignored in the rest of the analysis.

9. This conclusion would have to be modified to the extent that the market believed that the foreign country's high real interest rates signaled a change in underlying monetary policy whereas the SOE's matching response was only temporary.

sured price or wage inflation to increase as a result of external factors. However, the rise in real interest rates will eventually slow down the growth of domestic aggregate demand and the corresponding slowdown abroad will reduce real export growth. The decline in output will lead to an eventual decline in the quantity of money demanded. In addition, the rise in nominal interest rates will have a direct effect on money demand because of the negative interest elasticity of the monetary aggregate used for targeting purposes. Thus, matching the increase in foreign rates will eventually lead to a decline in the monetary aggregate below its target growth path and hence will require the authorities eventually to lower domestic rates from their new higher level in order to achieve the target growth rate of the monetary aggregate. Furthermore, in the case of Canada, where the relevant interest rate elasticity of the demand for M1, the narrow aggregate used as a target, is substantially larger than the corresponding M1 elasticity in the United States,[10] moving interest rates up in step with U.S. rates would lead to a much larger downward movement of M1 than would be the case in the United States.

Since unchanged domestic interest rates in the SOE would lead to money rising above its target and an increase in the SOE rates equal to that in the large country would lead to money falling below its target, there must be an intermediate position in which interest rates rise, but by less than those in the foreign country such that the monetary aggregate achieves its target. In this intermediate case, interest rate differentials have moved in favor of the large country (although by less than in the case of no change in domestic rates) and hence there will be some depreciation of the domestic currency. The resulting price increase will put upward pressure on money demand as will any increase in output resulting from the depreciation of the currency. In the other direction, there will be downward pressure on money demand from the

10. The difference in the interest rate elasticity of demand for transactions balances in the two countries results principally from the fact that Regulation Q constrains some competing rates from adjusting when market rates change in the United States whereas no such restrictions exist in Canada. Hence, when market rates rise in Canada, all rates tend to rise whereas in the United States savings account rates and some time deposit rates are unchanged. There is thus no tendency to shift into these accounts from transactions balances. The elasticity in M1 equations with respect to the savings deposit rate is therefore irrelevant and only the elasticity with respect to market rates enters into the analysis. As more rates become decontrolled in the United States, the restrictions imposed by Regulation Q will be less binding and the relevant interest rate elasticity of transactions balances will rise (provided own rates on these balances remain fixed).

increase in domestic nominal rates and from the decline in output arising from the increase in domestic real rates. Thus, in the intermediate run, the monetary aggregate will be kept on target by this in-between policy of increasing domestic rates in response to a rise in foreign rates but by a smaller amount. In Canada this policy has been described as taking some of the pressure of foreign rates on domestic rates and some on the exchange rate." When large country rates increase, the amount by which domestic interest rates must rise to achieve the monetary aggregates target is greater, the larger the response of the exchange rate to a given increase in interest rate differential, the larger the effect of a given exchange rate change on prices and output, the smaller the interest rate elasticity of money demand, and the smaller the effect on output of a rise in real domestic interest rates.

Although this in-between policy does lead to money achieving its target in some intermediate run, the way it has been implemented in Canada does not ensure that the target will be achieved in the short run. Because of the various lags in the system the achievement of targets in the very short run would require more volatility of interest rates and possibly exchange rates than is considered desirable. Hence the focus of the policy has been the attainment of the monetary aggregate target in the intermediate run with less volatility in financial variables. Depending on the magnitudes of the various elasticities and the lengths of the different lags, the monetary aggregate may diverge from its target for some period of time. The in-between policy actually implemented in Canada thus "short-circuits" the normal process in which interest rates are adjusted in response to actual movements in money and instead adjusts them to offset movements in the monetary aggregate that appear likely to result in the intermediate run from the foreign interest rate increase.[12]

2. The nominal interest rate increase in the large country reflects an increase in inflationary expectations.

---

11. Of course at times over the last two and a half years, factors other than interest rate differentials have also influenced the value of the Canadian dollar and these must be introduced into any detailed analysis of Canadian policy over this period. For such an analysis see the annual reports of the Bank of Canada.

12. The reader may have been surprised at the omission throughout this section of any direct effects on money demand in the SOE of the rise in foreign nominal rates. However, Alexander (1981) has shown that the effect of external factors on the demand for M1 in Canada is very weak. The analysis would therefore be changed only marginally by the inclusion of this linkage.

Suppose the rise in nominal interest rates in the large country reflects an increase in inflationary expectations. If there are no changes in inflationary expectations in the SOE, initially there will be no downward pressure on its currency even if it leaves its interest rate unchanged.[13] Over time, if the rate of inflation does rise in the large country, the currency of the SOE will appreciate in response to the differential in the rates of inflation. The monetary aggregate will be unaffected by these developments since the currency appreciation will just offset the rise in world prices, leaving domestic prices in the SOE on their previous path.

However, if the SOE reacted to the interest rate increase in the large country by raising its nominal interest rate, it would bring about an appreciation of its currency and thereby put downward pressure on prices. The appreciation would eventually lead to a decline in output in the SOE as net exports responded to the increase in the real value of the currency. Furthermore, the rise in real rates would, in itself, tend to reduce output. The rise in the domestic interest rate along with the reductions in output and prices would all act in the direction of reducing the growth rate of money in the SOE and hence signal the inappropriateness of the initial increase in interest rates.

There is the possibility that the foreign exchange markets would attribute the same upsurge in inflationary expectations to the SOE as had occurred in the large country in spite of the fact that there was no objective basis for such a reassessment in the SOE. Until the markets came to realize their error, the SOE would be faced with the need to accept an (unwarranted) depreciation of its currency if its interest rate were held below that of the large country or an unnecessarily high real interest rate if it reacted by raising its interest rate to match that of the large country.[14] Presumably, as time passed and the expected higher inflation rate did not materialize, there would be a reversal in inflationary expectations and the SOE would be able to reduce its interest rate if it had raised it previously. To the extent that wages in the SOE

13. In fact, there is apt to be upward pressure on its currency if the rise in inflationary expectations in the large country derives from an unanticipated increase in the growth rate of money.

14. Achieving a monetary target in this case again requires an in-between policy in which domestic interest rates are adjusted by a fraction of the increase in foreign rates. The fraction is somewhat larger than in the earlier case (1) since the upward pressures on price and output are both greater as a result of the market's inability to perceive the divergence of relative inflation rates in the two countries.

responded rapidly to price changes, any initial depreciation could get embedded fairly rapidly in the price and wage structure and could go some way to setting off an inflationary burst even if there had been no such inflationary pressures building up in the domestic economy previously.[15]

3. *The rise in the nominal interest rate in the large country reflects a rise in inflationary expectations but the exchange market interprets it as a rise in the real rate.*

At .times foreign exchange markets appear to have responded to increases in nominal rates in the large country that have reflected rises in inflationary expectations as if they were increases in real rates. Or, to put the same point another way, it sometimes seems as if there are inconsistencies between expectations in domestic securities markets and those in foreign exchange markets.[16] In such a case, the SOE is again faced with a dilemma. If it holds its interest rate unchanged, the result will be a depreciation of its currency with the ensuing effects on prices, wages and output and the monetary aggregate. Furthermore, if the inflation rate in the large country has in fact risen consistent with the interpretation of its own money markets, the prices of traded goods in the SOE will increase both because of the increase in world prices and because of the depreciation of the currency. If the SOE responds by allowing its interest rates to rise along with those of the large country, its currency will remain unchanged in the short run but the domestic price of tradeable goods will rise because of the rise in their world prices. However, the higher domestic real interest rates will slow output growth, offsetting the expansionary effects of the fall in the real value of the domestic currency and offsetting the tendency of the higher prices to push up money growth rates. In addition the higher nominal interest rates in the SOE will tend to slow the growth of the monetary aggregate. It is likely, once again, that the in-between policy will lead to the achievement of the monetary aggregate target for the period in which the markets have inconsistent interpretations of developments in the large economy.

---

15. This is not to argue that there would be an indefinitely long-lasting vicious circle beginning with the depreciation. Provided that the SOE held to its monetary targets in the long run, such a spiral could simply not continue. Nevertheless, there might well be a period of time in which measured rates of inflation were pushed up by the depreciation and resulting price and wage responses.

16. For an analysis of the effects of a similar possible inconsistency on international capital flows, see Freedman and Longworth (1980).

4. Summary

If the SOE wishes to keep its monetary aggregate on target in the intermediate run it will have to respond to the rise in foreign interest rates by a rise in domestic rates that is some fraction of that in foreign rates except in the case where the foreign interest rate increase reflects higher inflationary expectations and is so interpreted in the foreign exchange markets.

IV. The role of the exchange rate in the setting of policy

In the previous section, I analyzed the effect of a change in foreign interest rates on the monetary aggregate in the context of an economy in which the authorities have set a target for that aggregate and seek to achieve it over some intermediate run. In this section, I examine the more basic question of the role of the monetary aggregate and of the exchange rate as possible intermediate targets in a world of volatile foreign interest rates. In particular, the question is raised as to whether it is appropriate to maintain unchanged the policy of trying to achieve a given target growth rate of a monetary aggregate in the face of changes in foreign interest rates. Although there has been some research done on this topic[17] we have not yet reached the stage of being able to make definitive statements on this question. Indeed, it seems to me that the theoretical literature has not dealt with the question in a way that is pertinent to the policymaker's concerns. I focus therefore on the kinds of considerations that should enter into an assessment of the potential role of exchange rates in the policy process.

Since much of the literature in this area derives from the original pathbreaking Poole (1970, 1971) analysis; let us first consider briefly the logic of the Poole approach. The illustrative model used by Poole comprises an equation representing the IS curve and an equation representing the LM curve, each with an additive error. Poole then shows that if there are shifts on the expenditure side of the economy (the IS curve is volatile), use of money as an instrument yields a smaller variance for income than use of the interest rate instrument. Conversely, if there are shifts in the demand for money (the LM curve is volatile), the use of an interest rate instrument results in a smaller

17. See, for example, Boyer (1978), Sparks (1979, 1982), Henderson (1979, 1983), Bryant (1980), Roper and Tumovsky (1980), Artis and Currie (1981) and Weber (1981).

income variance than if money is chosen as an instrument. If both IS and LM curves are volatile, the choice between money and interest rate will depend on the relative size of the shocks to the IS curve and LM curve (both variance and covariance of stochastic disturbances) as well as the parameters of both equations as all these elements are needed to calculate the variance of income.

There are a number of important points that need to be emphasized about the Poole approach. First, it assumes that the policymaker sees only the results of stochastic shocks in the form of movements of interest rates or money but has no specific information regarding the source of shocks to the system. To the extent that such information becomes available, the formal Poole analysis indicates that the authorities should try to offset the shock by manipulating their instrument, i.e., fine tuning is possible to the extent information regarding the shocks is or becomes available.[18] Second, if the authorities can determine from historical evidence the relative probabilities to be assigned to the source of shocks, they can choose a policy (which Poole calls a cdmbination policy) that dominates the simple policy of setting money or interest rate alone. For example, in an economy in which IS shocks are much more common than LM shocks, a tendency for interest rates to rise can be taken as a signal that the IS curve has shifted to the right and hence the money stock should be reduced, raising interest rates even further.[19] Third, the argument for the use of the money stock as an intermediate target that does not change in response to each new piece of information requires the additional assumption of what Brunner (1980) has called "diffuse uncertainty" regarding the structure of the economic system. As I have argued at length elsewhere,[20] if the authorities have, or believe they have, reasonably good estimates of the demand for money equation but have much less confidence in their estimates of the coefficients of the IS curve (or price equation, etc.) including those of the lag structures, then a case can be made for simply setting the money stock or the growth rate of the money stock at a given magnitude. This type of policy will ensure reasonable long-run outcomes although the short-run results may be

18. This is one of the messages contained in Kareken, Muench, and Wallace (1973), in which instruments are adjusted in response to each piece of information that becomes available. As Friedman (1975) has pointed out, in such a model there is no need for an intermediate target and instruments should be linked to ultimate goal targets.

19. See Mitchell (1980) for a diagrammatic treatment of this type of analysis.

20. Freedman (1981).

substantially inferior to those that could be achieved in a hypothetical world with full information. The policymaker thus opts for a policy that is "second-best", but which will strongly guard against disastrous long-run outcomes. Thus, for example, a money supply target prevents the sort of cumultive one-way errors that lead to accelerating inflation although it can do little to offset short-run cycles in the economy.

As an example of how some of these elements (specific knowledge of source of shocks, historical evidence on source of shocks, knowledge of economic structure) enter into policymaking, consider the response of the authorities to a decrease in the monetary aggregate. Initially it is assumed that the decrease in money represents a disturbance to the demand for money equation rather than a shift in the IS curve. The reason for this judgement is that historically money has been a very "noisy" series and tells us very little in the short run about income movements (i.e., the signal to noise ratio is very low for weekly or even monthly movements in money). If the low money stock numbers persist one searches for innovations in financial markets as a possible source of the movement. However, if no such structural shift is discovered to have occurred, and if the low money numbers continue one interprets the decrease in money stock as a signal that income has been declining (i.e., the signal to noise ratio in the money stock is considerably higher in the intermediate run than in the very short run). Of course, all other data are also being analyzed for confirmation or rejection of the interpretation regarding the decline in income. In short, the authorities respond to the underlying thrust of money movements rather than short-run "wiggles" in the series because of historical evidence regarding the relative volatility of IS and LM curves over different time periods. Specific knowledge of sources of shocks, where available, is also used as an input to decision making.[21]

The extensions of the Poole analysis to an open economy can be examined in the light of the above discussion. Unlike the closed economy literature which has used the simple IS-LM model as a common basis, the open economy literature has diverged in a number of directions as a result of different specifications of the exchange rate equation and other related equations. In adding an external sector to the model, the investigator has to make a number of choices: (1) perfect versus imperfect substitutability between domestic and foreign assets;

21. See Thiessen (1982) for further discussion of some of these issues.

(2) completely flexible domestic prices versus sticky prices à la Dornbusch; (3) if sticky prices, ad hoc stickiness versus the overlapping or staggered wage contract structure; (4) rational expectations in the exchange market versus some form of adaptive expectations; (5) rational expectations in the long run only versus rational expectations at all points of time; (6) minimization of output variance versus minimization of price variance; (7) perfect versus imperfect substitutability of domestic and foreign traded goods; (8) existence of non-traded goods sector."

Some of these choices can have very significant implications for the modeling strategies that can be followed and the kinds of questions that can be asked. Thus, for example, the assumption of perfect substitutability between domestic and foreign assets immediately rules out the possibility of effective governmental intervention in the foreign exchange market. And the assumptions of perfectly flexible domestic prices and perfect substitutability of assets and goods are sufficient to entail the strongly monetarist approach to exchange rate determination. Moreover, by restricting the loss function to the variance of output or prices, the literature rules out the possibility that there are costs to interest rate or exchange rate volatility. Given the array of choices listed above it is not surprising that the various articles dealing with the topic of the exchange rate as instrument or target have not arrived at a consensus position. Furthermore, as will be argued below, some of the very important aspects of the problem have thus far been neglected in the theoretical literature.

A number of the articles basically follow the original Poole approach by asking whether a money rule or an exchange rate rule minimizes the variance of income. Not surprisingly, the general result is that for certain shocks a money rule dominates and for certain shocks an exchange rate rule dominates. In the case of a more complex model in which there is imperfect substitutability between domestic and foreign securities, Henderson (1979) compares a "rates constant" policy in which both interest rates and exchange rates are held at target values in the face of shocks with a "aggregates constant" policy in which both money supply and foreign exchange reserves are held at target values. He too finds that different policies dominate for different shocks. Henderson also shows that a combination policy in which both rates

22. Many of these considerations are relevant for closed economy models as well but have been ignored in that literature.

and stocks changed would be better than either of the polar cases of constant rates or constant aggregates. Thus the case is made that a controlled float may be better than either a pure float or a fixed exchange rate.[23]

Some papers focus explicitly on the response of domestic policy to foreign interest rate increases and other foreign shocks. Sparks (1982) traces out the implication for the SOE of the various interest rate responses discussed in Section 3 and comes to the conclusion that the SOE ought to respond to a temporary foreign interest rate increase by raising domestic rates by a fraction of the foreign rate increase. Artis and Currie (1981), after examining the implications of a variety of external and domestic shocks, raise the possibility of making money targets conditional on exchange rate movements in a world in which price stabilization is a primary concern of policy. This suggestion appears to be a version of the optimal combination policy discussed by Poole and others.

From the point of view of a SOE such as Canada, the policy literature developed thus far has not been overly helpful. In practice, Canada has had only one policy instrument, namely the interest rate, since the amount of international reserves at the disposal of the authorities was never sufficient to have a long-lasting effect on the exchange rate in a world in which foreign and domestic assets were very close substitute.[24] From this perspective those articles, such as Artis and Currie, in which international reserves are not treated as an instrument are more useful than those, such as Henderson, in which they are treated as a potential instrument. A second aspect of much of the literature that lessens its usefulness is the focus on minimization of the variance of output. In practice the concern about foreign interest rate movements has derived principally from the effect that the resulting exchange rate movements would have on inflation at a time when policy was directed to slowing the rate of inflation. The type of model required to deal with this type of question is one in which shocks are superimposed on a disinflationary path and the analysis focuses on the effect of the shocks on the rate of inflation.

---

23. Roper and Tumovsky (1980) reach this conclusion as well but in their model intervention is the way of changing the level of the money supply and therefore the optimality of the "dirty float" is equivalent to the conclusion that a fixed money rule is not optimal.

24. The role of intervention in Canada is simply to smooth out short-run fluctuations and, on occasion, to prevent a completely one-way market from developing.

More important, the Poole-type assumption made throughout this literature that the authorities have equally good knowledge of all sectors of the economy is precisely what is at issue. If one assumes that there is "diffuse uncertainty" about most of the economy but that the demand for money equation is believed to be stable, it is most unlikely that any policy will dominate the fixed money rule policy. However, it can be argued that there are certain types of shocks for which the authorities have a reasonably good ability to trace out the economic results and hence that these shocks can be partially offset whereas the same assertion cannot be made for other types of shocks. In the case of the latter, a simple unchanged target for the monetary aggregate is probably the preferred policy. However, in the case of the former one might be able to improve on the simple money rule by integrating the exchange rate into the policy process as part of a Poole-type combination policy. The challenge is to distinguish between the two types of shocks and to specify precisely how exchange rates can be used in the latter case.

Putting these elements together, one has the following rationale for focusing on the exchange rate, at least in short-run policy analysis.[25] First, at a time in which the anti-inflationary strategy is the primary goal of policy, one wishes to avoid or at least partly offset shocks that could be detrimental to this strategy.[26] Second, U.S. interest rate increases have, via their effect on the exchange rate, fairly direct and fairly rapid effects on SOE prices.[27] In economies in which wages are implicitly or explicitly indexed, these prices will feed fairly quickly into wages. Third, the links are sufficiently straightforward that the authorities feel that they can track the effects through the system and, by adjusting interest rates, offset them at least in part. That is, the shock itself is identifiable and the effects of the shock can be traced with a degree of accuracy. The assumption of diffuse uncertainty does not hold in the case of this shock although it does hold for others, particularly those where the shock can only be identified from the conse-

25. In the long run, the monetary targets remain the principal focus of policy since the main long-run concern is to avoid cumulative policy errors in one direction which might lead to accelerating inflation. It is a challenge to the theoretical literature to try to integrate both the short-run and long-run policy concerns of policymakers.

26. There remains the difficulty of distinguishing between shocks that are transitory and need little or no offset and those that are longer lasting and may require a policy response.

27. Indeed the effect of the exchange rate on prices is more direct and more rapid than that of money.

quences. Fourth, to the extent that there is upward ratcheting of expectations when prices rise there may be some asymmetrical behavior by economic participants that makes it harder to reverse upward shocks to prices. Whether such ratcheting exists is of course an empirical question. Fifth, at times exchange markets have behaved in a way that can be interpreted as overshooting. To the extent that such behavior exists, a policy response that avoids the kind of sharp movements in exchange rates that may lead to the build-up of extrapolative expectations is much more defensible.

The literature in this area, although interesting, does not yet come to grip with many of these issues. The research agenda for the future should include both empirical work to determine the quantitative significance of some of the conditions on which the argument for focusing on exchange rates has been based as well as theoretical models that reflect and analyze the perceptions of the policymakers regarding different levels of confidence in their knowledge of the behavior of different sectors of the economy.

References

Alexander, W.E. (1980), "Foreign Influences on the Demand for Money in an Open Economy: The Canadian Case," paper prepared for the 17th Meeting of Technicians of Central Banks of the American Continent, Bogota, Columbia (November), pp. 24-29.

Artis, M.J. and D.A. Currie (1981), "Monetary Targets and the Exchange Rate: A Case for Conditional Targets," ***Oxford Economic Papers*** 33, pp. 176-200.

Boyer, R.S. (1978), "Optimal Foreign Exchange Market Intervention," ***Journal of Political Economy*** 86, pp. 1045-1055.

Brunner, K. (1980), "The Control of Monetary Aggregates," in Federal Reserve of Boston, ***Controlling Monetary Aggregates III***, Conference Proceedings No. 23, pp. 1-65.

Bryant, R.C. (1980), ***Money and Monetary Policy in Interdependent Nations,*** The Brookings Institution.

Freedman, C. (1981), "Monetary Aggregates as Targets: Some Theoretical Aspects," Bank of Canada Technical Report 27 and NBER Working Paper 775.

Freedman, C. and D. Longworth (1980), "Some Aspects of the Canadian Experience with Flexible Exchange Rates in the 1970s," Bank of Canada Technical Report 20 and NBER Working Paper 535.

Friedman, B.M. (1975), "Targets, Instruments, and Indicators of Monetary Policy," ***Journal of Monetary Economics*** 1, pp. 443-473.

Henderson, D.W. (1979), "Financial Policies in Open Economies," ***American Economic Review*** 69, pp. 232-239.

——— (1983), "Exchange Market Intervention Operations: Their Effects and their Role in Financial Policy," in J.F.O. Bilson and R.C. Marston, ***Exchange Rates: Theory and Practice,*** University of Chicago Press (forthcoming).

Kareken, J.H., T. Muench, and N. Wallace (1973), "Optimal Open Market Strategy: The Use of Information Variables," ***American Economic Review*** 63, pp. 156-172.

Mitchell, D.W. (1980), "The Relation Between Alternative Choices of Monetary Policy Tool and Information Variable," ***Journal of Macroeconomics 2,*** pp. 247-256.

Poole, W. (1970), "Optimal Choice of Monetary Policy Instrument in a Simple Stochastic Macro Model," ***Quarterly Journal of Economics*** 84, pp. 197-216.

——— (1971), "Rules-of-Thumb for Guiding Monetary Policy," Open Market Policies and Operating Procedures, 135-189, Board of Governors of the Federal Reserve System.

Roper, D.W., and S.J. Turnovsky (1980), "Optimal Exchange Market Intervention in a Simple Stochastic Macro Model," ***Canadian Journal of Economics*** 13, pp. 296-309.

Sparks, G.R. (1979), "The Choice of Monetary Policy Instrument in Canada," ***Canadian Journal of Economics*** 12, pp. 616-624.

——— (1982), "Expectations and Monetary Policy in an Open Economy: Should Canada Follow U.S. Interest Rates?" M.I.T. Working Paper No. 293.

Thiessen, G.G. (1982), "The Canadian Experience With Monetary Targeting," paper delivered at International Conference on Monetary Targeting at the Federal Reserve Bank of New York (forthcoming).

Wallich, H.C. and R.D. Haas (1982), "International Transmission of Interest Rate Movements," Aussenwirtschaft (forthcoming).

Weber, W.E. (1981), "Output Variability Under Monetary Policy and Exchange Rate Rules," ***Journal of Political Economy*** 89, pp. 733-51.

10
Discussion

Hermann-Josef Dudler

The paper prepared by Charles Freedman addresses important policy issues that are likely to challenge central bankers as well as academic analysts throughout the 1980s. He approaches the relevant problem area, coordination of domestic monetary management with monetary policies abroad, through a needle's eye — or to use less biblical language in the conference environment: a narrow canyon, namely U.S.-Canadian monetary relationships in recent years. Given its strong trade and financial links with the United States, *Canada* in some respects clearly represents a *special case*. Nevertheless, the careful empirical and theoretical analysis offered by Charles Freedman is clearly pertinent also to other industrial countries outside the United States.

I can only offer a personal German, or at best, central European, view in this respect. However, taking economic conditions in this restricted geographical area as a point of reference, it seems the paper succeeds in bringing out the following *general issues* bearing on monetary policy coordination:

- Recent experience with U.S. interest rates and dollar exchange rate movements is correctly classified as a major external shock event: In relation to the dominant U.S. economy even larger countries like Germany or the United Kingdom at times feel to be in the "small-open-economy" position characterized in the paper.
- The paper underlines the need for a considerate policy response to exchange rate shocks. In this respect, it undoubtedly reflects a concern shared by all European central banks which pursue pre-announced monetary targets.

- Finally, it is realistically admitted that neither academic analysts nor central bankers are at present well prepared to propose generally acceptable policy solutions to the resulting short-run operational problems.

Let me now make some more detailed comments on the main sections of the paper where I feel a modicum of German or Central European flavor could enrich the U.S.-Canadian menu of issues.

I cannot really quarrel with Charles Freedman's presentation of ***stylized facts.*** His dating of oscillations in short-term U.S. interest rates, the evidence presented on marked swings in uncovered interest rate differentials, and the graphical demonstration of gyrations in dollar exchange rates illustrates the challenges to short-run monetary management emanating from the unusual volatility of U.S. money market rates. To complete the factual picture, European central banks would, perhaps, tend to add two sets of information:

- First, on the effects of U.S. interest rate ***volatility:*** It is apparent from the data that central banks outside the U.S. temporarily "uncoupled" domestic from U.S. money market rates, allowing dollar exchange rates to absorb part of the interest rate pressure. They were less successful, however, in insulating their domestic long-term rates from the unusual variations in U.S. bond rates. In the German case this implied higher volatility in the growth of monetary aggregates; and it may generally have raised uncertainties pertaining to the future development of bond prices and long-term interest rates as anticipated by holders of financial and real assets in Europe.
- Second, on the ***level*** of U.S. interest rates: European observers would tend to translate the decline of their currencies against the U.S. dollar between end-1979 and end-1981 into a combined inflationary/deflationary disturbance impact equivalent to 2 percent of GNP and assume that this partly reflects the perceived high level of U.S. real interest rates. The implied worsening of the inflation/unemployment "discomfort index" is widely seen as a more serious problem than short-run exchange-rate related operational difficulties in achieving announced monetary objectives.

I found Charles Freedman's paper intellectually particularly attractive in the middle section where it develops an operational policy rule for small open economies attempting to maintain control over the money supply in the face of actual or perceived increases in real interest

rates abroad. After discussing two polar cases — involving full or no adjustment to the rise in foreign interest rates — he concludes that an *"intermediate" or "in-between" policy* of partial domestic interest rate adjustment is a superior way of ensuring the achievement of domestic monetary targets in the somewhat longer run. The route to be followed in determining the correct interest rate adjustment, however, would seem to be paved with great uncertainties for most European central banks. The relevant empirical judgements to be made include assumptions on the transitory or more permanent nature of a rise in foreign interest rates, the likely reaction of the exchange rate and the dynamic response pattern of domestic cost, price and output variables to external disturbances. The Bundesbank and smaller European economies following Germany's dollar policy have therefore hesitated to change their domestic money market rates as long as there seemed to be a chance that erratic movements in foreign interest rates and the corresponding changes in dollar exchange rates and foreign trade prices could reverse themselves within the intermediate period. Countries like France, where monetary implementation procedures heavily rest on administrative credit, interest rate and exchange controls, have tended to delay domestic policy adjustments even further. In short, the perception of external shocks emanating from **U.S.** monetary policies seems to differ somewhat among dependent economies on both sides of the Atlantic:

> In Canada, movements in **U.S.** interest rates as such seem to be regarded as a potential source of disturbance eliciting an early considerate adjustment of policy-controlled short-term Canadian interest rates.
>
> In Europe, confirmation of a more lasting **U.S.** interest rate movement and its actual spill-over into foreign trade prices may provoke a counter-balancing mid-course correction in the thrust of domestic monetary management. (In fact we may iterate *in practice,* where Canadians only iterate *intellectually* to set the correct path for short-term interest rates.)

This distinction in the perception of phenomena which constitute "external shocks" relevant to monetary management seems to be even more important in the context of the final section of Charles Freedman's paper. His discussion of a *modified monetary aggregates strat-*

egy, which combines the achievement of medium-term monetary objectives with a short-run policy of offsetting identified external shocks, adequately describes the broad policy framework on which countries like Germany, the United Kingdom and Switzerland have relied in recent years. On an experimental basis, these countries have allowed domestic monetary objectives to deviate from their intermediate midpoint target paths to mitigate the destabilizing impact from large and sustained exchange rate movements. However, these approaches rarely involved offically announced exchange rate objectives and, as a rule, implied a departure from announced monetary growth targets only when deflationary or inflationary repercussions from movements in foreign trade prices had already begun to erode the credibility of monetary aggregates policies. The resulting policy framework, which the Bundesbank has to some extent formalized in recent years, may be said to represent a monetary targeting approach constrained by the perceived need for offsetting recognized external disturbances.

Such compromise policies are certainly far from constituting a perfect solution to exchange rate and monetary management problems resulting from marked differences in policy goals, operating procedures and economic performance among major countries. They ultimately reflect the recognition that a floating exchange rate regime provides less scope for an independent pursuit of national monetary and ultimate economic objectives than early academic advocates of flexible exchange rates (like M. Friedman or E. Sohmen) and many "progressive" central bankers had been ready to expect. The paper prepared by Charles Freedman therefore seems to rise one ultimate question: Is there really much scope for *individual* countries to improve their monetary and economic performance unilaterally by responding in a more sophisticated manner to policy-induced external shocks?

If I am not entirely mistaken, future research efforts may at least partly have to go in the direction of a *global systems analysis* to enable central banks to deal collectively with monetary coordination problems in the 1980s. First steps along this route can already be discerned. Reflecting the growing disenchantment with the floating rate regime's ability to smoothly absorb pronounced policy differences among major countries, contributors to this newly developing systems-related debate tend to propose more or less radical reforms on existing policy procedures and the basic characteristics of the present exchange rate regime.

At the risk of oversimplification, the following classes of proposals may tentatively be distinguished:

- *The conservative option:* This would involve an explicit return to an *adjustable peg system,* possibly modified to allow exchange rate flexibility within a wider parity band. (A number of smaller European countries, which peg their exchange rate to the D-mark, have always regarded this as a better solution than running an independent monetary policy, and present proposals to extend the European Monetary System geographically or strengthen its internal coherence go in the same direction.)
- *Global policy rules:* Those who believe that simple rules are superior to discretion under any circumstances and could positively impress the exchange markets if such commitments are collectively undertaken, advance such ideas as: The return to a *gold standard* (U.S. gold commission); The joint control of the *world money supply* by major central banks (McKinnon), or The imposition of a *"Real Interest Rate Equalization Tax"* (Dornbusch). (In one way or another these proposals seem to rest on a fairly reduced model of exchange rate determination which is hardly universally acceptable.)
- *The "defeatist" option:* Under this heading I would categorize proposals amounting to a return to early postwar *capital and exchange controls* or similar devices (such as Tobin's external transactions tax).
- *"Front-door" collective policy coordination:* This would require a bold attempt to *avoid major rifts* in policy performance among the larger economies and require a cumbersome international consultation process. (A step in this direction seems to have been taken during the last economic summit meeting which has asked the IMF to monitor reinforced policy coordination efforts.) Whether this is a realistic idea could largely depend on the willingness of dominant economies such as the United States and Germany to define their national interests in a wider geographical and political sense. But "thinking the unthinkable" may be more attractive than another go at intervention or simple-rules-policies on a global scale.

These comments reflect the opinion of the author only.

Discussion

Richard N. Cooper

I agree so extensively with Freedman's sensible, middle-of-the-road conclusions — including his call for some well focused empirical research — that I find it difficult to comment directly on the paper. One of its appealing features is its emphasis on the continuing search for information in the emerging data and the suggestion that all of the information at hand should be used to ascertain the possible source of economic disturbances; it has the perspective of a policymaker in this regard. He also reaches the eminently reasonable, but puzzlingly controversial, conclusion that the monetary authorities should pay attention both to prices and to quantities and, at least in the short-run, should even target both entities.

Rather than comment on Freedman's paper in detail, I will offer several reflections induced by reading it. First, the conveners of the conference are to be congratulated for inviting a paper on Canada, or some foreign country, to a conference devoted predominately to the United States, with its closed economy orientation. Freedman's paper reminds us that doctrine that may or may not be suitable to the United States certainly is not suitable to other countries, which are more open and more dependent on the world economy. In particular, foreign shocks can have an impact through the exchange rate, and for this reason the authorities of other countries may want to dampen movements in exchange rates.

As a footnote on the history of thought, I note that the current emphasis on expectations is not entirely new and can be found at least 20 years ago in the literature on foreign exchange rates. The Canadian dollar floated freely against the U.S. dollar during the 1950s, but it never deviated far from a ratio of one to one. The most commonly accepted — although not necessarily correct — explanation for this

phenomenon was that expectations induced private speculation which kept the rate near to parity. Moreover, in a dissertation at Yale in the early 1960s, Robert Aliber studied floating exchange rates during the 1920s and found that a sudden switch in expectations regarding the future value of the French franc during 1923 — a switch that was induced by realization that Germany would not make the large reparations payments which the French had expected, a real phenomenon — had a profound influence on subsequent movements in the exchange rate of the French franc and, via those movements, on the French economy. Furthermore, although Belgium pursued a very different and less expansionist monetary policy than did France during the early 1920s, expectations based on prewar parity between the Belgian and French francs induced a steady decline in the Belgian franc in parallel with that of the French franc. The sharp decline in the Belgian franc represented a major external disturbance to the Belgian economy, and the decline in the franc became largely self-fulfilling. It would be useful to reexamine these episodes with modem tools and concepts.

A second reflection: if a small open economy should intervene in the exchange market to inhibit movement in its exchange rate in order to reduce the transmission of outside disturbances, why should it not go the whole way and simply fix the exchange rate, as Ireland did with respect to the British pound for many years? Freedman's answer would be that in that event it would import purely monetary disturbances eminating from abroad. And even when the disturbances abroad were real in nature, pegging the exchange rate would deflect money growth from its long-run steady growth path and would require subsequent correction. I do not find the second objection very compelling, especially the meaning of domestic monetary targets in a truly small open economy is entirely unclear. If international trade and financial transactions are high proportions of GNP and are heavily invoiced in foreign currency (the U.S. dollar), is it meaningful to focus on a conventional national demand for money function? This is ultimately an empirical question. But if it is appropriate, would it then be advisable to separate the Boston dollar from the New York dollar, and both from the Kansas City dollar, with a view to achieving superior stabilization of income, prices, and monetary growth within each Federal Reserve district? We shrink from addressing such wholly hypothetical questions. But if the argument applies to Canada, why does it not also apply to regions within the United States? I am convinced that we will not understand

fully monetary policy in open economies, where one money exchanges for another until we can give more satisfactory answers to such questions than we can at present.

My third reflection involves a question: can any change in foreign interest rates be regarded as exogenous by a small open economy, as Freedman implicitly suggests? If so, this represents a great simplification in the analysis of policies for such economies. Unfortunately, we cannot be confident that any change in interest rates is purely exogenous. The same factors that make an economy open in terms of goods and services and finance also open it in terms of technology and expectations and "animal spirits" of businessmen. If interest rates rise abroad, very likely the same factors will tend to raise interest rates in the small open economy, except in the singular case where the rise in interest rates was brought about solely by a change in policy abroad.

My fourth reflection concerns the applicability of Freedman's reasoning to the United States. Canada, after all, is not really a small economy on the world scale. It ranks seventh or eighth among countries. It is small only relative to its most important trading partner, the United States. The United States in turn is smaller than the rest of the world taken together. If it makes sense for a small open economy to respond partially to disturbances from abroad by acting directly on some price, the interest rate or the exchange rate, does not the same logic apply qualitatively to the United States? It too can import inflationary pressures via the exchange rate. The magnitudes may differ, but the underlying logic applies: the domestic effects of direct impulses from abroad can be dampened by directly offsetting actions. Of course, an economy as large as the United States must take into account the repercussions of its own actions on the rest of the world, and back again on itself — something that perhaps Canada can safely neglect. Thus, when the United States acts in response to developments abroad, it involves at least an implicit choice about the appropriate *world* economic policy, and this in turn raises the question of coordination of policies across national boundaries. But it seems to me that the underlying point remains. If Freedman's arguments apply correctly to Canada, as I believe they do, they also apply, appropriate changes being made, to the United States.

My fifth and final reflection is this: if U.S. actions are a source of disturbance to Canada and other countries, and disturbances — whether inflationary or contractionary in impulse — are undesirable,

should the United States modify its behavior in the interests of Canada and of other countries? Charles Kindleberger suggested many years ago that on the basis of economic structure Canada should become the 13th Federal Reserve district, with a seat on the Federal Open Market Committee, since the FOMC's actions have such a strong influence on Canada. The European Community these days perhaps should be added with the 14th seat. Short of that improbable development, should the United States itself try to take foreign considerations into account in framing its own policy?

Many people have an instinctive negative reaction to this kind of question. United States political instrumentalities exist to serve U.S. objectives, not those of the world as a whole. But it is not mere altruism that would guide U.S. policymakers to take into account developments abroad and our impact on them. When we engage in changes of policy; monetary or otherwise, we assume that the change takes place within a given economic and political structure. We have a sense about how far we can go without altering the structure fundamentally. Yet action within the limits of U.S. tolerance may be outside the limits of tolerance in other countries. Actions by the United States may alter their structure, even their political system. Three recent events come to mind as possible examples of this phenomenon. The latest fall of the Italian government, which came about over the economic austerity program forced in part by world economic conditions, may be just the nth in a long line of falls of Italian governments. But it may also be the one that brings the Communists into the government for the first time, which will mark a watershed both in economic policy and in military policy for the Italian government. Second, the attempted coup in Kenya failed; but if it had been successful that could have well altered greatly the strategic situation in Each Africa. That too was produced in part by economic adversity. Finally, the Argentine invasion of the Falkland Islands was a desperate move to divert public attention from economic adversity at home. Admittedly much of that adversity was self-generated; but economic circumstances would have been much easier — and the invasion possibly avoided — if world economic conditions had been more bouyant.

Already in this conference we have seen economists move extensively into psychology, recognizing the importance of "credibility" and "expectations" for the effectiveness of economic policy. By the same token, economists also must move into political science and take

into account the influence of policy actions on future and foreign economic and political structures. Suppose as social scientists operating within a full general equilibrium system — including economic and political responses abroad, not just responses of economic agents within the United States — we could forecast that one more year of the current U.S.-induced world recession would spell the demise of the liberal trading system for at least a decade. This is not an improbable event, since monetary policy now acts heavily by the exchange rate. Tight money appreciates the dollar as well as raising real interest rates. But domestic producers in export and import-competing industries do not perceive this as a new channel of monetary policy and hold the Federal Reserve responsible. Rather, they blame "unfair foreign competition" for their current difficulties and call, via the political process, for protection against such competition. Foreigners are more than ready to respond in kind. The liberal trading system may be the major casualty of the fight against inflation.

Or suppose that we could forecast that two more years of the current U.S.-induced world recession would so disturb our allies and friendly countries that our defense expenditures would rise by 1990 to 10 percent of GNP, well above the recent 5 percent or even President Reagan's preferred 7 percent, with corresponding supply-side effects on the U.S. economy. I would think that such external considerations as these should influence U.S. economic policy. Of course, we are in no position today to make such forecasts with any confidence. But that does not mean that such external considerations should be left wholly out of account. A well-integrated and well-coordinated economic policy must also take account of its impact on the rest of the world.

12

Implementing Monetary Policy in the 1980s

Introductory Remarks
Donald D. Hester

This morning we are very fortunate to have three interesting and distinctive papers that treat different aspects of the problem of implementing monetary policy. The first is by Carl Walsh, who has been a visitor at the Kansas City Federal Reserve Bank. His paper is one of two recent highly innovative studies that he has prepared. They use the rational expectations apparatus to suggest why model structure should not be viewed as being invariant to the Federal Reserve's operating procedures.

The second paper is by Ed Kane. Professor Kane's paper contains original artwork and indeed is a very imaginative contribution that considers how monetary policy will be implemented in a changing financial environment.

The third paper is by Ben Friedman, who argues that net debt may be a better target for monetary authorities than a monetary aggregate. In this audience he can surely expect some dissent.

Before turning the meeting over to these gentlemen, I would like briefly to mention two topics that I feel are important for implementing monetary policy in the coming years. They are not considered in this morning's papers. First, with growing automation in funds management by banks and other traders, it has become increasingly possible to exploit rigidities in the intraday schedules according to which money market transactions and reserve positions are settled. Through repurchase agreements, Eurodollar transactions, and "daylight overdrafts" banks and their customers have been able to increase the transactions settling capacity of a given volume of bank reserves. This slippage could and should be arrested by moving to real-time reserve accounting wherein a bank would be expected to have an adequate volume of

reserves relative to deposits continuously or at least at several different randomly chosen points of time within a day. This reform would considerably weaken the appeal of repurchase agreements and Eurodollar accounts.

Second, financial instrument futures markets have probably had an important effect on the transmission of monetary policy. However, there is an important omission in the set of contracts that is offered; there is no consumer price index contract. If there were such a contract, the public and monetary authorities could measure the expected rate of inflation over time intervals of different length and could determine real interest rates accurately. With long-term contracts pension funds and long-duration investment projects could be hedged. Real interest rates are appealing intermediate monetary policy indicators, as Wicksell long ago suggested. I hope that these topics can be addressed in the following discussion or on a future occasion.

The Effects of Alternative Operating Procedures on Economic and Financial Relationships

Carl E. Walsh

I. Introduction

On October 6, 1979, the Federal Reserve announced a significant change in the way it would henceforth conduct monetary policy. Although there was no change in the basic objectives toward which monetary policy was to be directed, the actual operating procedures used to implement policy were to be formulated in terms of reserve aggregates, rather than interest rates, as the means of controlling the supply of money. The period since the shift in operating procedures has experienced extreme increases in the volatility of interest rates and most measures of the money supply.[1] The occurrence of this historically unusual behavior subsequent to the change in the Federal Reserve's operating procedures suggests that the policy shift may have induced changes in basic economic and financial relationships so that empirical relations which held prior to October 1979 may no longer accurately describe the way the economy behaves. The extent to which the structure of financial relationships between interest rates, reserve aggregates, and the money supply depend upon the Federal Reserve's method of implementing monetary policy will be examined in this paper. Relationships which under the current operating procedures are important for the conduct of monetary policy will be studied in an attempt to determine how they might depend upon the behavior of the Federal Reserve.

The views expressed herein are solely those of the author and do not necessarily represent the views of the Federal Reserve Bank of Kansas City or of the Federal Reserve System. The author would like to thank Bryon Higgins, Douglas K. Pearce, V. Vance Roley, and Gordon Sellon for helpful discussions.

1. The apparent increase in reserve volatility may, however, be an artifact of the seasonal adjustment factors (see Lindsey and other, 1981). Unexpected changes in the money supply have also become more variable (see Roley, 1982).

Monetary policy operating procedures are usually analyzed by looking at the implications for income, interest rates, or monetary aggregates of alternative choices of an instrument variable, given a model structure. This model structure might be either a theoretical specification of behavioral relationships or an empirical model estimated over a historical time period. The perspective adopted here will be quite different; the focus will be on the ways in which the model structure may vary' in response to a change in the Federal Reserve's operating procedures. Such an analysis is necessary if, for example, the relative merits of using an interest rate or a reserve aggregate instrument are to be fully evaluated. There are two objectives in carrying out this type of analysis. First, it may suggest ways in which structural shifts induced by the October 1979 policy change may help to explain the post-October 1979 behavior of interest rates and monetary aggregates. Second,' the analysis may suggest possible structural changes which will occur if the Federal Reserve were to make further changes in its operating procedures.

The next section discusses some of the ways in which structural relationships might be affected by the Federal Reserve's operating procedures. Current operating procedures are very briefly reviewed in Section III in order to highlight the important role of bank borrowing and money demand. These relationships are then examined in Sections IV and V to suggest how they may be affected by changes in the manner in which monetary policy is implemented. An analysis of intraweek borrowing also shows how interest rate responses to the Friday money announcements depend upon Federal Reserve policy. The implications for monetary policy of the analysis of structural change are discussed in the concluding section.

II. Economic Structure and Monetary Policy

Before examining those aspects of the economic structure of the financial sector which are important for the implementation of monetary policy, it will be useful to first, briefly, review the ways in which monetary policy affects the economy. The discussion will focus on those effects which are likely to lead to structural shifts inresponse to a change in operating procedures. If policy actions 'result in shifts in some or all of the structural parameters which characterize the behavioral responses of individuals in the economy, then knowledge of

such impacts will generally be necessary for the evaluation of the desirability of the policy action.

The classic discussion in the economics literature of the relationship between structural parameters, policy variables, and knowledge useful for the design of policy is contained in Marschak **(1953).** He defines knowledge as useful "if it helps to make the best decision" (p. **1).** The example Marschak develops involves the choice of an output level by a profit maximizing firm whose product is subject to an excise tax. Useful knowledge for the firm depends upon whether the tax rate has been constant in the past and is expected to remain constant in the future, has been constant but is expected to change in the future, or has varied in the past. In general, the firm, in order to make the best decision, needs to know the past empirical relationship between its profits and its output ***and*** knowledge of how the parameters of this historical, statistical relationship depend upon the excise tax rate. A different tax rate will lead to a different empirical relationship between profit and output.

This basic insight, that empirical relationships estimated during a period with one setting of policy variables such as tax rates will shift if the policy variables are changed, has been recently developed further by Lucas **(1976)** to call into question the usefulness of econometric model simulations as a means of evaluating alternative fiscal and monetary policies. The estimated coefficients in macroeconometric models are unlikely to be policy invariant; they will change if monetary or fiscal policy is carried out in a manner that differs from that characterizing the model's estimation period. Therefore, existing macroeconometric models may be of limited use for simulating the effects of alternative policy rules. For example, models estimated using historical U.S. data may reveal little about the effects of adopting a constant growth rate rule for the money supply.

Lucas and Sargent **(1981)** provide a more general framework for analyzing this problem than was originally developed by Lucas **(1976).** They consider the problem of using historical observations to infer how the behavior of an economic agent ***"would*** *have* differed had the agent's environment been altered in some specified way."[2] This environment depends, in some complex way, on the manner in which the monetary and fiscal authorities act. Policy evaluation requires know-

---

2. Lucas and Sargent (1981, p. xi-xii); as italics in original:

ledge of those parameters which will be policy invariant, that is, which will remain unchanged in response to a change in the way policy is determined. Typically, only preferences and technology are assumed to be .policy invariant. Empirically estimable demand and supply curves depend on both these policy invariant aspects of the economic environment and on the behavior of monetary and fiscal policy. Also required for an evaluation of alternative policies is a knowledge of the ways in which these demand and supply curves will differ under the alternative policies.[3]

To focus the discussion on an example that will be relevant for the subsequent analysis of Sections IV and V, consider the ways in which the interest elasticity of demand for a financial asset might depend on the manner in which monetary policy is implemented. Usually the effects of monetary policy are identified with the portfolio effects caused by a policy-induced interest rate change with asset demand interest rate elasticities given. This type of effect is not analyzed here; instead, the emphasis will be on the relationship between monetary policy and the empirical value of the interest rate elasticity.

It is useful to distinguish three ways in which the response of asset holders to an interest rate change may be related to the actions of the monetary authority. Empirically estimated' interest elasticities will depend on the permanence, informational content, and riskiness of interest rate movements over the sample period used to estimate the asset demand equation.[4] Each of these three characteristics of interest rate changes will be affected by the manner in which monetary policy is implemented.

In the presence of transaction costs which render portfolio adjustments costly, the aggregate response of asset holders to a change in an interest rate will depend on the perceived permanence of the rate movement. For example, a rise in the interest rate on a fixed rate security may induce a large portfolio shift if the rate rise is viewed as temporary as individuals attempt to "lock in" the new high rate. A permanent rate increase may lead to a smaller immediate portfolio adjustment. If most interest rate changes over the sample period have been relatively permanent, the estimated interest elasticity of the de-

3. See Sargent (1981). This problem is recognized, but not addressed, by McCallum and Hoehn (1982) and Tobin (1982).

4. These three characteristics are not mutually exclusive. It will be useful, however, to distinguish between them.

mand for the asset might be small. If the monetary authority were to change its policy so that greater interest rate volatility resulted, interest rate movements would be viewed as more transitory in nature. Empirical estimates of the demand function in the new environment would find that the interest elasticity had risen.

Recent research in macroeconomics has examined the manner in which policy can affect the informational content of price and interest rate movements. Individuals use continuously observable variables such as interest rates to make inferences about economic events which might currently be unobservable. For example, interest rates, along with the initial announced value of the money supply, might be used to estimate the actual money supply or to infer whether the economy has been subject to a real or a nominal shock. Interest rate movements might also be used to draw inferences about future monetary policy. A change in the manner in which both the open market desk and the discount window automatically respond to movements in interest rates and borrowing demand will influence the way in which market participants interpret interest rate movements. If this affects their portfolio adjustments, estimated interest rate effects will depend upon discount window management and the operational instructions given to the open market desk. Section IV will deal with an example in which the information on future interest rates contained in the weekly money supply announcement varies under alternative operating procedures.

In addition to affecting estimated interest elasticities by influencing the permanence and informational content of interest rate movements, alternative policy behavior can have an impact on the risk structure of asset returns. Theories of portfolio choice by risk averse individuals imply that interest rate elasticities will be functions of the joint probability distribution of asset holding period yields. If monetary policy is expected to react in the future to what are as yet unobservable events, the joint distribution of returns can be affected by the monetary authority's policy rule. For example, a policy rule which promises to be accommodating in the face of any future supply shocks leads to a different distribution of asset returns (and therefore a different optimal portfolio) than does a policy rule which promises to be nonaccommodating in response to such shocks. A policy which leads to greater unpredictability in interest rate movements will, by increasing the riskiness of interest yielding financial assets, tend to reduce asset demand interest elasticities. Section V shows how the slope of the

money demand function will, for this reason, shift if the monetary authority is expected to tolerate greater interest rate fluctuations under its new operating procedures.[5]

This discussion has pointed out several ways in which behavioral relationships such as asset demand equations will change if the monetary authority alters its operating procedures or the rules it follows in determining policy. It should be expected, then, that a major shift in operating procedures such as was carried out by the Federal Reserve in October 1979 would alter the relationships that existed in the pre-October 1979 period between interest rates, reserve aggregates, and the money supply. This discussion also suggests that studies of the choice of an instrument for monetary policy which assume a model structure which is invariant to the choice of instrument will not fully capture the likely effects of a switch from an interest rate to a reserve aggregate operating procedure. The remainder of this paper will attempt to draw some conclusions about the structural implications of a shift in operating procedures. First, though, a brief description of current procedures will help to isolate for further examination two empirical relationships which are central to the current procedures and which are unlikely to be policy invariant.

III. Current Operating Procedures[6]

The current operating procedures of the Federal Reserve, in effect since October 6, 1979, involve using nonborrowed reserves as a policy instrument to control the growth of monetary aggregates. The implementation of policy to achieve the targeted rates of growth of the aggregates involves estimating a path for total reserves between meetings of the Federal Open Market Committee which is consistent with the desired path for the monetary aggregates. Subtracting estimated borrowings from this total reserve path yields a path for the actual policy instrument, nonborrowed reserves. The federal funds rate is then market determined by the requirement that the reserve market clear.

Because of lagged reserve accounting, however, reserve demand in any week is predetermined, based upon deposit levels of two weeks

5. See Walsh (1982a). Weiss (1980) and King (1982) also consider ways in which prospective monetary policy affects the economy.

6. For more complete descriptions of current operating procedures, see Axilrod and Lindsey (1981), *New Monetary Control Procedures* (1981), or Hetzel (1982).

earlier.' Hence, the Federal Reserve's only decision is how much of that reserve demand to meet through the discount window and how much through open market operations. The federal funds rate then adjusts until banks are satisfied with the reserve composition between borrowed and nonborrowed reserves that is supplied by the Federal Reserve. The choice of a level for nonborrowed reserves is essentially then equivalent to a choice of an expected value for the federal funds rate. If the demand for money depends upon interest rates on short-term market securities, the funds rate chosen must be consistent with interest rate levels which are expected to equate the demand for money with the Federal Reserve's targeted quantity of money.'

With lagged reserve accounting, shifts in money demand can result in corresponding money supply movements without producing any contemporaneous disturbance in the market for reserves. Only two weeks later will reserve demand be affected. The impact on the money supply during the week of the demand shock will be the same whether the funds rate or nonborrowed reserves is the instrument of policy. When, in two weeks, reserve demand is affected, a policy which attempts to maintain a constant federal funds rate will allow for an endogenous response of reserves which will validate the effect of the money demand shock on the quantity of money. Maintaining a nonborrowed reserve target, however, will lead to federal funds movements which will tend to partially offset the initial money demand shift, thereby keeping the money stock closer to its target.

Unpredictable movements in bank borrowing from the discount window, due to a change in expected future funds rates for example,[9] will under a federal funds operating procedure be accommodated by an adjustment in nonborrowed reserves. Because interest rates are not affected, there is no contemporaneous effect on the demand for money. Under a nonborrowed reserves policy, however, the funds rate will move in response to shifts in the borrowing function. The resulting effect on short-term interest rates will lead to a change in the quantity of money.

---

7. This discussion ignores excess reserves. On June 28, 1982, the Federal Reserve announced that it planned to return to contemporaneous reserve accounting.

8. A graphical analysis of these relationships is presented in Jones (1981) and Hetzel (1982).

9. The role of the expected funds rate in determining borrowing will be discussed in the next section. See also Goodfriend (1981).

In evaluating alternative operating procedures for the implementation of monetary policy, the demand for money function and the borrowing function are of central importance. Despite this, there seems to have been little analysis of how these relationships might be altered by changes in operating procedures.[10] Instead, these two functional relationships have been assumed to be policy invariant in the face of a shift in the Federal Reserve's choice of a policy instrument. Utilizing the discussion of monetary policy in section II, the next two sections will examine the borrowing function and the money demand function to determine how they might depend on the Federal Reserve's operating procedures. In each case, some attempt will be made to hypothesize how the relationship might have shifted as a result of the October 1979 change in the Federal Reserve's behavior.

IV. Intraweek Borrowing and Money Supply Announcements

Under lagged reserve accounting, controlling the money supply requires that the Federal Reserve control money demand through interest rate movements. For a given level of nonborrowed reserves, the federal funds rate is determined by the requirement that banks be willing to borrow an amount equal to required reserves less nonborrowed reserves.[11] To control the funds rate, then, the Federal Reserve must be able to accurately estimate the borrowings function relating desired bank borrowing to the federal funds rate. This section will analyze a simple model of the intraweekly determination of the federal funds rate, focusing on the borrowing relationship and the interest rate response to the Friday money supply announcements.[12] In each case, the dependency of the observed relationships on the Federal Reserve's operating procedures will be stressed. The model used is ad hoc and ignores the role of risk in affecting bank behavior; instead, the temporary versus permanent and the inference aspects of policy, as well as the role of prospective policy, will be emphasized. A consideration of the risk effects on asset demands is postponed until Section V.

---

10. The exception here seems to be Goodfriend (1981) who considers the relationship between the borrowing function and Federal Reserve policy. Prior to October 1979, several authors discussed the effect on the term structure of interest rates of a shift to a reserve aggregates policy; see Pierce and Thomson (1972).

11. For simplicity, excess reserves are assumed to equal zero.

12. Prior to February 1980 the announcements were made on Thursday.

Under present reserve accounting regulations, banks[13] must hold reserves over the settlement week from Thursday to Wednesday in order to satisfy required reserves against deposits during the Thursday to Wednesday period two weeks previous to the current settlement week.[14] In order to focus on the aggregate borrowings function relating bank borrowings to the spread between the federal funds rate and the discount rate, and to analyze the effects of the weekly money supply announcements, it will prove useful to treat a settlement week as consisting of just three "days." Day 1 runs from Thursday morning until 4:10 p.m. (EST) on Friday, the time of the Federal Reserve's announcement of the estimated money supply of two weeks earlier. At the beginning of day 1, banks can choose to hold reserves, sell federal funds, purchase securities, and borrow from the discount window. The actions of the j^{th} bank are constrained by the budget identity equating its assets and liabilities:

$$R^j_{t,i} + S^j_{t,i} + F^j_{t,i} = D^j_{t,i} + B^j_{t,i} \tag{1}$$

where R = reserve holdings
S = security holdings
F = federal funds sold
D = deposits
B = borrowed reserves.

The first subscript denotes the week, the second gives the day of the week, and the superscript denotes the individual bank. Thus, $D^j_{t,i}$ equals deposits on day i of week t at bank j. The week subscript will often be deleted if no confusion will arise from so doing.

Day 2 runs from 4:10 p.m. (EST) Friday through Tuesday of the following week. Day 2 is assumed to differ from day 1 only in that an estimate of aggregate deposits during week t-2, D^a_{t-2}, is available.[15,16] If $D^a_{t-2} = E_1(D^a_{t-2})$, where $E_1(D^a_{t-2})$ is the expected value, on day 1, of D^a_{t-2}, day 2 is exactly like day 1 as the Federal Reserve is assumed to

---

13. The Depository Institutions Deregulation and Monetary Control Act of 1980 provides for reserve requirements against transaction deposits at nonbank institutions. All institutions subject to reserve requirements are simply referred to as banks in this paper.

14. Vault cash, ignored here, is counted toward reserves against contemporaneous deposits. This discussion also ignores the 2 percent reserve carryover provision.

15. In order to focus on deposits, currency is not dealt with here.

16. The absence of a second subscript denotes a weekly average: i.e., $X^j_t = (1/3)(X^j_{t,1} + X^j_{t,2} + X^j_{t,3})$. The absence of a superscript will denote the aggregate value for all banks: $X_{t,i} = \sum_j X^j_{t,i}$.

engage in policy actions only at the beginnings of day 1 and day 3. If $D^a_{t-2} \neq E_1(D^a_{t-2})$, banks incorporate the new information contained in $D^a_{t-2} - E_1(D^a_{t-2})$ and adjust their portfolios; interest rates and deposits change as a new equilibrium is established.

On day 3 (Wednesday)[17] banks must meet their reserve requirement, which implies that $R^j_t = kD^j_{t-2}$ or

$$R^j_{t,3} = 3kD^j_{t-2} - R^j_{t,1} - R^j_{t,2} \tag{2}$$

where k is the required reserve ratio, and average reserves over the settlement week, $(\frac{1}{3})(R^j_{t,1} + R^j_{t,2} + R^j_{t,3})$, must equal kD^j_{t-2}. At the start of day 3, the monetary authority can engage in open market operations and banks reallocate their portfolios subject to (1) and (2).

On each day, the federal funds rate and the interest rate on securities adjust to equilibrate the federal funds, reserves, and security markets.[18] Given this overview of the model structure, the detailed specification of the demand and supply equations for each asset can now be described. The equilibrium expressions for the two interest rates which are then discussed are derived in detail in Walsh (1982b).

Since many banks, particularly large ones, are limited in the frequency with which they can utilize the discount window, borrowing demand during days 1 and 2 will depend positively on the current profitability of borrowing and negatively on the expected profitability of borrowing on day 3. To adopt a specification that is similar to that apparently used by the Federal Reserve staff,[19] the profitability of borrowing is measured by the spread between the funds rate and the discount rate. It is assumed that the administration of the discount window results in a marginal cost of borrowing to an individual bank that is an increasing function of the bank's borrowing level. Also, it is assumed that banks are sufficiently risk averse that they do not completely arbitrage away any difference between the current spread and the expected day 3 spread between the funds rate and the discount rate.

---

17. The unequal lengths of the three days will be neglected.

18. Although the reserves market and the federal funds market are not distinct, they do provide two equilibrium conditions: aggregate federal funds sold must equal zero and banks must be satisfied with the borrowed/nonborrowed reserves composition supplied by the Federal Reserve.

19. *See* Keir (1981) and Levin and Meek (1981).

The aggregate borrowings function is then approximated by

$$B_i = \alpha_0 + \alpha_1(r_i^f - r_i^d) + \alpha_2 E_i(r_3^f - r_3^d) + u;\ i = 1,2^{20} \quad (3)$$

$$B_3 = \alpha'_0 + \alpha'_1(r_3^f - r_3^d) + u_3 \quad (3')$$

where $B_i = \sum_j B_{i,i}^j$ is aggregate borrowing on day i, rf is the funds rate, and r_i^d is the discount rate; u and u_3 are mean zero, serially independent, stochastic disturbance terms. The parameters a_1 and α'_1 are positive while a_2 is negative. It is assumed that $a_1 + a_2 > 0$; an equal rise in the current and future expected spread increases current borrowing. In order to focus on intraweekly interest rate movements, any restrictions on borrowing in future weeks implied by current borrowing have not been dealt with in specifying (3) and (3′).[21]

Within the settlement week, banks view deposits as demand determined. Given its borrowings each bank must allocate $D_i^j + B_i^j$ among reserves, securities, and net federal funds sold. Since the alternative to investing an extra dollar in securities is to sell a dollar in the federal funds market, the demand for securities should be a positive function of $r_i^s - rf$ where r^s is the interest rate on securities. Reserve holdings should depend negatively on this variable. Since an extra dollar of reserves held on days 1 or 2 reduces the need for reserves on day 3 because of the reserve averaging procedure, the demand for reserves should depend positively (and security demand negatively) on $E_i(r_3^f) - r_i^f$ for i = 1,2.[22] If reserves are expected to be relatively expensive on day 3 ($E_i(r_3^f) - r_i^f$ is large), banks adjust in the current period by increasing their reserve holdings and selling securities.

Aggregate bank securities and reserve holdings are assumed equal to

$$S_i = \beta_0 + \beta_1(r_i^s - r_i^f) + \beta_2 E_i(r_3^f - r_i^f) + v_i^s;\ i = 1,2 \quad (4)$$

$$S_3 = \beta'_0 + \beta'_1(r_3^s - r_3^f) + v_3^s \quad (4')$$

$$R_i = \gamma_0 + \gamma_1(r_i^s - r_i^f) + \gamma_2 E_i(r_3^f - r_i^f) + v_i^r;\ i = 1,2 \quad (5)$$

---

20. Goodfriend (1981) obtains a somewhat similar borrowing function for weekly borrowings from a model in which the marginal cost of borrowing to an individual bank is an increasing function of the bank's previous borrowing.

21. Borrowings could also be assumed to depend positively on D_{t-2}, but this would not affect the subsequent analysis. Note that due to restrictions on the frequency with which banks can borrow, an equation similar to (3) would hold with t denoting a period between FOMC meetings and i denoting a particular week within an intermeeting period. See the discussion of temporal aggregation below.

22. This ignores any discounting of $E_i r_3^f$.

with R_3 given by (2).[23] Federal funds sold can be obtained by substituting (3), (4), and (5) into (1). The stochastic disturbance terms, v^s, v_3^s, and v^r are assumed to have mean zero and be serially independent. The previous discussion implies that $\beta_1, \beta', > 0, \beta_2 < 0, \gamma, < 0$, and $\gamma_2 > 0$. In addition, own rate effects are assumed to dominate so that $\beta_1 + \beta_2$ and $\gamma_1 + \gamma_2$ are both positive.

The final two components of the model needed to solve for the intraweekly equilibrium interest rates are a specification of the behavior of the nonbank public and the monetary authority. The nonbank public is assumed to hold either deposits or securities; its demand for deposits is given by:

$$D_i = \delta_0 + \delta_1 r_i^s + \epsilon_i; \delta_1 < 0, i = 1,2,3. \tag{6}$$

In order to form expectations about the day 3 federal funds rate, banks will need to forecast the amount of nonborrowed reserves that the monetary authority will add to or subtract from the reserve market on day 3. Suppose that the monetary authority has targets for total deposits, D^T, and the federal funds rate, r^T. Nonborrowed reserves on day 3 are adjusted if the money supply announcement indicates that total deposits do not equal D^T. They are also adjusted if r_3^f moves away from r^T:

$$U_{t,3} = \mu_0 + \mu_1(D_{t-2}^a - D^T) + \mu_2(r_{t,3}^f - r^T) + \eta_{t,3} \tag{7}$$

where U_i equals nonborrowed reserves on day i and η is a serially independent, mean zero disturbance term due to such random factors as float. The parameters μ_1 and μ_2 measure the monetary authority's response to deviations from its targets with $\mu_1 \leqslant 0$ and $\mu_2 \geqslant 0$. Equation (7) represents a hypothetical policy reaction function which will subsequently be used to represent various alternative policy procedures.

Equilibrium requires that r^r and r^s adjust on each day to equate the demand for and supply of federal funds and the demand for and supply of securities. The model's equilibrium conditions can be written as

$$F_{t,i} = 0 \tag{8}$$

$$U_{t,i} = R_{t,i} - B_{t,i} \tag{9}$$

for $i = 1,2,3$ and F, R, and B given by (1) – (6). $U_1 = U_2$ is treated as an exogenous parameter, while U_3 is given by (7).

23. These equations can be obtained by aggregating individual bank demand equations which depend on the same right-hand variables as long as expectations are identical across banks.

In Walsh (1982b) the model is solved for the equilibrium interest rates on days 1 and 2 and the following reduced form expressions for r_i^f and r_i^s are obtained for i = 1,2:

$$r_{t,i}^f = \pi_{f0} + \underset{-}{\pi_{f1}} U_{t,i} + \underset{+}{\pi_{f2}} r_{t,i}^d + \underset{+}{\pi_{f3}} E_i(r_{t,3}^f) + \underset{-}{\pi_{f4}} E_i(r_{t,3}^d) + e_t^f \quad (10)$$

$$r_{t,i}^s = \pi_{s0} + \underset{-}{\pi_{s1}} U_{t,i} + \underset{+}{\pi_{s2}} r_{t,i}^d + \underset{+}{\pi_{s3}} E_i(r_{t,3}^f) + \underset{-}{\pi_{s4}} E_i(r_{t,3}^d) + e_t^s \quad (11)$$

where the parameters π_{ji} are functions of the structural parameters and their signs are reported below each coefficient.

Equations (10) and (11) contain two terms, $E_i(r_{t,3}^f)$ and $E_i(r_{t,3}^d)$, which are day i expectations about day 3 variables. Since r_3^f will be determined on day 3 by the requirement of market equilibrium, market participants will, if expectations are rational, base $E_i(r_3^f)$ on the model's prediction of r_3^f, conditional on the information available on day i. The reduced form equation for r_3^f can be found by combining equations (2) and 3′), together with (9) to yield:

$$r_{t,3} = r_{t,3}^d - (\alpha_0'/\alpha_1') + (1/\alpha_1')(3kD_{t-2} - R_{t,1} - R_{t,2} - U_{t,3}) - (1/\alpha_1')u_{t,3} \quad (12)$$

Equation (12) implies that, unless $U_{t,3}$ is adjusted in response to a change in $r_{t,3}^d$ (as it would have been under the pre-October 1979 operating procedures), the spread between the funds rate and the discount rate on day 3 is unaffected by changes in the discount rate.[24]

Taking expectations of both sides of (12) as of day i (i= 1 or 2) and using the policy rule (7) to evaluate $E_i U_{t,3}$,

$$E_i r_{t,3}^f = (1+\mu_2/\alpha_1')^{-1}[E_i r_{t,3}^d - (\alpha_0'/\alpha_1') + (1/\alpha_1')(3kE_iD_{t-2} - E_iR_{t,1} - E_iR_{t,2}) - (1/\alpha_1')(\mu_0 + \mu_1 E_i D_{t-2}^a - \mu_1 D^T - \mu_2 r^T)] \quad (13)$$

where it is assumed that market participants know the values of D^T and r^T, and, if i = 2, $E_iD_{t-2}^a = D_{t-2}^a$ since the announcement is made at the beginning of day 2. Notice now that changes in the discount rate are expected to affect the spread if $\mu_2 \neq 0$. To forecast the day 3 funds rate requires that banks attempt to estimate the total reserve demand for the week ($3kE_iD_{t-2}$) as well as the amount of borrowing which will occur on days 1 and 2. Equation (5) could be used to express $E_iR_{t,j}$ in terms of interest rates and interest rate expectations. The expected day 3 funds

---

24. Goodfriend (1981) presents some evidence that suggests increases in the discount rate have not resulted in changes in the spread between the funds rate and the discount rate.

rate also depends upon the expected money announcement $E_1 D^a_{t-2}$. This variable is, in some ways, like the "intrinsically irrelevant" variable that King (1982) analyzed. It has a direct effect on $r^f_{t,3}$ and $E_1 r^f_{t,3}$ only if the monetary authority responds to it ($\mu_1 \neq 0$). However, D^a_{t-2} also has an indirect effect on the expected day 3 funds rate if it provides information that can be used to forecast D_{t-2}.[25] The money announcement gives an indication of future policy if $\mu_1 \neq 0$ and yields information on D_{t-2} as long as $E_1[(D^a_{t-2} - E_1 D^a_{t-2})(D_{t-2} - E_1 D_{t-2})] \neq 0$.

To see how these two roles of D^a_{t-2} affect market interest rates, consider how r^f_2 and r^s_2 will differ from r^f_1 and r^s_1. By assumption, days 1 and 2 differ only in that D^a_{t-2} is announced at the start of day 2. Equations (10) and (11) imply that

$$r^f_2 - r^f_1 = \pi_{f3}(E_2 r^f_3 - E_1 r^f_3) \tag{14}$$

$$r^s_2 - r^s_1 = \pi_{s3}(E_2 r^f_3 - E_1 r^f_3) \tag{15}$$

where it is assumed for simplicity that the discount rate is not expected to be adjusted in light of the money announcement. The interest rates on federal funds and securities move in response to revisions in expectations about the funds rate which will prevail on day 3. Since the information set relevant for forming expectations on day 2 differs from that used on day 1 only by the addition of the observed value of D^a_{t-2}, the revision in expectations can be written[26]

$$E_2 r^f_3 - E_1 r^f_3 = \psi_f (D^a_{t-2} - E_1 D^a_{t-2}) \tag{16}$$

where $\psi_f = E_1[(r^f_3 - E_1 r^f_3)(D^a_{t-2} - E_1 D^a_{t-2})]/E_1(D^a_{t-2} - E_1 D^a_{t-2})^2$. In Walsh (1982b) it is shown that

$$\psi_f = (3k\phi - \mu_1)/(\alpha'_1 + \mu_2 + \gamma_2(\pi_{s3} - \pi_{f3}) + \gamma_2(1 - \pi_{f3})) > 0 \tag{17}$$

with $\phi = E_1(D_{t-2})(D^a_{t-2} - E_1 D^a_{t-2})/E_1(D^a_{t-2} - E_1 D^a_{t-2})^2$. ϕ will be positive and, if D^a_{t-2} is an unbiased estimate of D_{t-2}, it will equal one. Substituting (16) into (14) and (15),

$$r^f_2 - r^f_1 = \pi_{f3}\psi_f (D^a_{t-2} - E_1 D^a_{t-2}), \tag{18}$$

$$r^s_2 - r^s_1 = \pi_{s3}\psi_f (D^a_{t-2} - E_1 D^a_{t-2}). \tag{19}$$

---

25. After this paper was substantially completed, the Federal Reserve announced a return to contemporaneous reserve accounting. In this case, D^a_{t-2} no longer would provide a direct measure of the aggregate demand for reserves. Since deposit levels are serially correlated, ϕ in equation (17) below would be positive, but smaller than under lagged reserve accounting.

26. See Sargent (1979, pp. 206-208).

Since both $\pi_{f3}\psi_f$ and $\pi_{s3}\psi_f$ are positive, a positive money surprise, $D^a_{t-2} > E_1 D^a_{t-2}$, leads to a rise in both the federal funds rate and the securities interest rate. Such a positive relationship between the money announcement "surprise" and interest rates has been documented by Grossman (1981), Urich and Wachtel (1981), and Roley (1982).

The reaction coefficients, $\pi_{f3}\psi_f$ and $\pi_{s3}\psi_f$, depend upon μ_1 and μ_2, parameters which characterize the behavior of the monetary authority. Changes in operating procedures, represented here by changes in μ_1 or μ_2, will result in shifts in the response of interest rates to money surprises. Because, according to (10) and (11), day 1 and day 2 interest rates depend on the federal funds rate expected to prevail on day 3, day 1 and day 2 interest rates depend upon the expected day 3 behavior of the monetary authority. This response depends both upon the way nonborrowed reserves are to be adjusted to future as yet unobserved variables (μ_2 measures the way U_3 will respond in the future to r^f_3) and on how U_3 responds in the future to currently observed variables (μ_1 measures the way U_3 will be adjusted in light of D^a_{t-2}). Letting A denote the denominator in (17), the response coefficients in (18) and (19) can be written as

$$\pi_{j3}\psi_f = 3\pi_{j3}k\phi/\Delta - \pi_{j3}\mu_1/\Delta;\ j = f,s. \tag{20}$$

The first term represents the effect of the revised expectation of D_{t-2} produced by the announcement; the second represents the effects of the prospective policy reaction to the announcement.[27]

Consider how one might use this framework to represent the October 6, 1979 shift in operating procedures by the Federal Reserve. One way to do so might be to represent the pre-October 1979 policy as one with a large μ_2 and a zero μ_1; strong policy actions were taken in response to movements in the funds rate in an attempt to stabilize it, while information on past monetary aggregates produced no policy response. The new, post-October 1979, operating procedures could be characterized by a smaller μ_2, as less of an attempt is made to stabilize r, with μ_1 still equal to zero since the nonborrowed reserve path is rarely adjusted on an intraweekly basis. A reduction in μ_2 causes A to fall and, from (20), $\pi_{j3}\psi_j$ rises. The shift to a reserve aggregates

27. Urich and Wachtel (1981) attribute the positive response of interest rates to a policy anticipations effect. However, even if $\mu_1 = 0$, $\pi_{j3}\psi_f > 0$ since D^a_{t-2} provides information on the aggregate demand for reserves.

operating procedure under which market participants believe the Federal Reserve will not react strongly to interest rate movements will make interest rates more responsive to money announcement surprises. This is exactly the empirical result found by Roley (1982) in comparing the pre- and post-October 1979 periods.

Suppose that the Federal Reserve changed its operating procedures and began to actively adjust the nonborrowed reserve path on an intraweekly basis in response to any deviation of the announced deposit level from its target. This type of procedure could be represented by a large, negative value of μ_1 in equation (7). According to (20), an increase in the absolute value of μ_1 increases the response coefficients; interest rates would rise even more in response to a positive money surprise.

Equations (18)–(20) can be used to evaluate recent proposals for changing the manner in which the weekly money supply announcements are made. Suppose that instead of releasing D^a_{t-2}, a new variable A, is announced, equal to a four-week moving average of past weekly deposit levels:

$$A_t = (1/4)(D^a_{t-2}+D_{t-3}+D_{t-4}+D_{t-5}). \tag{21}$$

For simplicity, it is assumed that the actual levels of deposits in weeks t-3, t-4, and t-5 are included.[28] In the equation $r^s_{t,2} - r^s_{t,1} = \phi_A(A_t - E_1A_t)$, how will the new response coefficient ϕ_A compare with $\pi_{s3}\psi_f$? And how will A, $- E_1A_t$ compare with $D^a_{t-2} - E_1D^a_{t-2}$?

The answer to this second question follows immediately from the assumption that D,,, D,,, and D_{t-5} are known during week t:

$$A_t - E_1A_t = (1/4)(D^a_{t-2} - E_1D^a_{t-2}). \tag{22}$$

Reporting A, rather than D^a_{t-2} leads to a less volatile series of surprises in that the conditional variance of A, is equal to $(1/16)E_1[D^a_{t-2} - E_1D^a_{t-2}]^2$. However, this does not imply that interest rate movements will be smaller. Since

$$E_1(D_{t-2} - E_1D_{t-2})(A_t - E_1A_t)/E_1(A_t - E_1A_t)^2 = (1/4)E_1(D_{t-2})(D^a_{t-2} - E_1D^a_{t-2})/(1/16)E_1(D^a_{t-2} - E_1D^a_{t-2})^2 = 4\phi, \phi_A$$

can be written as

28. This assumes that during week t, the figure on D_{t-3} is available.

$$\phi_A = 3\pi_{s3}k(4\phi)/\Delta - \pi_{s3}\mu_1'/\Delta$$
$$= 4(\pi_{s3}\psi_f) - \pi_{s3}(\mu_1' - 4\mu_1)/\Delta \quad (23)$$

where μ_1' now measures the way the public believes the monetary authority will adjust U_3 in response to A_t. If both μ_1 and μ_1' are zero or if it is believed that U_3 is still adjusted only in response to D^a_{t-2}, $\mu_1' = 4\mu_1$ and $\phi_A = 4\pi_{s3}\psi_f$. In this case,

$$r_2^s - r_1^s = \phi_A(A_t - E_1A_t) = 4\pi_{s3}\psi_f(1/4)(D^a_{t-2} - E_1D^a_{t-2})$$
$$= \pi_{s3}\psi_f(D^a_{t-2} - E_1D^a_{t-2}). \quad (24)$$

The new method of making money supply announcements reduces the volatility of surprises but has no effect on the volatility of interest rates. Only if the public interprets the new announcement procedures as indicating a change in the monetary authority's behavior, so that $\mu_1' \neq 4\mu_1$, will interest rate movements be affected.

The response of variables other than the interest rates to the money announcement can also be analyzed within this framework. As was discussed in the previous section, predicting bank borrowing from the discount window has taken on greater, importance under the current reserve aggregates operating procedures. However, by increasing, interest rate volatility, the reserve aggregates operating procedures will also reduce the day-to-day predictability of borrowings. For example, suppose at the end of day 1 the monetary authority, after observing B_1, tries to predict day 2 borrowings. The prediction error will be $B_2 - E_1B_2 = (a_1\pi_{f3} + \alpha_2)\psi_f(D^a_{t-2} - E_1D^a_{t-2})$ and the prediction error variance is given by

$$E_1(B_2 - E_1B_2)^2 = (\alpha_1\pi_{f3} + \alpha_2)^2\psi_f^2E_1(D^a_{t-2} - E_1D^a_{t-2})^2. \quad (25)$$

Since ψ_f is larger under the reserve aggregates policy, the variance of the borrowings prediction error will also be larger.

The preceding analysis also has some implications for the standard borrowings equation which relates the level of borrowings to the contemporaneous value of the spread between the funds rate and the discount rate.[29] Again, suppose that the monetary authority attempts to

---

29. Keir (1981) provides examples of this specification for the borrowings function using weekly data. The issue of temporal aggregation is discussed below. See also Goodfriend (1981) who reaches conclusions similar to those obtained here.

predict day 2 borrowings from the following equation estimated by OLSQ:

$$B_2 = a_0 + a_1(r_2^f - r_2^d). \tag{26}$$

From (3), the estimated value of a, will equal, given a large enough sample, $a_1 + \alpha_2 b$ where b is the regression coefficient in a regression of the expected day 3 spread on the day 2 spread.[30] The value of b, and hence the estimated slope of the borrowings function, will clearly depend upon the monetary authority's policy; if movements in the spread are relatively temporary, b will be small, while if movements in the spread tend to persist, b may be close to one. Under the old interest rate operating procedures, the Federal Reserve attempted to stabilize the funds rate, at least on an intraweekly basis. This would imply that b might be close to one and the estimated slope of the borrowings function would approximately equal $\alpha_1 + a_1$. Under the new procedures, interest rates are allowed to fluctuate over a wider range; r_2^f and r_3^f will be less closely related and b will be much smaller. Therefore, under current operating procedures, $a_1 = a_1 + \alpha_2 b > a_1 + \alpha_2$. A plot of borrowings on the horizontal axis and the spread on the vertical axis would appear to be flatter under the new operating procedures.

Borrowing functions are usually estimated with weekly data whereas the conclusions reached so far refer to shifts in a daily borrowings function. However, the model suggests that the observed relationship between total weekly borrowings and the average spread between the funds rate may also be flatter under the new operating procedures. Assuming, for simplicity, that $a_1 = a'_1$, and aggregating equations (3) and (3') reveals that a regression of total weekly borrowings on the average spread for the week, $r_t^f - r_t^d$, will yield a biased estimate of the true slope with the bias a function of the covariance between $r_t^f - r_t^d$ and the average of the day 1 and day 2 expectations of $r_{t,3}^f - r_{t,3}^d$.[31] This covariance is likely to be smaller under the post-October 1979 operating procedures than it was under the pre-October 1979 procedures. This again implies that the coefficient on $r_t^f - r_t^d$ in a

30. The additional bias created by the covariance between r_2^f and u, the disturbance term in equation (3), is ignored here since it is independent of the policy parameters μ_1 and μ_2; from Walsh (1982b), $\text{Cov}(r_2^f, u) = \text{Cov}(e^{\cdot}, u) = Q(\beta_1 - \delta_1)\sigma_u^2$ if u is distributed independently of v^r, v^s, and ϵ.

31. See Walsh (1982b).

weekly borrowings function will appear to have risen. That this appears to be the case is suggested by the empirical work of Levin and Meek (1981) and Keir (1981).

The results of this section are easy to summarize. Apparent structural changes in interest rate responses to money surprises and in the borrowings function can be explained, at least partially, as the result of the shift to a reserve aggregates operating procedure which allows greater interest rate fluctuations in attempting to offset deviations of monetary aggregates from their targets.

V. Interest Rate Risk and Money Demand

The money supply is determined within each week by money demand under lagged reserve accounting. It is important then to consider how money demand might be affected by the Federal Reserve's choice of operating procedures. In the previous section, because the focus was on bank borrowing, a very simple deposit demand equation was assumed, one in which the parameters were taken to be policy invariant. The present section will consider the dependency of the money demand function on the behavior of the monetary authority. The general conclusion is that a change to a reserve aggregates operating procedure induces a shift in the money demand function. This structural change tends to amplify the increase in interest rate volatility which would accompany a reserve aggregates policy.[32]

The demand for money is normally explained by appealing to transaction and portfolio motives for individuals to hold money. If the correlation between nominal interest rates and inflation is less than one, money can be held to reduce portfolio risk even though it is itself a risky asset. As shown by Boonekamp (1978) and Buiter and Armstrong (1978) in partial equilibrium frameworks and utilized in a general equilibrium, rational expectations model by Walsh (1982a), the interest elasticity of the demand for money will vary inversely with the volatility of nominal interest rates. This result follows from simple models of portfolio choice by risk averse investors. As asset returns become less predictable so that assets are riskier, portfolios are adjusted less in response to a change in expected returns.

For example, assume that individuals exhibit constant relative risk

---

32. A rigorous derivation of the results reported in this section is contained in Walsh (1982a).

aversion [33] and allocate their wealth between money and bonds in order to maximize a linear function of their portfolio's expected real rate of return and its variance:

$$u = E_t r_{p,t+1} - (\tfrac{1}{2})\rho E_t(r_{p,t+1} - E_t r_{p,t+1})^2 \tag{27}$$

where $E_t r_{p,t+1}$ is the expected real rate of return on the portfolio from t to $t+1$ and p is a measure of risk aversion which could vary across individuals. If m, is the fraction of wealth held in money, the portfolio return is given by

$$r_{p,t+1} = r_{m,t+1} m_t + (1 - m_t) r_{b,t+1} \tag{28}$$

where $r_{m,t+1}$ and $r_{b,t+1}$ are the real returns on money and bonds, respectively. If $r_{m,t+1} = -\pi_{t+1}$ where π_{t+1} is the rate of inflation from t to $t+1$, and $r_{b,t+1} = i_{t+1} - \pi_{t+1}$, where i_{t+1} is the nominal bond return (including both interest and capital gain) from t to $t+1$, the optimal proportion of wealth to hold in the form of money, m_t^d, is given by [34]

$$m_t^d = (\sigma_i^2 - \sigma_{i\pi})/\sigma_i^2 - (1/\rho\sigma_i^2) E_t i_{t+1} \tag{29}$$

where $\sigma_{i\pi} = E_t(i_{t+1} - E_t i_{t+1})(\pi_{t+1} - E_t \pi_{t+1})$ and $\sigma_i^2 = E_t(i_{t+1} - E_t i_{t+1})^2$. If market interest rates follow a martingale, $E_t i_{t+1} = i_t^n$ where i_t^n is the nominal, market rate of interest at time t. The slope of the money demand function is equal to $dm_t^d/di_t^n = -(1/\rho\sigma_i^2)$. Greater interest rate volatility leads to a reduction in the responsiveness of money demand to changes in the market rate of interest.

One of the major arguments in favor of the shift from an interest rate oriented operating procedure to a reserve aggregates one was that it would allow greater movements in interest rates. Since the resulting greater volatility of market interest rates increases the risk associated with holding interest earning assets, equation (29) predicts that the change in operating procedures should have produced a structural shift in the money demand equation. By affecting the risk characteristics of financial assets, a change in the monetary authority's behavior will result in private sector responses such that asset demand equations estimated under one policy regime will no longer reflect the behavior

---

33. Boonekamp's analysis is carried out under less restrictive assumptions.

34. This is derived in Walsh (1982b). If money also yields a return in the form of transaction services which are related to the volume of transactions, (29) would include a term such as income to proxy for transactions. For simplicity, income effects are ignored although they could easily be included as is done in Walsh (1982a).

of asset holders under the new policy regime. The parameters of the money demand equation should not be assumed to be policy invariant for the purpose of evaluating alternative operating procedures.

In terms of a standard graph of money demand on the horizontal axis and the interest rate on the vertical axis, a shift from a policy which stabilizes interest rates to one which allows greater fluctuations in interest rates is likely to produce a money demand curve which is steeper than that observed under the old policy. This, in turn, has implications for the degree of interest rate volatility which is likely to occur under a reserve targeting procedure.

In order to keep the money supply equal to its targeted path, interest rates must move in response to money demand shifts. If the demand for money appears unusually strong, interest rates must rise to keep money demand equal to the targeted money supply. This can be accomplished either by direct control over short-term interest rates or by exercising indirect control through nonborrowed reserves. This is illustrated in Figure 1 in which m* is the money supply target, m^d is the initial money demand curve, and the dashed line represents money demand if there has been a random shock which has increased the demand for money. To keep the money supply on target, the interest rate must rise from r_0 to r,.

The line labeled Pre-1979 represents the interest rate-money stock co-movements which would have been tolerated under the old operating procedures. This policy response function, derivable from the reserve market equilibrium, was relatively flat as the Federal Reserve acted to stabilize interest rates. As a result of the positive shock to money demand, the interest rate rises only to r_2. As a consequence, the money stock rises above the target to m,.

The new operating procedures can be represented by a steeper policy response-reserve market equilibrium relation such as the line labeled Post-1979 in Figure 2. If there has been no change in the underlying money demand function m^d, the same positive shock as illustrated in Figure 1 now would lead to a rise in the interest rate to r,. Money again diverges from its target, but the discrepancy, $m_2 - m^*$, is smaller than under the old operating procedures.

If individuals correctly perceived that the Federal Reserve would tolerate wider interest rate movements under the new operating procedures, the money demand curve would not remain unchanged but would become steeper as the interest elasticity of money demand

declined. The new money demand curve is drawn as m_d' in Figure 3. The same,[35] positive random shock to demand that could formerly have been offset by a rise in the interest rate to r, now requires that r rise further, to r_4, to keep the money stock equal to m*. Under the new procedures, the interest rate increases to r_4 and the money supply equals m_3. The interest rate rises further and the money supply diverges from target further (i.e., $r_4 > r_3$ and $m_3 - m^* > m_2 - m^*$) than they would have if the money demand function had not become steeper. If money demand becomes less sensitive to interest rate movements, larger movements in market interest rates will be necessary to maintain any given degree of control over the money supply.[36] The structural shift induced by the change in operating procedures implies that models estimated under an interest rate policy regime will underestimate the interest rate volatility which would be associated with the active use of nonborrowed reserves as the instrument of monetary policy. If this induced structural shift is ignored, the greater interest rate volatility required to control the money supply could be incorrectly interpreted as evidence that the demand for money has become more unstable and is now subject to larger shocks.[37].

In the period since October 1979, there has been a pronounced rise in interest rate volatility.[38] The analysis of this section suggests that some of this rise may be due to structural shifts induced by the change in the Federal Reserve's operating procedures. These structural shifts in asset demand equations are likely to have occurred because the policy change altered the joint distribution of asset returns and therefore affected the risk characteristics of financial assets. The analysis also suggests that, in choosing between an interest rate and a reserve aggregate instrument, the possibility that the structural relationships describing the economy may not be the same under both policies needs to be recognized.

---

35. The shock is the same as measured by the horizontal displacement of the money demand curve.

36. Control over the money supply might be measured here by $E(m - m^*)^2$.

37. *See* Tinsley and others (1981) who concluded that the year after the introduction of the new operating procedures was atypical, subject to larger than normal shocks.

38. *See* Johnson and others (1981) and Tinsley and others (1981).

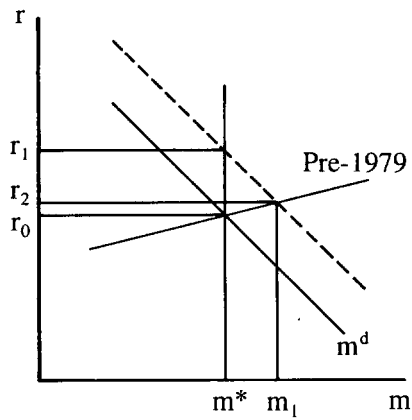


FIGURE I

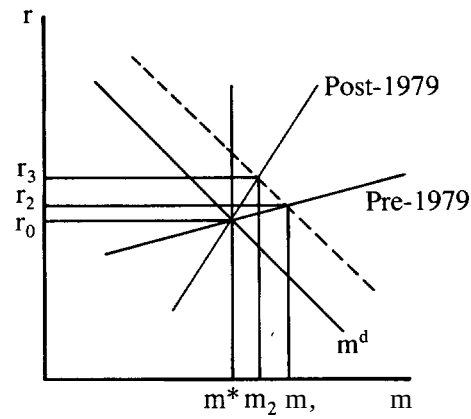


FIGURE 2

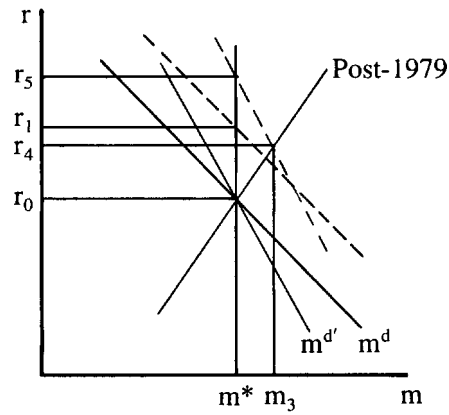


FIGURE 3

VI Implications for Monetary Policy

In this concluding section, some of the implications for monetary policy of the specific examples developed in the previous two sections are discussed. Some general observations on the relationship between policy and structural change will also be made.

The model of the previous section implied that a policy regime which tolerated greater fluctuations in interest rates would be accompanied by a money demand function that was relatively interest inelastic. To repeat one of the conclusions of that section, a policy which

attempts to keep money on target will produce large swings in interest rates if the interest elasticity of the demand for money is small. Producing these large movements in interest rates would require aggressive use of the nonborrowed reserve instrument. This will be especially true if, as the analysis of Section IV suggests, the borrowings function exhibits greater interest elasticity when interest rate volatility rises.

The other implication of a low interest elasticity of the demand for money is that the automatic corrective response to deviations from the money target under a reserve aggregates policy is weakened. Under lagged reserve accounting, a positive shock to money demand results in a rise two weeks later in total reserve demand. Given a fixed path for nonborrowed reserves, the rise in reserve demand leads to an increase in market interest rates which serves the role of an automatic stabilizer by reducing money demand and offsetting the positive deviation of money above its target path. However, an increase in the responsiveness of borrowing to the funds rate and a decline in the interest elasticity of money demand reduces the force of this automatic adjustment. The rise in borrowing produces a smaller rise in the funds rate and other market rates which in turn exercises a weaker restraining effect on money demand. The speed with which money returns to its target will therefore be slower than estimates obtained under an interest rate policy regime might suggest.

Policy-induced structural change is a factor that has been ignored in the academic literature on the relative merits of an interest rate and a reserve aggregates operating procedure.[39] The implications of the previous two sections for this choice can be illustrated with the use of Figure 3 in Section V. Inspection of that figure shows that, for a given policy response-reserve market equilibrium schedule such as the post-1979 line drawn, money demand shocks produce more interest rate volatility and greater deviations of money from its target the steeper is the money demand curve. This indicates that monetary control will be worse in response to money demand shocks under a reserve aggregates policy than would be implied by empirical results obtained during an interest rate targeting regime.

Shocks to the market for reserves, on the other hand, may pose less of a problem than existing empirical models might imply. Such shocks cause the money stock to deviate from target by affecting interest rates

39. This literature was initiated by Poole (1970). Other examples are Pierce and Thomson (1972), LeRoy (1979), and McCallum and Hoehn (1982).

and therefore money demand. Figure 3 suggests that random shifts in the policy response-reserve market equilibrium function will cause larger interest rate movements but smaller money stock deviations the steeper is the money demand function. The effects, therefore, of random shocks to borrowing or errors in predicting total reserves demand may be less than would be implied by pre-October 1979 empirical models. As discussed earlier, the resulting volatility of interest rates under a policy regime which controls the money supply through the use of nonborrowed reserves as the operational instrument will exceed the level implied by models estimated during a period of interest rate stability.

With lagged reserve accounting, McCallum and Hoehn (1982) have shown that an interest rate policy always produces better control over the money supply than does a reserve aggregates policy. This remains true when possible structural changes are considered, but the comparison becomes less unfavorable to a reserve aggregates policy; the decreased responsiveness of money demand to interest rates and the increased sensitivity of borrowing to the funds rate tend to moderate the impact of reserve market shocks on the money supply under a reserve aggregates policy.[40]

The reserve market equilibrium locus under a reserve aggregates policy depends upon the behavior of both the Federal Reserve and of the banking sector. Under an interest rate policy in which the federal funds rate is, over each week, fixed by the Federal Reserve, the reserve market equilibrium locus represents only the policy behavior of the Federal Reserve in setting interest rates. It is not a money supply function.[41] This plus the dependency of structural relationships on policy calls into question the reliability of any conclusions reached using money multiplier models. Money multipliers are claimed to be reduced-form parameters, and, as pointed out by Marschak (1953), knowledge of reduced-form parameters alone seldom constitutes sufficient information upon which to base policy choices. Money multipliers were, however, neither reduced-form parameters nor structural parameters in the pre-October 1979 period as both the money supply and reserve aggregates were endogenous variables. The ratio of two endogenous variables is unlikely to contain any casual information;

40. McCallum and Hoehn (1982) use a model in which income is also endogenous. An examination of their equation 23 (p. 16) shows that the general conclusions reached here are not affected when income shocks are incorporated into the model.

41. This is pointed out by McCallum and Hoehn (1982).

using pre-October 1979 multiplier models to carry out conterfactual policy experiments is illegitimate.[42] Using empirical results from models estimated prior to 1979 to draw inferences about the effects of imposing an arbitrary path for reserves, as is done by Johannes and Rasche (1981), may tell one little about the likely effects of such a policy.[43]

Suppose, however, that the Federal Reserve reinstituted contemporaneous reserve accounting and made total reserves (or any other choice of reserve aggregate) a truly exogenous variable. For simplicity, assume that the time series behavior of total reserves could be modeled as a moving average process, $R_t = R_0 + A(L)\epsilon_t$ where $A(L)$ is a polynomial in the lag operator L and ϵ is a white noise random variable. Under such a policy regime one could estimate a multiplier relationship for some monetary aggregate, M. If $\bar{m}$ is the money multiplier, on average, $M_t = \bar{m}R_t = \bar{m}(R_0 + A(L)\epsilon_t)$.

Consider a change in policy, as represented by a change in $A(L)$ to $A'(L)$. It is highly unlikely that the monetary aggregate M would now be given by $M_t = \bar{m}(R_0 + A'(L)\epsilon_t)$. As long as banks and the public have nontrivial portfolio choices to make, those choices will be affected by changes in the stochastic processes generating the exogenous variables which define the environment in which decisions are made. Since $\bar{m}$ is a reduced form parameter, it will be affected by changes in the underlying behavioral relationships which define the model structure.

The need to confront the possibility of policy induced structural change complicates the problem of evaluating any policy shift such as the October 1979 change in operating procedures. In the previous section it was noted that a change in the slope of the money demand curve could be misinterpreted as a more unstable money demand function. Distinguishing between a series of atypical shocks or a structural change as the correct explanation for what appears to be unusual behavior would be difficult over short periods, but attempting to do so is important since the two alternative explanations have different policy implications.

If, as suggested by Tinsley and others (1981), the increased volatility

---

42. This argument is made by Hetzel (1982).

43. "In arriving at these conclusions it was assumed. . . that the Johannes-Rasche multiplier forecasting models would remain stable in a reserve aggregate control regime." (Johannes and Rasche, 1981, p. 311.) It is just this assumption which is unlikely to be true. The multiplier approach is critically discussed in Lindsey (1981) and Lindsey and others (1981).

of money and interest rates subsequent to the Federal Reserve's change in its operating procedures was the result of unusually large shocks, no need is indicated for a reevaluation of the operating procedures. Attributing the greater volatility to the structural change induced by the shift in operating procedures, on the other hand, might suggest the need to reevaluate current operating procedures.

The dependency of economic relationships on the policy of the Federal Reserve suggests that the use of empirical models for policy analysis may be limited. The examples examined in this paper certainly indicate the general applicability of the Lucas critique to the problem of evaluating alternative operating procedures. Basic economic and financial relationships are unlikely to be invariant with respect to changes in the behavior of the Federal Reserve. Adequate policy evaluation requires a move away from ad hoc empirical models specified at the level of demand and supply curves. Such curves will not remain stable in the face of changes in the economic environment in which economic agents operate.

It is important to keep in mind, however, that the existence of a structural change does not automatically imply its quantitative significance. The induced behavioral responses to the October 1979 change in operating procedures may only be minor factors in explaining the subsequent behavior of interest rates and monetary aggregates. It is important, therefore, to view the October 1979 action as a regime shift which provides economists with a rare controlled experiment with which to assess the empirical importance of the Lucas critique. A search should be made for evidence of any structural changes that may have been due to the shift in operating procedures. The impact of greater interest rate volatility on the risk structure of financial assets and on the informational content of interest rate and money supply movements might provide starting points for any search for structural change.

This paper has focused on the behavioral changes that might result under alternative policy rules and has ignored the equally important effects of financial markets on the innovations induced by policy actions. Because the current behavior of the nonbank public and the banking sector depends upon current and prospective monetary policy, any analysis of alternative operating procedures needs to consider the ways in which policy affects the informational content of interest rates and money supply announcements and the risk structure of financial assets. Because these effects depend upon public perceptions of Fed-

eral Reserve behavior, the predictability of private sector behavior is likely to depend on the predictability of the Federal Reserve's behavior. It is only the structural implications of alternative policy rules that are likely to be tractable.

References

Axilrod, Stephen H. and David E. Lindsey (1981), "Federal Reserve System Implementation of Monetary Policy: Analytical Foundations of the New Approach," ***American Economic Revierv,*** 71 (May), pp. 246-252.

Barro, Robert J. and Zvi Hercowitz (1980), "Money Stock Revisions and Unanticipated Money Growth," ***Journal of Monetary Economics,*** 6 (April), pp. 257-267.

Berkman, Neil G. (1978), "On the Significance of Weekly Changes in M1," ***Nerv England Economic Review*** (May/June), pp. 5-22.

Board of Governors of the Federal Reserve System (1981), ***New Monetary Control Procedures*** (February).

Boonekamp, C.F.J. (1978), "Inflation, Hedging, and the Demand for Money," ***American Economic Review*** 68 (December), pp. 821-833.

Boschen, John and Herschel Grossman (1980), "Monetary Information and Macroeconomic Fluctuations," NBER Working Paper No. 498 (July).

Brimmer, Andrew F. and Allen Sinai (1981), "Rational Expectations and the Conduct of Monetary Policy," ***American Economic Review*** 71 (May), pp. 259-267.

Bryant, John and Neil Wallace (1980), "A Suggestion for Further Simplifying the Theory of Money," Federal Reserve Bank of Minneapolis Staff Report No. 62.

Buiter, Willem H. and Clive A. Armstrong (1978), "A Didactic Note on the Transactions Demand for Money and Behavior Towards Risk," ***Journal of Money, Credit, and Banking,*** 10 (November), pp. 529-538.

Cacy, J.A., Bryon Higgins, and Gordon Sellon Jr. (1981), "Should the Discount Rate be a Penalty Rate?" ***Economic Review,*** Federal Reserve Bank of Kansas City, (January), pp. 3-10.

Craine, Roger, Arthur Havenner, and James Berry (1978), "Fixed Rules vs. Activism in the Conduct of Monetary Policy," ***American Economic Review*** 68 (December), pp. 769-783.

Davis, Richard G. (1971), "Short-Run Targets for Open Market Operations" in ***Open Market Policies and Operating Procedures — Staff Studies,*** Board of Governors of the Federal Reserve System (July), pp. 37-69.

DeRosa, Paul and Gary H. Stem (1977), "Monetary Control and the Federal Funds Rate," ***Journal of Monetary Economics,*** 3 (April), pp. 217-230.

Fair, Ray (1981), "Estimated Effects of the October 1979 Change in Monetary Policy on the 1980 Economy," ***American Economic Review,*** 71 (May), pp. 160-165.

Goldfeld, Stephen M. (1982), "New Monetary Control Procedures: A Review Essay," ***Journal of Money, Credit, and Banking,*** 14 (February), pp. 148-155.

_____ (1982), "Rules, Discretion, and Reality," ***American Economic Review,*** 72 (May), pp. 361-366.

Goodfriend, Marvin (1981), "Discount Window Borrowing, Monetary Control, and the Post-October 6, 1979 Federal Reserve Operating Procedures," Federal Reserve Bank of Richmond Working Paper 81-1 (January).

Grauer, Frederick L.A. and Robert H. Litzenberger (1980), "Monetary Rules and the Nominal Rate of Interest Under Uncertainty," ***Journal of Monetary Economics, 6*** (April), pp. 277-288.

Grossman, Jacob (1981), "The Rationality of Money Supply Expectations and the Short-Run Response of Interest Rates to Money Surprises," ***Journal of Money, Credit, and Banking,*** 13 (November), pp. 409-424.

Hester, Donald D. (1981), "Innovations and Monetary Control," ***Brookings Papers on Economic Activity*** 1, pp. 141-189.

_____ (1982), "On the Adequacy of Policy Instruments and Information When the Meaning of Money Is Changing," ***American Economic Review,*** 72 (May), pp. 40-44.

Hetzel, Robert L. (1981), "The Federal Reserve System and Control of the Money Supply in the 1970's," ***Journal of Money, Credit, and Banking,*** 13 (February), pp. 31-43.

_____ (1982), "The October 1979 Regime of Monetary Control and the Behavior of the Money Supply in 1980," ***Journal of Money, Credit, and Banking,*** 14 (May), pp. 234-251.

Higgins, Bryon (1980), "Free Reserves and Monetary Policy," ***Economic Review,*** Federal Reserve Bank of Kansas City, (July/August), pp. 15-26.

Ho, Thomas and Anthony Saunders (1981), "Bank Behavior, the Structure of the Federal Funds Market and the Effects of Monetary Policy," mimeo (July).

Johannes, James H. and Robert H. Rasche (1979), "Predicting the Money Multiplier," ***Journal of Monetary Economics***, 5 (July), pp. 301-325.

_____ (1981), "Can the Reserves Approach to Monetary Control Really Work?" ***Journal of Money, Credit, and Banking,*** 13 (August), pp. 298-313.

Johnson, Dana and others (1981), "Interest Rate Variability Under the New Operating Procedures and the Initial Response in Financial Markets," in ***New Monetary Control Procedures,*** Federal Rserve Staff Study Vol. 1, Board of Governors of the Federal Reserve System (February).

Jones, David S. (1981), "Contemporaneous vs. Lagged Reserve Accounting: Implications for Monetary Control," ***Economic Review,*** Federal Reserve Bank of Kansas City, (November), pp. 3-19.

Kaufman, Herbert M. and Raymond E. Lombra (1980), "The Demand for Excess Reserves, Liability Management and the Money Supply Process," ***Economic Inquiry,*** 18 (October), pp. 555-566.

Keir, Peter (1981), "Impact of Discount Policy Procedures on the Effectiveness of Reserve Targeting" in ***New Monetary Control Procedures,*** Federal Reserve Staff Study Vol. I, Board of Governors of the Federal Reserve System (February).

King, Robert G. (1981), "Monetary Information and Monetary Neutrality," ***Journal of Monetary Economics,*** 7 (March), pp. 195-206.

_____ (1982), "Monetary Policy and the Information Content of Prices," ***Journal of Political Economy,*** 90 (April), pp. 247-279.

Levin, Fred J. and Paul Meek (1981), "Implementing the New Operating Procedures: The View from the Trading Desk" in ***New Monetary Control Procedures,*** Federal Reserve Staff Study Vol. I, Board of Governors of the Federal Reserve System (February).

Lindsey, David E. (1981), "Nonborrowed Reserve Targeting and Monetary Control," mimeo.

Lindsey, David E. and others (1981), "Monetary Control Experience Under the New Operating Procedures" in ***New Monetary Control Procedures,*** Federal Reserve Staff Study Vol. II, Board of Governors of the Federal Reserve System (February).

LeRoy, Stephen F. (1979), "Monetary Control Under Lagged Reserve Accounting," ***Southern Economic Journal,*** 46 (October), pp. 460-470.

LeRoy, Stephen F. and David E. Lindsey (1978), "Determining the Monetary Instrument: A Diagrammatic Exposition," ***American Economic Review,*** 68 (December), pp. 929-934.

Lombra, Raymond and Frederick Struble (1979), "Monetary Aggregate Targets and the Volatility of Interest Rates: A Taxonomic Discussion," ***Journal of Money, Credit, and Banking,*** 11 (August), pp. 284-300.

Lucas, Robert E., Jr. (1973), "Some International Evidence on Output-Inflation Tradeoffs," ***American Economic Review,*** 63 (June), pp. 326-334.

_____ (1976), "Econometric Policy Evaluation: A Critique" in ***The Phillips Curve and Labor Markets,*** ed. by K. Brunner and A.H. Meltzer, Carnegie-Rochester Conference Series on Public Policy Vol. 1, pp. 19-46.

Lucas, Robert E., Jr. and Thomas J. Sargent (1981), "Introduction" in ***Rational Expectations and Econometric Practice,*** ed. by R.E. Lucas, Jr. and T.J. Sargent, University of Minnesota Press, pp. xi-xl.

Marschak, Jacob (1953), "Economic Measurement for Policy and Prediction" in ***Studies in Econometric Method,*** ed. by W.C. Hood and T.C. Koopmans, Cowles Commission Monograph No. 14, pp. 1-26.

McCallum, Bennett T. and James G. Hoehn (1982), "Money Stock Control with Reserve and Interest Rate Instruments Under Rational Expectations," N.B.E.R. Working Paper No. 893 (May).

Pierce, James L. (1977), "Improving the Monetary Aggregates: An Evaluation of the Report of the Advisory Committee on Monetary Statistics" in ***Optimal Policies, Control Theory, and Technology Exports,*** ed. by K. Brunner and A.H.

Meltzer, Carnegie-Rochester Conference Series on Public Policy Vol. 7, pp. 103-123.

_____ (1980), "Making Reserve Targets Work" in *Controlling Monetary Aggregates III*, Federal Reserve Bank of Boston, Conference Series No. 23 (October), pp. 24-263.

Pierce, James L. and Thomas D. Thomson (1972), "Controlling the Stock of Money" in ***Controlling Monetary Aggregates II: The Implementation,*** Federal Reserve Bank of Boston, Conference Series No. 9 (September), pp. 115-136.

Poole, William (1970), "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model," ***Quarterly Journal of Economics,*** 84 (May), pp. 197-216.

Roley, V. Vance (1982). "The Response of Short-Term Interest Rates to Weekly Money Announcements," mimeo, Federal Reserve Bank of Kansas City (April).

Sargent, Thomas J. (1979), ***Macroeconomic Theory,*** Academic Press, N.Y.

_____ (1982), "Beyond Demand and Supply Curves in Macroeconomics," ***American Economic Review,*** 72 (May), pp. 382-389.

Sellon, Gordon H., Jr. (1980), "The Role of the Discount Rate in Monetary Policy: A Theoretical Analysis," ***Economic Review,*** Federal Reserve Bank of Kansas City, (June), pp. 3-15.

Sivesind, Charles and Kevin Hurley (1980), "Choosing an Operating Target for Monetary Policy," ***Quarterly Journal of Economics,*** 94 (February), pp. 199-203.

Taylor, John B. (1982), "Establishing Credibility: A Rational Expectations Viewpoint," ***American Economic Review,*** 72 (May), pp. 81-85.

Tinsley, Peter and others (1981), "Money Market Impacts of Alternative Operating Procedures" in ***New Monetary Control Procedures,*** Federal Reserve Staff Study Vol. II, Board of Governors of the Federal Reserve System (February).

Tobin, James (1982), "Money and Finance in the Macroeconomic Process," ***Journal of Money, Credit, and Banking,*** 14 (May), pp. 171-204.

Urich, Thomas and Paul Wachtel (1981), "Market Response to the Weekly Money Supply Announcements in the 1970's," ***Journal of Finance,*** 36 (December), pp. 1063-1072.

Walsh, Carl E. (1982a), "Interest Rate Volatility and Monetary Policy," N.B.E.R. Working Paper No. 915 (June).

_____ (1982b), "The Effects of Alternative Operating Procedures on Economic and Financial Relationships," Federal Reserve Bank of Kansas City, Research Working Paper No. 82-08 (September).

Weiss, Laurence (1980), "The Role for Active Monetary Policy in a Rational Expectations Model," ***Journal of Political Economy,*** 88 (April), pp. 221-233.

Discussion

Bennett T. McCallum

Let me begin by emphasizing that I view Walsh's (1982a) paper as a useful and skillfully-executed piece of work. In particular, I strongly agree with the paper's basic contention, namely, that crucial econometric relationships among monetary, financial, and real variables will tend to shift systematically, when policies or policy procedures are altered, unless great care is taken in the formulation and estimation of these relationships. This point is of substantial importance in the analysis of policy and policy implementation, and Walsh demonstrates it quite effectively. In addition, his paper includes several useful observations concerning previous research efforts. I have some reservations, however, about aspects of the specific applications appearing in Sections IV and V. My reasons for these reactions are explained in what follows.

Analysis of Borrowing Behavior

Walsh's basic point amounts, of course, to an application of the "Lucas critique" — so called because of the enormously influential exposition in Lucas (1976) — to the effects of changes in the Fed's operating procedures. It may therefore be useful to recall that the critique is widely agreed to be applicable wherever the econometric (or theoretical) relationships in question are defective in either of two ways. The first of these is the failure to take account of forecasting or expectational behavior on the part of rational individuals or firms, whose expectational parameters[1] will adjust when policies or procedures change since the latter will bring about changes in the dynamic,

I am indebted to Marvin Goodfriend for helpful discussions and to the National Science Foundation for financial support.

1. Parameters that appear in representations of expectations in terms of state variables observable to the agent.

stochastic behavior of variables that the agents take as exogenous and attempt to forecast. The second type of defect stems from a failure to express the relationships in terms of agents' fundamental objectives and constraints, because these are much more likely to be policy-invariant than are supply and demand functions.[2] As Walsh says, for an adequate response to the Lucas critique, typically "only preferences and technology are assumed to be policy invariant."

It is the second of these defects that leads Walsh to doubt the conclusions regarding operating procedures developed in a paper by James Hoehn and myself (McCallum and Hoehn, 1982). In that paper, in which we derive minimum mean-square money stock control errors under different operating procedures, we use a macroeconomic model that fully incorporates rational expectations but relies upon relationships of the supply-demand variety, not justified by explicit maximizing analysis. I would agree with Walsh that the persuasiveness of our analysis is lessened by this aspect of the model.

As it happens, however, the model of intraweek interest rate determination presented in Walsh's Section IV is open to exactly the same criticism. In particular, an important component of the model is the set of equations relating bank borrowing in the three "days" of each week to current and expected end-of-week spreads between the federal funds rate and the discount rate [equations (3) and (3')]. Neither these equations, nor analogous ones describing security demands, are justified by analysis of maximization problems involving banks' objectives and constraints. Instead, the equations are simply posited as plausible and conventional relationships. Thus, just as in McCallum and Hoehn (1982), there is no compelling reason to believe that the parameters — or even the functional forms — would be policy-invariant.

In this respect, the analysis of bank borrowing behavior previously developed by Goodfriend (1981) goes somewhat farther than Walsh's in the direction suggested by the Lucas critique. In particular, Goodfriend poses explicit objective and cost functions for the representative bank, and uses these to derive decision rules. The precise specification is too simple — assumes away too many aspects of reality — to form the basis for an operational, empirically-implementable model. Nevertheless, it serves well to illustrate the point at hand — that changes in

2. This basic point is emphasized by Lucas and Sargent (1981) and by Sargent (1982), among others.

policies or procedures will systematically tend to shift the relationship between borrowing and the current spread.

A few brief additional comments on Walsh's model are warranted. First, its decomposition of the week into distinct subperiods is an interesting step that may prove fruitful in modeling reserve demand. But, second, a satisfactory model will clearly need to describe inter-week movements as well. Third, the formulation in (7) of the Fed's policy rule is rather awkward and implies an indeterminate price-level in the case with $\mu_1 = 0$. Finally, the assumption that excess reserves always equal zero would be inappropriate for the analysis of some feasible operating procedures.

Analysis of Money Demand

Let us now turn to Walsh's section V and his analysis of the effects of policy procedures on the parameters reflecting money-demand behavior. The money-demand function is derived in the context of a portfolio choice problem, with the representative demander depicted as holding only money and bonds. The second of these assets offers the holder a higher nominal return and neither asset provides transactions services, but money tends to be held nevertheless because the nominal return on bonds — the differential between the returns on bonds and money — is random. The implied money demand function is one in which the fraction of wealth held in the form of money is negatively related to the expected nominal rate of return on bonds. As the slope of this relationship depends upon the conditional variance of the nominal bond return, any policy action that affects this variance will also affect the slope of the money-demand function. Consequently, Walsh argues that "a change to a reserve aggregates operating procedure induces a shift in the money demand function. . .[that] that tends to amplify the increase in interest rate volatility which would accompany a reserve aggregates policy" (p. 27).

While this argument is skillfully conducted, I find it rather unsatisfying to certain respects. The first and most important of these concerns the assumption, implicit in the model, that no "bonds" exist that are risk-free in nominal terms. Most monetary theorists would, I believe, accept the contrary judgement of Barro and Fischer (1976, pp. 139-140) that "there are assets, such as time deposits, that have precisely the same risk characteristics as money and yield higher returns. Accordingly, although the . . . portfolio framework has provided the basis

for significant advances in the field of finance . . . , it does not explain the demand for money."[3] And if the main distinction between money and short-term, interest-bearing paper assets resides in their relative transactions-facilitating properties, not their risk characteristics, then it is unclear that a change in interest rate volatility will shift the parameters of the money demand function in the manner suggested by Walsh.

A second reservation concerning the argument involves its use in explaining the large increase in interest rate (and money stock) volatility that has been observed subsequent to the particular change in operating procedures that was effected on October 6, 1979. While it might be that some of the increased volatility has resulted from the type of parameter shift described by Walsh, the fact that an increase occurred does not provide highly convincing evidence in favor of the parameter-shift hypothesis since it is also predicted or explained in other ways. The model in McCallum and Hoehn (1982), for example, implies that an increase in money stock control errors will result from the adoption of a reserve aggregate instrument when lagged reserve requirements are in effect,[4] and the same model suggests a large increase in interest rate volatility. These predictions could also be obtained from less explicit models and should not be surprising intuitively since the use of a reserve instrument in combination with lagged reserve requirements amounts to an indirect (and thus inherently error-ridden) method of using an interest rate instrument.

Another reservation involves the complete macroeconomic model developed in Walsh (1982b), which is used to provide a justification for some of the claims in Section V of the paper under discussion. The problem with this model is that it is not, as claimed, a bona-fide general equilibrium model. More specifically, the various behavioral relationships in that model are not-derived by means of a unified analysis in which all agents maximize well-specified objective functions and all markets clear.[5] While the portfolio balance relation is obtained from a

3. in an earlier paper (1982c), Walsh uses an overlapping generations framework to derive a money demand function similar to that of the present paper. The second asset (besides money) in this model is real capital, the return to which is random. If a risk-free interest-bearing bond were marketed by the government, no "money" would be demanded since it provides no transactions services. For an extended discussion of the role of overlapping-generations models in monetary economics, see McCallum (1983).

4. The qualifying clause should be emphasized; the model suggests that a reserve instrument would be likely to permit better monetary control than an interest rate instrument under a contemporaneous reserve requirements regime.

5. The meaning of the latter requirement will be discussed below.

maximizing analysis, the aggregate supply and demand relations are simply posited. Thus it is not demonstrated that the three relations are consistent with each other. Here, as in Section IV, Walsh stops short of a complete response to the Lucas critique — complete in the sense described by Lucas and Sargent (1981) or Sargent (1981).

General Comments

Having expressed several complaints or reservations about some details of Walsh's examples, let me now reiterate that I think the general theme of his analysis is not only correct but important. It is important, that is, to base policy on analysis using models that are designed to be policy-invariant. It simply makes no sense to do otherwise. In this regard I am compelled to say that I would agree with Walsh's suggestion that the Lucas critique is applicable to the Johannes-Rasche (1979) evidence concerning the accuracy of their procedure for monetary control. I am sorry to have to say that, for I happen to believe that their reserve-based procedure would in fact work very well, but the logic of the point is inescapable.

I would emphasize, however, that the point applies as well to all other existing analyses of which I am aware[6] of the effects of different operating procedures — analyses both empirical and theoretical. And it certainly applies to policy analyses based on so-called "vector autoregressions" (VARs), a fact that I mention because of the prominent role of VARs in some recent discussions of policy [e.g., Friedman (1982) and Gordon and King (1982)]. To me, it is surprising that well-informed economists would at this date consider using VARs for policy purposes, since they are even less appropriate than the traditional econometric models discussed in Lucas's critique. From the papers in question, moreover, it appears that the basic defense for using the VAR procedures in this way is that they were developed by a brilliant econometrician, Christopher Sims. But of course that fact provides no logical justification at all. And Sims's (1982) own recent emphasis on the fact that most "policy" ***actions*** do not constitute changes in ***policies*** — i.e., policy rules or regimes — does nothing to validate the use of the method (which measures the effects of isolated actions) for predicting the effects of changes in policies.

Since I have applauded Walsh's progress in terms of the Lucas-Sargent program for developing policy-invariant models, and have

6. Including those in the Federal Reserve System Staff Study (1981).

criticized him primarily for not progressing more rapidly, some final comments about that program are in order. The first thing that needs to be said about the methodology is that, despite its emphasis on competitive general equilibrium theory, it does not carry any implication that monetary policy is necessarily "ineffective" in the sense in which that term has been used in the rational expectations literature (McCallum 1979, 1980). Second, recommending the use of equilibrium models is not the same as asserting that the behavior of the economy is well-described by *flexible-price* equilibrium models. As Taylor's (1982) paper for this conference points out, these models are difficult to reconcile with the data. What is needed is an extended equilibrium analysis that explains the existence and nature of nominal contracts and thus predicts how they will respond to changes in policy.' Third, the mere step of writing down an explicit optimizing model is (obviously) not a guarantee of success. If the model includes a poorly-specified objective function or constraint, it will be a poor model, explicitness notwithstanding. The virtue of the equilibrium-analysis program is that it involves a particular form of analytical discipline, i.e., it encourages one to think carefully about the behavior of individual agents and about the way in which the actions of many such agents interact. This discipline is valuable, and Walsh's paper should be commended for trying to bring more of it to the consideration of alternative operating procedures.

References

Barro, Robert J., and Stanley Fischer (1976), "Recent Developments in Monetary Theory." ***Journal of Monetary Economics 2*** (April), pp. 133-167.

Federal Reserve System Staff Study, ***New Monetary Control Procedures,*** Board of Governors of the Federal Reserve System, 1981.

Friedman, Benjamin M. (1982), "Using a Credit Aggregate Target to Implement Monetary Policy in the Financial Environment of the Future," ***Monetary Policy Issues in the 1980s, A*** Symposium Sponsored by the Federal Reserve Bank of Kansas City (August).

7. As the development of models of this type will be extremely difficult, one possible reaction by policymakers might be to abandon the whole attempt and formulate policy without reliance on ***any*** model or models. Such a reaction would reflect, I think, a fundamental misunderstanding. A model is; after all, nothing but a coherent analytical framework designed to facilitate thinking about some complex system. The only alternative to using a model of ***some*** type is to be incoherent. The actual issue relevant to the attitude in question is whether to use formal or informal models. The main advantage to a conscientious policymaker of formal, explicit models is that they enable the user (and others) to search for flaws — i.e., logical inconsistencies and counterfactual assumptions.

Gordon, Robert J. and Stephen King (1982), "The Output Costs of Disinflation in Traditional and Vector-Autoregressive Models," ***Brookings Papers on Economic Activity,*** (1981) No. 1, forthcoming.

Goodfriend, Marvin (1981), "Discount Window Borrowing, Monetary Policy and the Post-October 6, 1979, Federal Reserve Operating Procedure," Federal Reserve Bank of Richmond Working Paper 81-2 (September).

Johannes, James H., and Robert H. Rasche (1979), "Predicting the Money Multiplier," ***Journal of Monetary Economics*** 5 (July), pp. 301-325.

Lucas, Robert E., Jr., (1976) "Econometric Policy Evaluation: A Critique," ***Carnegie-Rochester Conference Series on Public Policy,*** Vol. 1, ed. by K. Brunner and A. H. Meltzer North-Holland Publishing Co., Amsterdam.

Lucas, Robert E., Jr., and Thomas J. Sargent (1981), "Introduction," ***Rational Expectations and Econometric Practice,*** ed. by R. E. Lucas and T. J. Sargent University of Minnesota Press, Minneapolis.

McCallum, Bennett T. (1979), "The Current State of the Policy-Ineffectiveness Debate," ***American Economic Review*** 69 (May), pp. 240-245.

_____ (1980), "Rational Expectations and Macroeconomic Stabilization Policy: An Overview," ***Journal of Money, Credit, and Banking*** 12 (November, Part 2), pp. 716-746.

_____ (1983), "The Role of Overlapping-Generations Models in Monetary Economics," ***Carnegie-Rochester Conference Series on Public Policy,*** Vol. 18, ed. by K. Brunner and A. H. Meltzer. Forthcoming.

McCallum, Bennett T., and James G. Hoehn (1982), "Money Stock Control with Reserve and Interest Rate Instruments Under Rational Expectations," NBER Working Paper No. 893 (May).

Sargent, Thomas J. (1982), "Beyond Demand and Supply Curves in Macroeconomics," ***American Economic Review*** 72 (May), pp. 382-389.

Sims, Christopher J. (1982), "Policy Analysis with Econometric Models," ***Brookings Papers on Economic Activity*** (No. 1), forthcoming.

Taylor, John B. (1982), "The Role of Expectations in the Choice of Monetary Policy," ***Monetary Policy Issues in the 1980s, A*** Symposium Sponsored by the Federal Reserve Bank of Kansas City, (August).

Walsh, Carl E. (1982a), "The Effects of Alternative Operating Procedures on Economic and Financial Relationships," ***Monetary Policy Issues in the 1980s***, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, (August).

_____ (1982b), "Interest Rate Volatility and Monetary Policy," Federal Reserve Bank of Kansas City Research Working Paper No. 820-3, (April).

_____ (1982c), "The Demand for Money Under Uncertainty and the Role of Monetary Policy," Federal Reserve Bank of Kansas City Research Working Paper No. 82-04, (May).

15

Discussion

James L. Pierce

It is well known that model parameters are not invariant to shifts in policy regimes. Since Lucas' excellent paper on the subject, economists have paid lip service to the problems raised by regime shifts. Most policy analyses, however, ranging from columns in national magazines and newspapers to more formal work, continue to use models whose parameters are implicitly assumed to be immune to regime shifts.

Carl Walsh departs from standard practice by analyzing how the parameters of a money market model might be affected by the October 1979 change in the Federal Reserve's operating procedures. When the Fed switched from a policy of stabilizing within-month fluctuations in the federal funds rate to a policy of aiming at a path for nonborrowed reserves—while allowing large fluctuations in the funds rate—the probability distributions of asset returns were affected and the parameters of the system changed. Walsh is correct to be distrustful of models whose parameters were estimated from data generated under the old regime to analyze the behavior of the system under the new regime.

There appears to be good reason to be concerned about possible structural changes following the shift in policy regimes. The behavior of financial markets has been difficult to predict and some troublesome puzzles have emerged. While the variance of short-term interest rates rose markedly, as predicted by existing models, the variance of short-term money growth also increased. This was not predicted by existing models and created considerable embarrassment for the Fed since it claimed that the change in operating procedures was needed to achieve closer control over money growth. Finally, long-term interest rates have behaved in a mysterious fashion. Not only has their average level remained higher than seems consistent with reasonable expectations of

inflation, but their variance has also increased. Furthermore, large changes in long-term interest rates accompany unexpected fluctuations in weekly money growth. While there are good reasons for expecting short-term interest rates to move with surprises in weekly money growth, these reasons do not carryover to long-term interest rate.

It is by no means clear that changes in the behavior of interest rates, money growth, and other financial variables are all attributable to the shift in the Fed's operating procedures. Other factors changed at roughly the same time. The unprecedented average level of interest rates, the great uncertainty concerning future fiscal and monetary policies and about future budget deficits have probably played their part. If we are to gain a better understanding of what is going on, however, it is necessary to look at various sources of change in financial markets. Carl Walsh provides us with an interesting start in that direction.

Walsh provides two examples of how parameter changes resulting from the regime shift might have affected the behavior of money and interest rates. He argues that borrowing from the discount window became more responsive to changes in the differential between the funds rate and the discount rate, and the interest elasticity of money demand declined. Walsh shows that these parameter changes tend to increase the variance of both short-term interest rates and of money. Leaving aside for the moment the issue of whether these parameter changes occurred or not, the paper provides a clear and concise analysis of how these parameter changes affect the system. While Walsh's analysis of the stochastic properties of money and interest rates is incomplete because several stochastic factors are not included, the results suggest an answer to the puzzle of why the variance of money increased under the new operating procedures. I shall return to the omitted stochastic factors but first let us turn to some interesting predictions of Walsh's model.

Walsh shows that unexpected movements in the money stock affect interest rates even when market participants do not expect the Fed to change its policy with respect to non-borrowed reserves. This result is important because some observers seem to believe that it is only expectations of changes in policy that produce interest rate movements. With lagged reserve accounting, announcement of the money stock gives information about future required reserves and about future interest rates even if policy is unchanged. Walsh's equation (20) gives a

nice decomposition between the effect on interest rates of money surprises, with expectations, of policy unchanged, and the effect of money surprises on market expectations of changes in Fed policy.

Walsh also uses his model to show that the Fed's proposal to announce a moving average of current and lagged money will not reduce interest rate fluctuations relative to what occurs with reports of weekly money data. His model is a convincing basis for rejecting this bit of hand waving by the Fed.

The paper also contains some telling criticisms of the money multiplier models favored by some economists. He correctly asserts that these are not true reduced forms because their parameters move with endogenous variables in the system. They are not only sensitive to regimes shifts but also to endogenous behavior for a given regime. It is easy to show that shifts in the public's choice between transactions accounts and currency and between transactions accounts and time accounts affect the money multiplier. Thus, money demand affects the money "supply" relation. The money multiplier models do capture some predictable time-series properties in the data. It is dangerous, however, to use them for analyzing the response of the system to changes in exogenous variables. There is no reason to believe that their time-series properties are invariant to the shift in the Fed's operating procedures.

Walsh is careful to treat his borrowing and money demand stories as examples and he concedes that the parameter shifts considered may not be of much practical significance. Despite these caveats, he spends a substantial portion of the paper on rationalizing why the parameter shifts actually did occur. It is here that I have some problems with the analysis.

Walsh's three-period borrowing model is interesting because it clearly illustrates that depository institutions have an incentive to do intertemporal optimization when it comes to their use of the discount window. This involves comparing the current differential between the federal funds rate and the discount rate to the expected future differential. The expected future differential is affected by unexpected movements in money growth. Since the frequency of borrowing is limited by the Fed, institutions have to weigh the benefits of borrowing today against the benefits of borrowing in the future. In Walsh's model, the demand for borrowing from the Fed is affected by the variance of interest rates and under the new regime it is affected by surprises in

reported money growth. He shows that the shift in policy regimes increases the responsiveness of borrowing to a change in the interest rate differential.

It is possible that this change has occurred, but the model is *ad hoc* and it is difficult to put much faith in its predictions. A bothersome feature of the type of model used by Walsh is that the credit rationing behavior of the Fed is left out of the picture. Walsh attributes the lack of infinite demand for borrowing when the funds rate exceeds the discount rate to risk aversion of "banks". This is a weak reed and there is nothing in the model to support this behavior. The actual reason that borrowed reserves are a small proportion of total reserves even when market interest rates exceed the discount rate is that the Fed limits the amount of borrowing. Since the Fed's supply function for credit from the discount window is not specified, Walsh's borrowing function is not a demand function; it is a mixture of supply and demand. This has two important consequences. First, the Fed's supply constraint explains why the amount of borrowing from the discount window only rises to a few billion dollars when the differential of market interest rates over the discount rate rises to hundreds of basis points. We are observing the supply function not the demand function. This suggests a strong nonlinearity in the response of borrowing to a change in the interest rate differential. Second, even if the parameters of the demand function for borrowing by depository institutions did change following the shift in policy regimes, this does not guarantee that actual borrowing changed. It is quite possible that the Fed responded to a change in the true demand function by changing its administration of the discount window. If this occurred there is no reason to expect the change in the "parameters" that Walsh predicts. To address the issue productively it is necessary to have a more careful specification of the true demand and supply relations than one finds in this paper or in the literature generally.

I also do not find Walsh's analyses of why the interest elasticity of money demand changed to be very convincing. He shows that an increase in the variance in the rate of return on nonmoney assets relative to the variance of the return on money increases the demand for money and it decreases the interest elasticity of money demand. It is hard to believe that this portfolio balance story is a very important factor in explaining money demand. There are assets such as overnight RPs, very short-term treasury securities, Eurodollars, and money market

mutual funds that dominate money as an asset for many agents. At the same time that the variance of interest rates increased, the average level of interest rates rose dramatically. There have been massive shifts from noninterest bearing money to these other assets. It is difficult to disentangle the effect of the rise in the level of interest rate from the effects of an increase in their variance. It is my guess, however, that the effects of the level of interest rates has been a much more important factor.

It is likely that the interest elasticity of money demand has fallen. With the increased use of RPs, money market mutual fund accounts, Euro accounts, and similar assets, those agents with the highest elasticity of money demand have essentially stopped using money as it is conventionally measured. This leaves agents with low elasticity and agents who must hold compensating balances as the primary money holders. The switch to other assets tends to reduce the interest elasticity of measured money demand. This is not a result of the increase in the variance of interest rates, however, but rather it is a consequence of innovations in cash management that were prompted by the high level of interest rates. These innovations would have occurred in the absence of a shift in policy regimes provided the Fed would have achieved the same high average level of interest rates with its old operating procedures.

Walsh is critical of existing stimulation studies because they use models whose parameters were estimated using data from the earlier policy regime. One should be suspicious of their predictions. It is important to realize, however, that the short-run interest elasticity of money demand in these models is already very low. For example, the monthly money market model used by the Federal Reserve Board's staff predicted that the variance of short-term interest rates would rise a great deal when policy shifted to a reserve path. While this model may have underestimated to some degree the extent of the increase in variance, its qualitative results were correct. Money market models have done a less impressive job of explaining the increase in the variance of money.

I applaud Walsh for addressing the question of why the variance of interest rates and of money have both increased. Perhaps changes in the parameters of the money demand and borrowing functions are the answer. Since Walsh's analysis of the stochastic properties of the entire system is incomplete, his results must be viewed with skepticism,

however. Much additional research is needed. The issues should be addressed within the context of a fully stochastic model where all behavior relations — both money demand and supply — are subject to random fluctuations and in which covariances are taken into account. Dynamic factors must also be considered because money demand and other behavioral relations appear to be affected by lagged interest rates as well as by their current values. It is also possible that the probability distributions generating the additive errors change when policy regimes change.

I hope that Walsh continues to work on the issues that he raises. Perhaps he can provide a more iron-clad case for explaining the increase in the variance of both money and short-term interest rates. If successful, we can then expect him to explain why the variance of long-term interest rates has increased and why long-term interest rates are so responsive to weekly surprises in the money numbers.

Rejoinder

Carl E. Walsh

I would like to thank both my discussants for their thoughtful comments and to take this opportunity to respond to some of the points they have raised.

Ben McCallum correctly points out that the specifications adopted to describe bank behavior are ad hoc. One would like, in a more complete model, to derive behaviorial relationships from some deeper theory of maximizing behavior subject to constraints. However, the examples of possible dependency of structure on policy were just that — examples. As such, I tried to use very simple models which would focus on one channel by which policy affects structure at a time. For each channel, the focus was on only certain aspects of the model structure while the remainder was assumed, for the purpose of the example, to be policy invariant. McCallum's comments point out clearly the direction which future research in this area should take. Deriving behaviorial relationships explicitly from a maximizing framework should provide models with richer implications for the effects of policy.

Jim Pierce also points out some useful ways in which the model of bank borrowing needs to be extended. Of particular importance is the role of the supply of borrowing and the possibility of an identification problem in describing a borrowings-funds rate relationship as a demand function.

Both discussants question the plausibility of a money demand function derived from a portfolio choice model. The interest rate volatility argument only requires that a rise in interest rate uncertainty decreases the interest rate elasticity of the demand for money. Buiter and Armstrong have shown that this result holds in a transactions demand for money model in which the interest rate is stochastic.

One final point. I was not attempting to argue that the rise in interest

rate volatility which accompanies a shift to a reserve aggregates operating procedure was entirely due to policy induced structure shifts (see Figure 2). Rather, the money demand shift was a source of additional volatility over and above what would be expected when the monetary authority stops smoothing interest rate movements and the model is treated as policy invariant. As I mentioned in the paper, it may be difficult to separate structure shifts from larger shocks; I agree with Pierce's point that it may also be difficult to separate the effects of greater interest rate volatility from those of the recent high level of interest rates.

16

Selecting Monetary Targets in a Changing Financial Environment

Edward J. Kane

In the years since the Accord, the worlds of financial-intermediary competition and Federal Reserve policymaking have changed in many ways. But an awakening Rip Van Winkle would find one thing unaltered: the Fed's steady adherence to a policymaking strategy of intermediate targeting.

Such a strategy has three basic elements: policy instruments, intermediate policy targets, and policy goals. In principle, policy instruments are variables that the Fed controls absolutely, while policy goals are socially desirable developments that Fed officials are statutorily assigned to promote. Fed goals relate to various dimensions of good macroeconomic performance: low unemployment, price stability, a strong dollar, sustainable economic growth, and an improved distribution of income. The Fed's major macroeconomic instruments are reserve requirements, discount procedures, and securities transactions, but it controls a host of supplementary (and less broadly focused) instruments. These include regulation of deposit terms (shared since 1980 with the Depository Institutions Deregulation Committee), stock-market margin requirements, oversight of bank holding-company activities, and credit-allocation powers under various pieces of fair-credit legislation and the just-expired Credit Control Act. Mention should also be made of Fed officials' open-mouth policy: well-publicized declarations concerning the aims and future consequences of current policy actions.

As the name ***intermediate*** target implies, targets stand somewhere between instruments and goals. Target variables differ from goals in that hits are supposed to have little ***direct*** social benefit and misses are simpler to monitor and correct. A goal variable is an index of one aspect of macroeconomic welfare, such as the unemployment ratio or

the average rate of inflation in consumer prices. Hard information on goal variables becomes available infrequently (once a month or once a quarter) and even then observations lag behind events and remain subject to subsequent revisions in value. Because information on goal variables is dated, sparse, and unreliable, policymakers tend to identify alternative indices that can be tracked closely and that theory and empirical evidence agree should move in a predictable and forward-looking way with goal variables. The presumed linkage between movements in targets and current and future movements in goal variables lets targets serve as proxy variables. They are conceived as sighting devices that aid policymakers to take indirect aim on hard-to-track goals. This conception is illustrated in cartoon fashion in Figure 1, which is reproduced from Kane (1980). The policy instrument is portrayed as a cannon that aims proximately through the center of an intermediate-target tube that wheels and pivots to track a heat-seeking missile (intermediate target number two), which itself follows the tiny goal variable (more accurately, the current flock of goal variables) as it wings through the clouds. For those of you familiar with the video game ***Missile Command,*** the Fed may be said to manipulate its second target much as a Missile Command player uses the game's little blue airplane to plot a proper trajectory for rocket launchings from the player's missile base.

For its policy strategy to be complete, it is not enough for the Fed simply to list its instruments, targets, and goals. It must take two more steps: (1) it must spell out differences in the projected linkage between its targets and goals over time spans of different length, and (2) it must explain the feedback processes that lead it to alter the current settings [Brunner and Meltzer (1964), Guttentag (1966)] and even the ***identities*** of the intermediate targets it uses. But the Fed steadfastly refuses to traverse these additional steps. Only the first step in the feedback loop that links the three types of variables is laid out and this only for ***very short*** control periods and acknowledged current targets. Because it seems counterproductive economically, an incomplete control strategy must be politically useful to Fed officials (Kane, 1980). First, as Maisel (1973) explains, an incomplete strategy makes it easier to paper over internal dissent. Second, it minimizes the embarrassment Fed officials might feel in rapidly adapting Fed policy priorities to the ebb and flow of external political pressure.

This paper represents an attempt by an outsider to make sense out of

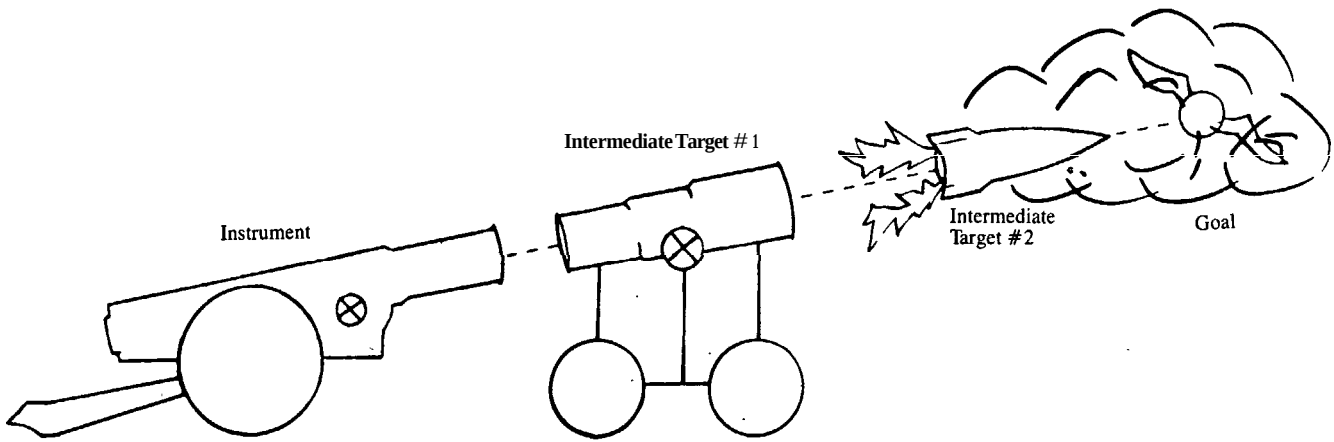


Figure 1
Aligning Instruments With Goals In a Policymaking Framework That Uses Intermediate Targets

the nature and timing of revisions the Fed has made in the set of intermediate targets it pursues and in the operating procedures by which it pursues them. When only ***economic*** goals and constraints enter the formulation of the Fed's policy optimization problem, observed changes in Fed operating procedures typically seem overdue and at least mildly maladapted. Introducing ***political*** goals and constraints into the picture lets us portray changes in the framework of monetary policy as optimizing behavior by savvy but beleaguered agency managers.

Some readers may find the argument clearer if I cast it in algebraic terms. Let g_e and g_p stand for vectors of the Fed's economic and political goal variables, respectively. Let x stand for the vector of Fed instruments and intermediate targets. Finally, let the matrices E and P express applicable economic and political constraints on the use of instruments and targets in pursuit of the respective goals. Traditional economic formulations of the Fed's decision problem hold that it should set x to maximize an objective function $U(g_e)$. This objective function is defined on purely economic goals, and the maximization is subject to economic constraints $Ex = g_e$, given by the structure of the macroeconomy. I maintain that the Fed's decision problem has the following more complex structure:

$$\text{Maximize } U(g_e, g_p),$$

Subject to:

$$Ex = g_e,$$

$$Px = g_p.$$

Efforts made in this paper to infer the identity of specific goals and constraints in particular eras are frankly speculative.

I. Desirable Properties for Intermediate Targets

For readers uncomfortable with analogies that aim weapons of mass destruction at animate targets, I can shift the metaphor to video games and to basketball. For what it's worth, basketball — which features a fixed goal, a moving shooter, and defensive reactions — is the context in which I first encountered intermediate targeting. In one gym our high school team visited, our opponents repeatedly swished shots through the basket from the half-court circle by aiming at a light fixture

in the ceiling. This temporarily disorienting experience taught me four important lessons about intermediate targeting. Targets are most helpful when they meet four conditions:

1. They replace a hard-to-sight or distant target by a "nearer" one.
2. They reduce the dimensionality of the sighting problem.
3. They remain in a fixed relation to the marksman's ultimate goal.
4. They open up an angle of fire against which opposing forces cannot easily defend.

For the intermediate targets proposed historically for use in U.S. monetary policymaking, these four characteristics are never simultaneously met. Choosing an intermediate target means accepting a particular set of tradeoffs among the four characteristics. Poole (1970) and Friedman (1975), along with many others, model the considerations that policymakers should examine in choosing between alternative target frameworks.

Tradeoffs actually made by Fed officials have to be inferred from the changes they make in the set of operative targets from time to time. They have regularly targeted at least two of the following three elements:

1. A measure of commercial-bank reserve positions.
2. The level and volatility of one or more short-term interest rates.
3. Since 1966, growth rates in various monetary and credit aggregates.

Given that random disturbances act upon macroeconomic relations, these three types of targets differ sharply in their "sightability" or nearness to Fed instruments. Excellent data on *nominal* interest rates are available instantaneously, while passable data on bank reserve positions (which for small deposit institutions are largely estimated) are available daily. Preliminary data on growth rates in monetary and credit aggregates develop weekly, but these figures contain substantial amounts of noise.

In addition, the linkages assumed are subject to instability in the short run and may change permanently with financial innovation. Over time; linkages between any instrument and specific economic goals vary both in lag structure and in cumulative magnitude.

We cannot rule out the possibility that, with expanded and well-designed sampling programs, goal variables such as actual and expected rates of growth in GNP, the rates of actual and expected price inflation, and the unemployment rate could be tracked more accurately

from week to week than growth rates in money and credit can. The central bank ought to devote more resources to investigating opportunities for replacing a system of intermediate targeting with a system that produces more-accurate current information on goals and on their expected future values.

Advocates of targeting monetary-aggregate growth rates typically lay claim to high scores on the second and third criteria: reduced dimensionality and predictable linkage to macroeconomic goals. Targeting monetary aggregates reduces the dimensionality of the FOMC's sighting problem in that it resolves policymakers' perennial dilemma as to whether to aim their instruments at inflation or unemployment in the short run. Monetarist economic models hold that well ordered monetary growth leads over time to convergence toward virtually every reasonable macroeconomic goal. In addition, monetarists have amassed a considerable body of empirical evidence on the sightability of altemative aggregates. Johannes and Rasche (1981) indicate that shifts in relations between monetary aggregates and an ***appropriate*** reserve instrument, such as the monetary base, are in practice easy to allow for. Finally, monetary growth rates are far less strongly defended politically than interest rates.

Targeting nominal interest rates or net unborrowed reserve positions scores poorly on linkage and defendedness. Economic and political adaptation to policymakers' use of these targets changes their economic significance. This adaptation illustrates the need to pay attention to the fourth criterion. Much financial change is contingent upon the particular policy actions initiated by the Fed. Microeconomic adaptations are undertaken defensively by any firm, government, or household that finds itself to be heavily burdened by the Fed's pursuit of a particular choice of targets (Kane, 1974). At the same time, these same parties also direct political pressure toward the Fed to give them a break in some way. In the aggregate, these adaptations scale back substantially the net linkage between given movements in the set of nearby targets and in the Fed's distant targets and ultimate goals. Defensive adaptations to actions framed proximately in terms of high ***nominal*** interest rates tend over time to induce procyclical movements in monetary growth and in the inflation rate, converting high nominal interest rates into low (or even negative) ***real*** rates. This occurs because discrepancies between actual and targeted monetary growth lead speculators to anticipate a change in FOMC interest-rate targets. The

Fed's temporary defense of its pre-existing targets produces pread-justment spurts in monetary growth rates. Before October 1979, the Fed was unwilling to force subsequent monetary growth rates low or. high enough to offset such spurts.

Similarly, defensive adaptations to unborrowed-reserves or free-reserve targets tend, by greatly affecting the optimal level of borrowing from the Fed, to make initially plausible target levels consistent ultimately with procyclical movement in various monetary and credit aggregates (Gilbert and Resler, 1980). Finally, because of extensive tax and subsidy interventions into the process of producing money — differential reserve requirements, restrictions on explicit rates of interest payable on traditional forms of money, and inadequacies in the pricing of federal deposit insurance — the growth rate of substitutes for components of a targeted monetary aggregate tends to ***surge*** when growth in that aggregate is curbed and to ***retreat*** when growth in that aggregate is unleashed (Kane, 1979). Since 1965, the pace of institutional change alternately accelerated and decelerated with market rates of interest. Interacting with technological change, deposit-institution regulatory paradigms and Fed .policies have hurried and shaped much of the financial change observed during the 1970s (Kane, 1981).

II. Evolution of Specific FOMC Targets During the 1960s and 1970s

Announcements concerning Fed targets are products of deliberations undertaken by the Federal Open Market Committee (FOMC). Until 1966, FOMC domestic-policy directives to the manager of the System Open Market Account targeted so-called money-market conditions. Monthly directives instructed the Account manager to buy or sell securities to control movements in a subset of target money-market variables: typically, an alleged index of the degree of slack in commercial-bank reserve positions and one or more short-term interest rates.

In effect, open-market operations aimed at developing and maintaining optimal money-market conditions. The rub lay in officials' inability either to establish predictable linkages between their money-market targets and recognized goal variables or to verify the optimality (ex post or ex ante) of the specific targets they chose to pursue. In addition, the tasks of determining both the current state of money markets and what open-market transactions were appropriate

passed in practice largely into the hands of the Account manager in New York. Critics charged that this bureaucratic division of labor resulted in "money-market myopia:" an obsessive concern for smoothing the cyclical course of short-term interest rates, leading to the neglect of slower-developing but more-important macroeconomic goals.

A. The Beginning of a Transition to A Monetary-Aggregates Strategy

Transition to what was advertised as a monetary-aggregatesstrategy began in June 1966. From a hard-headed perspective, this widely heralded transition has yet to be completed. The first step taken was the addition of a "proviso clause" to the FOMC directive. Reminiscent of still-another video game ***(Breakout),*** this clause informed the Account manager that prevailing money-market targets would need to be re-calibrated if total bank credit (as proxied by member-bank deposits) broke out of an agreed-upon range of growth. Between formal FOMC meetings, recalibration was accomplished more or less at the discretion of the Account manager after telephone contact with various members of the FOMC. An intermeeting notification procedure was not yet a part of the directive.

In 1970, growth rates in designated monetary and credit aggregates officially graduated to the position of a trajectory-settingdistant target. The Account manager was instructed to seek money-market conditions "consistent with" an objective of achieving modest growth in these aggregates. By 1972, target money-market conditions were expressed in terms of a reserve aggregate and the federal-funds rate (FFR). When cumulative daily figures on the reserve aggregate broke out of an assigned tolerance range, interim telephone meetings of the FOMC were called at the discretion of the Chairman of the Board of Governors to consider recalibrating the FFR target. Effectively, the first-line reserve aggregate (whose interpretation was greatly complicated by the Fed's reliance on lagged reserve accounting) functioned as a daily proxy for unobserved intraweekly growth in designated monetary aggregates that were themselves seen as proxying longer-term movements in goal variables.

I doubt that a video game whose targeting procedure was this complex could provide enough hits to satisfy an arcade owner's client

base. So it proved for the FOMC, who responded in the middle-1970s by steadily de-emphasizing the reserve-aggregate link between its FFR and monetary-growth targets. During the era, the Fed's game plan was to hold the FFR within a narrow range that according to staff research would prevent growth in *money demand* from breaking out of the latest target range set by the FOMC for growth in the supply of money (see Lombra and Moran, 1980).

In 1974, the FOMC began to report two-month target ranges (dubbed "tolerance ranges") for monetary-aggregate growth rates. Starting in May 1975, the Fed Chairman was requested (under House Concurrent Resolution No. 133), and later required, (under the Humphrey-Hawkins Act) to make a semiannual report to the House and Senate banking committees on the FOMC's target monetary growth rates over the next 12 months. It is widely understood that monetarist forces in Congress hoped that forcing the FOMC regularly to frame and defend its monetary-growth targets relative to a one-year policy horizon would serve as therapy against recurrence of FOMC money-market myopia. Between May 1975 and February 1981, Fed Chairmen presented semiannual reports at quarterly intervals, appearing before the House and Senate Committees in different calendar quarters. Since February 1981, Chairman Volcker has given what is essentially the same report to both committees in the same months. Target ranges selected by the FOMC are summarized in Table 1.

If one supposes that the midpoint of each range represents an acceptable point estimate of FOMC targets, one is led to suspect that outside forces frequently interfere with the Fed bureaucracy's ability to concentrate on its targets. Perhaps the equivalent of a video-arcade owner regularly pulled the plug on the Fed's machine whenever the FOMC threatened to accumulate a decent score.

B. October 1979 Change in FOMC Targeting Procedures

A special October 6, 1979 meeting of the FOMC reoriented the focus of subsequent policy directives as dramatically as a fateful trip to Damascus long ago altered St. Paul's attitude toward Christians. The FOMC's previous strategy combined tightly targeted bounds on the FFR with loose confines on monetary-aggregate growth rates. As shown in Table 2, the new strategy widened targeted bounds on the FFR and greatly narrowed them on monetary-aggregate growth rates. Subsequently, "reserve aggregates" elbowed the FFR out of its place

Table 1: Reports of 12-Month Target Ranges on Monetary Growth Rates First Requested by House Concurrent Resolution No 133 (Quarterly through 1980, Semiannual Thereafter)

Reporting Date	*Reported 12-Month Target Runge (in percent)*		
	MI	*M2*	*M3*
May, 1975	5 0 to 7.5	8.5 to 10.5	10 0 to 12.0
August, 1975	4 5 to 7.5	7.5 to 10 5	9.0 to 12.0
November, 1975	5.0 to 7.5	7.5 to 10.5	9 0 to 12.0
February, 1976	4.5 to 7.5	7 5 to 10 5	9.0 to 12 0
May, 1976	4.5 to 7.0	7 5 to 10 0	9.0 to 12.0
August, 1976	4.5 to 7 0	7.5 to 9.5	9 0 to 11 0
November, 1976	4.5 to 6 5	7.5 to 10.0	9 0 to 11 5
February, 1977	4 5 to 6.5	7 0 to 10.0	8.5 to 11.5
May, 1977	4 5 to 6 5	7.0 to 9.5	8 5 t o 11 0
August, 1977	4.0 to 6.5	7.0 to 9 5	8 5 t o 11.0
November, 1977	4.0 to 6.5	6.5 to 9.0	8 0 to 10.5
March, 1978'	4.0 to 6 5	6 5 to 9.0	7.5 to 10.0
May, 1978	4 0 to 6.5	6 5 to 9.0	7 5 to 10 0
July, 1978	4.0 to 6 5	6.5 to 9.0	7.5 to 10.0
November, 1978.	2 0 to 6 0	6 5 to 9.0	7.5 to 10 0
February, 1979	1.5 to 4.5	5 0 to 8 0	6 0 to 9.0
May. 1979	0 to 5 0	4.0 to 8.5	6.0 to 9 0
July, 1979	1.5 to 4.5	5 0 to 8.0	6.0 to 9 0
November, 1979	3 0 to 6 0.	5 0 to 8.0	6 0 to 9.0
	MI-A	*MI-B*	
February, 1980	3.5 to 6 0**	4 0 to 6 5**	6.0 to 9.0	6.5 to 9 5
May. 1980	3.5 to 6 0	4.0 to 6 5	6.0 to 9.0	6.5 to 9 5
July, 1980	3.5 to 6.0	4.0 to 6.5	6.0 to 9.0	6.5 to 9.5
October, 1980	3.5 to 6 0	4 0 to 6 5	6 0 to 9.0	6.5 to 9 5
February, 1981	3 0 to 5.5	3.5 to 6.0	6.0 to 9.0	6 5 to 9.5
July, 1981	. . .	3.0 to 5 75#	6.0 to 9 0	6.5 to 9 5
February, 1982		2 5 to 5 5	6 0 to 9.0	6.5 to 9 5
July, 1982		2.5 to 5.5+	6 0 to 9.0+	6.5 to 9 5+

Source "Record of Policy Actions of the Federal Open Market Committee" in *Federal Reserve Bulletin* and *Annual Reports of the Board of Governors of the Federal Reserve System.*

Notes

*In 1978, Chairman Miller's testimony was delayed until March 13 by difficulties in clearing his appointment through the Senate Banking Committee.

**M1-A is the sum of two components. (I) demand Deposits at commercial banks other than those due to domestic banks, the U.S government, and foreign banks and official institutions, less cash items in process of collection (CIPC), and (2) currency holdings outside the banking system and U S. Treasury. (This definition parallels the previous definition of MI) Separate tolerance ranges for MI-A were discontinued with the July, 1981 report.

M1-B collapses to M1 in midyear 1982. It is defined as M I-A plus negotiable orders of withdrawal (NOW) accounts, automatic transfer service (ATS) accounts, credit-union share-draft accounts and demand deposits at mutual savings banks.

#This is calculated as the average of ranges set for 1981 and 1982.

TABLE 2

Short-Run Targets in the FOMC's Domestic Policy Directive Between October, 1979 and December, 1981 (data in percentage points unless otherwise indicated)

FOMC Meeting Dare	FOMC *Short-Term Horizon for Monetary* Conrrol *(in months)*	*Percentage Growth* Targeted F o r MI	MI-A	*M1-B*	*M2*	*Intermeeting Range Targeted* for Weekly *Average* FFR *(in percent per annum)*
October, 1979	4	4 5	—	—	7 5	11 5 to 15 5
November, 1979	2	5 0	—	—	8 5	11 5 to 15 5
January. 1980	3	4 0 to 5 0	—	—	7 0	11 5 to 15.5
February. 1980	3	—	4 5	5 0	6.5	11 5 to 18 0[a]
March. 1980	6	—	4 5	5 0	7 75	13 0 to 20 0
April, 1980	6	—	4 5	5 0	6 75	10 5[a] to 19 0
May, 1980	2	—	7 to 7 5	7 5 to 8 0	8 0	8 5 to 14 0
July, 1980	3	—	7 0	8 0	8 0	8 5 to 14 0
August. 1980	4	—	7.0	9 0	12.0	8 0 to 14 0
September, 1980	5	—	4 0	6 5	8 5	8 0 to 14 0
October. 1980	4	—	2 5	5.0	7 25	9 0 to 15 0
November. 1980	4	—	2 5	5 0	7 75	13 Oto 18+[a]
December, 1980	4	—	4 25[c]	4 75[c]	7 0	15 0 to 20 0
February. 1981	4	—	2 0[b]	2.75[b]	7 0	15 0 to 20 0
March. 1981	4	—	—	5 5	10 5	13 0 to 18+[a]
May. 1981	3	—	—	≤3 0	6 0	16 0 to 22 0
July. 1981	4	—	—	7 0	6 0 to 9 0+	15 0 to 21 0
August, 1981	4	—	—	7 0	6.0 to 9 0+	15 0 to 21 0
October, 1981	4	—	—	7 0	10 0+	12 0 to 17 0
November. 1981	3	—	—	7 0[c]	11 0	11 0 to 15 0
December. 1981	5	—	—	4 0 to 5 0	9 0 to 10 0	10 0 to 14 0

Source *Annual Reports*, Board of Governors of the Federal Reserve System

Notes

[a] Indicates changes made in telephone votes taken subsequent to meeting date

[b] At an intermeeting telephone conference, the FOMC agreed to accept "some shortfall" in the growth of these aggregates.

[c] Indicates beginning and end dates for undertaking "shift adjustments" in targets to abstract from the effect of introducing NOW accounts nationwide

as intermediate target number one, knocking it all the way into a subordinate proviso clause. Also, the FOMC lengthened the formal horizon within which short-run control is conceived and, consonant with this longer horizon, went on in 1981 to schedule its meetings at slightly less frequent intervals.

C. What Difference Has the Post-1979 Targeting Framework Made?

With continuing changes in the microeconomic structure of financial competition and with important regulatory and political changes taking place soon after, available data cannot support unambiguous inferences about the effects that the new targeting framework has had on national economic performance. Depending on which economic indices one emphasizes and on how one takes into account other potentially relevant developments, the change in FOMC policy framework can be portrayed as spectacularly successful, relatively unimportant, or absolutely disastrous in its effects.

From the vantage point of midyear 1982, we can only say that the change in targeting procedure has been followed by five macroeconomic developments:

1. Higher interest rates and growth in substitutes for traditional forms of money
2. Generally slower growth rates in the monetary base, M1, and real GNP.
3. An increase in the volatility of interest rates and in the growth rates of monetary aggregates and GNP.
4. Higher unemployment, bankruptcy, and foreclosure rates.
5. A substantial reduction in average rates of inflation.

To go on to attribute these developments to the FOMC's adoption of a new policymaking framework is to commit the logical fallacy of *post hoc*, ergo proper *hoc*. All good economists know better than to fall into this trap, but in the absence of a well-developed alternative theory it is permissible (by Occam's Razor) to employ an unsophisticated perspective simply as a working hypothesis. This paper maintains that changes in FOMC procedures cannot be the ultimate cause of anything. Changes in the Fed's targeting framework are best viewed as administrative responses to changes in economic and political pressures felt by

Fed officials.' In this view, the forces that account for the Fed's differential macroeconomic performance before and after October 6, 1979 emanate from its previous record of policy failure and from the sphere of national and international politics.

III. The Fed and Political Pressure

A. The Fed Has Political as Well as Economic Goals

Since Congress and the President have been content ***not*** to force the Fed to adopt a complete strategy, one can infer that they too find advantages in incompleteness. The advantage that I see is that by leaving the Fed high command a substantial amount of ex ante discretion, elected officials leave themselves room to blame the Fed ex post for things that go wrong. This is what I call the "scapegoat theory of the Fed" (Kane, 1975 and 1980). Overseeing a complete strategy would undercut Fed 'independence' and implicate incumbent elected officials in monetary policy before the fact. Looking always toward the next election, holders of elective offic prefer to position themselves'so that they can choose after the fact which policies to claim and to disclaim. I maintain that the Fed is given just enough autonomy to serve as a plausible scapegoat for elected politicians and that this limited autonomy is bureaucratically desirable enough to make Fed officials work to preserve it. Fed leaders can protect themselves most easily by cultivating good relations with the President, because in a bind he has the power to veto Congressional attempts to attenuate Fed autonomy.

The Fed's autonomy gives it standing and credibility as an institutional force in the nation's political life. Since Fed officials draw personal prestige (both in and out of office) and job satisfaction from this standing, it is natural for these officials to value it. Although through time the Fed's success in promoting consensus economic goals largely determines its political standing, tradeoffs exist for Fed officials between future political standing, bureaucratic autonomy, and current macroeconomic performance.

Chairman Volcker is well aware that, in ten years under Chairmen Bums and Miller, the Fed squandered much of the credibility it had

1. I'do not allege that these responses develop as a consequency of explicit calculation. External conditioning and subconscious calculation of costs and benefits are sufficient.

painstakingly built up during 18 years under Martin's stewardship. Burns and Miller damaged the institution's credibility by overly "open-mouthing" the open-market operations the Fed perennially delivered. Strong pledges that the Fed will steadfastly continue to fight inflation are received too skeptically today to have much impact on rational expectations of inflation. Rational observers look with virtually X-ray vision through Fed promises and react instead to the potentially inflationary economic and political consequences that reside in the federal budget deficits projected for current and future years. They hypothesize that the growing national debt these deficits imply will be monetized if and when elected politicians become convinced that such a course would prove beneficial to them.

B. Political Pressure and Monetary-Policy Targeting

The need to promote its political goals makes Fed monetary-policy targeting a ***political*** as well as an economic exercise. In choosing its intermediate targets, the Fed acts under definite political constraints. In a sense, Fed targets choose themselves, when they emerge as variables into whose movements elected politicians and vocal interest groups read Fed errors of commission and omission. Fed officials show their sensitivity to public criticism in many ways, particularly in friction between the Board of Governors and presidents and research staffs of maverick Reserve banks. Any article scheduled to appear in a Reserve Bank's economic review must undergo a prepublication screening by the Board's staff. This screening focuses on a paper's economic and political content. Toma and Toma (1981) cite some regression evidence indicating that in the 1970s the ***timing*** of relative budgetary cutbacks at the St. Louis and Minneapolis Reserve banks is consistent with the hypothesis that officials of these banks may have been disciplined for publicly criticizing the dominant FOMC conception of how monetary policy works. However, this explanation needs to be tested against specific alternative hypotheses about changes in the division of labor across Reserve banks.

Economic variables that the White House, the Congress, and various interest groups believe that Fed officials ***should*** target cannot help but appeal to Fed officials as targets to monitor and pursue. Economic analysis (e.g., Friedman, 1975, and Gordon, 1982) has traditionally evaluated Fed targets in terms of the firmness and predictability of

hypothesized linkages between System instruments, System targets, and System goals. But to explain shifts in the targets actually used, the political costs and benefits of alternative targets desperately need to be brought into the analysis. Changes made in the operative set of intermediate targets are hard to explain without bringing their effects on popular and political support for the Fed as an institution (Mayer, 1982).

The Fed's policymaking environment may be conceived as an evolving set of economic and political constraints within which the agency's leadership seeks to maximize a stationary objective function. Changes in the set of operative constraints either may be ***exogenous*** to the Fed or may be the ***intended*** or ***unintended result*** of the policies it follows.

Among the most relevant exogenous changes are autonomous shifts in macroeconomic parameters and changes in the external and internal political environment:

1. Changes in the President or in his economic-policy priorities.
2. Changes in the composition of Congress, especially in the leadership of the Senate and House banking committees.
3. Changes in the Fed Chairmanship and, to a much lesser extent, in the membership of the Federal Open Market Committee.
4. Changes in the statutory powers and duties of the Fed.

Descriptions of the instruments and intended effects of Fed policy may be found in any money-and-banking textbook. Chief among the ***unintended*** effects of monetary policy are qualitatively predictable defensive adaptations in individuals' financial accounts and activities that serve in the aggregate to undermine the effectiveness of the specific policy actions the Fed takes. These adaptive reversal or ***undoing effects*** emerge as the cumulative result of reactive economic and political behavior by individual financial-services firms and their customers. This reactive behavior is designed to lessen the burdens that adjustments in policy instruments would otherwise thrust upon them. Undoing effects often greatly reduce the intended net impact of movements in Fed instruments. Of course, the precise pattern of undoing effects that unfolds differs according to the specific policy instruments the Fed uses and the particular intermediate targets through which it pursues its ultimate goals.

To model this dialectical process of doing and undoing, it is necessary to consider changes in the Fed's political and financial environ-

ment as components of a larger process of financial change. Changes in political restraints (such as the 1980 extension of Fed reserve-requirement powers to nonmember deposit institutions) change the optimal set of Fed targets. In turn, changes in Fed targets condition the nature of the undoing effects that take place. Finally, undoing effects that develop take their place as elements in the Fed's policy performance as this is perceived by those able to alter the political constraints imposed on the Fed.

I emphasize the existence of this general dialectic to clarify that, although money-supply targeting greatly speeds up growth in money substitutes (such as overnight and retail repos, money-market funds, and Eurodollars), neither the fact of such growth nor its limited predictability establishes a presumption against money-supply targeting. Arguments to this effect are often disguised statements of political opposition to the ***distributional consequences*** of money-stock targeting. Only by showing that undoing effects on goal variables would be lessened by using a specific alternative target (such as a credit aggregate or real interest rates) can a proper economic case be made.

C. Sources of Continuing Political Pressure for Targeting Interest Rates

Political restraints faced by the Fed reflect the current outcome of an ongoing sectoral struggle over the distribution of the costs and benefits of Fed policies. To sort out winners and losers in the game, it is necessary to make conjectures about the current attitudes of principal players toward the major macroeconomic changes that have occurred since October 6, 1979. My loose decoding of the flow of rhetorical statements appearing in the financial press supports the conjectures embodied in Table 3.

To me, the most striking aspect of the table is the correspondence between Reagan Administration attitudes and views expressed by Chairman Volcker in testifying before Congress. The two parties agree even to the extent of self-protectively blaming the deficit for unpopular macroeconomic developments. One also sees that, except for the President and a monetarist minority in Congress and academia, every sector listed would prefer a monetary policy that would immediately lower and stabilize (i.e., target) real interest rates. Builders and thrift

Table 3: Matrix of Conjectural Mid-1982 Attitudes of Affected Parties Toward Macroeconomic Developments Since October, 1979

	Macroeconomic Developments					
Affected Parties	*Cumulative Rise in Level of Real Interest Rates*	*Increased Interest Volatility*	*Lower Inflation Rate*	*Jumps in Unemployment, Bankruptcy, and Foreclosure Rates*	*Stronger Dollar*	*Larger Federal Budget Deficits*
Reagan Administration	Accept as a short-run cost for slowing inflation in long run	Dislike	Greatly like	Accept in short run for long-run benefits	Like	Like in part
Bulk of Congressional Incumbents	Dislike	Dislike	Like	Fear Greatly	Like	Like better than alternatives
Academic and Congressional Monetarists	Accept in short run for long-run benefits	Blame largely on defects in Fed operating procedures	Greatly like	Accept in short run for long-run benefits	Like	Dislike
World Central Bankers	Liked for awhile	Greatly dislike	Greatly like	See as a source of long-run benefits	Liked for awhile	Dislike
Thrift Institutions	Greatly dislike	Greatly dislike	Like	Dislike	Like	Like in part
Builders	Greatly dislike	Dislike	Unsure	Dislike	Dislike	Like in part
Consumers	Dislike	Dislike	Like	Dislike	Like	Fear
Labor	Dislike	Dislike	Like	Greatly dislike	Dislike	Like in part

institutions complain loudly and tirelessly, as exemplified in the advocacy advertisements reproduced as Figures 2 and 3. The rational-expectations hypothesis implies that sponsors' willingness to expend resources to solicit letters to the Fed Chairman testifies to their belief that acts of political protest influence Fed policy choices. Even world central bankers — reputed to be the major players in the October 6 shift in FOMC priorities and procedures — would prefer now that the Fed shift to a combination of interest-rate and exchange-rate targets.

FIGURE 2

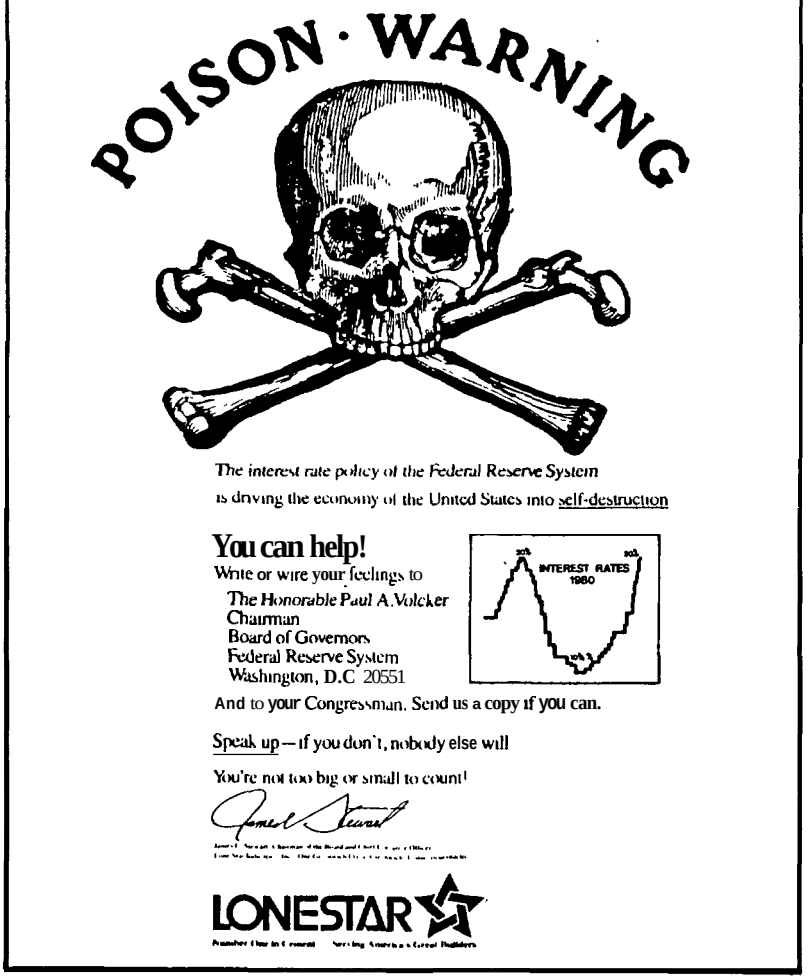
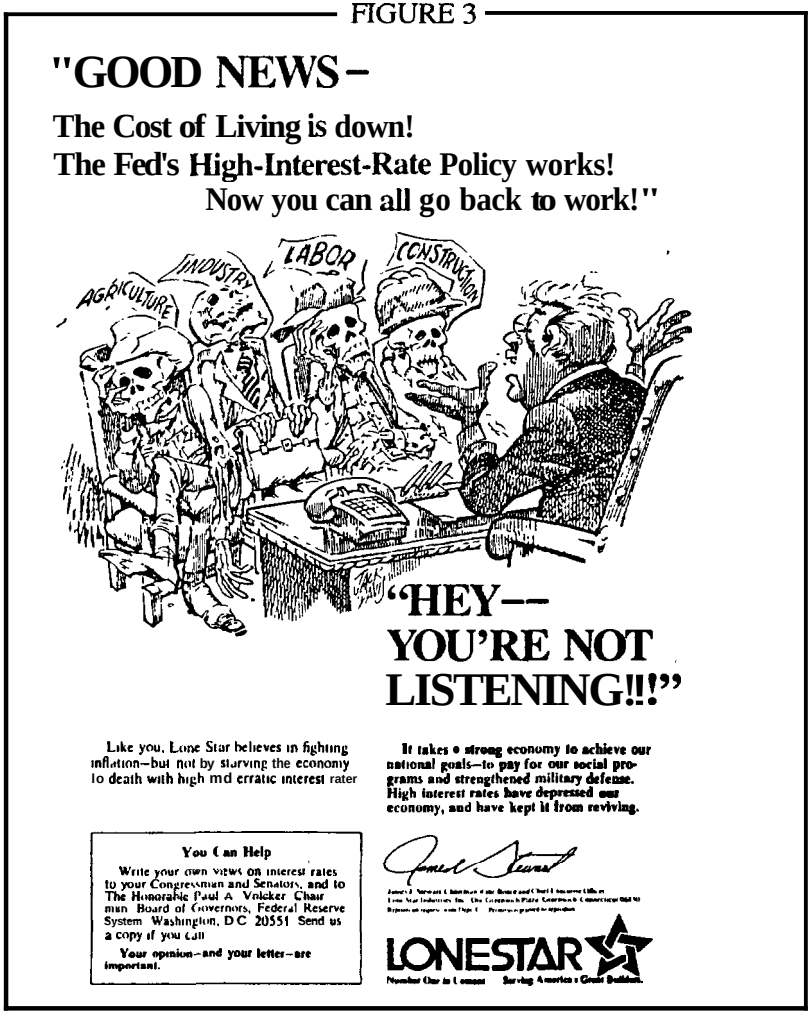


FIGURE 3



To quiet a companion who was raving about the impressiveness of Niagara Falls, Oscar Wilde remarked that the scene would be far more impressive if the water flowed the other way. Many observers put just such a twist on the Fed's post-1979 de-emphasis of nominal interest rates. It would impress capital markets a good deal more if it did not hinge on the continued support of a President whose views on macroeconomic policy diverge sharply from those representative of Congress and of the pool of recognized aspirants to the oval office in 1984.

If the President were to withdraw his support for the current thrust of Fed policies, greater emphasis on targeting nominal interest rates would emerge soon thereafter.[2] Lacking either markets in indexed bonds and price-level futures or an in-place sample survey framework to collect timely information on market participants' expectations of inflation, *ex* ante real interest rates are not yet feasible targets.

IV. Contemporary Monetary-Policy Puzzles

When contemporary Fed watchers get together, two questions dominate the discussion. First, why have U.S. monetary aggregates proved so volatile under unborrowed-reserves targeting? Second, why have interest rates — particularly *short* rates — failed to decline substantially as the rate of price inflation has slowed?

A. Volatility of Monetary Growth Rates

Widespread political opposition to the interest-rate consequences of monetary targeting puts continual political pressure on the Fed to smooth at least day-to-day movements in interest rates. This pressure is reinforced by clientele pressure from banks to ease the particular cost burdens that monetary-stabilization actions place on them. Although banks' clout has been substantially lessened by the resolution of the Fed's membership problem established in the Depository Institutions Deregulation and Monetary Control Act of 1980, it remains an important source of political constraint on operating procedures the Fed may wish to adopt (Kane, 1982b). Taken together, these twin pressures account for the FFR proviso in the FOMC directive, for the Fed's targeting of *unborrowed* rather than total reserves, for its predominant setting of below-market discount rates, and for the Fed's reluctance in the face of prolonged Administration and Congressional criticism to jettison lagged reserve accounting[3]. These elements in the Fed's operating framework protect the banking industry from bearing on a day-to-day basis a larger share of uncertainty costs associated with changes in macroeconomic policy instruments. But spreading these

---

2. It might be observed that, when then-President Carter attacked Fed monetary targeting in October 1980, Fed watchers such as David Jones claimed to see a temporarily increased "concern" for interest-rate movements.

3. In July, the Board of Governors quieted this criticism by proposing to move toward contemporaneous accounting, but only after allowing still-another year for comment and analysis. Because this action only loosely constrains future Fed reserve-accounting procedures, this approach effectively tables the issue.

costs onto other sectors increases the amplitude of the temporary undoing effects in reserve and monetary-aggregate growth that develop when the Fed acts either to inject or to absorb unborrowed reserves.

Seeing a bureaucratically self-interested response to the specific political pressures exerted on the Fed is consistent with careful observers' description of the Fed's re-targeting exercise as one of "de-emphasis" rather than "abandonment" of interest-rate targets. The Fed's post-1979 strategy can be interpreted as one of focusing on not-yet-politicized reserve and monetary targets to create political room for itself to let real interest rates rise sharply. By widening the permissible band of variation in interest rates, the Fed importantly increased its ability to drive real interest rates high enough to act as an effect restraint on future inflation. Taking this perspective, Governor Henry Wallich was quoted in the November 14, 1980 issue of the ***Wall Street Journal,*** as specifically crediting the Fed's de-emphasis of its interest-rate targets with making it politically easier for the Fed "to rally determination" to push interest rates "as high as was necessary."

B. What Keeps Short-Term Interest Rates So High?

It turns out that the answer to the first question forms part of my answer to the second. To construct a satisfactory answer, one must first identify the multifold elements that observed interest rates actually price. Contemporary financial theory conceives of the ***ex ante*** nominal interest rate applicable to a particular financial contract as composed of at least five component elements:

1. An anticipated real after-tax rate of return (the ***adjusted*** interest rate or A-RATE) on the shortest available instrument free of default risk.
2. An allowance for anticipated inflation over the life of the contract.
3. An allowance (which can, in principle, be positive or negative) for the longer maturity of the given contract (an allowance whose value is greatly influenced by the perceived volatility of future interest and inflation rates).
4. An allowance for the risk that the issuer may default (an allowance whose value is also greatly influenced by the perceived volatility of future interest and inflation rates).
5. An allowance for the anticipated **tax** bite on the nominal return.

It is obvious that nominal short-term interest rates are historically very high. But this does not imply that the A-RATE is historically high as well. Evidence exists that several of the add-on allowances are extraordinarily high, too. We can see this by focusing on how recent macroeconomic events should have affected these premiums.

1. ***Inflation Premiums.*** Why might anticipated inflation subside at a much slower rate than observed disinflation? It is easy to explain the resistance of investor expectations to observed disinflation. After being misled repeatedly between 1965 and 1980 by elected and Federal Reserve politicians about the strength of governmental anti-inflation efforts, the average U.S. citizen has become exceedingly skeptical. He (and she) finds it hard to regard the recent slowdown in the rate of inflation as a permanent adjustment. Market participants are afraid to accept at face value the anti-inflationary policy promises being made by President Reagan and Chairman Volcker, especially in the face of intragovernmental disarray over the size of future budget deficits. Today, premiums for anticipated inflation almost surely increase with maturity. Given the distribution of political pressures, a good chance exists that, even if these gentlemen slavishly stick to their promises, they could be replaced by traditionally short-sighted politicians before very long.

'2. ***Maturity Premiums.*** Empirical research on term-structure theory is consistent with the view that maturity premiums represent allowances for lender portfolio risk and illiquidity, each of which ordinarily increases with maturity. However, increased interest-rate volatility and the possibility that permanent disinflation might actually be underway makes the maturity pattern of borrower and lender risks unusual today. If the Fed keeps its promises, more disinflation would occur than is rationally expected, so that long lenders would gain at the expense of long borrowers. Depending on how the odds sort out for marginal borrowers and lenders, the term-premium structure might currently have a negative slope. Corporate fears of loading up with long-term debt — debt that disinflation might subsequently reveal to be embarrassingly high-priced — puts short-term borrowing in great demand today.

3. Volatility and Default Premiums. We have already seen that interest volatility affects the maturity premium. Abstracting from default, a short-term loan may be conceived as an option purchased by the lender to roll his investment over at fresh rates at the next opportunity.

When the possibility of default is allowed, a loan may be regarded as an option sold by the lender that allows a borrower either to deliver a series of promised payments or to accept the penalties associated with default. Option pricing theory indicates that the value of such an option is positively related to the variability of the interest-sensitive and inflation-sensitive capitalized value of enterprises that the borrower may be called upon to forfeit. This effect has been reinforced by added protection against seizure of debtor assets provided under the Bankruptcy Act of 1978, which first went into effect in (you guessed it) October, 1979. The default premium impounded into a given interest rate may be conceived as the value of this option pro-rated over the life of the loan.

4. ***Tax Premiums.*** For otherwise equivalent securities, ratios of yields on tax-exempt and fully taxable securities rise with maturity (Fortune, 1973). This occurs because long-term securities must offer the same anticipated after-tax risk-adjusted yield as a pure capital-gains asset and effective (i.e., discounted) tax rates on capital-gains income fall with the length of the holding period (Kane, 1982a; Kormendi and Nagle, 1982). The interest-rate ratio is particularly low for short maturities. This occurs because favorable capital-gains tax treatment does not apply to any investment held less than a year (six months for commodity futures contracts). Data on short-term tax-exempt yields are hard to come by, but weekly yields on tax-exempt money-market funds are published weekly. We examined data for the four weeks ending June 18 and 25 and July 2 and 9. Over this period, seven of the shortest tax-exempt funds averaged about 9.5 weeks in maturity and 7.35 percent in yield. Even if investors expected inflation to average only 6 percent over subsequent 9.5-week periods, 7.35 percent converts (before adjustment for differential exposure to state and local taxes and for default risk) to an A-RATE of just 1.35 percent.

I also compared the 7.35-percent yield on tax-exempt MMFs with the average yield on five well-established MMFs whose asset maturities (which averaged 5.5 weeks) proved consistently longer than the typical taxable MMF. The ratio of average tax-exempt to taxable MMF yields was 53.5 percent. Abstracting from potential differences in inflation, maturity and default premiums, we may interpret this ratio as implying an effective tax rate of 46.5 percent on short-term investments. As an order-of-magnitude check for maturity effects, we may substitute yields on 60-day dealer-placed commercial-paper or CDs

into the denominator. This leads to even higher estimates, suggesting a marginal tax rate of 50 percent.

Using the 46 percent tax rate, a 16 percent prime rate promises only 8.64 percent after taxes. Next, we assume conservatively that the consensus estimates of per-quarter expected inflation cannot be less than 6 percent, and that prime borrowers (who are on average a good deal less creditworthy than they used to be) have at least a bit more default risk than issuers of dealer-placed commercial paper and funds compos'ed of short-term tax-exempts. These assumptions produce what I regard as an upper-limit estimate of 2.5 percent for the three-month A-RATE.

This decomposition of market interest rates suggests that the question conventionally posed is misconceived. The problem is ***not*** that short-term A-RATES are high today, but that they were so low in the decade and a half prior to October 6, 1979. These low rates produce a legacy of sectoral distortions (especially in housing, consumer durables, and business inventories) that dominate the national economic scene today. The relevant analytic question is to explain how previous Fed policies of targeting a single nominal interest rate managed to hold the A-RATE so ***low*** for such a long time.

V. Summary

I doubt very much that systems that employ a multiplicity of intermediate targets constitute efficient ways to organize decisions about monetary policy. But if intermediate targets are to be used, it is hard to argue that U.S. experience since October 6, 1979, favors targeting nominal interest rates rather than reserve, credit, or money-supply aggregates. In any case, anyone who believes that Fed selection of intermediate targets turns principally on criteria of economic efficiency has an unsophisticatedly narrow view of the Fed's institutional decision problem.

Policy choices embody ***political*** compromises between goals desired by different sectors. Discretionary use of intermediate targets fuzzes over these compromises and lets them be made in a politically less stressful manner. Fed leaders' most important compromises are made between their need to respond to short-run political pressures and their desire to improve the long-run performance of the national economy. In a representative democracy, the tradeoffs monetary

policymakers make must respond to the relative political influence of contending sectoral interests (Hetzel, 1982).

Fed spokespersons have continually affirmed their belief that the economic and political worlds change too rapidly for monetary policymakers to rely on an unchanging policy rule, or even to commit themselves to an explicit model of future linkages between instruments, targets, and goals. Nondiscretionary policy rules are brute-force ways to reduce the force of short-run political pressures. As a mechanism for ensuring consistent decisions over time, policy rules have clear economic appeal. However, a policy rule establishes time consistency only by boxing in the legitimate reaction of sectoral interests to incompletely foreseen policy burdens that such rules thrust upon them. The implied quasi-disenfranchisement of unanticipated losers could impose substantial long-run political costs on all players.

References

Brunner, Karl, and Allan H. Meltzer (1964), "The Federal Reserve's Attachment to the Free Reserve Concept," U.S. House of Representatives, Committee on Banking and Currency, Subcommittee on Domestic Finance, U.S. Government Printing Office, (May 7).

Fortune, Peter (1973), "Tax-Exemption of State and Local Interest Payments: An Economic Analysis of the Issues and an Alternative," New ***England Economic Review,*** Federal Reserve Bank of Boston, (May/June), pp. 3-31.

Friedman, Benjamin (1975), "Targets, Instruments, and Indicators of Monetary Policy," ***Journal of Monetary Economics,*** *1* (October), pp. 443-473.

Gilbert, R. Alton, and David H. Resler (1980), "Conduct of Monetary Policy Under Reserves Targeting," Federal Reserve Bank of St. Louis, unpublished working paper (December).

Gordon, Robert J. (1982), "Money Growth Beyond 1982," paper presented at Meeting of Academic Consultants with Board of Governors of the Federal Reserve System, (April 27).

Guttentag, Jack M. (1966), "The Strategy of Open Market Operations," ***Quarterly Journal of Economics,*** 80 (February), pp. 1-38.

Hetzel, Robert L. (1982), "The Formulation of Monetary Policy in a Nonanalytical Framework," Federal Reserve Bank of Richmond (August), unpublished.

Johannes, James M., and Robert H. Rasche (1981), "Can the Reserves Approach to Monetary Control Really Work?," ***Journal of Money, Credit and Banking,*** 13 (August), pp. 298-313.

Kane, Edward J. (1974), "All for the Best: The Federal Reserve Board's 60th Annual Report," ***American Economic Review,*** 64 (December), pp. 835-850.

_____ (1975), "New Congressional Restraints and Federal Reserve Independence," ***Challenge,*** 18 (November-December), pp. 37-44.

_____ (1979), "The Three Faces of Commercial-Bank Liability Management," M.P. Dooley, H.M. Kaufman, and R.E. Lombra (eds.), Sage Publication, Beverly Hills: ***The Political Economy of Policymaking,*** pp. 149-174.

_____ (1980), "Politics and Fed Policymaking: The More Things Change, The More They Remain the Same," ***Journal of Monetary Economics,*** 6 (April), pp. 199-211.

_____ (1981), "Accelerating Inflation, Technological Innovation, and the Decreasing Effectiveness of Banking Regulation," ***Journal of Finance,*** 36 (May), pp. 355-367.

_____, (1982a), "Tax Exemption, Economic Efficiency, and Relative Interest Rates," *Efficiency* ***in the Municipal Bond Market: The Use of Tax Exempt Financing for "Private" Purposes,*** George Kaufman (ed.), JAI Press, Greenwich: pp. 1-12.

_____, (1982b), "Changes in the Provision of Correspondent-Banking Services and the Role of the Federal Reserve Banks Under the DIDMC Act," Carnegie-Rochester Conference Series on Public Policy, Vol. 16 (Spring), pp. 93-126.

Kormendi, Roger C., and Thomas T. Nagle (1982), "The Interest Rate and Tax Revenue Effects of Mortgage Revenue Bonds," ***Efficiency in the Municipal Bond Market,*** Kaufman (ed.) JAI Press, Greenwich, pp. 117-148.

Lombra, Raymond, and Michael Moran (1980), "Policy Advice and Policymaking at the Federal Reserve," ***Carnegie-Rochester Conference Series on Public Policy,*** Vol. 13 (Autumn), pp. 9-68.

Maisel, Sherman J. (1973), ***Managing the Dollar,*** Norton, New York.

Mayer, Thomas (1982), "Money Stock vs. Interest Rate Targets: An Institutional Approach," ***Kredit und Kapital*** (forthcoming).

Poole, William (1970), "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model," ***Quarterly Journal of Economics,*** 84 (May), pp. 197-216.

Toma, Eugenia F., and Mark Toma (1982), "Research Activities and Budget Allocations Among Federal Reserve Banks," California State University, Northridge.

17

Discussion

Robert H. Rasche

I held two expectations about this session: one proved correct, the second erroneous. First, I knew that FAA regulations would prevent Kane from bringing his Civil War cannon. Second, I anticipated that he would arrive here in his basketball shorts with TV monitor under one arm and Atari under the other, and prepared to caucus in the comer with the assembled members of the FOMC in order to help them improve their intermediate targeting.

Unsubstantiated rumor has it that Kane in fact does have his TV and Atari. Rumor also has it that his basketball shorts were lost, so his noble intention cannot be carried out. This is unfortunate, since my query, as discussant, to the experiment was obviously: "Frankly, don't you feel that Intellivision is more realistic?"

Kane's paper is organized into five sections:

1. A discussion of the process of intermediate targeting.
2. A review of the evolution of Federal Reserve intermediate targeting over the past 16 years.
3. An analysis of current and past Federal Reserve behavior in terms of the "regulatory dialectic."

and then two sections addressing current problems of monetary policy-making:

4. The short-term volatility of monetary growth rates.
5. The persistence of high nominal short-term interest rates in the face of recession and declining inflation rates.

I wish to focus my discussion on the third section of the paper and some extensions of that analysis. I choose to do so, because I agree that Kane has his definitions correct in Section I (and he has a comparative if not absolute advantage over me in video games); he has his history straight in Section II; he has what I view as the correct answer to the

volatility of money growth question, namely, current procedures are a deemphasis not abandonment of interest rate smoothing (see Tinsley, et *al,* 1981); and finally his conjectures about high short-term interest rates are plausible, but they remain just that: conjectures, not refutable hypothesis. This phenomenon is common to all the popular explanations of the short-term interest rate behavior of the past six months: all ultimately seek refuge in unobservable inflation expectations, volatility and/or default premiums or tax premiums. All of these undoubtedly contribute to the recent experience. However, without better measures than I have seen proposed, we cannot discriminate among the various "explanations" currently in vogue, nor can we explain fully why short-term interest rates fell so dramatically in October-November, 1981, only to rise unexpectedly in December 1981, and then persist at high levels.

I find the "regulatory dialectic" framework a potentially useful tool for the ex post analysis of economic policy, particularly as applied by a skilled and witty analyst like Ed Kane. The basic model postulates a utility maximizing regulatory bureaucracy which alters the implicit taxes (regulations) that it can legally impose on its profit maximizing or cost minimizing constituencies. Those constituencies, the regulated, in turn react within their constrained environment in such a way as to minimize the tax burden that they must bear. The unique aspect of this fairly straightforward theory of the regulated firm as applied to the financial sector of the conomy which is not adequately emphasized in Kane's paper is the ability of the regulated industry to react by adopting new production technologies (financial innovations) that in large measure allow them to evade (legally) the implicit taxation. This introduces the complication that the coefficients of Kane's economic constraints are not stationary.

It should be noted that if Kane is correct in his model, then he is asserting that it is inadequate to assert that policy analysis must be based on models that are grounded in preferences and production technology that are invarient to policy regime changes. [Lucas critique]. Kane is asserting that in some cases even such models are subject to the Lucas critique.

The strength of this analytic framework for the ex post analysis of historical policy events strikes me as its weakness in the ex ante analysis of prospective policy actions. To function as a theory capable of generating forecasts about future policy and policy regimes, the

framework requires: (1) an alaboration of the objective function of the regulatory bureaucracy; (2) an explicit statement of the short-run and long-run political and economic constraints against which the regulatory agency .operates; and (3) an understanding of the process of innovation by the regulated firms. I am not surprised that Kane has little to say about implementing monetary targets in a changing financenvironment.. Efforts to model the objective function of the Federal Reserve have not proven particularly fruitful. Indeed from Kane's perspective, all efforts to which I am aware are misspecified, since they exclude the vector g_p. The short-run and long-run constraints on Fed behavior are not articulated (eg. what is meant by the "independence of the Fed" and in what if any sense are intermediate targets given to Congress constraints on Fed behavior). Finally, our standard theories of the firm postulate stationary production functions and seem never to come to grips with the problem of evolving production technologies in the face of changing relative prices.

Unfortunately as a general hypothesis, it is possible that the "regulatory dialectic" could be a dangerous analytic tool in the hands of a "crackpot" analyst, basically because it fails, a priori, to rule out any behavior. Consider the following hypothetical analysis of the 1965-82 inflation experience.

1. The Fed, as a bureaucratic institution, is concerned with the size of its constituency; the regulated banking industry. My evidence in support of this hypothesis is the continual concern over the "membership question" during the whole history of the system.
2. One argument of the Fed's objective function is to preserve or maximize size of the industry under its control thereby, indirectly preserve its primacy among financial regulatory agencies.
3. The Fed observed its constituency declining in importance during the 50s and early 60s because of the rapid growth of nonbank financial intermediaties, particularly S&L associations.
4. The Fed realized that S&L's, because of legal constraints that could not be quickly changed, were highly vulnerable to secularly rising cost of funds.
5. Conclusion: The Fed engineered the 65-80 inflation as a "solution" to the S&L problem which would preserve its primacy among regulatory agencies.

Let me hasten to say that I do not believe this application of the

"regulatory dialectic" analysis; the point is that there is no way to refute the deduced conclusion.

What if anything can be ventured as an answer to the question of implementing monetary policy in a changing financial environment. First, is intermediate targeting dead? I think we can be quite confident that the answer to this question is, No. Intermediate targeting has been the practice of the Fed at least since the 1920s, though historically the preference of the bureaucracy was for targeting on money market conditions not monetary aggregates. Some sort of intermediate targeting is probably required for the institution to continue to operate in a world of "diffuse uncertainty."

Second, if intermediate targeting will continue, will targeting of monetary aggregates continue, or will we see a return to previous regimes of targeting interest rates on even nonquantative targets such as "tightness" or "ease" of the money market (Maisel, 1973)? Kane's Table 3 suggests that there are few if any groups outside the Administration that are pleased with the evolution of the economy since October 1979. This could be read as a forecast of a quick demise of monetary targeting if the Administration were to withdraw its support, as Kane concludes (p. 17). Such a forecast assumes that the alternatives to targeting monetary aggregates impose less severe political and economic constraints on the Fed than does the present regime. I see that as unlikely. A return to nonquantative intermediate targeting does not appear consistent with the preservation and/or improvement of the credibility of the institution. It was abandoned originally because there was no effective accountability in the policy implementation process.

Similarly, a return to targeting interest rates seems outside of the feasible set. Even under the present policy regime, the Fed is harassed for "setting" interest rates. Targeting interest rates would fall victim to setting low interest rates; ultimately this would lead to a replication of the 1966-79 experience, which would totally destroy the Fed as a creditable policy making institution. In short, retreat to the past is not a viable alternative.

Can the Fed restore its credibility by pursuing its current policy of intermediate targeting of monetary aggregates? Success along these lines requires the persistence of stable relationships between (1) the Federal Reserve's policy instruments and the intermediate targets and (2) the intermediate target and the alternate policy goals.

The experience of the past five years suggests that we can be

optimistic on the first of these two issues, in spite of the "undoing" effect of the reaction of the regulated sector to the regulatory regime. It is important to distinguish two types of reactions by the regulated institutions. The first is the reaction within a fixed regulatory environment (financial innovation or changes in the production technology). Estimates of the various components of the relationship between policy instruments and intermediate targets (Johannes and Rasche, 1979, 1981) suggest that this innovative process proceeds in a gradual fashion which should cause no major forecasting problems to the policymakers. The second reaction is that which occurs when there is a major change in the regulatory structure (implicit taxes), such as the introduction of ATS accounts in November 1978 or the legalization of NOW accounts nationwide in January 1981. Reaction to such discrete changes in the regulatory constraints can be sharp and swift when the constraints have been binding. However, experience in the two cases cited suggests that the transition period is very short. The reaction to ATS accounts was over in two to three months based on our models; the reaction to NOW accounts was over in four months, judging from both our models and the Board's staff estimates of "shift adjustments." Transition periods of such short duration should not impinge on longer run monetary control. This conclusion is reinforced by evidence from both our models and the monthly money market of the Board's staff that the changes that have occurred in such transition regimes are of the nature of changes in the constants, not the slopes of various statistical relationships estimated from historical data.

How optimistic should we be about the persistence of a stable relationship between the intermediate target and the ultimate policy goals? Alternatively, we might phrase the question: how stable will the demand for money function be? A prerequisite for answering this question is a definition of money. At this point I shall assume a transactions measure of money is the appropriate measure (i.e. the present M_1 measure) and postpone comments on alternative measures.

Throughout the past decade the question has arisen: has the demand for money function shifted? Using the specifications proposed by Goldfeld (1976), as our standard, the answer to this question is affirmative, though the shifts have been fewer than frequently alleged. Furthermore, while the money regressions run to investigate this subject have not produced a definitive answer as to why the shifts have occurred, the accumulated research, in my judgment, tells us a lot

about the timing and character of the historical shifts, and hence rules out a lot of alleged causes. The work by Hafer and Hein (1982), has gone a long way toward pinning down the shifty Goldfeld specification. They have demonstrated, I think quite conclusively, that the shifts which occurred in the 1970s were relatively few in number, and were constant shifts not slope changes. It seems to me that the revealed nature of the shifts rules out the evolution of Repos or money market mutual funds as major factors in causing instability of the M, money demand equation, since these close substitutes for transactions deposits have continued to grow throughout the latter part of the decade when there is no evidence of continuing shifts in the money demand function. The evidence does not appear to rule out for example, discrete innovations in cash management techniques. Again, if such changes are large, but occur infrequently and with very short transition periods, then the relationship between a transactions measure of money and the ultimate policy goals should be sufficiently stable to make progress toward long-run objectives feasible under monetary aggregate targeting.

My conclusion from all of this is that monetary aggregate targeting is the best hope for the restoration of the Fed's tarnished credibility and the achievement of an acceptable long run economic policy and hence is the procedure that a utility maximizing bureaucracy will continue to employ. I would not conclude that monetary aggregate targeting in its present implementation will necessarily persist, nor should it necessarily persist. I think a good case can be made that the current targeting procedure does not provide a good sighting on the ultimate goal, independent of the the issue of controlability of the monetary aggregate or stability of the money demand function. The current approach to monetary targeting focuses on an objective at a specific point in time, in particular the average value of the measured money stock in the fourth quarter of each calendar year. This has two shortcomings. First, the behavior of the aggregates in the first nine months of the year does not count directly in the target; it, of course, counts' indirectly in that it determines how large an adjustment would have to be made in the fourth quarter to get in the target range. This builds in an excuse for inertia in returning to targets paths. Second. and more serious, is that at presently formulated and presented the end of year target is only loosely related to the "ultimate goal" of getting the long-run rate of monetary growth down to non-inflationary levels.

During the late 1970s we experienced "base draft" with a vengeance, and in spite of the "open mouth" policy of former Fed chairmen, no measurable progress was made toward the stated ultimate goal. Perhaps monetary targeting should be reformulated in terms of objectives for average annual growth rate from some fixed point in time (t_o) to some specified future date. I will admit to not having thought through all of the deficiencies of such a measure, but there are at least two advantages. As $(t-t_o)$ gets larger, this measure is the long-run monetary growth measure that the Fed has agreed is a matter for its concern. Also, by focusng on such a measure, the week-to-week or month-to-month variability induced by the noise in the money control process is greatly reduced from the variability of week-to-week or month-to-month growth that appears to have sensitized financial markets in the recent past.

An explicit association of the current year-to-year target growth rates with the longer-run goal can be easily established. If we view the fourth-quarter to fourth-quarter growth ranges as essentially November-to-November growth ranges, and if we set t_o for present purposes as November 1979, then it is easy to examine the implication of the fourth-quarter over fourth-quarter targets for the long-run cumulative growth rate. The cumulative annual average growth rate of M_1 from November 1979 through November 1981 is 6.09 percent. Obviously, realized annual growth over this period greater than 6.09 percent will result in an increase in the cumulative growth of M_1 at the end of 1982 over that achieved at the end of 1981, and negative progress on the long-run objective. The Fed's monetary policy objectives for fourth-quarter 1982 over fourth-quarter 1981 (February 1982) were for growth of M_1 in a range of 2.5 to 5.5 percent. This range implies a target reduction of the cumulative M, growth from November 1979 by 21 to 123 basis points over the period November 1981 through November 1982.

What can be said about the question that in a world of continuing and continuous financial innovation it is impossible to measure money and hence it is irrelevant to target a particular aggregate, such as M,. This appears to me to be a reincarnation of the position associated with the Radcliffe Committee and Gurley-Shaw with respect to financial intermediates. Money market funds, Repos, etc., are not perfect substitutes for transactions accounts, though they may be extremely close substitutes. Just as the growth of nonbank financial intermediates relative to

commercial banks did not render monetary policy impotent, it is unlikely that the new wave of close "money substitutes" will render monetary policy impotent. Indeed, to the extent that the use of such substitutes continues to grow at the expense of M_1 transactions deposits, I would expect it to induce an increase in the trend growth of M_1 velocity. There is no evidence that this has occurred to date (Tatom, 1982). However, such an implication would seem to warrant continued concern on the part of the Fed for getting long-run monetary growth (measured as transactions deposits) down from its high levels of the late 1970s.

References

1. Goldfeld, S. M. (1976), "The Case of the Missing Money," ***Brookings Papers on Economic Cativity,*** No. 3.
2. Hafer, R. W. and S. E. Hein (1982), "The Shift in Money Demand: What Really Happened?" ***Review,*** Federal Reserve Bank of St. Louis (February), pp. 11-15.
3. Johannes, J. M. and R. H. Rasche (1979), "Predicting the Money Multiplier," ***Journal of Monetary Economics*** (July), pp. 301-25.
4. _____ (1981), "Can the Reserve Approach to Monetary Control Really Work," ***Journal of Money, Credit and Banking*** (August), pp. 298-313.
5. Maisel, S. (1973) ***Managing the Dollar, W. W.*** Norton, New York.
6. Tinsley, P. et. al (1981), "Money Market Impacts of Alternative Operating Procedures," ***New Monetary Control Procedures,*** Federal Reserve Staff Study, Vol. II.

18

Discussion

Raymond E. Lombra

Introduction

.Reflecting the reward structure in academia and sincere disagreements over the conduct of monetary policy, criticisms of Fed actions are in ample supply. More generally, there is little doubt that academic economists and monetary policymakers are frequently disappointed with one another. Part of the problem, according to Henry Wallich, is that "academic economists do not have to live with their mistakes and some of them, therefore, are prone to understate the degree of uncertainty attached to their analyses" (1982, pp. 242-243). Specific impediments to a mutually beneficial exchange of views, which frequently surface at and frustrate participants in conferences such as this one, include the emphasis accorded shorter run technical issues related to the "plumbing" linking instruments and targets, the alleged robustness of the latest regression results, and critical evaluations of the Fed's performance by "outsiders." Ed Kane's insightful discussion of the latter, particularly his observation that depending on one's perspective and preferences, "the [1979] change in FOMC policy framework can be portrayed as spectacularly successful, relatively unimportant, or absolutely disastrous in its effects," vividly illustrates the gulf to be bridged.

In organizing my thoughts, I found it helpful to think about two issues: (1) Why would the Federal Reserve Bank of Kansas City and the System as a whole, already in possession of a highly competent staff with many ideas and reflections of its own, add to the growing list of post-1979 conferences on monetary control; (2) What does Kane's assessment of policymaking hold for the seemingly more mundane

technical, empirical, and analytical issues continually facing the staff and policymakers. The resulting collage follows.

Kane's Psychoanalysis of Fed Policy

Kane's paper brings together a number of important themes which he has developed over the past decade, including the scapegoat thesis and the regulatory dialectic, and assesses their implications for a variety of micro and macro, static and dynamic issues surrounding the formulation and implementation of monetary policy. The resulting careful synthesis provides a more solid and, therefore, more reliable frame of reference for real-world discussions of monetary control issues. Simply put, Kane believes, as do I, that the development of useful theoretical and empirical analyses of the policy process is not often enhanced by studies that abstract from salient features of the political and economic environment within which policy is made or by the natural tendency of policymakers to cover their trails and tails. When combined at the formal analytical level with the ever present and pernicious ceteris *paribus* assumption, which often seems to be taken seriously in the professional literature, the resulting partial-equilibrium, static, macro analysis of various plumbing issues, such as the optimal structure of reserve requirements and reforming the discount facility, abstracting as it does from the dynamic microeconomic adaptations Kane emphasizes, is subject to important limitations.

At the more general and practical policymaking level, Kane's analysis frames and examines the basic issue clearly; whether or not technical adjustments in policy procedures can alter economic outcomes depends to a considerable degree on whether procedures have ever, or can ever, sever the relationship between the so-called ultimate and proximate causes of economic fluctuations. Kane's sobering reflections on this issue suggest that logically prior to designing any alteration in existing procedures or regulations is a recognition that monetary policymakers have and do play a political role in the broadest sense of that term. Reforms that ignore this role may alter the appearance but not the reality of policymaking.

Put more dramatically, are the frequent misses of established targets and the intransigence displayed by policymakers regarding often-suggested procedural and regulatory reforms, the result of incompetence, corruption, or bad luck? I think not. In general, actual or

perceived constraints flowing from the political-social environment combine with uncertainties surrounding the economic outlook and central features of the transmission mechanism. The resulting tension between appearance and reality in a complex policymaking process, developed by Kane, may help to reconcile policymakers' calls for caution and eclecticism in decision making with policy critics' charges of myopia and amnesia.

At a deeper level, Kane's analysis has Kuhnian overtones: why did the Fed change procedures in 1979 when the "technology" had been on the shelf for over a decade and economic performance had been deteriorating for some time? Is the regime change or threshold definable and predictable ***ex ante?*** Less philosophically, are the adaptive forces Kane discusses of the "bang-bang" or evolutionary (gradual) type? On what does the presumably variable pattern and speed of adjustment depend? How precisely do the shock-absorbing properties of different procedures and regulations, discussed extensively by Tinsley (1981), change the distribution of costs and benefits across the Fed's clientele, emphasized by Kane? Are there any predictable aspects of the changing distribution and the resulting adaptive behavior? As Solow once said in another context, an adult could spend a lifetime trying to answer such questions (1979, p. 208). Nonetheless, as Bill Dewald has noted, knowing what you do not know and need to know is the beginning of knowledge (1982, p. 248).

To avoid misunderstanding and to introduce the remainder of my remarks, acceptance of Kane's basic thesis does not in my judgement render this conference, and others like it, nugatory. First, research should not be unduly constrained by what appears politically feasible today; tomorrow may require or tolerate changes which appear remote today. Second, as Willett and Laney (1982) have argued, positive analysis which indicates that political forces have shaped policy (and often produced procyclical and, on balance, inflationary outcomes) does not imply that the ***only*** way to produce a less destabilizing policy is to deal directly with the underlying political and social forces. My own perception is that in the short run the Fed operates in a zone of feasible actions with boundaries that are not unduly narrow or wholly exogenous. The resulting contrained optimization problem admits discussion of a host of issues regarding monetary policy in the 1980s to which I will now turn.

Current Research and Policy

It is doubtful that many students and practitioners of monetary policy view the last 2% years with pride. While the infamous "incomplete success" at Desert One would seem an overly harsh analogy to apply to the volatility of interest rates, money, and economic activity experienced, the sterility and obfuscation of official reviews do tempt one. Leaving the policy record aside for the moment, System personnel have provided numerous useful explanations and evaluations of the intracacies and various technical aspects of the new procedures. However, the aura of precision and coherence which often results from such attempts to make complex matters understandable and tractable for both insiders and outsiders, belies the "judgement", "flexibility", and yes, even ad hocery, which I suspect permeates aspects of the Bluebook, the staff's two-volume and subsequent studies of the current operating procedure, and the actual execution of policy.

To be more specific, the economic rationale for multiple monetary aggregate targets is not obvious. Moreover, do the target ranges for the various aggregates reflect standard control errors or the degree of maneuvering somehow thought desirable? What are the analytical foundations for the shifting emphasis accorded various aggregates? Under what specific circumstances can such vacillation be shown to lead to improved policy? The ambiguities appearing at the strategy level are aggravated by questions raised by the various "adjustments" made in the nonborrowed reserve path and the borrowing assumption. Are the so-called technical adjustments to the path in the face of multiplier errors mechanical and consistent? If they vary in timing or size, what explains the variable adjustment? Similar questions apply to the more fundamental adjustments to the reserve path generated by the deviation of actual monetary growth from target. Of even more interest to monetary economists, are the relationships in the Bluebook among the relevant impact elasticities, implicit lag structures, and the "reentry paths" for the aggregates once they are off target well defined?

Unfortunately, various aspects of the staff's highly competent two-volume study of the new procedures (and various followups), suggest the analytical and empirical foundations for the existing strategy, and therefore the evidence against proposed alternatives, is not very robust. In particular, the poor performance of the borrowing, interest rate, and exchange rate equations which the staff uncovers, along with the questions recently raised about the Board's monthly model by Ander-

son and Rasche (1982), and the much-examined and still controversial perturbations to money demand, make one wonder whether the standard economists' tenet — "It's an empirical question" — is useful or useless in this context.

The degrees of freedom used up in identifying and estimating financial models, emphasized by Cooley and LeRoy (1981), and the finding that favorable simulation properties for money demand equations seem to be obtained only in the presence of ,unrealisticallyslow adjustment speeds (Offenbacher and Porter, 1982), reminds me of something Jim Pierce said some years ago. Reflecting on the ready availability of computer terminals, sophisticated software, and data banks, he speculated that every important macro variable had at some time and place and in some context been regressed against every other variable, thus producing a range of results whose implications for policy and future research were far from obvious. Along the same lines, I wonder about the staying power of the latest apparent winners in the Triple Crown of monetary aggregate correlation derbies — i.e., velocity equations, pseudo-reduced form equations for GNP, and demand or supply equations — namely, Ben Friedman's Credit, from the Radcliffe farm, and Bill Barnett's Divisia, from the Theil farm. Presumably, the tendency to regress one endogenous variable on another and Lucas's critique of policy-related econometric work (1976), coupled with Kane's less restrictive and, therefore, more general theorizing about the dialetical process governing the structural relationships linking the controllers and controllees, will produce healthy doses of both humility and skepticism regarding these and related matters.

Looking Ahead

The ongoing phase-in of the Monetary Control Act will be a force dominating discussions of monetary policy in coming years. Many Fed staffers agree with the position advanced by Bob Rasche; as reserve requirements become more uniform, universal, and contemporaneous, predictions of the relevant reserve aggregate multipliers will improve and the short-run precision of monetary aggregate control will increase significantly. Implementing some widely discussed reforms of discount policy are also believed to be conducive to tighter short-run control. In my judgement, the absence of an adequate model of the dynamic micro behavior of depository institutions, along with the usual

aggregation over the epidemic-like process which characterizes these intermediaries' collective adjustments to shocks, suggest the analytical and empirical macro models which point towards large payoffs to various regulatory and procedural reforms need to be supplemented by models which take account of micro dynamic factors. I take this to be one of Kane's central points. To illustrate, if we don't know anything specific about the volume and composition of reserves depository institutions desire to hold, how can we know whether a given reserve requirement ratio is effective or not, and, if effective, what adaptations are likely?

Although arguable, it does not seem to me that the above perspective immediately and inescapably leads one to the position recently espoused by Federal Reserve Bank Presidents Moms (1982) and Solomon (1981), and by Don Hester (1981). They argue that ongoing financial innovation and technological advances, along with increasing international integration, are in the process of rendering some or all of the monetary aggregates obsolete as policy targets. While some aspects of the underlying arguments are well taken, especially the call to "open up" our traditionally closed-economy models, it must be acknowledged that the growth rate of velocity on average in recent years, as Bob Weintraub and other monetarists have forcefully pointed out, has not yet deviated significantly from longer-term trends. Moreover, as detailed in some recent work by the Board staff, an aggregate encompassing the volume of the means of payment still performs about as well or better than other aggregates in the correlation derbies mentioned above (Offenbacher and Porter, 1982). To be sure, this empirical work does uncover some troubling problems; many coefficient estimates do not seem reasonable and numerous equations do not appear structurally stable over time. Looking ahead, I am inclined to believe that developments such as deposit sweeping and Super NOWs will plague such empirical work even more in the future.

More generally, my own work suggests that the forces leading to and resulting from various changes in regulations and procedures, as emphasized by Lucas and Kane, play an important role in empirical work in this area. To illustrate, our models usually include data points covering most of the last 25 years, a period when the Fed's policy rule imparted considerable flatness to the short-run LM curve. Assuming the current strategy produces a more positively-sloped function, it seems unlikely that our models will be insensitive to such a switch in

regimes. This is, of course, consistent with the analysis in Carl Walsh's paper. Along the same lines, there is evidence that the once important credit availability effects, which were associated with the movement of ***nominal*** interest rates above Reg Q and usury ceilings, have been reduced significantly by innovation and the advent of deregulation. Preliminary research suggests that the changing relative role of nominal and real after-tax interest rates, which may help to explain part of Kane's query about past and current levels of the real rate, has dramatic effects on the short-run dynamic impact of monetary policy on the economy.

An additional potential problem for both monetary targeting and our empirical work has been previewed by the changing character of M2. Over the last several years the proportion of the nontransactions component of M2 bearing market-related yields has risen from essentially zero to about two-thirds. One result appears to have been a more stable growth pattern for this aggregate in the face of considerable fluctuations in interest rates and economic activity, and the deterioration of its performance in some of the types of equations mentioned above. If transactions balances in the 1980s increasingly bear market-related yields, as seems likely, similar changes in empirical relationships may be observed. Moreover, the resulting steepening of the LM curve will presumably amplify the real effects of financial shocks.

Some Concluding Thoughts

Recognizing that the abiding short-run focus of policymakers has rarely meshed well with the abstractions traditionally embedded in economists' models, Kane has encouraged us to examine various monetary control issues from a deeper, broader, more forward-looking perspective. As with many such conceptual exercises, the conundrums which emerge are many and clearcut answers are few. As a result, questions associated with defining and measuring money, estimating supply and demand functions, and designing improved regulations and procedures will continue to plague us. Like with the video games Kane mentions, frustration is part of what addicts us to the study of money and macroeconomics.

References

Anderson, Richard and Robert Rasche (1982), "What Do Money Market Models Tell Us About How to Implement Monetary Policy," American Enterprise Institute Conference on Current Issues in the Conduct of Monetary Policy, (February). (Proceedings forthcoming in ***Journal of Money, Credit and Banking).***

Cooley, Thomas and Stephen LeRoy (1981), "Identification and Estimation of Money Demand, ***"American Economic Review,*** (December).

Dewald, William (1982), "Discussion of Wallich's Paper," in ***The Political Economy of International and Domestic Monetary Relations,*** R. Lombra and W. Witte, (eds.) Iowa State Press, Ames.

Hester, Donald (1981), "Innovations and Monetary Control," ***Brookings Papers on Economic Activity,*** No. 1.

Lucas, Robert (1976), "Econometric Policy Evaluation: A Critique," in ***The Phillips Curve and Labor Markets, K.*** Brunner and A. Meltzer, (eds.) Vol I, Carnegie-Rochester Series on Public Policy.

Morris, Frank (1982), "Do the Monetary Aggregates Have a Future as Targets of Federal Reserve Policy," ***New England Economic Review,*** Federal Reserve Bank of Boston, (March/April).

Offenbacher, Edward and Richard Porter (1982), "Update and Extensions on Econometric Properties of Selected Monetary Aggregates," unpublished memorandum, Board of Governors of the Federal Reserve System.

Solomon, Anthony, (1981), "Financial Innovation and Monetary Policy," paper presented at American Economics Association meeting.

Solow, Robert (1978), "Summary and Evaluation," in ***After the Phillips Curve: Persistence of High Unemployment and High Inflation,*** Federal Reserve Bank of Boston, Conference Series No. 19.

Tinsley, Peter, and others (1981), "Money Market Impacts of Alternative Operating Procedures," ***New Monetary Control Procedures*** Federal Reserve Staff Study - Vol. II, Board of Governors of the Federal Reserve System.

Wallich, Henry (1982), "Policy Research, Policy Advice, and Policymakers," in ***The Political Economy of International and Domestic Monetary Relations,*** R. Lombra and W. Witte, (eds.) Iowa State Press, Ames.

Willett, Thomas and Leroy Laney (1982), "Causes of Monetary Expansion," in ***The Political Economy of International and Domestic Monetary Relations,*** R. Lombra and W. Witte, (eds.) Iowa State Press, Ames.

19

Using a Credit Aggregate Target to Implement Monetary Policy in the Financial Environment of the Future

Benjamin M. Friedman

One of the greatest problems central bankers face is that the financial environment in which they decide on and execute monetary policy is continually changing. Although central banks operate almost exclusively in the financial markets, the basic reason for having a monetary policy in the first place is to protect, or even improve, the nonfinancial economy's ability to deliver economic wellbeing to its nation's citizens. Hence there is always a gulf between what a central bank actually does and the results it seeks to achieve, and without at least some conceptual notion of the bridge spanning that gulf there is no basis for doing anything at all. When the financial environment changes, the bridge connecting the central bank's actions to the nonfinancial economy changes too. The challenge confronting central bankers is then to avoid "fighting the last war" — that is, to see that the conceptual framework by which they make monetary policy does not reflect the old reality while distorting the new one.

In the United States the Federal Reserve System has significantly altered its monetary policy framework several times since World War II, as both the financial environment and other policy considerations have changed. First, the immediate post-war policy of pegging bond prices gave way to that of targeting the net free reserve position of the banking system. Then that policy gave way to setting short-term interest rates, which in turn gave. way to targeting the growth of selected monetary aggregates (first via an interest rate procedure and most recently via a bank reserves procedure). In each case the evolving financial environment was an important factor dictating change in the conceptual framework of policy.

The challenge confronting the Federal Reserve today in this context is to design an appropriate monetary policy framework for the 1980s.

***Some parts of this paper draw heavily on several of my recent papers, especially [10, 12].**

Just as the emergence of rapid and volatile price inflation severely hampered the usefulness of the interest rate framework that it used in the 1960s, changes in financial practices and institutions have already eroded the advantages of the monetary targets framework it has used since the 1970s. Moreover, these financial market changes appear not just unlikely to reverse themselves but, indeed, likely to proceed substantially further. Disillusionment with the monetary targets strategy is already widespread and will probably become more so.

The purpose of this paper is to advocate, as an alternative way to implement monetary policy in the 1980s, a two-target framework focused not only on the money stock but also on the quantity of credit outstanding. No one knows with certainty what the financial environment of the future will be, of course, but a combined money-and-credit framework for monetary policy would have at least two features that are desirable in light of the current direction and momentum of evolution in the U.S. financial markets. First, and most importantly, recent changes in the financial environment suggest that relying exclusively on any one set of signals is unwise. Because it would focus explicitly on the liability as well as the asset side of the economy's balance sheet, a two-target money-and-credit framework would broaden the information base underlying the systematic response of monetary policy to unfolding economic developments. Second, recent changes also suggest that narrow financial aggregates are especially subject to problems of definition associated with financial innovation. Because the available empirical evidence indicates that the appropriate credit measure to use as a monetary policy target is total net credit (that is, the outstanding indebtedness of all U.S. nonfinancial borrowers), the broadness of the credit aggregate would complement the Federal Reserve's apparent preference for the narrow M1 monetary aggregate.

Section I examines the need for a new monetary policy framework by reviewing the recent experience under the monetary targets approach in the particular context of changes in the financial environment. Section II outlines some of the basic notions underlying the use of intermediate targets for monetary policy, and identifies four important criteria for choosing suitable targets. Section III summarizes the evidence indicating that, on each of these four criteria, total net credit represents a potentially useful monetary policy target. Section IV describes the two-target money-and-credit proposal. Section V concludes by summarizing the paper's principal conclusions.

I. The Need for a New Monetary Policy Framework

A useful place to begin in thinking about how to implement U.S. monetary policy in the 1980s is to ask how the Federal Reserve System arrived at the framework within which it implements monetary policy today. From the specific perspective of the financial environment, the key development that led the Federal Reserve to abandon the setting of short-term interest rates, its basic approach to monetary policy as of the late 1960s, was the emergence in the U.S. economy of rapid and volatile price inflation.[1] Once the new inflationary environment took hold in the financial markets, the problems inherent in basing monetary policy on nominal interest rates became apparent.[1]

Although there are a number of reasons why nominal interest rates per se do affect many kinds of activity in the U.S. economy (for example the effect of deposit interest ceilings), most of the logic that suggests a connection between interest rates and nonfinancial economic activity more appropriately refers to real interest rates — that is, the nominal interest rates observed in the market, adjusted for borrowers' and lenders' expectations about inflation. In an era of high and volatile inflation rates, performing this adjustment appeared to be just too difficult. Moreover, the interaction between inflation and the tax code complicates the matter still further, since borrowers can deduct from taxable income the part of their nominal interest payments which serve to compensate lenders for the erosion in value of their outstanding principal, while at the same time most lenders pay tax on this premium.

As the awareness of inflation and its effects became more widespread, therefore, interest rates became less useful as a focus for monetary policy. By contrast, a monetary policy based on the growth of the money stock — an idea that some economists had proposed for a long time — appeared to be unaffected by this new development.[2] The Federal Reserve adopted the monetary targets framework in the early

---

1. To be sure, the emergence of inflation was not an independent event; a different course of monetary policy would have led to a different experience with inflation. In this sense the reason for the demise of the interest rate approach to monetary policy was the conduct of monetary policy under that approach.

2. Friedman [14], for example, argued for a monetary policy focused on the money stock, along just these lines, very early on in the development of the inflation.

1970s, and the M's have occupied center stage in the design and implementation of U.S. monetary policy ever since.[3]

Changes in the financial environment, of course, were hardly the only reason underlying the adoption of the monetary targets framework. The increasing focus on price inflation itself as a major economic policy problem, together with the belief that the rate of money growth placed an effective ceiling on the economy's inflation rate, was an important factor in this development. So too was the belief among many economists that the supply side of the U.S. economy was essentially stable, and that economic fluctuations were due mostly to instability in aggregate demand which a more stable money growth rate could help avoid.[4] Finally, a matter of importance at least to economists was the belief that behavior in the economy's financial markets, including especially decisions by households and businesses about how much money to hold, was more dependably stable than were important aspects of behavior in the economy's product and factor markets.[5]

Now further changes in the financial environment have led to widespread disillusionment with the monetary targets framework. In response to changes in economic conditions, changes in competitive pressures, changes in available technologies (especially for communications and data processing), and changes in government regulations, financial market participants have introduced a wave of new financial instruments and new ways of using old ones. The immediate implication of these innovations — including NOW accounts, sweep accounts, money market mutual funds, money market certificates, repurchase agreements, and so on — is that measuring "money" has become anything but straightforward. Acting in response to these developments, the Federal Reserve Board in 1980 undertook a major redefinition of the major monetary aggregates, in effect abolishing the

3. It is difficult to be precise about when the Federal Reserve began focusing on monetary targets in an important way. Congress did not ask the Federal Reserve to announce its monetary targets in advance until 1975, but the Federal Open Market Committee started including a monetary growth target in its monetary policy directives in 1970. For evidence on the importance of monetary aggregate targets in Federal Reserve policymaking during these years, see De Rosa and Stem [5m, Diggins [6], Feige and McGee [7], and Lombra and Moran [25].

4. The work of Friedman and Schwartz [17] had contributed importantly to this view. See also, for example, Brunner [1] and Mayer [25].

5. Poole [27] first formalized this distinction in the context of the choice of a monetary policy framework, although it was implicit in the earlier work of Friedman and Meiselman [16].

traditional M1 and M2 measures that an entire generation of economists had studied.[6] Further, less sweeping redefinitions of the new M's have subsequently occurred on an irregular basis.

These same changes in the financial environment have also called into question some of the other key presumptions underlying the adoption of the monetary targets framework. The money demand function, once a standard example of an easily estimated relationship to use as an exercise in elementary econometrics course, all but collapsed in its conventional form in the mid 1970s.[7] Subsequent empirical work emphasizing the effects of financial innovations on the demand for money has discovered new relationships that fit the historical data better, but there is little ground for confidence in the face of potential further changes.[8] Similarly, the relationship between the inflation rate and the growth rate of any particular monetary aggregate is now more difficult to pin down. Meanwhile, oil shocks and agricultural price shocks during this same period have powerfully illustrated the importance of instability on the economy's supply side as a cause of economic fluctuations.

For all of these reasons, today's disillusionment with the monetary targets framework now underlying U.S. monetary policy is not simply a matter of unhappiness over the economy's recent performance. After all, any specific adverse economic experience could be due to either poor policy decisions or poor execution, or even bad luck, rather than an inadequate framework. The desire for change today is instead more fundamental, and therefore more persuasive. The well understood propositions that would favor the exclusive reliance on monetary aggregate targets, if they were true, just do not match today's financial environment.

Moreover, the financial environment of the future appears unlikely to revert to its earlier — from the perspective of the monetary targets framework, more hospitable — state. The problem is not just that the innovations of the past ten years are unlikely to be reversed. Freezing financial institutions and practices at today's point of evolution would probably be adequate to provide, after some time, a sufficient basis for whatever confidence in the monetary targets framework

6. See the articles in the *Federal Reserve Bulletin* in January 1979 and February 1980.

7. See, for example, Goldfeld [19].

8. See, for example, Leiberman [24], Garcia and Pak [18], Porter et al. [28] and Simpson and Porter [30].

was appropriate before. The problem, instead, is that change is endemic to financial markets, and the innovations introduced to date are unlikely to be the end of the process.

While the financial innovations of the future are no easier to predict than any other aspect of collective economic behavior, consideration of the innovations of the last decade does suggest two lessons for the design of a framework for implementing monetary policy in the 1980s. First, the effect of financial innovations on the economic relationships that matter for monetary policy is often quite localized. Specific instruments become either more or less attractive, and specific aggregates consequently gain or lose importance without major consequences for many other aggregates. The chief implication of this lesson is that diversification, in the sense of relying on disparate sources of signals, is likely to be superior to exclusive reliance on any one source. Second, the evidence for substitution within financial portfolios is substantially stronger than any evidence found to date on financial-nonfinancial substitutions. Hence a sharp movement of portfolios into some new (or newly am-active) instrument is very likely to be associated with a movement out of something else. The chief implication of this lesson is that broader aggregates, which internalize many such shifts, are likely to be superior to narrow ones.

Within these broad guidelines, the choice of a monetary policy framework for the 1980s is a more open issue today than has been true for quite a few years. As people have continued to examine closely the course of monetary policy and its impact on economic events, they have increasingly begun to question not just the specific stance of monetary policy at any time but also the underlying framework that defines monetary policy at the basic decision-making level. Some students of the subject have advocated a focus on new targets, some have advocated retention of the old ones, and some have advocated abolition of any explicit targets whatsoever. The range of choice is unusually broad, and the issue is of paramount importance.

II. Using and Choosing Monetary Policy Targets

Central banks have often found it useful to formulate and implement monetary policy by focusing on some intermediate target or targets. Under an intermediate target strategy, the central bank specifies some

financial variable(s) — in the United States today, the major monetary aggregates — to stand as proxy for the real economic targets at which monetary policy ultimately aims, such as economic growth, price stability, employment, and international balance. The result is, in effect, a two-step procedure. The central bank first determines what growth of the intermediate target is most likely to correspond to the desired ultimate economic outcome. It then sets some operating instrument over which it can exert close control — in the United States either a short-term interest rate or, since October 1979, the quantity of reserves — so as to achieve that growth rate for the intermediate target itself.

The essence of the intermediate target strategy is that, under it, the central bank is required to respond quickly and fully to any information reflected in the movements of whatever the intermediate target happens to be.[9] Under the current framework in the United States, with monetary aggregates used as the intermediate targets, any movement in the public's money holdings immediately creates a presumption that the Federal Reserve System should react. In principle the Federal Reserve is always free to change the money growth targets, of course, but in practice it is typically reluctant to do so. The intermediate target strategy instead calls for actions aimed at regaining the stated targets, so that the economic signals contained in movements of the monetary aggregates create a presumption of immediate response. By contrast, the presumption of this strategy, strictly implemented, is that there will be no response to signals arising from other sources but not reflected in the intermediate targets.

If the intermediate target strategy with the monetary aggregates as the central targets is faulty, what should the Federal Reserve do in its place? One plausible response to the changed circumstances summarized in Section I would be to reject the usefulness of any intermediate target at all for monetary policy. Without an intermediate target, the Federal Reserve would focus its policy directly on the nonfinancial economy — which, after all, constitutes the ultimate reason for having a monetary policy. For example, some economists have argued that the Federal Reserve should directly target the growth

---

9. Brunner and Meltzer [2, 3] provided the first systematic analysis of the role of intermediate targets for monetary policy. The "information variable" interpretation relied on here was developed in Kareken et al. [23] and Friedman [8].

rate of nominal gross national product.[10]

Such a direct approach may well constitute the most effective policy framework, and an informed public discussion of the idea would be highly useful.[11] Primarily for reasons that are more political than economic in any narrow sense, however, both the Congress and even the Federal Reserve itself appear firmly committed, at least for the immediate future, to having some kind of intermediate target to facilitate monitoring monetary policy on an ongoing basis. If the Federal Reserve simply reported to Congress a target for nominal income growth, for example, there would be no straightforward way to determine after the fact whether a failure to meet this target reflected an inappropriate monetary policy, an inconsistent fiscal policy, unexpected oil or other supply shocks, or still other relevant factors. In order to judge whether monetary policy in particular is (or has been) on the promised course, it is necessary to move the discussion of monetary policy to a point in the economic process closer to the source. Intermediate targets, whatever their other failings, do just that. The central factor dictating their use today is probably the desire to provide at least some form of accountability of monetary policy in this sense.

The question at hand, then, is whether there is some alternative intermediate target that the Federal Reserve can use in addition to (or possibly even instead of) the monetary aggregates, as a focus of monetary policy. To be sure, an enormous variety of financial variables is available for this purpose. The problem is not just finding potential targets but identifying targets which, if used, would lead to a superior performance for monetary policy.

The structure of the intermediate target strategy itself suggests four important criteria for choosing a suitable target. First, and most obviously, the target should be closely and reliably related to the nonfinancial objectives of monetary policy. Despite the proven seductiveness of discussions about whether any given M will or will not be within the announced target range, it is important never to lose sight of the simple truth that any such aggregate has no policy significance in and of itself.

---

10. The idea of targeting the growth of nominal income, while economic preferences presumably refer to real growth and price inflation separately, usually reflects the view that monetary policy can affect nominal income but not its division into real and price components; see Friedman [15] for a theoretical statement along these lines. By contrast, the evidence presented in Friedman [11] indicates that separating the real and price components of nominal income is important for understanding how monetary policy affects nonfinancial economic activity.

11. **Elsewhere [8, 9] I have also argued for a form of the direct approach.**

What matters is the effect of monetary policy on the nonfinancial economy, and intermediate targets not reliably related to that effect have no role at all to play in the monetary policy process.

Second, the relationship between the intermediate target and nonfinancial economic activity should be more than that of a mirror providing a reflection. For example, targeting a financial aggregate that just moved in step with nominal income, without affecting the subsequent movement of nominal income, would provide no advantages over directly targeting nominal income itself.[12] Instead, movements of the intermediate target should contain information about the future movements of the nonfinancial objectives of monetary policy.

Third, the intermediate target should be closely and reliably related not only to the nonfinancial objectives of policy but also to the operating instruments that the central bank can control directly — in the U.S. context, once again, either reserves or a short-term interest rate. For example, although common stock prices in the United States are a well known'leading indicator of business activity, there is little evidence to suggest that the Federal Reserve could exert sufficiently close control over the stock market to make it a good monetary policy target.[13] There would be little point in having an intermediate target that the central bank could not expect to affect reasonably closely, within some plausible time horizon determined by considerations of what matters for the economy as well as what provides political accountability.

Fourth, at the most practical level, data on the intermediate target must be readily available on a timely basis. An aggregate not measured until long afterwards is of little operational value. Moreover, the relevant data must be not only available but also reasonably reliable.[14]

---

12. An exception, which is probably not of much practical importance, is the case in which data on the aggregate are available before data on income. The data-lag case has received a good deal of attention in the literature, primarily because it is isomorphic to the more relevant case of structural economic lags; see **Friedman [8].**

13. Shiller [29] has also questioned the central bank's ability to influence real interest rates. Although most economists have accepted the central bank's ability to control short-term interest rates, at least over short time horizons and in nonpathological circumstances, doubt about the ability to control long-term interest rates is of long standing.

14. An outstanding example of a monetary policy error due to inaccurate data occurred in the early summer of **1974** when, despite the recession, the Federal Reserve allowed interest rates to rise to record highs because the then-available data indicated that money growth during that spring had far exceeded the specified target range. In fact, data now available indicate that money growth was within range throughout the spring of 1974.

These four criteria will largely determine the suitability of any financial variable — including the monetary aggregates as under the current framework, or a credit aggregate as proposed in this paper, or for that matter any other alternative — as an intermediate target for monetary policy.

III. Evaluating Credit as a Monetary Policy Target

The proposal of a credit target for U.S. monetary policy rests on the finding that at least one specific credit aggregate, total net credit (the outstanding indebtedness of all U.S. nonfinancial borrowers), satisfactorily meets each of the four criteria for a suitable intermediate target stated in Section II. Before proceeding to such a conclusion, it is essential to ask at the outset, "satisfactory" in comparison to what? Because the current framework used by the Federal Reserve System relies on monetary aggregate targets, the immediate standard required to support a proposal to use a new target in place of the M's is that the new target must meet these four criteria better than do the monetary aggregates that are the current focus of monetary policy, and the standard for a proposal to use a new target together with the M's (or at least one M) is that the new target meet these four criteria as well as do the monetary aggregates. The available evidence indicates that the total net credit aggregate does meet the latter standard.

A. Relationship to the Nonfinancial Economy.

Results based on a variety of methodological approaches consistently indicate that total net credit in the United States bears as close and as stable a relationship to U.S. nonfinancial economic activity as do the more familiar asset aggregates like the money stock (however defined) or the monetary base. Moreover, in contrast to the familiar asset aggregates, among which there seems to be less basis for choice from this perspective, total net credit appears to be unique in this regard among major liability aggregates. Unlike the asset aggregates, the stability of the relationship for total net credit does not just represent the stability of a sum of stable parts.

The U.S. nonfinancial economy's reliance on credit, scaled in relation to economic activity, has shown almost no trend and but little variation since World War II. (See Figure 1.) After falling from 156

percent of gross national product in 1946 to 127 percent in 1951, and then rising to 144 percent in 1960, total net credit has remained within a few percentage points of that level ever since. (The yearend 1981 level was 143 percent.) Otherwise it has exhibited a slight cyclicality, typically rising a percentage point or two in recession years (when gross national product, in the denominator, is weak) and then falling back. Although the individual components of this total have varied in sharply different directions both secularly and cyclically, on the whole they have just offset one another. In brief, the secular rise in private debt has largely mirrored a substantial decline (relative to economic activity) in federal government debt, while bulges in federal debt issuance during recessions have mostly had their counterpart in the abatement of private borrowing..

The first four columns of Table 1 summarize the stability of the ratios to gross national product of six financial aggregates — total net credit and five others — by showing 'the coefficient of variation (standard deviation normalized by mean) for each ratio computed from both annual and quarterly U.S. data over the 1959-80 sample period.[15] In each case the table shows the coefficient of variation computed from raw data, and also computed from detrended data. Total net credit consistently displays the smallest coefficient of variation among the six aggregates, and by a substantial margin, regardless of whether the data are annual or quarterly, or raw or detrended.

What matters for monetary policy, of course, is not just stability in the sense of zero time trend but stability in a more subtle (and, importantly, a dynamic) sense. Simple ratios of precisely contemporaneous observations may therefore fail to capture the relevant concept of stability in the relationship among variables that move over time with some general lead or lag pattern between them. The remaining columns of Table 1 present the respective standard errors, coefficients of determination and Durbin-Watson statistics of six estimated regression equations, in each case relating the growth of nominal gross national product to a moving average of the growth of one of these six financial aggregates listed in the table, plus a moving average of a fiscal

15. The three monetary aggregates all follow the Federal Reserve's new (post-1980) definitions. The reason for including bank credit is that the Federal Reserve currently reports a bank credit target to the Congress, along with the targets for the monetary aggregates. Table 1 is from [12], as are Tables 2 and 3 below. For a more thorough examination of this evidence, including earlier sample periods and pre-1980 definitions of the monetary aggregates, see [13].

policy measure. The equations are estimated, again using quarterly data for 1959-80, in the familiar form made popular by the Federal Reserve Bank of St. Louis.[16] Here again total net credit exhibits a closer relationship to nominal income than any of the other aggregates except the narrow money stock.

Other, more sophisticated methodologies lead to essentially the same results. In part because of the extent to which regressions of the St. Louis form have been discredited by a variety of criticisms, researchers examining the money-to-income (or, here, credit-to-income) relationship have increasingly turned to "vector autoregression" methods that allow for a richer dynamic interaction between money and income by relating the variation of income not to the entirety of the variation of money but only to that part of it which cannot already be deduced either from the past history of money itself or from the joint past history of both money and income.[17] In this context a key indication of the stability of the relationship to income of any financial aggregate is the behavior of that relationship following just such an "innovation," or unanticipated movement, in the aggregate (or in income). In addition, a further aspect of the tendency in recent research to avoid simple nominal income regressions of the St. Louis form has been a reluctance to ignore the distinction between the real and price components of nominal income variation. Hence some researchers have also treated real income and prices separately in carrying out this kind of analysis.

Results of using the vector autoregression methodology again indicate that the relationship between total net credit and nonfinancial economic activity is as close as is the analogous relationship for any of the monetary aggregates.[18] Indeed, these results reinforce those for the St. Louis regressions shown in Table 1, in that they suggest the superiority of total net credit and the M1 money stock over other monetary or credit aggregates. An "innovation" in either M1 or total net credit apparently leads to movements of both real income and prices which equickly restore the initial relationship between the aggregate and nominal income. Other aggregates exhibit this property to a noticeably lesser extent.

---

16. See [12] for the details of the specification.
17. See Sims [32, 33] for the development and application of the vector autoregression technique.
18. For the specific results and details of the method used, see [12, 13].

Finally, it is important to point out that the stability of the credit-to-income relationship is a phenomenon in no way restricted to the United States in the post-World War II period. The U.S. nonfinancial economy's reliance on credit relative to economic activity has shown essentially no trend not just over the past thirty years but over the past sixty. (The 1921 level was also 143 percent.) Nonfinancial borrowers' outstanding debt rose significantly in relation to gross national product only during the depression years 1930-33, when the economy was deteriorating rapidly and many recorded debts had defaulted de facto anyway. Otherwise the postwar stability in the United States appears to be a continuation of a pattern that dates back at least six decades. Among foreign economies, empirical research thus far has demonstrated a similar comparability of the credit-to-income and money-to-income relationships in Britain, Canada, Germany, and Japan.

In sum, there is ample ground for believing that total'net credit, measured by the total outstanding indebtedness of all of the economy's nonfinancial borrowers, is as closely related to nonfinancial economic activity as are the monetary aggregates which are so central to today's monetary policy framework.

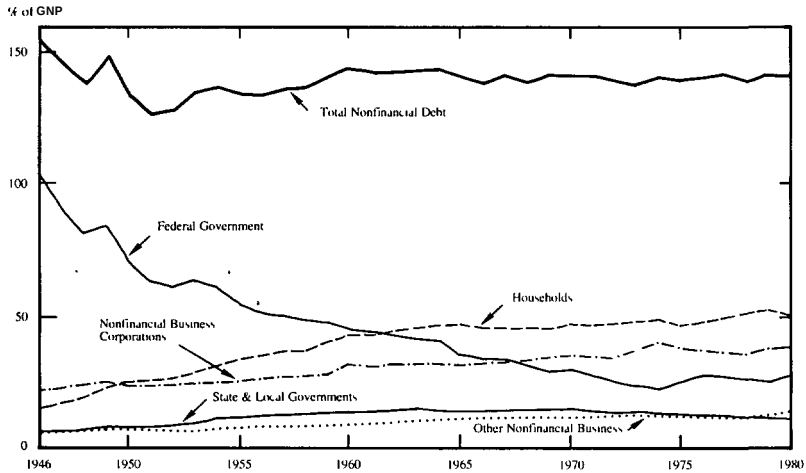
B. Information Content of the Relationship.

The finding that the credit-to-income relationship is as regular and as stable as the money-to-income relationship would be of little interest in a policy context if the economic behavior underlying these results were such that money "causes" income while income in turn "causes" credit. In that case movements of total net credit would simply mirror movements of income, and credit would be no more useful a target for monetary policy than income itself. Causality among economic phenomena is a difficult issue to resolve empirically, but some methods do exist for examing the available evidence. Results based on two such methods sharply contradict the notion that the causal link between credit and income is such as to vitiate the usefulness of the relationship for monetary policy.

First, in so far as the concept of causality that matters in this context is equivalent to econometric exogeneity, the results are not consistent with any simple notion that money causes income while income causes

FIGURE 1

OUTSTANDING DEBT OF U.S. NONFINANCIAL BORROWERS



credit.[19] If anything, they suggest the opposite. Table 2 summarizes the evidence on these relationsips, based again on quarterly data for 1959-80, by presenting F-statistics for a series of tests of the null hypothesis that all of the coefficients on one variable are zero, in each successive equation in several systems of regressions relating real income, prices, the M1 money stock, and total net credit.[20] Credit plays a more significant role in determining the variation of either real income or prices in the middle panel than does money in the top panel. Similarly, both real income and prices are highly significant in the money equation in the top real income and prices are highly significant in the money equation in the top panel, but only prices are (marginally) significant in the credit equation in the middle panel. Moreover, the corresponding results shown in the bottom panel of the table for the four-equation system including all four variables at once are also inconsistent with any simple money-then-income-then-credit reasoning.[21]

19. The association of causality with econometric exogeneity is due to Granger [20]; Sims [31] first introduced it in the macroeconomics literature in the context of monetary policy questions.

20. See [12] for details of the estimation method used.

21. The exogeneity test results shown in Table 2 differ in several interesting respects from those presented in [11] on the basis of the pre-1980 definition of M1 and the 1953-78 sample period. In brief, the earlier results indicated more fully parallel roles for money and credit.

TABLE 1
COMPARATIVE STABILITY TESTS FOR RELATIONSHIPS TO NOMINAL INCOME

	Coefficient of Variation				*Regression Results*		
	Annual Data		*Quarterly Data*		*Quarterly Data*		
	Raw	*Detrended*	*Raw*	*Detrended*	*SE*	$\overline{R^2}$	*DW*
Aggregate							
Total Net Credit	0.012	0.012	0.014	0.013	0.00789	0.37	2.15
Bank Credit	0.053	0.032	0.055	0.033	0.00871	0.24	1.77
M1	0.192	0.021	0.188	0.020	0.00756	0.41	2.01
M2	0.024	0.024	0.023	0.023	0.00811	0.32	1.76
M3	0.057	0.024	0.058	0.025	0.00827	0.29	1.71
Monetary Base	0.053	0.019	0.125	0.018	0.00843	0.28	1.91

Second, the "variance decomposition" technique of vector autoregression analysis directly addresses the question of how much independent information movements of one variable contain about subsequent movements of another — the precise question that matters in the context of using intermediate targets for monetary policy. The specific results of any one variance decomposition exercise depend heavily on the sample period used, the time horizon considered, and the ordering in which the variables in the analysis are considered. Nevertheless, the results of applying this method for a range of different sample periods, horizons and orderings consistently suggest that total net credit does contain information about future movements of real income and prices which is both statistically significant and economically substantial. Moreover, in most cases the results indicate that total net credit contains more information about real income and prices than does the M1 money stock.[22]

C. Relationship to Monetary Policy Instruments.

The broader the scope of any financial aggregate — on either the asset or the liability side of the economy's balance sheet — and the greater the variety of institutions and individuals involved in supplying and demanding it, the more problematic at the a priori level is the connection between that aggregate and the instruments under the central bank's direct control. Even in the case of the narrow money stock, the number and complexity of the linkages relating M1 movements to movements of reserves (or the monetary base) is fairly burdensome at either the analytical or the operational level.[23] The number of linkages is even greater for the broader monetary aggregates or for total net credit. In the end, however, the potential controllability of any such aggregate, either narrow or broad, depends on a diverse set of substitution responses characterizing the behavior of many different kinds of individual and institutional portfolios.

Table 3 presents the respective standard errors, coefficents of determination and Durbin-Watson statistics for a series of regressions, again based on quarterly data for 1959-80, relating the growth rates of each of four financial aggregates—total net credit and the three M's—to past values of nominal income growth and the Federal Reserve discount

22. For the specific results and details of the method used, see [12].

23. See, for example, the apparatus used by Johannes and Rasche [21, 22] or Tinsley et al. [34].

rate, and to current and past values of either of the Federal Reserve's two available policy instruments, the growth of nonborrowed reserves or the federal funds rate.[24] The table also shows the corresponding results for analogous regressions which also include as explanatory variables the past growth rate of whichever aggregate the equation is seeking to track.

Regardless of the choice of reserves or the interest rate as the policy instrument, these results consistently show smaller standard errors for total net credit than for any of the monetary aggregates—about 0.4 percent per quarter (or 1.4 percent at an annual rate) in the regressions omitting lagged credit growth, and about 0.3 percent per quarter (or 1.1 percent at an annual rate) in the regressions including it. One possibility, of course, is that the smaller standard errors for the credit aggregate could just reflect its being a smoother series than the monetary aggregates, but the typically larger R^2 values in the credit equations contradict this explanation. The regressions do account for more of the variation of credit than of the monetary aggregates. Similarly, it is possible that the better tracking performance for credit could just reflect a tighter relationship to income, with no implications for the Federal Reserve's ability to control credit via either reserves or the federal funds rate, but the statistical significance levels of the relevant coefficients contradict this explanation too. (In the equations based on the reserves instrument and excluding the lagged dependent variable, for example, the t-statistics on the respective sums of the coefficients on current and lagged growth of reserves are 2.10 for credit versus 2.96 for M1.)

The pitfalls of relying on relationships like these to judge the Federal Reserve's potential influence over any specific aggregate, as an intermediate monetary target, are well known. Even so, the available empirical evidence does suggest that total net credit is no less plausible an aggregate to try to target than are the monetary aggregates.

D. Availability of Data.

Although the standard vehicle in which the Federal Reserve publishes data on the total net credit aggregate is the flow-of-funds accounts, a publication which appears only once per quarter, the great bulk of the underlying data is actually available monthly. Indeed, the

24. The format of the regressions estimated is due to Davis and Shadrack [4]. See [12] for further details, as well as for analogous results based on monthly data.

Federal Reserve currently maintains, on an unpublished basis, a monthly credit data file. As of yearend **1980,** for example, total net credit outstanding in the United States was **$3,907.5** billion, of which **$3,436.1** billion, or **88** percent, consisted of items regularly reported each month and included in the Federal Reserve's monthly data file. Somewhat ironically, many of the items not included in this monthly data file represent the lending activities of various components of the federal government itself. Of the **$471.4** billion of **1980** yearend total net credit not included in the monthly data file, **$290.7** billion represented credit advanced directly by the U.S. government or by its sponsored credit agencies and mortgage pools. If the Federal Reserve were merely to collect from the relevant agencies of the federal government the kind of data it already has on the private sector, therefore, more than **95** percent of the total net credit aggregate would be available monthly.

Even without any extra data reporting on the government's part, however, the information contained in the **88** percent of total net credit which is currently included each month is hardly without value for monetary policy. For the **1963-77** sample period (the longest interval for which seasonally adjusted monthly credit series now exist in the Federal Reserve's monthly data file[25]), the correlation between the total net credit series reported in the flow-of-funds accounts and the quarterly "total" net credit series formed by using only the end-of-quarter months of the corresponding monthly series is **0.99985.** Moreover, the relationship between nonfiancial economic activity and the quarterly "total" net credit series is fully comparable to that shown above for the actual total net credit series.

available on a monthly basis. Weekly credit data are unlikely ever to be available, so that it will never be possible to monitor total net credit as closely as the M1 money stock; from this perspective the situation of credit is comparable to that of M2. Even so, movements of the weekly M1 data are dominated by statistical "noise," and relying on them is questionable for purposes of monetary policy decision making anyway. The monthly availability of data on total net credit is adequate.

---

25. After 1977 the Federal Reserve ceased performing seasonal adjustments to is monthly credit file.

E. Overview.

The total net credit aggregate satisfies each of the four basic criteria for selecting a monetary policy target as fully as do the major monetary aggregates. Total net credit has a strong relationship to both real income and prices; the credit measure provides potentially usable information about the future movements of these two aspects of the nonfinancial economy; movements in credit are related to either a reserves or a federal funds rate instrument; and credit data are available on a monthly basis. These findings are not sufficient to warrant dropping the monetary aggregates altogether in favor of a credit target for monetary policy. Especially in light of the changes in the financial environment discussed in Section I, however, they do suggest that total net credit would be a valuable target for monetary policy to use in conjunction with a monetary target.

TABLE 2
EXOGENEITY TESTS AMONG MONEY, CREDIT, INCOME AND PRICES

		F(X)	*F(P)*	*F(M)*	*F(C)*
Estimation of Autoregressive System (X,P,M)					
Equation:	*X*	65.68*	1.68	1.85***	____
	P	0.54	152.28*	0.86	____
	M	3.96*	3.01*	58.23*	____
Estimation of Autoregressive System (X,P,C)					
Equation:	X	5.10*	2.73'	____	2.01***
	P	1.14	45.81*	____	2.50**
	C	1.45	1.97***	____	66.00*
Estimation of Autoregressive System (X,P,M,C)					
Equation:	X	5.03	2.08***	1.15	1.28
	P	0.80	27.34*	.60	1.98***
	M	3.79*	3.62*	24.09*	1.23
	C	1.10	1.49	1.18	60.14*

Notes:
X is gross national product in constant prices
P is gross national product price deflator
M is money stock (M1)
C is total net credit
* significant at 1% level
** significant at 5% level
*** significant at 10% level

TABLE 3
FINANCIAL AGGREGATE CONTROL RELATIONSHIPS: QUARTERLY DATA

		SE	$\overline{R}^2$	*DW*
Reserves Instrument				
Aggregate:	Credit	0.00360	0.58	1.17
	M1	0.00614	0.26	1.77
	M2	0.00619	0.34	1.20
	M3	0.00651	0.35	0.89
Reserves Instrument with Lagged Dependent Variable				
Aggregate:	Credit	0.00280	0.74	2.05
	M1	0.00612	0.26	2.00
	M2	0.00538	0.50	1.81
	M3	0.00519	0.58	1.95
Interest Rate Instrument				
Aggregate:	Credit	0.00356	0.59	1.13
	M1	0.00628	0.22	1.59
	M2	0.00477	0.61	1.17
	M3	0.00701	0.24	0.63
Interest Rate Instrument with Lagged Dependent Variable				
Aggregate:	Credit	0.00275	0.75	2.09
	M1	0.00610	0.27	2.04
	M2	0.00407	0.72	2.02
	M3	0.00489	0.63	2.03

IV. A Proposal for a Two-Target Money-and-Credit Framework

The Federal Reserve System should adopt an explicit two-target framework, in which it would focus both on the money stock and on the quantity of credit outstanding. The Federal Reserve should pick one monetary aggregate, presumably M1, and one credit aggregate, total net credit; specify target ranges for both; and provide the quantity of reserves (or set a short-term interest rate) aimed at achieving these two targets. A deviation of either money or credit growth from its respective target range would then constitute a signal warranting reassessment of that reserve provision path (or interest rate level).

One potential difficulty in implementing this hybrid money-and-credit framework is a problem inherently associated with any policy of pursuing two targets instead of one. What if both targets are not simultaneously achievable? For all practical purposes, however, the Federal Reserve's current policy framework already suffers from just this problem, as the experience of M1 and M2 during 1981 demonstrated. If only M1 had mattered, the Federal Reserve would have had to conclude early on that its policy was too restrictive in relation to the specified target. By contrast, if only M2 had mattered, it would have had to draw the opposite conclusion. In resolving these conflicting concerns, the Federal Reserve had to decide on the relative importance of M1 and M2, and to determine why one was growing more slowly than anticipated and the other more rapidly.

A two-target framework based jointly on money and credit would in part have the same features. If money and credit were both growing in line with their respective targets, then the Federal Reserve would judge the prevailing reserve provision path (or short-term interest rate) to be appropriate. If both were above target, then the implication would be to slow the provision of reserves (or raise the interest rate). If both were below target, the implication would be to speed the reserve provision path (or lower the interest rate). If one were above target and one below, however, then—just as now, with an M1 and M2 target—the Federal Reserve would have to access which was more important under the circumstances, and determine why one was moving in one direction and one in the opposite direction relative to their respective stated targets.

The key advantage of an explicit two-target framework based on both money and credit, in comparison to a two-target approach based on two separate definitions of the money stock, is that it would draw on a more diverse information base to generate the set of signals that presumptively matter for monetary policy. Money is, after all, an asset held by the public, and each monetary aggregate is just a separate subtotal of the public's monetary assets. By having an M1 and an M2 target, as at present, the Federal Reserve is relying solely on the asset side of the economy's balance sheet but adding up those assets in two separate ways. By having a money target and a credit target, the Federal Reserve would create a presumption of responding to signals from both sides of the economy's balance sheet. The evidence that is now available indicates — not surprisingly, on some reflection — that

both sides of the balance sheet do matter.

Finally, as a practical matter it is useful to note that the Federal Reserve is free to implement this two-target money-and-credit policy framework at any time. No legislation is necessary. On the contrary, the Humphrey-Hawkins Act directs the Federal Reserve to specify a target for credit growth as well as for money growth. The Federal Open Market Committee has typically specified such a target, but it has chosen to focus only on credit extended through the banking system, which the available evidence indicates is far from the best source of information about the economy, even from within the liability side of the balance sheet. Moreover, the Federal Reserve's own discussions of monetary policy—in its reports to Congress, in the Open Market Committee's policy directives, and elsewhere—makes clear that the focus of policy is on money, not credit. Nothing in the legislation, however, requires that the Federal Reserve place its primary emphasis on money to the exclusion of credit, or that it focus only on bank credit among the available credit measures. From a legislative perspective, a two-target money-and-credit framework would simply have the Federal Reserve be even-handed within the requirements already laid down by the Humphrey-Hawkins Act.

The evidence available today suggests that a two-target money-and-credit framework for monetary policy would be superior to the current money-only framework, and that, over time, a monetary policy based on both money and credit would be likely to help achieve a more satisfactory performance in the financial environment of the future.

V. Summary of Conclusions

No one monetary policy framework is appropriate in all financial environments. As the environment changes, therefore, central banks must also sometimes alter the way in which they design and implement monetary policy. Because of major changes in the financial environment in the United States, the time has come for the Federal Reserve System to move beyond its current policy framework focused exclusively on monetary aggregate targets. Changes in the financial environment due to the advent of rapid and volatile price inflation were a major element in the move toward the monetary targets framework in the early 1970s. Now further changes in this environment, mostly involving an ongoing series of innovations in financial practices and

institutions, warrant further adaptation of the monetary policy framework.

A useful intermediate target for monetary policy must meet four basic criteria. The target must be closely related to the nonfinancial objectives of monetary policy. It must contain information about the future movements of those relevant aspects of the nonfinancial economy. It must be closely connected to the instruments over which the central bank can exert direct control. And data measuring it must be readily available on a timely basis.

Total net credit, measured by the aggregate outstanding indebtedness of all U.S. nonfinancial borrowers, satisfactorily meets each of these four criteria for choosing a monetary policy target. The relationship between total net credit and both real income and price measures of nonfinancial economic activity, judged by a variety of different methodological approaches, is as stable and reliable as is the corresponding relationship for any of the monetary aggregates (or the monetary base). The information about subsequent movements in nonfinancial activity contained in total net credit is at least comparable to that contained in money. Relationships between total net credit and either the quantity of nonborrowed reserves or the federal funds rate are comparable to the corresponding relationships for the principal monetary aggregates. Finally, data for a close approximation to total net credit are available on a monthly basis, and the relevant relationships based on the monthly data are also at least comparable to the corresponding relationships for the monetary aggregates.

The Federal Reserve System should therefore adopt an explicit two-target framework, in which it would focus both on the money stock (presumably the M1 measure) and on the quantity of credit outstanding as measured by total net credit. The key advantage of this two-target money-and-credit framework is that it would diversify, to include both sides of the economy's balance sheet, the information base providing the signals governing monetary policy responses to economic events. In comparison to today's money-only framework, a monetary policy based on both money and credit would be better suited to perform effectively in the financial environment of the future.

References

Brunner, Karl (1973), "Book Review." ***Journal of Economic Literature,*** XI (September), pp. 926-933.

Brunner, Karl, and Allan H. Meltzer (1967), "The Meaning of Monetary Indicators." Horwich (ed.), ***Monetary Process and Policy,*** Richard D. Irwin, Homewood.

_____ (1969), "The Nature of the Policy Problem." Brunner (ed.), ***Targets and Indicators of Monetary Policy,*** Chandler Publishing Company, San Francisco.

Davis, Richard G., and Frederick C. Schadrack (1974), "Forecasting the Monetary Aggregates with Reduced-Form Equations," ***Monetary Aggregates and Monetary Policy,*** Federal Reserve Bank of New York.

DeRosa, Paul, and Gary Stem (1977), "Monetary Control and the Federal Funds Rate." ***Journal of Monetary Economics,*** III pp. 217-230.

Diggins, James R. (1978), ***A Short Term Model of Federal Reserve Behavior in the 1970s,*** Unpublished Ph.D. dissertation, Harvard University.

Feige, Edgar L., and Robert McGee (1979), "Has the Federal Reserve Shifted from a Policy of Interest Rate Targets to a Policy of Monetary Aggregate Targets?" ***Journal of Money, Credit and Banking,*** XI (November), pp. 381-404.

Friedman, Benjamin M. (1975), "Targets, Instruments and Indicators of Monetary Policy." ***Journal of Monetary Economics,*** I (October), pp. 443-473.

(1977), "The Inefficiency of Short-Run Monetary Targets for Monetary Policy," ***Brookings Papers on Economic Activity,*** No. 2, pp. 293-335.
293-335.

_____ (1982), "Time to Re-Examine the Monetary Targets Framework," ***New England Economic Review*** (March/April), pp. 15-23.

_____ "The Roles of Money and Credit in Macroeconomic Analysis." ***Macroeconomics, Prices and Quantities: Essays in Memory of Arthur Okun,*** Tobin (ed.), The Brookings Institution, forthcoming.

_____, "Monetary Policy with a Credit Aggregate Target." ***Journal of Monetary Economics,*** Supplement, forthcoming.

_____ (1981), "The Relative Stability of Money and Credit 'Velocities' in the United States," mimeo, National Bureau of Economic Research.

Friedman, Milton (1967), "The Role of Monetary Policy." ***American Economic Review,*** LVIII (March), pp. 1-17.

_____ (1971), "A Monetary Theory of Nominal Income." ***Journal of Political Economy,*** LXXIX (March/April), pp. 323-337.

Friedman, Milton, and David Meiselman (1963), "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United States, 1897-1958, Commission on Money and Credit, ***Stabilization Policies.*** Prentice-Hall, Englewood Cliffs.

Friedman, Milton, and Anna Jacobson Schwartz (1963), A ***Monetary History of the United States 1867-1960,*** Princeton University Press.

Garcia, Gillian, and Pak, Simon (1979), "Some Clues in the Case of the Missing Money," ***American Economic Review,*** LXIX (May), pp. 330-334.

Goldfield, Stephen M. (1976), "The Case of the Missing Money," ***Brookings Papers on Economic Activity*** No. 3, pp. 683-730.

Granger, C.W.J. (1969), "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods." ***Econometrica,*** XXXVII (July), pp. 424-438.

Johannes, James M., and Robert H. Rasche (1979), "Predicting the Money Multiplier," ***Journal of Monetary Economics,*** V (July), pp. 301-325.

_____ (1981), "Can the Reserves Approach to Monetary Control Really Work?" ***Journal of Money, Credit and Banking,*** XIII (August), pp. 298-313.

Kareken, John, Thomas Muench and Neil Wallace (1973), "Optimal Open Market Strategy: The Use of Information Variables," ***American Economic Review,*** LXIII (March), pp. 156-172.

Lieberman, Charles (1977), "The Transactions Demand for Money and Technological Change," ***Review of Economics and Statistics,*** LIV (August), pp. 307-317.

Lombra, Raymond, and Michael Moran (1980), "Policy Advice and Policymaking at the Federal Reserve." Brunner and Meltzer (eds.), ***Monetary Institutions and the Policy Process.*** North-Holland Publishing, Amsterdam.

Mayer, Thomas (1978), "The Structure of Monetarism." Mayer et al., ***The Structure of Monetarism.*** W. W. Norton & Company, New York.

Poole, William (1970), "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model," ***Quarterly Journal of Economics,*** LXXXIV (May), pp. 197-216.

Porter, Richard D., Thomas D. Simpson and Eileen Mauskopf (1979), "Financial Innovation and the Monetary Aggregates," ***Brookings Papers on Economic Activity*** No. 1, pp. 213-237.

Shiller, Robert J. (1980), "Can the Fed Control Real Interest Rates?" ***Rational Expectations and Economic Policy,*** Fischer (ed.), University of Chicago Press.

Simpson, Thomas D., and Richard D. Porter (1980), "Some Issues Involving the Definition and Interpretation of Monetary Aggregates." ***Controlling Monetary Aggregates III,*** Federal Reserve Bank of Boston.

Sims, Christopher A. (1972), "Money, Income and Causality." ***American Economic Review,*** LXII (September), pp. 540-522.

_____ (1980a), "Macroeconomics and Reality." ***Econometrica,*** XLVIII (January), pp. 1-48.

_____ (1980b), "Comparison of the Interwar and Postwar Business Cycles: Monetarism Reconsidered." ***American Economic Review,*** LXX (May), pp. 250-257.

Tinsley, P.A., P. von zer Muehlen and G. Fries (1981), "The Short-Run Volatility of Money Stock Targeting." Mimeo, Board of Governors of the Federal Reserve System.

20
Discussion

Allan H. Meltzer

Benjamin Friedman's paper summarizes his work on an important topic—the comparison of procedures that extract information about, and compare the thrust of monetary policy over time. This is the "indicator problem" or in Friedman's words, the problem of choosing an "intermediate target." The problem arises when there is incomplete knowledge about the structure of the economy, including the length of leads and lags, the precise size of coefficients and the full specification of the equations used to describe the economy's structure. An indicator provides information about the comparative degree of "ease" or "restraint."

The main argument of the paper is that credit—defined as the total debt obligations of nonfinancial borrowers--contains useful information to supplement monetary aggregates. To paraphrase Friedman, the liabilities side of balance sheets of households and nonfinancial firms contains information that supplements the information in the monetary aggregates — on the asset side of these balance sheets. Most of the paper makes a different point, however. Friedman devotes most of his effort to showing that, on the criteria he uses, his measure of credit dominates the monetary aggregates during the sample period.

My comments have two parts. First, I compare Friedman's approach to some principal alternatives. Then, I offer some specific comments on his procedures and the definition of credit.

Implementing Monetary Control

The problem Benjamin Friedman addresses does not arise if there is a rule requiring constant money growth or tying money growth to some observable measure. With discretionary policy, the central bank may choose to alter policy in response to perceptions or forecasts of future

conditions. When governments choose discretion over rules, two methods of extracting information about the future effects of current policy are in use or have been proposed. To improve outcomes, these approaches must be sufficiently reliable to do better than a monetary rule.

What is "better"? Friedman makes no effort to compare discretionary policies to rules, so I suggest a minimum standard. Discretionary policy should reduce fluctuations in nominal GNP below the variability that can be achieved with a rule requiring constant money growth. To measure variability I start from the definition

(I) $Y = M + V$

where Y, M and V are the first differences of the natural logarithms of nominal output, money and velocity, and velocity is defined as the ratio of nominal output to the particular money stock used as M. Using (1), we can separate the variance of output growth into three components.

(2) var Y = var M + var V + 2 covar (M,V)

where var and covar are respectively variance and covariance.

A rule for constant money growth sets var M and covar (M,V) to zero. Real shocks remain; velocity changes with real shocks, so output fluctuates. Shocks to productivity and labor force affect the supply of output and the demand for money. And real shocks to aggregate demand also affect the demand for money.

Discretionary policy seeks to reduce var Y by making covar (M,V) sufficiently negative to offset the higher value of var M.[1] To reduce var Y by discretionary policy, the central bank must be able to recognize shocks as they occur, classify them as real or nominal, identify them as permanent or transitory and determine whether they originate on the supply or demand side of the economy. The basic case for a rule starts by recognizing that, in practice, this is a difficult task. (See Friedman, 1953).

One alternative to a monetary rule is the use of an econometric equation, or set of equations, to forecast the demand for money, one or more interest rates and other variables. The Federal Reserve uses several different variations, but their aim is to find the (short-term)

1. **I put aside two important issues. One is the control issue—whether var M can be zero. Zero variance is most easily achieved for the monetary base or total reserves. The second is the effect of var M on the demand for M and on var V. These issues are discussed in Brunner & Meltzer (1983).**

interest rate at which the demand for reserves (or the demand for non-borrowed reserves, or the demand for money) equals the stock of the relevant aggregate.

Since 1979, the Federal Reserve's approach places considerable weight on the demand for free reserves — excess reserves minus bank borrowing — or on the demand for borrowed reserves. Information from various sources, including econometric projections, is used to improve their estimates. Despite this effort, estimates of the banks' borrowing are subject to large errors, so the Federal Reserve misses its per-announced short- and longer-term targets for total reserves and money.

The predictions of econometric models are often imprecise in a relatively stable environment. When regulation and inflation force rapid change in arrangements, coefficients of econometric models change; errors of forecast are enlarged. Shifts in policy operations add to the problem.

Benjamin Friedman discusses a second alternative to a rule, the use of an indicator or intermediate target. This approach would have no justification if economists could provide a fully identified model of the economy, with stable parameters and well-specified leads and lags. Much of the policy problem would then disappear also. We would know whatever can be known about the future consequences of policy action and would know how much, when and what to adjust to keep the economy on some optimal path. With less than full information of this kind, there can be a role for intermediate targets if, for reasons that Friedman does not discuss, policy is subject to discretionary changes.*

I have two general comments on the three approaches. The first concerns the criteria to be used in choosing one procedure over another. Friedman does not discuss this issue, but his paper suggests that he would accept reduction in the variance of output growth as one of his criteria. The second distinguishes between systematic and non-systematic, or predictable and unpredictable, variability. Some procedures increase the costs of predicting the growth of money but lower the systematic variance of Y. Regulations may increase or reduce the systematic or predictable var M or var V or both. Regulation Q, for example, increases var Y and makes prediction of monetary aggregates more difficult.

---

2. An intermediate target could be the basis of a quantitative rule, but I do not interpret Friedman as favoring a rule.

A recent study suggests that, during the years 1953-80, Federal Reserve policymaking added more variability to nominal output growth than it removed.[3] The study suggests that keeping var M, and therefore covar (M,V), at zero would reduce fluctuations in Y. For the sub-period 1953-69, the difference is not large; the sum var M plus covar (M_1V) is positive but small. For 1969-80, the result is very different. A monetary rule that held money growth constant would have removed as much as half the variance of GNP growth.[4]

The Federal Reserve does not control money growth completely. Only the systematic or predictable growth rate of money can be controlled, so only the variance of the systematic component of money growth can be eliminated. What is, or is not, systematic or predictable depends on the definition of "money" and the rules or procedures under which "money" is produced. The quarterly variance of total reserves or the monetary base can be reduced to zero; the quarterly variance of conventional M^1 or M^2 cannot. Random fluctuations remain.

Computations suggest that var Y can be reduced to about 1 percent to 2 percent per quarter at annual rates. Further reductions can be obtained, for example, by adopting rules for fiscal policy that reduce the variability of the demand for money and by other policy and institutional changes that reduce uncertainty. The 1 percent to 2 percent range appears to be lower than the errors achieved by Friedman. The comparison suggests that the approach Friedman recommends permits greater variability than a rule requiring constant growth of money or the monetary base and is, therefore, less desirable.

Some Specific Comments

Friedman does not claim that his procedure is optimal. His aim is more limited. This section discusses the paper from a more limited perspective.

The procedure relies on an empirical regularity. In earlier work, Friedman has argued that there is a constant, or nearly constant, relation between the total debt of nonfinancial borrowers and nominal

3. The results are reported in Brunner & Meltzer (1983).

4. The data are quarterly observations. The statements in the text hold the variability of velocity growth constant. A monetary rule would affect the demand for money and therefore change velocity growth and its variability.

GNP. Friedman calls the numerator of the ratio "credit." Something keeps the ratio at or near 1.45 in the U.S.

Chart 1 of the paper shows that since 1946, debt of the federal government has declined relative to debt of households, nonfinancial businesses, and state and local governments. Substitution is about 1 to 1; 1 percent more government debt is accompanied by 1 percent less private debt. This implies full crowding out. Debts of all kinds appear to be substitutes in the aggregate portfolio. Apparently taxes, risks, the regulatory environment and the rate of inflation do not matter for the total. What combination of market decisions, individual and collective choices bring about this result? We can only wonder about the effect on the ratio of the use of par values for debt that has many years to maturity and the exclusion of guarantees and commitments for social security, housing and health. Do these debts not matter? If half the face value of government debt is replaced by commitments of equal value, does the ratio change?

The concept "total nonfinancial liabilities" is unusual. To obtain the total, Friedman combines the liabilities of government, households and nonfinancial corporations, but excludes the liabilties of financial institutions. The latter are counted as assets (including money) of corporations and the public. The government debt held as assets of the Federal Reserve banks is not cancelled, but intercorporate debt is cancelled. My attempt to construct the net assets on the other side of the public's balance sheet left me puzzled by the pattern of consolidation.[5]

Many of these points must be as troubling to Friedman as to me, but if they trouble him he does not say so. Nor does he speculate on the reason for constancy. Does a dollar of credit support 70 cents of GNP? Or, is it the other way around, a dollar of GNP yielding $1.45 of credit? Or, is the relation simultaneous? Does the constancy reflect a constant real rate of interest and a constant ratio of debt to equity in a world of constant risk? Does the growth of social security "debt" just match the perceived growth of equity, so that the ratio of debt to equity remains 1 to 1?

If the credit ratio is truly constant, it contains no information about future GNP. Friedman uses vector autoregressions and other techniques designed to show that credit "causes" GNP. The results in the lower panel of his Table 2, suggest, however, that credit "causes"

---

5. The details of the calculation are discussed in Friedman (1980).

prices but is not significantly related to real output when he controls for the effect of money.

The idea that credit "causes" output or prices has a specific meaning. Causality in the Granger-Sims sense means temporal precedence (Zellner, 1979 and Schwert, 1979). Friedman reports that the results of the "causality" tests depend on the sample period. If credit often has a "causal" effect on income and prices, but the significance of the effect differs from sample to sample, how reliable is the information? Friedman does not say, and he gives no basis on which to judge the stability of the estimates from sample to sample.

I accept Friedman's facts about the credit ratio, because he tells me they are facts. Before accepting his conclusion that there is useful information, I want to know more about the interpretation to be placed on the information. The reason is that I can think of two, very different interpretations.

Suppose money increases. If the increase is unanticipated, aggregate demand rises. Firms borrow to restore inventories and to finance production and inventory accumulation; and perhaps households borrow to finance purchases. The increase in borrowing increases Friedman's measure of credit. Production and real income rise. If this is the sequence followed, Granger-Sims tests would show that credit "caused" income. A different definition of causality would describe the unanticipated change in money and aggregate demand as the cause of the increase in credit and output, but the increase in credit would indicate that the economy was expanding.

Suppose that instead of an unanticipated increase in M, there is a large, sustained reduction in the growth of money. Inventories rise, and firms borrow to finance the unintended accumulation. Tax receipts decline, so the budget deficit increases. Credit to firms and government rises, for a time, as output falls. now the increase in the credit ratio has a different interpretation.

If expansions and contractions have about equal effect on credit and are equal in length, output (and prices) would have a weak reaction to credit. The positive relation found by Friedman may reflect (1) the fact that postwar expansions have been longer than postwar contractions and (2) the rise in the anticipated rate of inflation during the sixties and seventies.

My conjectures are consistent with the lead of credit, on average, and with the variability of the relationship between credit and other

variables. Of course, there are other explanations of the interrelation between these variables. Perhaps some are consistent with Friedman's conjectures about the information provided, on average, by postwar movements of credit.

References

Brunner, K. and A.H. Meltzer (1983), "Strategies and Tactics for Monetary Control," ***Carnegie-Rochester Conference Series,*** 18, ***K.*** Brunner and A.H. Meltzer (eds.), Amsterdam, North Holland.

Friedman, B.M. (1980), "Postwar Changes in the American Financial Markets," ***The American Economy in Transition, M.*** Feldstein (ed.), University of Chicago Press, pp. 9-78.

'Friedman, M. (1953), "The Effects of Full-Employment Policy on Economic Stability: A Formal Analysis," ***Essays in Positive Economics,*** M. Friedman (ed.), University of Chicago Press.

Schwert, G.W. (1979), "Test of Causality: The Message in the Innovations," ***Carnegie-Rochester Conference Series,*** 10, ***K.*** Brunner and A.H. Meltzer (eds.), Amsterdam, North Holland.

Zellner, A. (1979), "Causality and Econometrics," ***Carnegie-Rochester Conference Series,*** 10, ***K.*** Brunner and A.H. Meltzer (eds.), Amsterdam, North Holland.

21

Discussion

Richard G. *Davis*

Benjamin Friedman believes that the traditional emphasis on money as against credit in economic analysis and in monetary policy is unwarranted. In this paper he offers a case for treating money and credit measures equally in formulating monetary policy by having dual money and credit intermediate targets.

I suppose most economists would agree in principle that the credit market is as "important" as the money market. Presumably, however the emphasis on money has reflected a belief that the behavior of money in a modern economy results primarily from the decision of policymakers. Thus, there is probably a general presumption that money is "exogenous" while credit is not. On the other hand, most people would also agree that the credit market is capable of generating its own independent disturbances to the economy as a result of such things as financial innovation and regulatory changes affecting credit flows. And the notion that policy has been more directed to money than to credit is to some extent simply a generalization from recent U.S. experience. Obviously, attempts to control credit through policy measures have at times been important even in the United States and certainly they have been abroad.

In any case, the ability of the central bank to control money versus its ability to control credit is acknowledged by Friedman to be one of the criteria for choosing an intermediate target. I would like to take up this issue in a moment, but let me first comment briefly on the other criteria he suggests and the evidence he adduces for a credit target in relation to these criteria.

The views expressed are those of the author and do not necessarily reflect the views of the Federal Reserve Bank of New York.

To begin with a relatively simple issue, an important objection to the use of any broad credit mesure as an intermediate target has always been that the data are available only quarterly and with some lag. While there may well be such a thing as too-frequently-available-information, data availability only on the current schedule of the flow-of-funds figures is clearly a problem. Given the welter of incoming weekly and monthly figures on financial and nonfinancial developments and the ease with which policy instrument settings can be readjusted, a target measure available only quarterly would almost certainly be pushed into the background as policymakers feel the need to respond to more timely information.

Because of this consideration, Friedman's finding that virtually all of the components of his net credit measure can be made available monthly with only little extra effort is important. Of course, we don't know ***how soon*** such data would become available or how reliable preliminary (or final) estimates would be. It does seem likely to me that the credit figures would always remain both less quickly available and less reliable than the money numbers.

Friedman's other two criteria for judging intermediate targets are (1) the closeness and stability of its relationship to nonfinancial variables of ultimate significance and (2) its ability to provide information on current and, especially, future values of these variables. Friedman offers a variety of statistical tests relevant to these criteria but he seeks to show only that ***money cannot be shown superior*** to his credit measure. He does not try to establish the stronger point that the credit measure might actually be superior to money.

Of the various tests he has presented, the more elementary ones (displaying velocity variability and performance in St. Louis-type "reduced form" equations) actually do seem to favor his credit measure. The markedly smaller variance of credit velocity growth rates relative to M1 velocity is readily visible to the naked eye in charts of both one-quarter and four-quarter velocity growth rates. The major source of the difference seems to be that credit velocity has fluctuated rather steadily around its roughly zero average for many years while M1 velocity slowed in the late 1960s and early 1970s and then reaccelerated. Business cycle and subcyclical patterns in the two velocity measures are quite similar, however.

Another interesting point that turns up from simple inspection of a chart of growth rates in Friedman's credit measure and M1 is that the

credit growth rate is much less erratic than M1 growth. One interesting example of this is the famous second quarter of 1980 when the absolute drop in the M1 growth rate was nearly 10 percentage points. The corresponding slowdown of Friedman's credit meaasure was less than half as great—this despite the presumed importance of the credit controls in that quarter. Overall, the charge that the Federal Reserve's short-run performance has been erratic since October 1979 in terms of money growth rates would be far harder to sustain if it were also judged in terms of credit behavior. Credit growth has in fact moved within a quite narrow range in recent quarters.

I will not comment on some of the more sophisticated statistical tests that Friedman has employed to compare the impact of "innovations" in the money and credit measures. Overall, they seem hard to interpret and Friedman has been careful to stick to his purely negative point that they can't be used to show that money is superior to credit. Some of these tests[1] have in fact produced some rather peculiar results — seemingly implying that neither money nor credit have much significance in explaining movements on prices and real output. Overall, I doubt that policymakers would be much influenced by tests that are so hard to make sense out of intuitively and that seem to lead to such ambiguous and counter-intuitive results.

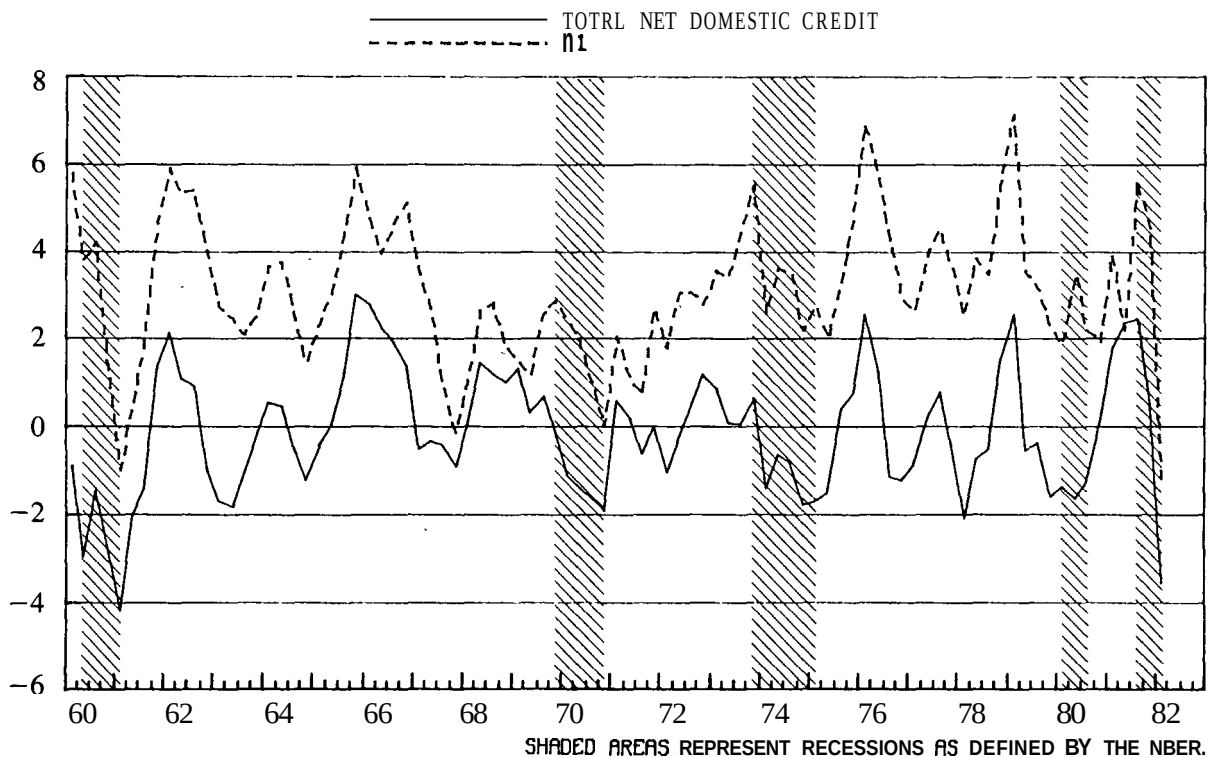
With respect to the issue of controlability in terms of instruments available to the central bank, I have major reservations about Friedman's credit measure — as indeed I increasingly do about some of the money measures themselves. Clearly, total nonfinancial credit is not subject to reserve requirements and there seems to be no reason to expect it to exhibit a stable or predictable reserve multiplier. I don't see how a "reserve path" could be drawn up for a targeted credit growth rate in the way that is currently done for M1.

With respect to the pre-October 1979 instrument, the funds rate, I also fail to see any meaningful way in which instrument settings could be set to achieve total credit growth targets. In the case of M1 there was a perfectly intellectually respectable means of arriving at such interest rate settings via use of the money demand function. In the absence of evidence of a stable "demand function" for total credit in terms of short term rates, a parallel rationale for using a funds rate target to hit a credit measure seems doubtful.

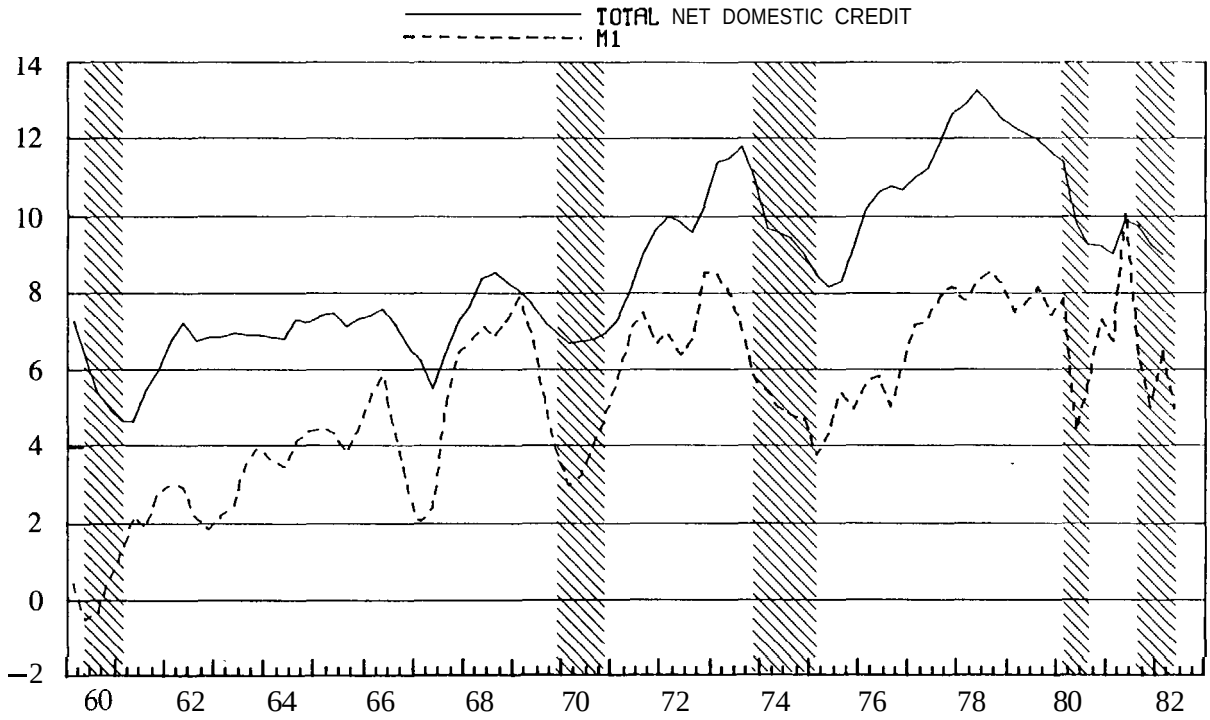
---

1. **For example, those in the bottom panel of Table 2 in the paper presented to this conference.**

GROWTH IN VELOCITY OF TOTAL NET DOMESTIC CREDIT
AND M1,FROM FOUR QUARTERS EARLIER, IN PERCENT



GROWTH OF TOTAL NET DOMESTIC CREDIT AND M1
FROM FOUR QUARTERS EARLIER, IN PERCENT



SHADED AREAS REPRESENT RECESSIONS AS DEFINED BY THE NBER.

Freidman makes his case for the controllability of his credit measure in terms of equations relating changes in credit or, alternatively, a measure of money, to lagged changes in GNP and current and lagged changes in nonborrowed reserves or, alternatively, current and lagged levels of the funds rate. He finds that standard errors are uniformly and substantially lower for the credit measure than for any of the money measures. He thus concludes that credit is at least as controllable as money whether the Fed uses a reserves or interest-rate instrument.

I have several problems with these equations in drawing such a conclusion. First, it appears to me that the relative controllabilities of the various aggregates should be judged on the basis of R^2 results rather than standard errors. On this basis the results are not so clear cut. Indeed in monthly equations presented in an earlier paper, the credit measure comes off substantially worse than either M2 or M3.[2] Second, from my own hasty experiments with such equations using Friedman's credit measure, I doubt the apparent superiority of credit over money in the quarterly equations says anything about comparative responsiveness to current movements in policy instruments. But more fundamentally, I just don't see the rationale for these equations as applied to total credit. The original version of these equations, as developed by Schadrack and myself, was designed to estimate the controllability of money measures on a monthly basis. They were derived from widely accepted underlying "structural equations for the demand for money and for reserves (and taking GNP as given over one-month periods). I don't see a corresponding rationale for the use of such equations to determine the controllability of credit and have, as a result, not confidence in the equations Freidman estimates — which indeed appear to have some rnisspecifications in terms of our original rationale.[3]

Despite these reservations, I am in fact attracted by Friedman's proposal to target net credit, presumably in place of one or more of the broad money measures currently targeted and/or the bank credit target. Obviously, when you have multiple targets, as we already do, the practical import is to modify responses to undershoots or overshoots on

2. "Monetary Policy with a Credit Aggregate Target," Table 7 (to be published in the *Journal* of *Monetary Economics).*

3. Friedman uses the *level* of the funds rate whereas it appears that changes in money growth rates should be influenced by *changes* in the funds rate. The same level/changes problem exists with respect to the discount rate. Indeed, this variable should not even be included in the funds rate equations since, according to the underlying logic of the original equations, when the funds rate is used as the policy instrument, only determinants of the demand for money enter into the reduced form.

the part of one of the targets in light of the performance of the others — e.g., if M1 is below range, you may respond less vigorously if M2 is over its range. Since target measures rarely move in tandem, the minute you adopt multiple targets, you find yourself having to make judgments about how to weigh the implications of divergent movements of the targeted measures. This is presumably what most monetarists dislike about multiple targets in general—although we tend to get conflicting advice as to just what single target to use.

If you are willing to use multiple targets on the grounds that aberrations potentially affecting any single target are just too dangerous to risk, the inclusion of a credit measure along with a money measure seems appealing. This is especially true if the not-very-directly-controllable credit measure were to replace an *also* not-very-directly-controllable broad money measure. Practically speaking, I am attracted to Friedman's credit measure because its growth rate is substantially less volatile than that of, at least, M1.

It may be instructive to look at how Friedman's credit measure has actually behaved since October 1979 and thus to see how its use as a target might have influenced the Federal Reserve's instrument settings. Measured on a fourth quarter to fourth quarter basis (the way the targets are defined), credit growth slowed modestly from 12.5 percent in 1978 to 11.7 percent in 1979, roughly paralleling the equally modest slowing in M1. So this does not suggest that instrument settings cued on M1 would have been much affected by a credit target in 1979.

In 1980, credit growth slowed more markedly from the 11.7 percent 1979 figure to 9.2 percent while M1 growth was about unchanged over the year relative to its 1979 growth rate. As I noted earlier, the drop in credit growth in the second quarter of 1980 was much less acute than the drop in M1 growth. Similarly, while credit re-accelerated later in the year along with M1, the acceleration was much milder and in no quarter did credit growth equal or exceed its 1979 average. On balance, I think the significantly greater slowdown in credit for 1980 as a whole and its much less volatile quarter-to-quarter performance relative to M1 would have made for much less anxiety about monetary policy if there had been more focus on credit than there actually was at the time.

In 1981, credit, like M2 and M3, continued to grow at about its 1980 pace. Thus the notion that monetary policy tightened sharply further in 1981, derived from concentrating on M1 and especially on M1 adjusted for NOWs, is not born out by the credit measure. Finally, there

was only a very modest acceleration of credit growth in the first quarter of 1982 in contrast to the sharp acceleration of M1 that attracted so much attention.

In sum, the performance of policy has been substantially steadier judged in terms of credit than in terms of money. The advantage of such an appearance is not entirely self-serving. Market perceptions about the steadiness of policy obviously can have effects on interest rate volatility and, through the risk premium, perhaps even on the average level of rates. So a measure that has less tendency to alarm the markets with large short-term gyrations may well have substantive advantages.

The strongest argument for introducing a credit target at this time, however, may be the current and prospective impact of financial innovation and deregulation on the money measures we target. I know the case has been made that suitable averaging of M1 velocity over long enough time periods suggests that financial innovation has,not created significant problems to date. But I find that evidence unconvincing. For one thing, we have already had one redifinition of the Ms, including the transactions M1 definition, and nobody doubts that this was necessary. Second, most agree that something did go seriously wrong with the money demand equations in 1974 and that the problem persisted for some time. Third, I think it is clear that, at the least, the introduction of nationwide NOWs last year created major new problems for the interpretation of M1. Meanwhile, other aspects of financial innovation and deregulation produced quite abnormal behavior, given prevailing interest rate conditions, for M2 and M3 in 1981.

But perhaps most importantly, the prospects are (as Friedman notes) that further innovation and deregulation will have major effects on all the Ms over the coming years. It seems to me, for example, that the "sweep account" phenomenon has the potential for drastically reducing the demand for conventional transactions instruments, though its importance is probably only marginal to date. The money funds could have similar effects if they began price transactions services directly and ended current limitations on use of the check writing privilege. On the other hand, interest rate deregulation for NOW accounts by 1986 could greatly increase the demand for M1 as currently defined, but what the net effect of all these things taken together would be we cannot be sure.

These various current and prospective developments are specific to the markets for the instruments we include in our definitions of ***money.***

I know of no particular reason to expect them to have similar effects on total net credit. Consequently, credit may become relatively more reliable as a financial indicator in the future.

Admittedly our inability to get a good direct handle on the credit measure is a weighty objection. However, as more and more of M2 and M3 come to consist of nonreservable instruments paying market-related rates, our ability to get a direct handle on them, whether through nonborrowed reserves or the funds rate, is also weakening. Indeed similar problems could come to infect the transactions measure of money to the extent that sweep accounts and money fund shares become increasingly important in making payments.

In the meanwhile, my conclusion is that on balance, replacement of one of more of the higher numbered Ms with Friedman's credit measure may have merit. Even if not directly controlable, monitoring total credit behavior could prevent destabilizing responses to movements in potentially misleading money measures.

Symposium Participants

Wayne D. Angell
1341 South Mulberry
Ottawa, Kan. 66067

Stephen H. Axilrod
Staff Director
Board of Governors
Federal Reserve System
20th and Constitution Ave., N.W.
Washington, D.C. 20551

Kenneth Bacon
Washington Editor
Wall Street Journal
22 Cortlandt Street
New York, N.Y. 10007

Anatol Balbach
Federal Reserve Bank of St. Louis
St. Louis, Mo. 63166

Rachel Balbach
Centerre Bank, NA
One Centerre Plaza
P.O. Box 267
St. Louis, Mo. 63166

Joseph Bench
Vice President
Shearson-American Express
2 World Trade Center
New York, N.Y. 10048

John Berry
Washington Post
1150 15th St. N.W.
Washington, D.C. 20071

Alan Blinder
Department of Economics
Princeton University
Princeton, N.J. 08544

J. A. Cacy
Vice President and Senior
Economist
Federal Reserve Bank of Kansas
City
Kansas City, Mo 64198

Phillip Cagan
Department of Economics
Columbia University
New York, N.Y. 10027

Kathleen Cooper
Security Pacific National Bank
333 S. Hope
Los Angeles, Calif. 90071

Richard Cooper
Department of Economics
Harvard University
Cambridge, Mass. 02138

E. Gerald Corrigan
President
Federal Reserve Bank of Minneapolis
250 Marquette Avenue
Minneapolis, Minn. 55480

Richard G. Davis
Senior Economic Advisor
Federal Reserve Bank of New York
New York, N.Y. 10045

Thomas E. Davis
Senior Vice President
Federal Reserve Bank of Kansas City
Kansas City, Mo. 64198

Doris M. Drury
10879 E. Powers Drive
Englewood, Colo. 80111

Dr. Hermann-Josef Dudler
Deutsche Bundesbank
D-6000 Frankfurt 1
Postfach 2633
Wilhelm-Epstein-Strasse 14
West Germany

William J. Eaton
Los Angeles Times
1875 *I* Street, N.W.
Washington, D.C. 20006

Robert Eisenmenger
Director of Research
Federal Reserve Bank of Boston
600 Atlantic
Boston, Mass. 02106

Charles Freedman
Department of Monetary and Financial Analysis
Bank of Canada
Ottawa, Ontario

Benjamin Friedman
Department of Economics
Harvard University
Littauer Center 127
Cambridge, Mass. 02138

Jonathan Fuerbringer
New York Times
229 W. 43rd Street
New York, N.Y. 10036

Marvin S. Goodfriend
Research Officer
Federal Reserve Bank of Richmond
P.O. Box 27622
Richmond, Va. 23261

Robert Gordon
Department of Economics
Northwestern University
2003 Sheridan Road
Evanston, Ill. 60201

Roger Guffey
President
Federal Reserve Bank of Kansas City
Kansas City, Mo. 64198

Donald Hester
Department of Economics
Social Sciences Building
University of Wisconsin
Madison, Wis. 53706

Bryon Higgins
Assistant Vice President and Economist
Federal Reserve Bank of Kansas City
Kansas City, Mo. 64198

Richard Hoey
Bache Halsey
100 Gold Street
New York, N.Y. 10038

Symposium Participants

W. Lee Hoskins
Pittsburgh National Bank
Fifth Avenue and Wood Street
Pittsburgh, Pa. 15222

Timothy Howard
Federal National Mortgage Association
570 Walnut Street
Philadelphia, Pa. 19106

John H. Kalchbrenner
Senior Vice President and Chief Economist
Shawmut Bank of Boston
1 Federal Street
Boston, Mass. 02211

Edward Kane
Department of Economics
Ohio State University
Columbus, Ohio 43210

Kenneth A. Kaufman
1545 New York Avenue, N.E.
Washington, D.C. 20002

Silas Keehn
President
Federal Reserve Bank of Chicago
P.O. Box 834
Chicago, Ill. 60690

Michael W. Keran
Federal Reserve Bank of San Francisco
400 Sansome Street
San Francisco, Calif. 94120

Donald Koch
Director of Research
Federal Reserve Bank of Atlanta
P.O. Box 1731
Atlanta, Ga. 30301

P. Michael Laub
Director, Economic and Policy Research
American Bankers Association
1120 Connecticut Ave., N.W.
Washington, D.C. 20036

Charles Lieberman
Vice President
Morgan Stanley
1251 Avenue of the Americas
New York, N.Y. 10020

Raymond Lombra
Department of Economics
Pennsylvania State University
State College, Pa. 16801

John Makin
University of Washington
Seattle. Wash.

Bennett T. McCallum
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pa. 15213

Paul Meek
Federal Reserve Bank of New York
33 Liberty Street
New York. N.Y. 10045

Dr. A. James Meigs
Senior Vice President and Chief Economist
First Interstate Bank of California
707 Wilshire Blvd.
Suite W 14-2
Los Angeles, Calif. 90017

William C. Melton
Vice President
Irving Trust
One Wall Street
New York, N.Y. 10015

Allan Meltzer
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pa. 15213

Frederic Mishkin
University of Chicago
1126 East 59th Street
Chicago, Ill. 60637

Frank E. Morris
President
Federal Reserve Bank of Boston
600 Atlantic Avenue
Boston, Mass. 02106

Scott Pardee
Executive Vice President
Discount Corporation of New York
58 Pine Street
New York. N.Y. 10005

Dr. D. D. Peters
Senior Vice President and Chief Economist
Toronto Dominon Bank
P.O. Box 1
Toronto Dominion Centre
Toronto, Canada M5K 1A2

James Pierce
Department of Economics
University of California-Berkeley
Berkeley, Calif. 94720

William Poole
Department Economics
Brown University
Providence, R.I. 02912

Aris Protopapadakis
Research Officer
Federal Reserve Bank of Philadelphia
100 North Sixth Street
P.O. Box 66
Philadelphia, Pa. 19105

Donald L. Raiff
Vice President and Senior Economist
Northern Trust Company
50 S. LaSalle Street
Chicago, Ill. 60675

Robert Rasche
Michigan State University
East Lansing, Mich. 48823

Norman Robertson
Senior Vice President and Chief Economist
Mellon Bank, NA
Mellon Square
Pittsburgh, Pa. 15230

Barry K. Robinson
Vice President
Federal Reserve Bank of Kansas City
Kansas City, Mo. 64198

Lawrence K. Roos
President
Federal Reserve Bank of St. Louis
P.O. Box 442
St. Louis, Mo. 63166

Dr. Leonard Santow
Senior Vice President and Adviser to the Board
J. Henry Schroeder Bank and Trust Company
1 State Street—8th Floor
New York, N.Y. 10015

Karl A. Scheld
P.O. Box 834
Chicago, Ill. 60690

Edward Stevens
Monetary Adviser
Federal Reserve Bank of Cleveland
1455 E. Sixth Street
P.O. Box 6387
Cleveland, Ohio 44101

Symposium Participants

John Taylor
Woodrow Wilson School
Princeton University
Princeton, N.J. 08540

Ronald Teigen
Department of Economics
University of Michigan
Ann Arbor, Mich. 48109

Raymond Theoret
National Bank of Canada
215 Saint Jacques
Montreal, Quebec H2Y IM6

James Tobin
Yale University
New Haven, Conn.

Paul A. Volcker
Chairman, Board of Governors
Federal Reserve System
20th and Constitution Ave., N.W.
Washington, D.C. 20551

Carl Walsh
Department of Economics
Princeton University
Princeton, N.J. 98540

Marc W. Wanshel
Crocker National Bank
Economics Department
One Montgomery Street
San Francisco, Calif. 94104

William White
Senior Economist
International Monetary Fund
Room 10320
Washington, D.C. 20431

John O. Wilson
Senior Vice President and Director
of Economics
Policy Research
Bank of America, NA
P.O. Box 37000, 6th Floor
San Francisco, Calif. 94137