Monetary Aggregates Targeting in a Low-Inflation Economy

*William Poole**

The first Boston Fed conference, 25 years ago in June 1969, bore the title, *Controlling Monetary Aggregates*. The conference volume leads off with a panel discussion, begun by Paul Samuelson. He opened his remarks with a one-sentence paragraph: "The central issue that is debated these days in connection with macro-economics is the doctrine of monetarism" (Samuelson 1969, p. 7). The background of that conference was the rising rate of inflation and accumulating evidence that excessive money growth was the cause of the problem. The principal question debated was whether the Fed should adopt a monetary target and abandon tight control of the federal funds rate.

Today we are dealing with what appears to be the opposite problem. The inflation rate has fallen to levels not seen since the early 1960s, but experience over the past decade or so seems to show that inflation is no longer closely related to money growth. Nevertheless, the question concerning the best target for the Fed to pursue remains the same. The organizers of this conference have framed the topic for this session as follows: "Monetary policy has often been characterized as attempting to maintain an intermediate target, such as a monetary aggregate, within a target range. However, changing financial markets have called into question the reliability of the relationships between intermediate targets and ultimate goals of monetary policy. . . . Should monetary policy abandon intermediate targets?"

With all due respect to my friends at the Boston Fed, the question is misstated. The quoted passage should read, "Should monetary policy

*Herbert H. Goldberger Professor of Economics, Brown University. The author thanks Data Resources, Inc. for providing access to its data bank, from which many of the data used in this paper were drawn.

have abandoned monetary targeting? Is the federal funds rate a satisfactory monetary policy instrument?" I rephrase the question because there can be no doubt that over the past few years the Fed's policy has focused on setting the funds rate and that money growth, however defined, now plays at best a marginal role. Indeed, the significance of money stock data in policy decisions seems considerably less than that of aggregate data such as the industrial production index and the consumer price index. The Fed still believes that money stock data are somewhat more important than, say, Rhode Island retail sales data, but not much more important.

The Fed is obviously uneasy with this situation, as it should be. Nothing has changed to eliminate the potential perils in controlling the fed funds rate. Yet, who can quarrel with success? Following the 1982 recession the economy enjoyed an unusually long economic expansion, which ended in an unusually mild contraction. During the expansion, the core CPI inflation rate remained fairly steady at about 4½ percent per year, and last year inflation was below 3 percent. It is true that the expansion following the mild 1990–91 recession got off to a slow start, and perhaps the Fed could have done things a little differently. Perfection, though, is a damn tough standard; it makes much more sense to emphasize departures from historical experience than from the dream world of macroeconomic bliss. On the realistic standard of history, the Fed has performed well indeed in recent years.

How can monetary policy research contribute to maintaining the Fed's excellent performance in the years to come? Proponents of monetarist policy prescriptions—those who want the Fed to resume paying attention to money growth targets—have devoted their research to, among other things, the stability of the money demand function, the regularities of the cyclical behavior of monetary aggregates, and the principles of defining monetary aggregates. Opponents of monetarist policy prescriptions—those who argue the case for the fed funds policy instrument—have devoted their research to, among other things, the instability of the money demand function, the irregularities of the cyclical behavior of monetary aggregates, and the problems with all existing definitions of monetary aggregates. Strangely, those who advocate that the Fed control the fed funds rate base their case almost entirely on the case against monetary aggregates. The funds rate as a monetary target really has not received much academic study.

This imbalance of research effort is unfortunate, given that monetary policy ought to be based on a comparison of the relative advantages and disadvantages of various approaches. My first published paper on this subject, about 25 years ago (Poole 1970a), emphasized that the practical issue then facing the Federal Reserve was to choose between controlling some monetary aggregate and some interest rate, and that the choice should in principle depend on whether the money stock or

the interest rate would be the more reliable policy instrument. The issue today remains the same. The enormous literature on monetary policy has clarified many of the issues, but few of the protagonists who have been in this intellectual battle over the years have changed their minds on how the Fed should run its policy.

Part of the problem, as just suggested, is that most of the research has been focused on monetary aggregates and too little has been focused on how the Fed has, or should, employ an interest-rate instrument. The obvious problems in recent years in using monetary aggregates have permitted the federal funds rate to win the policy competition by default. This paper will review the major considerations involving the monetary aggregates, and then present some new findings concerning the role of interest rates in monetary policy.

Policy Goals, Policy Instruments, and Intermediate Targets

Policy analysis has long been based on a framework distinguishing policy goals, intermediate targets, and policy instruments. Despite the widespread use of this framework, those using it are not always very precise about exactly how they interpret the main concepts. Thus, this paper begins with a few comments on how I view this framework, and on which aspects of various disputes are relevant here.

Policy Goals

One issue that has been settled is that the structure of the economy does not contain a long-run trade-off between employment and inflation. Not settled is whether a short-run trade-off exists and, if it does, its nature and stability. Attitudes toward this issue do affect policy positions, but for the purposes of this paper the trade-off debate can be ignored. It will be assumed that the ultimate goal of monetary policy in the long run is to keep inflation low, and that the goal in the short run is to maximize an objective function that depends on the levels and stability of employment and inflation in the current and future periods. The connection between the short run and the long run depends on the Fed's discount rate and the risks it is willing to take, including political risks arising from pressures from the Congress and the Administration. The argument here will depend little on the precise nature of the structure of the economy within which the policy optimization takes place.

A common argument, but one that makes no sense to me, contends that the Fed should simply concentrate on achieving its ultimate goals. Some inflation hawks, for example, want the Fed to follow a "price rule." Others want the Fed to target nominal GDP growth "directly." Statements of this kind sweep under the rug the important problem of

how the Fed should adjust its policy instruments in pursuit of policy goals. Economists differ much less in their views on the goals they want to achieve than in their views on how to adjust policy instruments to achieve the goals. Some of the confusion arises because the issue of political control over monetary policy gets mixed up with technical issues concerning relationships between instruments and goals. Although the main purpose of this paper is to examine technical issues, a short digression on political control over monetary policy seems in order.

Political Control of Monetary Policy

A central bank is ultimately responsible to the voters, and economists have long been interested in the question of how monetary policy goals are and should be determined in a democracy. The issue is partly one of political economy and partly one of the effectiveness of monetary policy in terms of the behavior of the variables in the objective function —the level and stability of employment, inflation, interest rates, and whatever other variables might be considered.

Democracies exercise control over central banks in a number of different ways in different countries, and a lively literature exists on how best to organize this control. In some countries, the central bank reports directly to the treasury or finance ministry, and through that department to the president or prime minister. In other countries, the United States included, the central bank has a substantial degree of independence from the executive branch, and the objectives of policy are determined primarily by the appointed central bankers with a minimum of legislated guidance from the legislature. (Of course, legislative and executive branch commentary ranging from thoughtful analysis to political potshots is common, but commentary should not be confused with formal legislation.) In both sets of countries—those with relatively independent central banks and those with central banks controlled directly by the party in power—policy goals typically are vague and poorly defined. Political discourse focuses on inflation and unemployment, and other less important issues, but the emphasis changes over time and the goals are usually a little more or a little less, with substantial uncertainty over exactly what the operative goals are at any particular time.

The situation was quite different under the classic gold standard. The government, including the central bank, had as its primary monetary policy goal the maintenance of convertibility of the country's paper money into gold at a fixed price. That policy goal, for better or for worse, was very specific and widely supported within the gold-standard countries. New Zealand has recently taken a similar direction. Under the Reserve Bank of New Zealand Act of 1989, price stability is the sole objective of monetary policy (Fischer 1993, p. 2). The Reserve Bank of

New Zealand operates under a contract negotiated between the minister of finance and the Reserve Bank governor to achieve zero inflation, and the governor may be fired for failing to reach the target (pp. 8–10).[1]

Legislative determination of policy goals must take one of two forms: a *performance* standard or an *instrumental* standard. New Zealand has decided on a performance standard; the Reserve Bank of New Zealand has the task of determining how to adjust its policy instruments to achieve the legislated goal of price stability. Milton Friedman has long favored an instrumental standard in the form of a legislated target for money growth or the monetary base.[2] The issues in legislated standards will not be considered here, but rather the simple point that however the goals of policy are determined, the issue remains of how to control instruments to reach the goals. The legislature decides this question when it sets an instrumental standard; the central bank must decide the question when attempting to meet a legislated performance standard. In the absence of a clear legislated standard—the situation prevailing in the United States—the central bank must have some goal or other in mind, explicitly or implicitly, and must adjust policy instruments to best achieve that goal.

The instrumental issue would be irrelevant or uninteresting if the relationship between instruments and goals were so precise that errors in achieving goals were economically irrelevant. At the present state of knowledge, such errors are far from irrelevant. We simply do not know with much precision what the outcome will be of adjusting policy instruments in particular ways. Thus, no possibility exists that a "price rule" or "direct targeting" will make the instrumental question irrelevant in the foreseeable future. Arguing for such an approach ducks the key issue of how to achieve the goals of policy.

Intermediate Targets

It is conventional to define the instruments of Federal Reserve policy to be open market operations, the discount rate, and reserve requirements, and to treat the federal funds rate and some monetary aggregate as possible intermediate targets. This conventional taxonomy is more confusing than enlightening. From a control-theoretic point of view, an instrument is any variable that can be controlled without error or, more practically, with an error that is small relative to the error in controlling the ultimate goal variables. A narrow monetary aggregate (the monetary base, bank reserves, or M1) could be controlled with errors that are very small relative to the errors in controlling the price

[1] Canada also has a zero inflation target, but the arrangement is somewhat more vague and less formal than in New Zealand. See Fischer (1993).

[2] For an early statement of Friedman's views on this issue, see M. Friedman (1959).

level or nominal GDP. The Federal Reserve can also control the federal funds rate within a narrow range, day by day. Thus, a narrow monetary aggregate and the federal funds rate will be treated here as possible policy instruments rather than as intermediate targets.[3]

The problems of controlling M2 and other broad monetary aggregates are much greater than the problems of controlling narrow aggregates. M2 should not, I believe, be thought of as a policy instrument; if the central bank is to pursue an M2 target, it should be viewed as an intermediate target between policy instruments and policy goals. The problems of targeting intermediate variables were explained years ago by Benjamin Friedman (1975). Basically, pursuing an intermediate target adds a layer of control errors that makes control of the final goal variables less accurate than it could be by operating on policy instruments directly. Thus, from a technical point of view, there is every reason not to employ intermediate targets but to analyze policy in terms of the best settings for policy instruments to achieve the policy goals.

A possible argument for a role for intermediate targets is in explaining policy to the general public. The public might not understand the rationale for adjusting policy instruments in particular ways but might understand the significance of intermediate targets. For example, if open market operations are viewed as the instrument, then the Fed would surely lose its audience in explaining why $8.8 billion of 3-day matched-sale transactions were necessary this week to offset the net of float, changes in Treasury balances, and the reflux of currency after the Memorial Day weekend. It is much more insightful to say that the target is a particular federal funds rate, or a desired rate of M1 growth. However, if the federal funds rate, or M1 growth, can be achieved with a small margin of error, these variables might as well be called "policy instruments" in the first place.

If an intermediate variable cannot be controlled reasonably accurately, then the concept does not help to promote public understanding of monetary policy. Faced with large errors in controlling an intermediate variable, the Fed will get bogged down explaining the errors either as unavoidable control errors or as deliberate misses reflecting improved control of ultimate goals by appropriate settings of policy instruments. Both of these points are relevant to the Fed's attitude toward M2 in

[3] For those not used to thinking about policy instruments and intermediate targets in these terms, note that today the Fed can control the federal funds rate, which is usually considered an intermediate target, more precisely (as measured by the standard deviation of the actual rate as a ratio to the target rate) than it can its total assets, which are usually considered a policy instrument. The Fed's assets fluctuate as a consequence of such things as changes in bank borrowing at the discount window, transactions with foreign governments and central banks, and the speed of check-clearing, which affects items in the process of collection. If more accurate control of a particular instrument is desired, changes in Fed rules and procedures could deliver reduced control errors.

recent years. With the substantial change in bank behavior in bidding for small time certificates, the spread between the certificate yield and open market interest rates has changed. As a consequence, M2 has appeared less controllable than some had thought in the past and less closely related to nominal GDP. The Fed thought, correctly in my opinion, that it could do a better job of controlling the economy by controlling the federal funds rate appropriately than by targeting a predetermined path for M2.

Targets for Policy Instruments: Announce or Not?

The issue of the choice of the policy instrument should be kept separate from the issue of whether the Fed should announce and adhere to an annual target path for the chosen instrument. The case for announcing settings for policy instruments states that adhering to announced targets creates greater certainty about policy in the private sector and provides valuable policy discipline.

A policy of adhering to an announced path for a policy instrument requires that ultimate goal variables be related to the instruments in a reliable way. More precisely, it should not be possible to achieve significant gains in the performance of the goal variables by adjusting policy instruments continuously rather than adhering to predetermined paths for instruments. If large gains are possible, then the pressure on the Fed to grab those gains will be substantial. Clearly, if discipline over policy can be maintained some other way, as with performance standards enforced somehow or other, then there is every reason to improve policy performance by permitting departures of instruments from their planned paths.

As far as I know, no advocate of a funds rate target has ever called for the Fed to adhere to a target path for the funds rate announced a year in advance, or even three months in advance. The Fed's decision to abandon efforts to hit an announced money growth target need not have led to concentration on the fed funds rate; the Fed could have adopted a system of setting short-run targets for money growth or reserves growth in much the same way as it now sets short-run ranges for the fed funds rate.

A policy built around continuous adjustments of a policy instrument requires relatively little information about the relationship of the instrument to the goal variables. The Fed obviously needs to know the direction of the effect, all other things being equal, and needs some feel for the magnitude and timing of the effects. The information requirements are not really very different from those for the driver of a car. The direction of effects from applying accelerator and brake are known, and an ordinary driver quickly learns about how much of each policy instrument to apply in various situations. The control problem is fairly

robust to control errors; to slow down, apply the brake, and if the car is not slowing fast enough, apply a little more brake. The Fed in fact operates primarily by feeding back from current observations on the economy; on the basis of these observations and long experience, the Fed raises or lowers the fed funds rate a little more or a little less. If raising the funds rate over the first half of 1994 does not appear to be slowing the economy enough, then the Fed will raise the rate a bit more, and a bit more after that if necessary. This procedure certainly is not perfect, and occasionally the Fed has behaved about as predictably and competently as a drunken driver. But on the whole, the process has worked amazingly well in recent years.

The Fed could follow the same approach with an M1 instrument instead of with the fed funds rate; in fact, a strong case can be made for paying much more attention to M1 than has been true in recent years. To make that case, this paper will begin by reviewing some monetary regularities.

Understanding Monetary Regularities

Analysis of the relative advantages and disadvantages of targeting the money stock or the interest rate must begin with accumulated knowledge about gross monetary regularities concerning monetary aggregates and interest rates.

Monetary Aggregates Regularities

Perhaps the most important of monetary aggregates regularities is that large differences in rates of inflation are associated systematically with large differences in rates of money growth. Figures 1 and 2 tell a story that has long been well-documented.[4] These figures provide a cross-section view of the relationship between money growth and inflation for all countries reported in the tables in the back of the World Bank's *World Development Report, 1993*. Countries with a high rate of money growth experience a high rate of inflation. In a scatter diagram for a large sample of countries, the points lie approximately along the diagonal; the higher the rate of money growth, the higher the rate of inflation. This result conforms with standard monetary theory. All other things being equal, an exogenously higher rate of money growth yields a higher inflation rate; in equilibrium the inflation rate will equal the rate of growth of money per unit of real GDP.[5]

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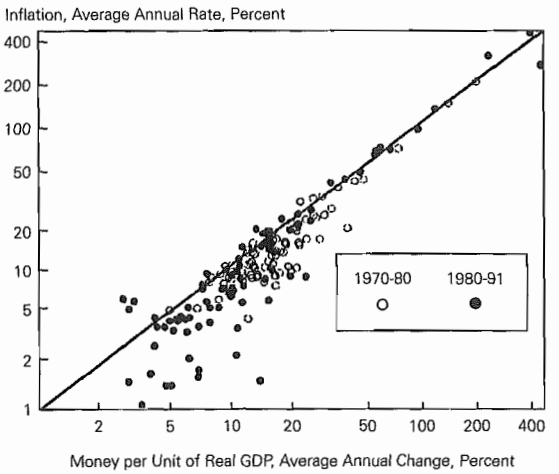
[4] Figures 1 and 2 are reproduced from Poole (1994a). For another recent study, see Duck (1993).

[5] Depending on tastes in macro theory, a few more conditions might have to be added to make this proposition airtight, but in practice failure to meet all the theoretical

Figure 1

Money Growth and Inflation: All Countries



Source: World Bank, *World Development Report 1993*, Tables 1, 2, and 13. Reproduced from Poole (1994a).

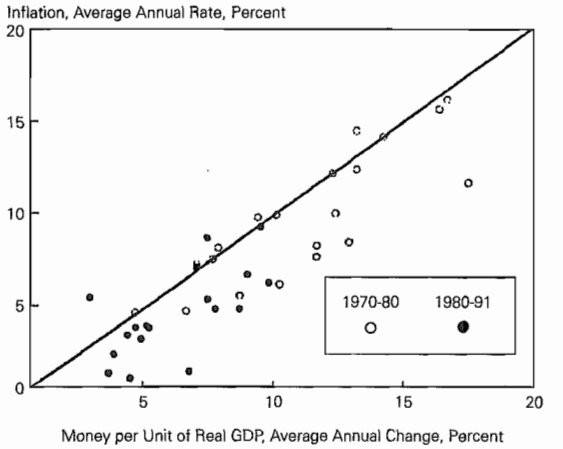
When dealing with rates of inflation of 20, or 50, or 200 percent per year, no one disputes that lower money growth is essential to reduce inflation. But in considering countries with lower and lower inflation rates, the relationship between money growth and inflation appears to be less and less reliable. In Figure 2, the points farthest off the diagonal are for countries with relatively low inflation rates. In Figure 1, the relationship between money growth and inflation seems quite loose for the 1980–91 period. The relationship between money growth and inflation (or nominal GDP growth) becomes less exact when inflation is lower, for two main reasons. One has to do with behavior in the private economy and the other with monetary policy.

When inflation is low, so also are nominal interest rates. In practice, a substantial part of the narrow money stock in most countries bears

conditions is of minor importance in explaining departures from the diagonal in figures such as these. Problems with the underlying data are surely more important.

Figure 2

Money Growth and Inflation: High-Income Countries



Source: World Bank, *World Development Report 1993*, Tables 1, 2, and 13. Reproduced from Poole (1994a).

little or no interest. When nominal interest rates are low, the opportunity cost to holding money is low, and people hold larger real balances. Moreover, the penalty for holding balances that are temporarily larger than they need to be is small. Thus, fluctuations in the amount of money created by the central bank (either purposely or inadvertently as a consequence of other policies) are largely absorbed in fluctuations in the amount of real balances held rather than in the rate of inflation. I know of no systematic study of how the lag between money growth and inflation depends on the rate of inflation, but my distinct impression is that the lag is short when inflation is high and long when inflation is low. In Cagan's (1956) classic study of hyperinflation, the lag between changes in money growth and changes in the inflation rate was measured in weeks. In the United States, the conventional view has been that the lag between money growth and inflation is approximately two years. It makes sense that the lag should be short when the cost of failing to adjust is high, and that the lag should be long when the cost of failing to adjust is low. A consequence of long lags is that the

year-to-year relationship between money growth and inflation will be more variable. Higher money growth may yield little inflation at first, and inflation may rise, perhaps in response to prior money growth, at a time when money growth is low.

A second consideration, one not well understood in today's debates over monetary policy, is that a predictable consequence of optimal monetary policy is that the correlation between monetary policy instruments and policy goals will be driven to zero. This issue is discussed in some detail in another paper (Poole 1994b), but the equations from that paper are reported here and the issue will be reviewed briefly.

Consider the following simple model:

$$Y = \alpha_0 + \alpha_1 X + \beta M + \varepsilon \tag{1}$$

with means $\mu_\varepsilon = \mu_X = 0$, variances σ^2_ε, σ^2_X, and covariance $\sigma_{\varepsilon X} = 0$. The central bank observes the vector X, and adjusts M to offset the effects of X on Y (GDP). The optimal M is

$$M^* = \frac{Y_f - \alpha_0 - \alpha_1 X}{\beta} \tag{2}$$

where Y_f is the target level of GDP. We can show that

$$\sigma_{YM} = 0. \tag{3}$$

Now suppose M is not set at M^* but instead at

$$M = \lambda M^*, \quad \lambda > 1, \ = 1, \quad \text{or } < 1. \tag{4}$$

Then,

$$\begin{aligned} \sigma_{YM} &= [\alpha_1 X(1-\lambda) + \varepsilon]\left[-\frac{\lambda}{\beta}(\alpha_1 X)\right] \\ &= -\alpha_1^2\left(\frac{\lambda}{\beta}\right)(1-\lambda)\sigma_X^2. \end{aligned} \tag{5}$$

$$\begin{aligned} &\text{If } \lambda = 1.0, \text{ then } \sigma_{YM} = 0 \\ &\quad < 1.0, \text{ then } \sigma_{YM} < 0 \\ &\quad > 1.0, \text{ then } \sigma_{YM} > 0. \end{aligned} \tag{6}$$

If monetary policy is optimal ($\lambda = 1.0$), then M and Y are uncorrelated. If monetary policy underreacts to information in X ($\lambda < 1.0$),

then money and GDP are *negatively* correlated. The intuition of this apparently strange result is straightforward. Suppose that X rises, which tends to push up Y, and that policymakers respond by reducing M. However, when policy underreacts, M does not decline by enough to offset the full effects of X and a negative correlation between M and Y is observed. If policy overreacts ($\lambda > 1.0$), then monetary disturbances dominate the outcome, yielding a positive correlation between M and Y.

The intuition of this result is clear, once intuition is developed by thinking through the common sense of the result. An optimal monetary policy makes use of all available information to produce the best possible result for the goal variables. To keep things simple, suppose the goal of policy is constant growth of nominal GDP.[6] Any correlation remaining in the data between the policy instruments (and any other variables known at the time the instruments are set) and growth in nominal GDP represents a lost opportunity to produce a better policy. If, for example, a positive correlation is observed between money growth and departures of GDP growth from its target rate, then the central bank could have produced a better result by raising or lowering money growth to keep GDP growth closer to target.[7] U.S. monetary policy really has been much better since 1982 than before, and that is the most important reason why the correlation between money growth and GDP growth has become so small, as documented by Friedman and Kuttner (1992).

An implication of this argument is that the search for a better monetary aggregate, as measured by its correlation to nominal GDP, is doomed to failure if the central bank is doing a good job. Suppose careful statistical analysis uncovers a better monetary aggregate. Then, once the central bank uses the aggregate optimally, the correlation between the aggregate and nominal GDP will be driven to zero. Given the aggregate, fluctuations in nominal GDP will reflect unavoidable random disturbances and measurement error. The important implica-

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[6] If the utility function of the policymakers depends on a number of variables, nominal GDP need only be replaced in this argument by the evaluated utility function. That is, take all the individual goals such as inflation, unemployment, and so forth, and then calculate the level of utility from realizations of the individual goals. In the general argument, this calculated level of utility replaces the growth rate of GDP in the argument in the text.

[7] For an everyday analogy, when driving on an interstate in the mountains, your car may travel at a nearly constant speed of 65 mph but the amount of gas being fed to the engine will vary greatly depending on whether the car is going uphill or down. If you are successful at keeping close to 65 mph, the correlation between gas flow to the engine and the speed of the car will be zero. Assuming the car has a large enough engine, any non-zero correlation between speed and gas flow to the engine during the period when the target speed is 65 mph would be evidence that you are not driving as skillfully as possible. Of course, this analogy assumes that the only goal variable is speed of 65 mph; however, the illustration could easily be extended to consider a more complicated utility function.

tion of this argument is that the Fed must choose its policy instruments largely on the basis of evidence from periods when policy was *not* optimal and from economic theory.[8] Practical experience in using policy instruments may also be important.

The same argument applies to the federal funds rate or any other instrument of policy. Optimal use of the instrument will destroy all simple correlations between the instrument and the goals of policy. In principle, causal mechanisms could be sorted out econometrically if good estimates were available of the shocks to which the central bank is responding as it adjusts its instruments. However, in practice the central bank responds to a wide and changing range of information, and there is little hope of untangling causal mechanisms with any degree of reliability in an optimal control environment. Indeed, it is in principle impossible to identify econometrically the Fed's response to one-of-a-kind disturbances such as the stock market crash; no estimation is possible with a sample of one in the period at issue. During the 1980s, the Fed reacted successfully to a variety of such disturbances.

If policy is optimal (or nearly so) over some period, a search for variables correlated with deviations of goal variables from their target levels may uncover spurious correlations.[9] With a short enough sample period and a long enough list of series, some series or other is bound to be suitably correlated. Once a reasonably successful policy regime is established, as I believe it has been since 1982, improvements will be difficult to come by. To avoid the problem of acting on the basis of spurious correlations, proposed improvements will have to be considered provisional until enough new data have arrived to show that the correlations are genuine rather than spurious.

Interest Rate Regularities

As for interest rates, an important regularity in the present context is that sustained higher inflation yields higher interest rates. A second is that, other things being equal, raising interest rates tends to depress

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[8] This point is quite general. For example, as a practical matter the characteristics of the long-run Phillips curve cannot be tested without observations of permanent, or long-lasting, changes in the rate of inflation, because inflation expectations cannot be observed without error. U.S. data did not fit the Friedman-Phelps argument for a vertical long-run Phillips curve until the sample included the higher inflation rates of the late 1960s. In the larger sample, the error in observing expectations was small relative to the variance in actual, and therefore expected, inflation over the sample period.

[9] For this reason, I have serious reservations about recent work constructing broader monetary aggregates by adding bond and stock mutual funds to the existing M2. No clear theoretical reason exists for constructing such an aggregate; although households with mutual funds can readily turn them into cash by making a phone call, businesses can do the same with all their liquid assets.

economic activity and inflation. These twin facts produce a problem for monetary policy and for public understanding of it. To lower interest rates over the long run, the central bank must first raise rates to reduce inflation. Stating the proposition in the other direction, a consequence of lowering interest rates too much (or failing to raise them enough in time) is that inflation rises and sooner or later interest rates rise more than they otherwise would have.

As a baseline prediction, raising money growth by a sustained rate of 1 percentage point will lead to a sustained increase in inflation of 1 percentage point. Such an increase in inflation will, as a baseline case, yield a 1 percentage point increase in the nominal rate of interest. Although the direction of effects outlined in the previous paragraph is clear, no baseline prediction exists to provide guidance as to how much or how fast inflation will rise if the central bank, say, lowers interest rates by 1 percentage point from an initial point of equilibrium. The problem is that an economic model with a permanently fixed nominal interest rate set by the central bank has no determined price level. A consequence of this fact is that a central bank cannot calculate the appropriate interest rate target but must instead adjust interest rates up or down, a little more or a little less, on the basis of its feel for the economy.

Of course, given a specific macro model, with fully specified structure and expectations mechanisms, the appropriate interest rate for the central bank to set can indeed be calculated. However, no model exists that commands general support as being reliable in this sense. In fact, it is fair to say that while models can be used to illustrate general principles, no advocate of interest-rate control by a central bank would want to use a model to calculate the appropriate interest rate and then adjust the rate as indicated by the model. Rather, what the Federal Reserve does, and what advocates of interest-rate targeting recommend, is to adjust rates up or down based on a wide variety of information about developments in the economy. This is not meant to imply that this process cannot work well; it is simply an attempt to understand what actually happens. As a driver, I may have no idea how to calculate how much pressure to apply to brake and accelerator, but I can drive quite successfully by applying a little more or a little less based on long experience.

To sum up these points, as a baseline case higher money growth can be expected to yield higher inflation, and the relationship will lie approximately along the diagonal of a diagram such as Figure 1. Further, higher inflation can be expected to yield higher nominal interest rates—in equilibrium, approximately one for one. Departures from these baseline cases, especially in the short run, will be more pronounced the lower the average rate of inflation. A central bank fixing the rate of interest permanently creates an economy without a well-defined

equilibrium; a monetary policy based on interest-rate control must constantly adjust rates up or down to keep the economy on track. With regard to interest-rate targets, no solid information is available to indicate how much up or down, or how fast or slow, is required for a satisfactory outcome.

Issues in Money Stock Targeting

Starting in the mid 1970s, the Federal Reserve increasingly supported a monetary policy placing substantial emphasis on achieving money growth targets. In the mid 1980s, the Fed switched its emphasis from M1, which it had traditionally favored over other monetary aggregates, to M2. Over the course of the late 1980s, the relationship between money growth however defined and nominal GDP seemed less and less reliable, and the Fed's attention to money growth targets waned to the point of nearly vanishing.

With regard to M1, the main issue is that the interest elasticity of demand for M1 is considerably higher than estimated in the mid 1970s. In first taking up this issue (Poole 1970b), I argued that estimates of income and interest elasticities from postwar data were not well determined because of the long, rising trends in both real income and interest rates. I now believe that economists made a mistake in attributing rising velocity of M1 between 1946 and 1980 to some combination of a real income elasticity below unity and an exogenous trend. The consequence of this mistake was an estimate of the interest elasticity that was much too low, in the neighborhood of -0.1 to -0.2. Current estimates of the interest elasticity of demand for M1 suggest a number in the neighborhood of -0.5 (see Hoffman and Rasche 1991).

A relatively high (in absolute value) interest elasticity creates a major problem for a predetermined target for M1 growth. A real disturbance, or a substantial change in inflation expectations, may require a large change in interest rates if the economy is to remain close to full employment or expand along the desired path for nominal GDP. To illustrate the magnitude of this problem, consider the transition from the inflation rate of the late 1970s to the lower inflation rate of the mid 1980s. In the late 1970s, rules advocates (myself included) typically argued for predetermined, announced gradual reductions in money growth. Reducing money growth by 1 percentage point per year was a common recommendation. Suppose the economy were initially fully adjusted to an ongoing inflation rate of 7 percent per year and nominal interest rates averaging 10 percent. Now suppose the goal of monetary policy is to reduce inflation and nominal interest rates by 5 percentage points. The new equilibrium will have a nominal interest rate of 5

percent. Assuming a conventional money demand function with a real-income elasticity of 1.0, then

$$\ln \frac{M}{P} = a + \ln \frac{Y}{P} + b \ln i \quad \text{(money demand function), and}$$

$$\Delta \ln M - \Delta \ln Y = b\Delta \ln i.$$

If the interest rate goes from 10 percent to 5 percent, then $\Delta \ln i \approx -0.7$. If the interest elasticity is low, say -0.1, then the gap between money growth and nominal GDP growth is 0.07. If money growth is constant at 3.5 percent, then two years of zero growth in nominal GDP will be adequate to create equilibrium in money demand. However, suppose the interest elasticity of money demand is -0.5. Then, the total gap between money growth and nominal GDP growth to be bridged is 0.35. If money growth is constant at 3.5 percent, it would take (0.35/0.035) = 10 years of zero growth in nominal GDP to restore equilibrium in money demand. To restore equilibrium faster would require some combination of GDP growth below zero and money growth above 3.5 percent. If money growth is higher, what happens to expectations of future inflation when the central bank has staked its reputation on achieving its M1 target? If the central bank sticks to its money growth target, what happens to unemployment if growth in nominal GDP is negative?

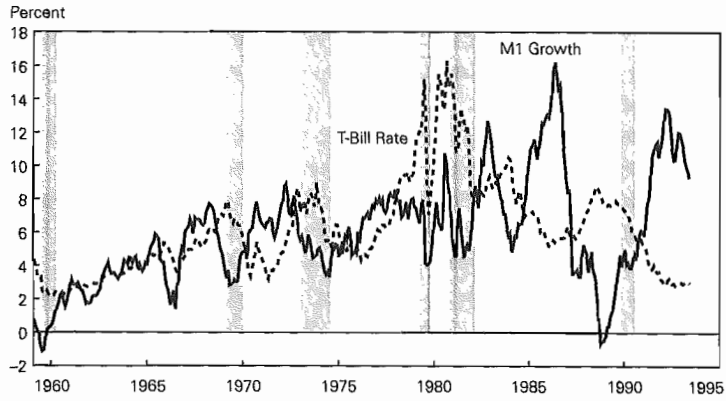
This simple arithmetic and the best current estimates of the interest elasticity of money demand have convinced me that a system of keeping actual M1 growth to targets announced a year in advance is not likely to work satisfactorily. Interest-rate fluctuations of several percentage points in a year are not uncommon even during periods in which the rate of inflation is changing relatively little. I believe that the increased volatility of M1 velocity after the 1980–82 period of disinflation was primarily a result of the Fed's greater success in permitting changes in interest rates and M1 growth that stabilized, or at least did not destabilize, the real economy and inflation rate.

That the typical cyclical pattern of money growth and interest rates changed after 1982 can be seen clearly in Figure 3. After 1982, large gyrations in money growth and interest rates occurred without a cyclical contraction until the one beginning in July 1990. M1 growth fell in 1984 as interest rates rose; M1 growth rose significantly in 1985 and 1986 as interest rates fell. Except for a few months' interruption following the stock market crash in October 1987, interest rates rose from late 1986 to March of 1989 and then fell almost every month before leveling out at about 3 percent in late 1992. For interest rates to start falling and M1 growth start rising well over a year before the cycle peak, as occurred before the peak in 1990, is unprecedented in U.S. history back to the first availability of monthly estimates of the money stock in 1907.

Figure 3

12-Month M1 Growth Rate and the T-Bill Rate

January 1960 to January 1994



The sustained and substantial short-run inverse relationship between M1 growth and the T-bill rate over the period after 1982 is also unprecedented in U.S. history, putting aside the periods dominated by world wars and the Great Depression.[10] The typical pattern before 1982, allowing for the lag of interest rates behind money growth, was a positive relationship reflecting the effect of money growth on inflation and interest rates, and the usual cyclical pattern. For monthly data from January 1960 through December 1982, the simple correlation between M1 growth and the T-bill rate is 0.53; for the period January 1983 through January 1994, however, the simple correlation is −0.45.

The change in the cyclical behavior of interest rates and money growth after 1982 must be attributed primarily to the Federal Reserve.

[10] The correlation between monthly data for the commercial paper rate and the 12-month growth rate of the Friedman-Schwartz M2 series was slightly negative for the period May 1908 to December 1960. This outcome is dominated by observations during the two world wars, the sharp recession in 1920–21, and the Great Depression. An examination of a graph of the data suggests that relatively normal subperiods are characterized by a positive correlation, but it would seem to be cooking the books to search too hard to find such periods for the purpose of reporting some positive correlations.

Except for the period from October 1979 to (about) October 1982, the Fed has always conducted policy by adjusting money market interest rates. Policy has focused sometimes on borrowed reserves, sometimes on free reserves, and sometimes on the federal funds rate, but these are minor variations on the basic theme of controlling money market interest rates. Experience after 1982 demonstrates that it is indeed possible for the Federal Reserve to base a successful policy on the federal funds rate, by adjusting that rate in a reasonably timely fashion to yield a satisfactory outcome for real GDP and inflation. The problem is how to sustain this good performance.

In principle, it might be possible to define a money growth target taking account of the interest elasticity of money demand. The announced target might take the form of a money growth range conditional on interest rates remaining in a certain range, and alternative higher (lower) money growth ranges conditional on lower (higher) interest rates. However, it is doubtful whether such an announced target would provide the predictability to the market and political constraint on the central bank that advocates of money growth targets have desired. It seems much better to emphasize a performance standard than a complicated instrumental standard.

The Federal Reserve adopted an M2 target in the mid 1980s when theory and evidence suggested that M2 velocity was likely to be more stable than M1 velocity. The argument was that the elasticity of M2 with respect to market interest rates would be much lower than that for M1 because a large fraction of M2 pays a market-sensitive rate. Moreover, observed M2 velocity was more stable than was observed M1 velocity. In the event, M2 velocity did not turn out to remain stable enough for M2 targeting to be satisfactory. The immediate source of instability in M2 velocity was a run-off of small time certificates in M2 after 1990.

The case is weak for aggregating time certificates, large or small, with currency and bank liabilities payable on demand. It is important to recognize that the extensive historical research of Friedman and Schwartz (1963a, 1963b) relies on a definition of M2 that does not match the current definition. Prior to 1960, bank liabilities in certificate form were of negligible importance. The concept corresponding to the Friedman-Schwartz M2 is what I have called MZM ("money zero maturity"); this measure includes currency plus all assets convertible to currency on demand at par (that is, without penalty). Without getting further into the debate on how to define money for policy purposes, it is fair to say that economists have not delivered a conceptual basis for defining money that commands general assent and has proven to be entirely satisfactory for policy purposes.

To summarize various strands in this discussion: When considering high rates of inflation and the problem of producing a modicum of financial stability in a country such as Russia today, emphasis on

controlling money growth is fully in order. The distortions and inefficiencies created by a high rate of inflation are so great that taking the first-order steps to bring down money growth is the major point that must be discussed with the interested parties. The same argument is relevant for the United States in the sense that the inflation of the 1970s could not have been reduced without a period of monetary stringency. Moreover, the relatively high rate of M1 growth from 1990 through 1993 could not be continued without inflation rising substantially at some point. In the first half of 1994, the Fed raised money-market interest rates and reduced M1 growth, adding another data point reinforcing the substantial negative correlation between M1 growth and interest rates after 1982.

Central banks in the United States and other high-income countries with well-developed financial markets have considerable room to permit substantial changes in M1 growth without adverse consequences. Indeed, changes in M1 growth in response to changes in interest rates and other factors can be positively beneficial. The problem is to find a way to ensure that the "can be" in the previous sentence is reliably translated to "are typically." The process is certainly not automatic and the risks of policy mistakes are substantial.

Issues in Interest Rate Targeting

The total absence of a model permitting calculation of the appropriate level for the federal funds rate creates a serious problem for the Fed, and for everyone else as well. Not only does such a model not exist, but also developing such a model may in principle be impossible. The Fed cannot set the federal funds rate without regard for market expectations about the future, as such expectations register in long-term interest rates. However, the problem is that long-term interest rates depend critically on market expectations about what the Fed will do in the future.

The Fed would have a downright easy job if designing monetary policy were equivalent to an engineering control problem, such as the design of an autopilot for a ship. In an engineering control problem, the mechanism to be controlled can be modeled as a system subject to external shocks. The autopilot monitors instruments showing the deviation from the desired course and speed, and then adjusts control instruments to keep the ship on its targeted track. Design of the autopilot must consider the characteristics of the ship and the nature of the disturbances pushing the ship off course, but the problem is easy compared to the monetary policy control problem. The wind and current are not watching the autopilot and trying to anticipate how the autopilot will adjust the rudder and throttle.

The Fed's job would be substantially equivalent to an engineering control problem if most of the shocks hitting the economy had little or nothing to do with expectations about Fed behavior in the future. Droughts, floods, OPEC oil shocks, Gulf Wars, and the like are examples of such shocks. How important are external shocks, compared to changes in expectations about Fed policy and endogenous business cycle processes?

To gain a feel for this question, it seems insightful to examine the behavior of the bond market, which is perhaps the most general and efficient aggregator of economic information. Large changes in bond yields presumably reflect new information in the market, or new assessments of existing information. I know no foolproof way of identifying the reasons for large changes in bond yields but have looked at reasons identified in the *Wall Street Journal* at the time of large changes in yields.

Table 1 (at the end of this paper) provides the results of this study.[11] The table is based on data on the weekly average index of the average yield on Treasury bonds with maturities of 10 years and over. The data series runs from 1963 through 1993. The standard deviation of percentage (not percentage point) changes in the weekly average yield for the entire sample is 1.4 percent. The volatility of interest rates is quite variable, and so a moving standard deviation was constructed covering 104 weeks. The table reports all changes larger in absolute value than two standard deviations as measured by the moving standard deviation. This procedure picks up all large changes in yields, where "large" is defined in the context of the market environment of the time. The table also includes all changes larger than 2.8 percent (twice the total sample standard deviation) on the assumption that changes this large are worth examining even if they occur in a volatile period with a moving standard deviation greater than 1.4 percent. At the beginning of each entry in the table, to explain what was going on at the time of a large change in the bond yield, is a code in parentheses: "R" indicates routine economic data; "M" indicates monetary policy news (either Fed action or speculation on Fed action); "F" indicates fiscal policy news, including news about regulations and controls; "V" indicates Vietnam-related news; "O" includes all other news, including news about oil-price changes.

The impression from reading the *Wall Street Journal*, both day by day over the years and from this recent ordeal at the microfilm machine, is that the overwhelming majority of large changes in bond yields arise in response to actions by the monetary authorities and to releases of routine economic data. Moreover, the effect of routine data on bond

[11] The author appreciates help from Arjan van den Born, Michael Crawley, John M. Frost, Rohit Malhotra, Todd C. Lee, Jeroen van Meijgaard, and Coenraad Vrolijk, who did much of the digging in the *Wall Street Journal* as part of their work in his graduate class during the spring of 1994.

yields often arises from speculation that the Fed will react to the data, or that the data change the odds on Fed action. The experience so far in 1994 is quite typical: The bond market has fluctuated in response to Fed policy actions, speculation on Fed policy, and release of new economic data. Over the entire sample, fiscal policy changes, including wage-price controls, have some effect on bond yields, as do foreign disturbances, but infrequently so. In fact, if reporters and the bond traders they talk with can be trusted, changes in interest rates are driven almost entirely by the internal dynamics of the economy and monetary policy, and hardly at all by exogenous shocks.

Before discussing the implications of Table 1, consider also the body of evidence from studies of announcement effects. A sample of relatively recent studies includes Cook and Hahn (1988, 1989); Cook and Korn (1991); Dwyer and Hafer (1989); Hardouvelis (1988); and Santomero (1991). These papers contain references to many other papers in this line of literature. My interpretation of this evidence is that the size of interest-rate responses to economic data depends primarily on the way the Fed is running its interest-rate policy.

In the late 1970s, and especially during the period from October 1979 to October 1982, interest rates responded in significant fashion to weekly data on the money stock (deviations of reported from anticipated data). The Fed was paying increasing attention to money growth, and so the market did too. After October 1982, the Fed paid less attention to money growth, and the market did too. The Fed responded to data on the real economy, such as employment and industrial production, and the market did too. In 1986 and 1987, the trade deficit was a contentious political issue. The trade deficit, especially that with Japan, had implications for U.S. interest rates because of Administration pressure on other countries to reduce their interest rates. Through the mechanism of foreign interest rates and their implications for the dollar exchange rate, U.S. monetary policy was indirectly affected by the trade deficit. Thus, U.S. interest rates responded to news on the trade deficit. As the 1980s wore on, the Fed responded less and less to the money data, and the money markets did too. Today, the Fed does not respond to money data, and neither does the bond market.

Considering the announcements literature and Table 1, it appears that the bond and money markets respond primarily to changes in Fed policy and to changes in expectations about Fed policy. The more confidence the market has in the Fed, the more the market will concentrate on what the Fed is doing and the less the market will concentrate on fundamentals other than the Fed. Consider an analogy: If you go to the horse track but know little about horse racing, it makes sense to place bets by watching what a bettor known to be well-informed does. The market watches the Fed because the Fed is well-informed, and because the Fed is the dominant player in the money market.

The more confidence the market has in the Fed's willingness to do what is necessary to maintain low inflation, the more sense it makes for the market to concentrate on what the Fed is doing. This situation poses several dangers. For one thing, the Fed cannot use the behavior of interest rates to provide useful information on how it should adjust the federal funds rate. The bond market today tells the Fed what the market thinks the Fed is going to do. If the Fed is slow to adjust the funds rate, for whatever reason, the bond market will not provide a clear, independent assessment of the appropriate interest rate. In this environment, it is easy for the Fed to make a mistake because the bond market will not provide a strong contrary signal.

Should the Fed look only at data on the real economy, and at goods and labor prices, in determining how to set the federal funds rate? If you believe that the money demand function is totally capricious, then monetary aggregates provide no useful information to supplement output and price data. I am convinced, however, that the Fed should not throw out the money data; monetary regularities are too well established for that to be sensible.

Over the past decade it has been shown that aggressive and skilled adjustment of the federal funds rate can yield a successful outcome. But what happens if the Fed gets caught in a political box and finds itself unable to move the funds rate enough? The answer is that in time inflation rises and the costly progress in reducing inflation is lost. What external standard can the Fed appeal to in building public support for responsible monetary policy? Given the lags, appeal to price performance itself is unsatisfactory. If the Fed does not tighten policy until inflation is clearly rising, then it is too late.

The Fed basically has been operating on an unemployment-rate standard. The Fed tightens if the real economy seems to be overheating, eases if the economy seems soft, and tries for a neutral stance in between. An unemployment standard is less than fully satisfactory, both because the short-run Phillips curve is of uncertain reliability and because policy designed to keep unemployment from falling is suspect politically.

Restoring a Role for Money Growth Targets

The issue is how the Fed can build on past successes and reduce the odds of policy mistakes. Greater short-run variability in money-market interest rates would not damage the economy and would, in my view, improve monetary policy. Note once again that before 1980, the Fed followed a procyclical policy by permitting money growth and interest rates to rise together during cyclical expansions and fall together during cyclical contractions. Since 1982, the Fed has confined the positive

correlation of money growth and the fed funds rate to the short run—periods over which the funds rate is fixed. Over longer periods, the Fed has adjusted the funds rate aggressively, yielding a negative correlation between money growth and the funds rate.[12]

The Fed should, I believe, allow the fed funds rate to vary within a considerably wider band, perhaps 100 basis points, between Federal Open Market Committee (FOMC) meetings. Open market operations should be designed to keep bank reserves on a steady path. In practice, the funds rate would often fetch up against one side or the other of the band, which might superficially make such a policy appear operationally equivalent to present policy. However, the market would know that the funds rate could move within the band, which would force the market to develop a view on future economic developments besides what the Fed was likely to do. At a time when economic conditions were changing, this policy would provide a smoother transition to higher or lower interest rates, and market responses to incoming data would help the Fed to determine the significance of the data. This information could be of significant benefit to the Fed. At present, recall from an earlier argument, bond market responses to incoming data primarily reflect market speculation on how the Fed will respond to the data.

For an illustration of the value of this approach, consider the situation the Fed faced as of mid May 1994. Weekly data on M1 suggested that the money stock was dropping rapidly (money growth was actually negative), indicating that the Fed had been successful in pushing up the funds rate enough to get ahead of the market. Suppose that the Fed, instead of pegging the funds rate in a 25-basis-point band around 4.25 percent, set a 100-basis-point band centered on 4.25 percent. Given that reserves growth was currently weak, the funds rate would settle temporarily at 3.75 percent. If the economy really was in danger of becoming overheated, incoming data on the real economy would lead the bond market to expect a resumption of reserves growth and a rising fed funds rate. The market would bid rates up, relieving the Fed of some of the responsibility for making the judgment and some of the political heat.

Closing Comments

The main issue today in monetary policy design continues to be the old one of the appropriate role in policy for interest rates and monetary aggregates. The Fed has been quite successful in recent years in aggressively adjusting the fed funds rate and has come to the point of essentially ignoring information from the monetary aggregates.

[12] This policy, by the way, is similar to the combination policy in Poole (1970a).

Ignoring the aggregates is a mistake. Evidence is overwhelming across the ages of the important role of money growth in causing inflation. The Fed has come to ignore the aggregates through a simple but understandable error of economic analysis. Fed policy has been so successful in offsetting disturbances and keeping the economy on a low-inflation track that the correlations between policy instruments and goal variables such as nominal GDP have disappeared. This outcome is a predictable consequence of optimal policy. In an optimal-control setting, the correlation between policy variables, or any other variables, and policy goals provides no information whatsoever on the structural relationships between the variables, all other things equal.

When I characterize U.S. monetary policy after 1982 as "optimal," I mean relative to prior experience. In two recent episodes, more attention to monetary aggregates would have yielded better results. Policy was too expansionary in the 1985–86 period, and this led to sharp increases in interest rates in 1987 and 1988 as the Fed worked to contain the effects of the expansionary policy. And although it is too early to assess the full consequences of very recent policy, I believe that M1 growth was too high in 1993, and that some of the surge in interest rates in the first half of 1994 could have been avoided if the Fed had started earlier to contain excessive money growth. These, though, are judgment calls, and others may judge differently.

The Fed's goal today should be to build on its record of success. Excessively tight control of the federal funds rate yields its own set of problems. Because of the Fed's success, the bond market runs off speculation about future Fed actions and little else, which is not a healthy state of affairs. The Fed is not omniscient; its job would be easier if it could make use of the information about the future course of the economy that is aggregated in the bond market. Moreover, with the bond market hanging on every Fed move, the Fed is in the tricky position of trying to provide direction to the market, and of trying to prove to the market that the direction is appropriate. The Fed is not in fact ultimately responsible for the level of real interest rates; real rates are determined by the fundamentals of fiscal policy, productivity, and thrift. But under its current policy the Fed *is* responsible for real interest rates in the short run, and that entangles the Fed unnecessarily in the politics of interest rates. These politics risk pressures to inflate that have in the past led to policy mistakes. More attention to money growth might help to reduce the probability of repeating those mistakes.

These are the reasons why the Fed needs to modify its policy of tight control of the fed funds rate. Current policy has been working too well for wholesale redesign to make good sense. A sensible evolution of policy would be to widen the fed funds band and restore some emphasis on M1 growth.

Table 1
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
JAN 26 63	1.03	(RF) Dec. durable goods orders down 3%; Dec. CPI down; gold outflow and fear of inflation cited; Kennedy proposes corp. tax cut.
APR 20 63	.75	(RF) Mar. industrial production index, personal income, housing starts all up; Mar. durable goods orders steady; steel price increases—speculation on Kennedy response.
SEP 7 63	1.00	(F) Large Treasury advance refunding announcement surprised traders.
NOV 9 63	.73	(RM) Fed raises margin requirements; bullish business news.
DEC 21 63	.73	(M) Fed Ch. Martin warns that tax cut might mean higher interest rates.
NOV 6 65	1.16	(RM) Fears of tight money cited; Oct. unemployment rate down to 4.3% from 4.4%.
DEC 11 65	1.37	(MO) Discount rate increase; Fed conflict with Johnson Admin.
FEB 5 66	1.79	(RMFV) Renewed U.S. bombing of N. Vietnam; factory orders up; tax increase debate; Fed voluntary restraints on bank credit possible.
FEB 12 66	1.32	(RFV) Mortgage interest ceilings raised; optimism fades after Vietnam peace initiative; retail sales down.
FEB 19 66	1.52	(R) Industrial production index up; housing starts down; durable goods orders up.
MAR 5 66	1.07	(R) CPI flat; factory orders up slightly.
MAR 19 66	−1.07	(R) Housing starts down.
MAR 26 66	−1.30	(RMF) Industrial production up; Johnson says tax increases would be premature; tightening Fed policy noted.
MAY 14 66	−1.10	(R) Retail sales down; industrial production up; Fed favors tax increase.
MAY 28 66	1.31	(FO) Treas. Sec. Fowler suggests bond sales above the 4.25% ceiling; German bank rate up.
JUL 2 66	2.16	(RV) Fed raises reserve requirements; banks raise prime rate; Vietnam bombing.
JUL 16 66	1.26	(RFO) Speculation on discount rate increase; unemployment rate steady at 4%; British bank rate increase; industrial production up; Fed cut Regulation Q ceiling.
AUG 20 66	1.68	(RF) Industrial production up strongly; personal income up; banks increase prime rate; Fed raises reserve requirements; July housing starts "plunged"; new factory orders down.
AUG 27 66	1.24	(RV) CPI up; negative Vietnam news.
SEP 10 66	−2.28	(F) Tax increase speculation, especially suspension of investment tax credit (ITC); Johnson recommends ITC suspension, cuts in federal spending.
OCT 29 66	−1.93	(R) Signs of slowing economy cited; U.S. Steel dividend increase; better corporate earnings reports.
DEC 17 66	−2.34	(RF) Easing demand pressures—Nov. retail sales, industrial production down; Nov. housing starts up; easier Fed policy noted.

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
DEC 24 66	−1.52	(RMF) Nov. durable goods orders down 3.1%, further reducing pressure for 1967 tax increase; Fed purchases coupon issues; small increase in Nov. CPI.
JAN 7 67	−1.78	(RO) Nov. new factory orders down; Bundesbank cuts discount rate.
FEB 18 67	1.80	(RM) Jan. retail sales edged down; Fed Ch. Martin states that economy may soon resume rapid growth, suggesting to market that Fed easing at an end; bullish capital spending survey; Jan. industrial production down due to snowstorms; large increase in personal income in Jan.; Jan. durable goods orders down 5.1%.
MAR 4 67	−2.67	(RM) Fed cuts reserve requirements—market sees this and other signs of Fed easing; Jan. new factory orders down 4.6%.
APR 22 67	2.00	(RMFV) Mar. industrial production up slightly; influential congressmen say income tax increases may be necessary; Mar. housing starts, personal income up; dealers believe Fed easing steps waning; Mar. durable goods orders down slightly; U.S. bombs Haiphong for first time; free reserves up sharply.
JUN 17 67	2.08	(R) May retail sales, personal income up; May industrial production down; May housing starts rose briskly.
OCT 21 67	2.71	(RMO) Sharp third-quarter GNP increase; Sept. industrial production down due to strikes; Sept. housing starts up 3.8% over Aug.; rise in rates attributed to tax increase delay, concern over Fed tightening; personal income up in Sept.; Bank of England raises discount rate from 5.5% to 6%; Fed extends 70% margin requirement to currently unregulated lenders.
JAN 6 68	−2.27	(RFV) Pres. Johnson imposes tight mandatory controls on corp. capital spending abroad, and reduced voluntary ceilings on bank lending abroad; Nov. new factory orders jumped up; Treas. reports U.S. gold stock fell; reports of peace feelers from North Vietnam.
MAR 16 68	3.90	(MO) Discount rate increase; heavy gold buying in London.
APR 6 68	−3.19	(VO) Pres. Johnson announces he will not run for another term; partial halt in bombing of North Vietnam.
MAY 25 68	2.57	(RMF) Apr. housing starts up 8% from Mar.; rate upsurge due to report that deficit-reduction legislation delayed; Fed credit-tightening noted; Apr. durable goods orders down.
DEC 28 68	2.79	(M) Tight money market conditions.
MAY 31 69	3.16	(M) Speculation on increase in prime rate.
OCT 11 69	−3.41	(RF) Sept. unemployment rate up sharply; rejection of bill that would have reduced tax-free status of munis.
OCT 18 69	−2.88	(RV) Sept. retail sales and housing starts up; heightened Vietnam peace hopes; small increase in Sept. personal income; Sept. industrial production down; third-quarter GNP up.

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
NOV 1 69	4.04	(RV) Vietnam concerns; absence of slowdown in economy and inflation worries; oversupply in bond market.
FEB 14 70	−3.49	(R) Weak economic data.
FEB 21 70	−2.82	(R) Jan. industrial production down 0.7%; Jan. housing starts down 6.9%; Jan. CPI up 0.6%; Feb. durable goods orders up 1.4%; Feb. CPI up 0.5% over Jan.
MAR 28 70	−2.80	(RM) Fed Ch. Burns hints at easier policy; prime rate cut; leading indicators up slightly.
APR 25 70	3.65	(VO) Announcement of troop withdrawal from Vietnam; CEA Ch. McCracken says "worst of 1970 downturn is over."
MAY 30 70	4.69	(RO) Wholesale prices higher; threat of Soviet involvement in Egypt; Democratic leaders call for wage-price controls.
JUN 6 70	−2.96	(RV) U.S. announces withdrawal from Cambodia; lower capital spending plans; Feb. new factory orders down 0.4%; speculation on wage-price controls; May unemployment rate up to 5.0% from 4.8%.
JUN 27 70	−2.30	(RMO) May CPI up less than expected; Penn-Central bankruptcy suggests less restrictive Fed policy; Fed suspends interest ceilings on some large CDs; May leading indicators down.
NOV 21 70	−3.18	(R) Speculation on Fed easing; industrial production down.
NOV 28 70	−3.62	(RF) CPI up at 7.2% rate; bill approved to extend Presidential authority for wage-price controls.
DEC 26 70	3.02	(RM) CPI up less than expected; speculation on discount rate cut.
MAR 13 71	−2.90	(RF) Feb. unemployment rate down to 5.8% from 6.0%; Feb. WPI up at 8.4% annual rate; report on advocacy of wage-price controls by Fed Ch. Burns; prime rate cut.
JUN 19 71	2.85	(RM) Prime rate up; May industrial production, housing starts up; May retail sales down slightly; discount rate increase.
AUG 21 71	−4.51	(F) Wage-price controls imposed.
JAN 20 73	2.54	(RM) Discount rate increased; Dec. industrial production up 0.8%; Dec. housing starts up slightly; market believes Fed has raised fed funds rate range; real GNP for 1972:IV up at 8.5% annual rate.
JUL 28 73	2.13	(RM) June CPI + 7.2% annual rate; Fed Gov. Brimmer suggests that rates will keep rising; June leading indicators up 1.9%; prime rate to 8.75% from 8.5%.
AUG 4 73	3.84	(RM) Rising food prices, hoarding, shortages; July WPI down 1.4% (viewed as aberration due to export controls); July unemployment rate down slightly; Fed Ch. Burns says that Fed might have to take additional steps to slow money growth.
SEP 8 73	−2.60	(RF) Nixon rules out tax-change proposals; Aug. unemployment rate up slightly; Aug. WPI up by 6.2% from July (74.4 % annual rate), largest monthly increase since 1946 (large increase expected).

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
SEP 29 73	−2.36	(R) Aug. CPI up at 22.8 % annual rate; explosive price rally on expectations of Fed easing; Aug. durable goods orders down 1.6%; Treas. Sec. Shultz says interest rates 'over the top.'
DEC 29 73	2.03	(RO) Oil price more than doubled to $11.651 a barrel by six Persian Gulf producing countries; Nov. CPI up at 9.6% annual rate; Nov. durable goods orders rose 0.3%.
APR 12 75	2.44	(M) Inflation fears due to easier monetary policy.
JUN 14 75	−2.18	(F) N.Y. City financial problems; lower than expected federal borrowing.
AUG 9 75	1.15	(R) July unemployment rate down slightly; strong employment report a surprise; July WPI up 1.2% from June.
AUG 23 75	1.84	(R) July industrial production up 0.5% from June; July housing starts up 14% from June; July CPI up at 14.4% annual rate.
SEP 13 75	1.95	(F) Increased Treasury bond sales.
JAN 15 77	3.07	(M) Large increases in M1 and M2.
JAN 29 77	2.20	(M) Large Treasury issue.
FEB 5 77	3.85	(RO) Major weather freeze may cause higher govt. spending; heavy bond calendar, inflation fears.
OCT 13 79	4.74	(RM) Sept. unemployment rate down slightly; Fed introduces new policy; Fed increases discount rate to 12% from 11%; money supply surge; Sept. retail sales up 2.2% from Aug.
OCT 20 79	2.45	(RMO) Sept. industrial production up 0.5% from Aug.; Sept. housing starts up 4% from Aug.; personal income up 0.6% from Aug.; M1, M2 up strongly; inflation fears from oil price increases; 1979:III real GNP up a surprising 2.4% annual rate; deflator up at 8.4% annual rate.
OCT 27 79	3.72	(RM) Prime rate increased; Sept. durable goods orders up 5.9%; decline in money supply; Sept. CPI up at 13.2% annual rate; some major banks increase prime rate.
DEC 1 79	−3.41	(RM) Prime rate cut; Oct. CPI up at 12% annual rate over Sept.; rally attributed to narrowing trade deficit, massive purchases of T-bills by Fed; Oct. leading indicators down 0.9%.
JAN 19 80	1.32	(RM) Dec. unemployment rate up slightly; Dec. retail sales up 1.1%, mostly due to price increases; Dec. industrial production, housing starts up; M1 fell less than had been expected.
JAN 26 80	2.68	(R) Dec. durable goods orders up 0.6%; Dec. CPI up 1.2%.
FEB 2 80	2.71	(R) Long Treasuries rise above 11% for first time in history; Dec. leading indicators unchg; Dec. new factory orders up 1.3%; Jan. unemployment rate up to 6.2%, from 5.9% in Dec.
FEB 9 80	4.48	(F) Large budget deficit; inflation fears.
FEB 16 80	2.61	(M) Discount-rate increase.
FEB 23 80	7.61	(M) Lingering effects of discount-rate increase.

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
MAR 15 80	−2.36	(RF) Jan. PPI up at 18% annual rate; Feb. retail sales down 0.7%; bond market rally due to expectations of new Carter anti-inflation moves; capital spending survey shows 1980 up by slim 1–2% real; Feb. industrial production up 0.2%; Carter anti-inflation proposals (incl. credit controls) announced.
MAR 29 80	3.29	(RMO) Feb. durable goods orders, personal income, up; Venezuela cuts residual fuel oil prices; Feb. CPI up at 16.8% annual rate; market confused when Fed permits fed funds rate to rise to 25%; Treasury prices soar on flight to quality given problems in silver, stock markets; prime rate up.
APR 5 80	−2.09	(R) Feb. leading indicators, new factory orders, down; major banks raise prime rate.
APR 12 80	−5.04	(M) Unexpectedly low money growth.
APR 19 80	−5.87	(R) Manufacturing output down sharply.
MAY 10 80	−4.53	(M) Fed discontinues surcharge on discount rate.
JUN 14 80	−4.41	(M) Discount rate cut.
JUN 28 80	2.91	(R) May durable goods orders down 7.3% from April; May CPI up 0.9% (10.8% annual rate); less Fed easing expected; candidate Reagan proposes tax cut for next year.
JUL 5 80	3.04	(RMF) Large unexpected increase in M1; May leading indicators, new factory orders, down; House Speaker O'Neill says tax cut certain in 1981.
AUG 2 80	3.31	(RMF) Fed cuts discount rate to 10% from 11%; M growth strong in recent weeks; bond prices fall on fears of growing federal borrowing, rapid M growth; June leading indicators up 2.5%; fears that Fed tightening policy.
OCT 11 80	−3.06	(RM) Sept. PPI down 0.2%; M1-A down $3.4 bil; Sept. retail sales up 1.6%.
OCT 25 80	2.80	(RM) Real GNP up 1% annual rate in third quarter; Sept. housing starts up 9%; M1-A up $4.1 bil; bond traders startled by signs of economic recovery; bond prices plunge on strong durable goods orders, growing fears of inflation; Sept CPI up 1%.
NOV 1 80	4.62	(RMO) Unexpectedly high CPI; Venezuela raises oil prices; M1 up.
DEC 27 80	−6.55	(F) Reagan announces that his incoming administration considering announcing a "national economic emergency."
FEB 14 81	3.19	(RMF) Jan. unemployment rate down slightly; M1-A down a surprising $3.3 bil; rates up on fears of heavy federal financing; rates surged after unexpectedly strong retail sales report; Jan. PPI up at 10.8% annual rate.
MAR 14 81	−2.86	(R) Feb. PPI up at 9.6% annual rate; Feb. unemployment rate down slightly; prime rate cut; retail sales up 0.9%.
MAR 28 81	4.32	(RMF) Feb. durable goods orders up 0.4%; fed funds rate rises to over 14%; heavy Treasury financing.
MAY 9 81	2.98	(RM) M1-B up a surprising $4.3 bil; Fed raises discount rate; banks raise prime rate; Apr. PPI up 9.6% annual rate.

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
JUL 25 81	3.37	(RM) June housing starts down 11%; large jump in M1-B expected to delay decline in rates; Fed lowers M growth targets for rest of 1981 and 1982; real GNP for 1981:II down at 1.9% annual rate; June durable goods orders down 0.8%; June CPI up at 8.4% annual rate.
AUG 29 81	4.06	(RFO) OPEC oil price cuts expected; July durable goods orders up 0.9%; July CPI up 1.2%; heavy supply of new Treasury bonds.
OCT 3 81	3.80	(RF) Major bank cuts prime rate; Aug. leading indicators, home sales, down; bond rally on signs of weakening economy; Sept. unemployment rate up to 7.5% from 7.2%; heavy supply of new Treasury bonds.
OCT 10 81	−4.19	(MO) Decreased surcharge on discount rate; fed funds rate down; Reagan pushes for less restrictive monetary policy; Sadat assassinated.
NOV 7 81	−6.40	(MF) Discount rate cut; banks cut prime rate; Treasury financing smaller than expected.
NOV 14 81	−4.66	(M) Negative money growth; speculation on discount-rate cut; Volcker says Reagan must cut deficit and Fed committed to tight policy.
NOV 21 81	−2.91	(RM) Oct. industrial production, housing starts, down; prime rate cut; Fed eliminates surcharge on discount rate.
DEC 12 81	3.19	(RF) Nov. unemployment rate rose to 8.4% from 8.0%; higher estimates of federal deficit from Reagan Admin.; Nov. PPI up at 6.0% annual rate; capital spending plans for first half 1982 show 1.8% rise (real) from second half 1981; Nov. retail sales up 0.8%, stronger than expected.
JAN 9 82	2.92	(RF) Nov. new factory orders up 0.2%; unexpected surge in M1-B; forecast of higher rates by Henry Kaufman; bond price rally on drop in fed funds rate; concern over federal deficit; Dec. unemployment rate rose to 8.9%, up from 8.4%.
FEB 20 82	−3.40	(RMO) Iran cuts oil price for second time in 10 days; Jan. PPI up 4.8% annual rate; M1 up surprising $2.3 bil, leading to expectations of Fed tightening; Jan. M1 up at 20.7% annual rate; Jan. industrial production down 3%; prime rate up; bond price rally on decline in fed funds rate; Jan. personal income up a slow 0.2%.
FEB 27 82	−3.34	(RMF) Iran cuts oil prices; real GNP for 1981:IV down at 4.7% annual rate; interest rates down sharply on decline in M1 and economic weakness; prime rate cut; Jan. durable goods orders down 1.5%; bond price rally on drop in fed funds rate; Jan. CPI up 3.6% annual rate; bond prices fall on increase in fed funds rate; Jan. trade deficit rose to $5.13 bil; less federal financing expected.

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
JUN 5 82	2.80	(RMFO) Apr. leading indicators up 0.8%; sliding bond prices due to concerns over federal financing needs, increase in fed funds rate; Apr. new factory orders, sales of new single-family houses down; major bank lowers prime rate; May unemployment rate up slightly; Israel invades Lebanon.
AUG 21 82	−6.76	(F) Fed funds and discount rate cuts.
SEP 25 82	−2.84	(RM) Aug. housing starts down 16.2%; Fed tightening expected due to sustained high M growth, incl. M1 increase of $4.3 bil. latest week; Aug. personal income up slim 0.3%; growing belief that economy weak; drop in fed funds rate below 10%; Aug. durable goods orders down 4%; Aug. CPI up at 3.6% annual rate; Fed officials say they will tolerate above-target M growth for a time.
OCT 16 82	−7.00	(M) Fed abandons money growth targets; lower interest rates likely.
NOV 6 82	−4.01	(MO) Speculation on discount rate cut; better than expected showing by Republicans in election.
FEB 26 83	−3.06	(RMO) Jan. personal income up only 0.1%; Volcker testimony previous Wed. de-emphasizes M targets; OPEC oil price cuts appear likely; real GDP down in 1982:IV; Jan. durable goods orders up 4.5%; Volcker says oil price declines could help to lower interest rates; prime rate cut; Jan. CPI up 0.2%.
AUG 20 83	−3.23	(RM) July PPI up 0.1%; M1 up a "surprisingly modest" $400 mil. in latest week; July industrial production up 1.8%; July housing starts down 0.6%; signs of moderating expansion noted; July personal income up moderate 0.6%; real GNP for second quarter revised to 9.2% (from 8.7%) growth rate; July durable goods orders down 3.6%.
SEP 3 83	3.00	(RMO) Bond prices down on smaller than expected decline in M1; July new factory orders down 1.7%; July leading indicators up 0.3%; U.S.S.R. downs Korean jetliner; Aug. unemployment rate unchg.
JAN 5 85	1.87	(RMO) Nov. leading indicators, factory orders, up; Nov. trade deficit up; M1 down $200 mil. about as expected; Nov. sales of new single-family houses down 10.6% (considered a "fluke"); oil prices down sharply Fri.
JAN 26 85	−2.79	(RM) Dec. personal income up "solid" 0.5%; real GNP for fourth quarter up at 3.9% annual rate (revised from 2.8%); deflator up only 2.4% (revised from 2.9%); bond prices rally on low deflator; Dec. CPI up 0.2%; unexpectedly large $2.8 bil decline in money; Dec. durable goods orders down 2.1%.
FEB 23 85	2.82	(RM) Jan. PPI unchg; Jan. industrial production, housing starts, up; rapid M growth putting pressure on Fed to tighten; bond prices tumble following Volcker testimony; mkt. believes Fed has stopped easing; personal income up 0.5%; real GNP for fourth quarter revised up to 4.9% growth from 3.9%; M1 grew $2.2 bil leaving money above Fed target.

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
JUN 8 85	−2.97	(RM) Fed easing expected given signs of weaker economy; bond prices decline on $2.6 bil. surge in money supply; bond prices down on strong employment report.
DEC 14 85	−3.06	(RMFO) Payroll employment up "modest" 182,000; bond prices surge on lower oil prices; interest rates down on signs of Fed easing; Nov. retail sales up 1.1%; tax reform effort seems in danger of collapse; Gramm-Rudman law challenged in lawsuit as unconstitutional; Nov. PPI up 0.8%; Nov. industrial production up 0.4%.
FEB 22 86	−2.95	(RMO) Jan. PPI down 0.7% led by oil prices; Jan. industrial production, housing starts, up; expectations of Fed easing, rumors of cut in Japan's discount rate soon; bond prices slump on Volcker testimony that Fed not about to ease further; fourth-quarter real GNP up only 1.2% annual rate; oil futures dip below $14 per barrel; Volcker urges tax law changes to discourage corp. borrowing; bond prices rally on good inflation outlook despite unexpectedly large $6.1 bil. increase in M1; Jan. personal income down 0.1%.
MAR 1 86	−5.12	(MO) Falling oil prices; speculation on discount rate cut.
MAR 8 86	−3.08	(RM) Discount rate cut; weak leading indicators.
APR 5 86	−4.62	(O) Oil prices down; Vice President Bush's trip to Saudi Arabia.
APR 26 86	3.59	(FO) Weak dollar; worry over large supply in bond market.
MAY 17 86	3.54	(F) Worry over large supply in bond market.
JUN 7 86	4.30	(MO) Volcker suggestion of discount rate cut; weak dollar; falling oil prices.
JUN 21 86	−4.11	(RM) Speculation on Japanese interest rate cuts, to be followed by U.S. rate cuts; low CPI increase.
AUG 16 86	−3.70	(RM) Decline in retail sales; discount rate cut speculation; weak leading indicators.
SEP 13 86	3.66	(RO) Norway cuts oil output; stronger economic data; Germany hesitant to cut its interest rates.
APR 4 87	3.34	(RM) Weak dollar leading to inflation fears; trade deficit concerns; Fed worries about weak dollar suggest higher interest rates.
APR 18 87	4.39	(RMO) Texaco files for Chap 11; Fed officials say rates may have to rise if dollar weakens further; Mar. PPI up 0.4%; rumor that trade deficit report would show large increase; speculation on Fed tightening; fed funds rate up; Feb. trade deficit up; Japan considering retaliation in trade dispute with U.S.; major industrial nations agree on intervention to support dollar; Mar. industrial production down 0.3%; Mar. retail sales up 0.2%; Mar. housing starts down 3.2%; bond prices up on Sec. Baker's speech suggesting that Reagan Admin. ready to take steps to bolster dollar.

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
MAY 23 87	3.04	(RMO) Banks raise prime rate; Apr. PPI up 0.7%; U.S. Navy ship hit in Persian Gulf by Iraqi air attack; Apr. industrial production down 0.4%; signs of credit tightening by Fed; Fed's main emphasis now on propping up dollar; Apr. housing starts down 2.9%; report that Volcker said that interest rates would edge up; rumors of major bank losses on Third World debt and possible major bank failure; world oil prices slumped; Apr. CPI up 0.4%; durable goods orders up 0.1%; dispute within Fed over Volcker's stand on keeping dollar from declining further.
MAY 30 87	−3.38	(RMO) Stronger dollar; weak economic news suggests Fed won't tighten; Reagan says he will veto any tax increase bill sent to him; senior White house official says Volcker likely to be reappointed if he wants another term; Apr. leading indicators down 0.6%.
SEP 5 87	3.37	(R) Weaker dollar, inflation worries.
OCT 17 87	2.81	(RM) Market encouraged by Greenspan speech saying that investors overly worried about inflation; disappointment in trade figures produced major decline in bond prices and largest-ever point loss in Dow industrial average; major bank raises prime rate; Sept. retail sales down 0.4%; Sept. PPI up only 0.3%; Sept. industrial production up 0.2%.
OCT 24 87	−6.23	(O) Treasury bonds safe haven after stock market crash.
OCT 31 87	−4.53	(MO) Lingering effects of crash; inflation expectations down; speculation on easier monetary policy in Germany and Japan.
JAN 23 88	−3.27	(R) Sharp narrowing of trade deficit in Nov.; Dec. PPI down 0.3%; Dec. industrial production up 0.2%; Dec. CPI up 0.1%; Dec. housing starts down 16.2%.
JUN 10 89	−2.92	(RMO) May unemployment rate down to 5.2% from 5.3%; May payroll employment up only 101,000; turmoil in China; bank prime rate cut; Fed easing clear from decline in fed funds rate; lower oil prices; 1989 capital spending plans up slightly from earlier survey; May PPI up 0.9%.
AUG 12 89	2.84	(R) Unexpectedly strong employment report; July PPI down 0.4%; July retail sales up 0.9%.
APR 21 90	2.60	(RO) Mar. PPI down 0.2%, core PPI up 0.3%; bond prices down on heavy selling by Japanese investors; CPI increase much larger than expected; Feb. trade deficit down sharply.
MAY 12 90	−3.90	(RM) Budget negotiations begin between Bush Admin. and congressional leaders; bond market rally on weak employment report and speculation that Fed might ease; Bush ready to accept tax increases other than income tax increases to obtain budget accord; Apr. PPI down 0.3%; Apr. retail sales down 0.6%.

Table 1 *continued*
Large Changes in Treasury Bond Yield, 1963 to 1993
Absolute value of changes > twice moving 2-year standard deviation or > 2.8 percent

Week Ending	Percentage Change	Explanation: R=routine economic data; M=monetary policy news; F=fiscal policy news; V=Vietnam-related; O=other
AUG 11 90	4.47	(RO) Sharp increase in gasoline prices; July payroll employment down 219,000—weaker than expected; long rates higher on Iraqi invasion of Kuwait; fears of wider Mideast conflict; "rising oil prices ignite inflation worries";Saudi Arabia agrees to boost oil production; Iraq annexes Kuwait; U.S. sends first troops to Saudi Arabia; July PPI down 0.1%.
OCT 6 90	−2.99	(RMF) Budget negotiators agree on tax increases; Aug. leading indicators down 1.2%; oil prices plunge; Fed easing likely; payroll employ. down 67,000; Fed signals lower rates if Congress approves deficit reduction bill.
DEC 28 91	−2.67	(M) Discount and fed funds rate cuts.
JAN 18 92	2.71	(RM) Better than expected employment report; Greenspan testimony that Fed had done enough to stimulate recovery.
SEP 12 92	−2.40	(RMF) Interest rates down on unexpectedly weak jobs report; Fed cuts fed funds rate; Pres. Bush outlines economic plan with possible tax cuts; Aug. PPI up 0.1%.
FEB 27 93	−2.94	(F) Clinton economic plan for deficit reduction; Treasury report of budget surplus for January.
APR 17 93	−3.00	(R) Lower than expected PPI and CPI data.
NOV 6 93	2.96	(R) Strong economic data.

Source: Data on weekly average index of the average yield on Treasury bonds with maturities of 10 years and over. Explanations taken from *Wall Street Journal*. See the text.

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Discussion

*Benjamin M. Friedman**

T. H. Huxley observed that new truths in science often begin as heresy, advance to orthodoxy, and end as superstition. It is doubtful that Huxley had explicitly in mind American monetarism of the latter half of the twentieth century (wholly apart from his being neither American nor an economist, he died in 1895), but his remark is apt to this discussion nonetheless. Monetarism, both as a positive theory of the U.S. economy and as a guide to U.S. monetary policy, has traversed just such an odyssey.

Advance to Orthodoxy

In the early years after the 1951 Treasury–Federal Reserve Accord first freed U.S. monetary policy from the wartime commitment to fix bond prices, monetary aggregates were far from the center of either mainstream macroeconomic thinking or Federal Reserve policymaking. Monetary policy in particular was still focused on fixing short-term interest rates, albeit at a value that was allowed to change from time to time. (Indeed, part of what it took to sell the Accord in the first place was a presumption that these required changes would not be sizable, and hence arguing that even small changes in interest rates could have major effects on nonfinancial economic activity was a major motivation underlying the "availability doctrine" advanced by Roosa and others at that time.) From the perspective of then-prevailing opinion, therefore, the frontal assault made by Friedman and Schwartz in their 1963 *Monetary*

*William Joseph Maier Professor of Political Economy, Harvard University.

History, and by Brunner and Meltzer in their 1964 attack on the Federal Reserve's use of an operating procedure based on free reserves (which amounted to roughly the same thing as short-term interest rates), did appear heretical.

Within an astonishingly short time, however, compared to the usual advance of intellectual ideas into the arena of practical affairs, not only academic economists but Federal Reserve officials as well came to place increasing weight on monetary quantities in their thinking. William Poole's classic paper, published in 1970 but available and widely discussed well before then, made a significant contribution to this process. So did the Boston Federal Reserve Bank's important 1969 conference. In 1970, the Federal Open Market Committee first began to refer explicitly to money growth objectives in its policy directives.

The emphasis placed on money growth as an explicit operating objective of U.S. monetary policy varied over the course of the 1970s, but the trend was clearly in the monetarist direction. In 1975 Congress adopted a resolution directing the Federal Reserve System to formulate such quantity objectives as explicit targets, and the 1978 Humphrey–Hawkins legislation required (and today still requires) the Federal Reserve to report these targets to Congress in advance and to report after the fact on its success or failure in achieving them. In a widely read 1975 paper, Sargent and Wallace reframed Poole's analysis of the money stock versus an interest rate as the instrument of monetary policy in such a way as to argue that the latter was not just inferior but impossible, indeed meaningless. In October 1979, Chairman Paul Volcker publicly announced that the Federal Reserve not only had adopted a new policy strategy centered on targeted rates of money growth but also would henceforth implement newly designed operating procedures intended to enhance its ability to achieve those targets. Just a decade and a half after Friedman and Schwartz and Brunner and Meltzer, monetarism had in fact advanced to orthodoxy in much of the academic world and among policymakers too.

Collapse and Retreat

The descent since that apogee has been even more rapid. In mid 1982, the Open Market Committee decided to allow substantially faster money growth than was consistent with its stated target, and in October of that year Chairman Volcker announced the abandonment of the money-oriented operating procedures adopted just three years earlier. Milton Friedman and other monetarist economists gained widespread attention by predicting that the resulting more rapid money growth would lead to renewed double-digit inflation, but experience falsified these claims and in time people mostly stopped voicing them (at least in

public). By contrast, the new academic growth industry became documenting the instability of money demand. Over the next decade, both internal and external views of Federal Reserve policymaking paid progressively less attention to money growth targets—or to money growth itself, for that matter. At the July 1993 Humphrey–Hawkins hearings, Chairman Alan Greenspan formally announced the "downgrading" of money growth targets as a focus of monetary policy. At the February 1994 Humphrey–Hawkins hearings, according to *The New York Times*, the one section of his written testimony that Chairman Greenspan did not bother to read aloud was the part dealing with money growth targets.

The well-known reason for this dramatic reversal is simply that the empirical relationships that once connected money growth to the growth of either income or prices in the United States have utterly collapsed. As Kenneth Kuttner and I have shown (1992), data for the most recent quarter-century of U.S. experience provide no evidence of any predictive content of money growth with respect to subsequent movements of either income or prices—or, for that matter, any other macroeconomic variables commonly taken to be of interest for purposes of monetary policy. The disappearance of these relationships is presumably due to a combination of factors including deregulation, financial innovation, globalization of financial markets, and no doubt others.

Unraveling and then quantifying the respective effects of these disparate influences is, to be sure, an appropriate and even important object of research for positive empirical economics. But too often the researchers who undertake such investigations appear to lose sight of their limited immediate relevance to monetary policy. The question that matters, for practical purposes of monetary policy, is not whether a sufficiently clever econometrician can suggest a new variable to include in the equation, or devise a new mathematical specification among the usual variables, capable of resuscitating some money–income or money–price regularity after it has collapsed, but whether it is possible to identify, *in advance*, relationships of sufficient stability and robustness to warrant using one or another measure of money growth as an explicit policy target. The Federal Reserve apparently believes the answer to this question is no. I agree. On the basis of William Poole's paper, it is not obvious that he disagrees either.

Is There a Model?

Poole offers a limited defense of monetary aggregate targets along two lines, one theoretical, the other statistical. The theoretical argument is that while we have a familiar and well understood model describing the consequences of a permanent increase or reduction of, say, 1 percent

per annum in the rate of money growth (however measured), there is no analogous baseline model describing the consequences of a permanent 1 percent increase or reduction in the nominal rate of interest. Exactly why the absence of such a model would constitute a valid argument for formulating month-to-month or even year-to-year monetary policy in terms of monetary aggregate targets is left unexplained. Indeed, Poole acknowledges that, "As far as I know, no advocate of a funds rate target has ever called for the Fed to adhere to a target path for the funds rate announced a year in advance, or even three months in advance." Yet he goes on to conclude that "no baseline prediction exists to provide guidance as to how much or how fast inflation will rise if the central bank, say, lowers interest rates by 1 percentage point from an initial point of equilibrium. The problem is that an economic model with a *permanently* (emphasis added) fixed nominal interest rate set by the central bank has no determined price level."

Fortunately, any reader who thinks the absence of a baseline model of *permanent* nominal interest rate changes is a matter of serious consequence for the conduct of monetary policy need only look as far as the papers in this volume by Jeffrey Fuhrer and by John Taylor, each of which lays out a simple variant of just such a model. Taylor's Figures 1, 3, and 4 do an especially good job of making this model intuitively understandable. Whether either Fuhrer's model or Taylor's is the best way to conceptualize the effects of monetary policy as implemented by the central bank's setting of interest rates is an empirical matter, of course, although Fuhrer's Figure 4 (upper panel) and Taylor's Figure 2 do suggest that these representations may not be far off the mark for recent experience.

By contrast, what Poole's paper does not acknowledge is that the central assumption of the baseline model based on money growth—namely, the existence of a stable long-run money demand function—is *not* supported by the U.S. data. Ryuzo Miyao (1994) recently completed what is probably the most comprehensive effort to date to test for money–income or money–price co-integration in any of the forms that would follow from stable long-run U.S. money demand. Miyao showed that even those few specifications that did appear to exhibit co-integration in recent years (the most notable examples are those based on M2 with an error correction term exploiting past residuals, as suggested by Feldstein and Stock 1993 and by Konishi, Ramey, and Granger 1993) fall apart when the sample is extended through 1993.

It is far from transparent, therefore, that the familiar baseline model with fixed money growth has more empirical support than the models of Fuhrer and Taylor with fixed interest rates. But regardless of how that comparison turns out—and we should frankly acknowledge that in policy-oriented monetary economics the empirical success of any given model can be a moveable feast—the more fundamental problem with

Poole's argument remains: Since nobody he knows (or anybody I know, either) has suggested that the central bank *permanently* fix nominal interest rates, even if it were true that there were no such model, why would its absence constitute a valid argument against using interest rates as the basis of monetary policy operations? And still more so, why would the absence of such a model constitute a valid argument *for* basing monetary growth policy on money growth targets?

Verification or Superstition?

The second part of Poole's limited defense of monetary aggregate targets is statistical. Eschewing the familiar but ever less credible effort to resuscitate a stable money–income or money–price relationship, Poole offers a statistical argument to the effect that the *lack* of such stability in the observable data is itself a sign of the success of monetary policy based on targeting money growth. The chief implication of this line of reasoning is that while the *presence* of empirical evidence relating money to either income or prices used to be the main argument for a policy of targeting money growth, today the *absence* of such evidence is an argument for this kind of policy—or at least grounds for not opposing it.

The very nature of this reasoning makes clear the extent to which, in the absence of supporting empirical evidence, the argument for money growth targets in the United States has today become a matter of simple faith. In the small child's version of familiar make-believe, the *double* magic is, first, that a toy stuffed animal comes to life and, second, that this transformation occurs in such a way as to escape ordinary human detection. According to Poole's argument, money does have a stable and reliable effect on income, but by the magic of optimal monetary policy this effect is not detectable in the observed data. As Huxley warned, here the discussion has clearly moved beyond the realm of economics as a science grounded in empirically verifiable propositions.

On closer inspection, however, Poole's statistical argument simply does not address the overwhelming bulk of the empirical evidence against a stable U.S. money–income or money–price relationship. Further, to the extent that this argument could in principle apply to one aspect of that evidence, a crucial (but unstated) assumption underlying the argument is itself contradicted by the data.

In his equation (1), Poole posits that income is subject to two separate influences: money and something else, labeled X. The argument is that the more nearly the central bank varies money so as to offset the influence of this X and thereby leave income unchanged over time, the smaller the correlation between money and income becomes. If the central bank were to vary money so as *perfectly* to offset the influence of

X on income, the correlation between money and income would become zero.

If money and income were the only variables we could observe, this line of argument would end here. But we can and do observe variables that are candidates for Poole's unspecified X. And once we do, we can move beyond this limited conclusion based only on the simple correlation of money and income as given in Poole's equation (5).

The main point of Poole's argument is that the *simple* correlation between money and income goes to zero with what he calls "optimal monetary policy." But optimal policy in this sense does not reduce, but rather *increases*, the *partial* correlation of money and income (which in the context of Poole's equation (1) just measures the relationship between money and income after allowance for the separate influence of X). It is this *partial* correlation, or its dynamic representation, that is the object of study in the multivariate regressions on which virtually the entire modern empirical money–income literature relies.

Poole is incorrect, therefore, in stating that this line of reasoning, directed toward the *simple* correlation between money and income, provides "the most important reason why the correlation between money growth and GDP growth has become so small, as documented by Friedman and Kuttner (1992)." Of the 210 separate regressions reported in that paper (not counting the co-integration tests, which are irrelevant to this argument), not one was a univariate regression. In every case, the test statistics at issue were dynamic analogs of *partial* correlations, not simple correlations. Similarly, every variance decomposition reported there was estimated from a system in which two or more variables (not counting lagged values of income itself) were potential influences on the variation of income. Here again, therefore, what was at issue was the dynamic analog of a *partial* correlation. Nor was Kuttner's and my work at all unusual in this regard. Just about all of the recent published work documenting the post-1970 collapse of money–income and money–price relationships in the United States has similarly relied on partial correlations. Poole's argument about simple correlations just does not address these results.

Further, in the absence of evidence of a nonzero partial correlation between money and income (or prices), this line of reasoning makes no sense even for the case of simple correlations. Although Poole never says so, a crucial assumption underlying his entire argument is that the partial correlation between money and income is nonzero. After all, it is this partial effect that the central bank supposedly exploits in order to pursue what the argument labels "optimal monetary policy." But this assumption of a nonzero partial correlation is just what so much of the recent U.S. evidence contradicts.

A Role for Monetary Targets?

In sum, a revival of monetary aggregate targets in the United States today would be largely an act of faith, unsupported by either theoretical or empirical argument. There *are* models of permanent interest rate changes, and as Bennett McCallum (1981) showed some years ago, their absence would not be relevant to the practical use of interest rates for monetary policy anyway. Poole's statistical argument about the simple money–income correlation proceeds from the assumption of a positive *partial* correlation and that is just what the voluminous (and constantly growing) empirical literature says is no longer present for the United States. Not surprisingly, Poole himself is appropriately cautious in his recommendations. The title of his paper and of the penultimate section notwithstanding, he does not actually call for "restoring a role for money growth targets."

Other parts of Poole's paper are interesting, but their connection to monetary aggregate targeting is at best remote and certainly unexplained. For example, the analysis of large movements in bond prices is a potentially very useful piece of work, and it may well become widely used and cited. It may be true, as Poole concludes, that "the bond and money markets respond primarily to changes in Fed policy and changes in expectations about Fed policy." But why does it then follow that, "The more confidence the market has in the Fed's willingness to do what is necessary to maintain low inflation, the more sense it makes for the market to concentrate on what the Fed is doing"? One can just as easily—I think more easily—argue that buyers and sellers of nominally denominated long-term obligations should pay more attention to the central bank's actions precisely when they are *unsure* of its commitment to maintain low inflation. More important for the purposes of this volume, why does this line of argument support an inference about the potential usefulness of money growth targets anyway?

The fact that U.S. monetary policy has been so successful over the past decade, by almost universal agreement, is not grounds for standing still. Policymakers should always try to do better, and the risks ahead are not necessarily well described by realizations in the past. Basing monetary policy on interest rates brings risks of its own (I have examined these elsewhere, for example in Friedman 1988), and complacency is always dangerous in any case. New thinking and research on how to improve monetary policy, and how to adapt today's interest rate approach to a rapidly changing economic and financial setting, is not just appropriate but necessary. To the extent that fluctuations in money growth contain useful information about subsequent movements of income or prices, the central bank should exploit that information. I have described elsewhere (most recently in Friedman 1993) an "infor-

mation variable" approach to monetary policy, which is a way of doing just that.

But all this is a far cry from explicit money growth targets. In the absence of cogent reasons grounded in either theory or the available empirical evidence, reinstituting monetary aggregate targets would not be a positive step for U.S. monetary policy—although I suspect Thomas Huxley would have understood the lingering desire to do so.

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*This list is limited to references not included in the paper by William Poole.

Discussion

*Donald L. Kohn**

William Poole has written an interesting and provocative paper covering a number of aspects of monetary policymaking. His primary focus is on one key phase of the policy process—adjusting the instrument variable to get to ultimate objectives. He acknowledges that the Federal Reserve has done a pretty good job of this over the past decade or so, operating with a federal funds or closely related instrument and keying changes in that instrument to a wide variety of incoming information. In that information set, monetary growth has received decreasing emphasis as the character and demand properties of the aggregates have changed, loosening their ties to goal variables.

Despite the reasonably good record, Poole is concerned that this process is prone to error, partly because the tight focus on interest rates may tend to be associated with potentially constraining political pressures. Certainly the history from the late 1920s to the late 1970s of similar procedures produced enough examples of serious problems to warrant raising these questions. Too often, this procedure was characterized by policy that moved "too little, too late," failing to damp cycles and occasionally exacerbating them. The improved recent performance owes partly to factors outside the control of the Federal Reserve, and a central bank believing that it had learned sufficiently from its history to guarantee that it would not repeat its mistakes would be suffering a serious attack of hubris.

*Director, Division of Monetary Affairs, Board of Governors of the Federal Reserve System. The views are those of the author and do not necessarily reflect the views of the Board or its other staff.

Reserves Management and a Flexible Funds Rate

Poole has raised a legitimate and serious potential problem, but I do not believe he has come up with a legitimate and serious solution to that problem. He would re-insert the monetary aggregates into policy and inject a degree of flexibility into the funds rate by focusing between each FOMC meeting on the quantity of reserves, not the funds rate, allowing the funds rate to fluctuate over a fairly wide range in response to changes in the demand for reserves. In his view, these variations would allow underlying market forces to show through into interest rates and would make it easier for the Federal Reserve to shift its policy stance over time.

Even in its sketchy form, this plan seems to have a number of drawbacks. It would impose a considerable degree of volatility and uncertainty on financial markets. The short-run demand for reserves is highly variable, responding not only to changes in income and spending but also to a wide variety of special influences on transactions balances, and it is therefore very difficult to predict. Recent examples of special factors affecting reserve demand would include tax flows, which are never adequately accounted for in seasonal adjustment, and the changing volume of deposits associated with mortgage refinancing. I do not have data for inter-meeting periods as a whole, but our mean absolute forecast errors for changes in M1 three weeks ahead averaged over $4 billion in 1993, roughly equivalent to a $400 million error in reserve projections. Our one-week-ahead forecasts of required reserves in 1993 were off by an absolute average of more than $150 million, and demands for excess reserves can vary for reasons related to the distribution of reserves in the banking system, temporary clearing needs, and the like. This suggests that the federal funds rate would almost always be at one end or the other of the range—and mostly for reasons that had nothing to do with emerging economic conditions—and could well be at both ends within an inter-meeting period.

Any procedure imposing such costs would have to have a clear rationale and produce substantial benefits. Presumably, reserves are targeted because they are related to M1, but even over longer periods, as Poole notes, the tie between M1 and spending or prices is very loose for economies experiencing low or moderate inflation. The introduction of NOW accounts made this aggregate very interest-sensitive over the targeting interval of a year, and the result has been a highly variable velocity. As a consequence, the FOMC had to drop its practice of setting annual ranges for this aggregate. The lack of correlation of money and income in the 1980s that Poole discusses may reflect optimal policy, but it has also been the result of the changing character of "money" and the greater availability of close substitutes owing to deregulation and

innovation in financial markets. Tying open market operations to hitting a reserve path would seem to lack a fundamental rationale, beyond providing a cover for interest rate adjustments. Indeed, Poole's example from May 1994, in which he posits a drop in the funds rate as M1 weakened after the tightening of policy, suggests that his procedure could have the effect of damping—at least temporarily—the negative correlation between money and interest rates that he cites as evidence of the Federal Reserve's countercyclical monetary policy.

Nor would Poole's proposal be likely to allow market expectations about the economy or prices to show through more clearly to longer-term interest rates. First, I do not share his degree of pessimism about extracting useful information from financial market prices. To be sure, it is a tricky business, not only because those prices incorporate the expected actions of the central bank, but also because they tend to display considerable volatility and may not always reflect underlying fundamentals. Nonetheless, careful analysis using information across maturities from a variety of markets—including those for equities, foreign exchange, and even commodities—and together with data on money and credit flows, can tell the central bank something about real interest rates and inflation expectations, and about how it is viewed by market participants. In this regard, the expansion of derivative markets has provided new tools in helping to read market signals. Results are merely suggestive and often do not have clear implications for policy, but they can supplement other sources of information.

Moreover, under Poole's proposal, markets would still be trying to anticipate the movement of short-term rates, and they would have additional information—the likely course of reserve demand—to factor in. One lesson of the 1979–82 reserve targeting period was that volatility in short-term rates tends to feed through to long-term rates, despite economists' views that alternative operating procedures causing that volatility should reduce longer-term uncertainty. I suspect that publication of M1 and reserves data would once again be met with major adjustments in interest rates across the maturity spectrum—not because money or reserves held any more information about the economy than they now do, but because they portended movements in short-term rates.

The Current Procedure

I started by saying that Poole had raised an important issue—how to increase the odds on the Federal Reserve continuing to move its instrument in a stabilizing fashion. The obvious question is whether I have something better to offer—some way of giving Poole greater assurance that our praiseworthy behavior will persist. Unfortunately, I do not.

I see no clear alternative to the current practice of looking at everything and making discretionary changes in a federal funds operating target. Specific targets for final or nearly final objectives like nominal GDP or inflation, while quite important from some perspectives, as will be discussed below, have limited operational content, given policy lags. I expect that changes in financial markets will continue to undercut the utility of money and credit aggregates or interest rates or rate relationships as intermediate targets—though they will be important information variables. And while forecasts are useful and policy inherently forward-looking, policymakers correctly remain skeptical of these forecasts, whether they come from their own staffs or from private forecasters.

The Lessons of the 1970s

Nonetheless, I think the Federal Reserve can build on the factors that have contributed to its relative success since 1980. As a result of the experience of the late 1960s and 1970s, policymaking moved in two complementary directions, which helped to improve it. The first was towards a renewed commitment to a fixed longer-run goal, that of price stability. Emphasis on price stability as a long-term objective, even without a specific timetable toward that goal, has helped to discipline the policy process. When weighing a particular course of action, the public commitment to moving inflation down further will be on one side of the scale, perhaps counterbalancing some of the pressures on the other side.

Moreover, greater emphasis on price stability has led to increased attention to inflation expectations, recognizing the role such expectations play in inflation and the costs of reducing it. This lends a forward-looking cast to policy, and it helps to avoid some of the pitfalls of the past; whatever the drawbacks of real interest rates as intermediate indicators, they are better than attempts to judge the likely effects of policy from nominal rates alone.

The second, equally important lesson of the 1970s was the need for flexibility in changing instrument settings. Policymakers recognize the limits of their knowledge. One problem with the car metaphor for monetary policy is that we cannot see the road ahead, we steer by looking in the rearview mirror, and data lags and revisions obscure even what we see in that mirror. We have at best only a rough idea of the response of financial markets to policy actions and of the quantitative relationships of aggregate demand to its determinants, including the implications of various monetary policy instrument settings. Recent disputes about the level of the NAIRU (the non-accelerating-inflation rate of unemployment) suggest that even if we could predict aggregate

demand, serious questions would remain about its implications for inflation.

Conclusions for Policy Adjustment

Faced with a high degree of uncertainty, policymakers have drawn two conclusions concerning adjustments to their instrument. One is that they need to look at all kinds of data to assess their progress down the road. No one piece of information will likely provide a consistently reliable guide to what lies ahead. Policymakers must pay attention to indicators on the economy and prices for clues about underlying demands for goods and services and inflation pressures. They must also look at information from financial markets as key elements in the transmission mechanism and as indicators of private sector expectations.

The second conclusion policymakers have drawn is that they need to be ready to change instrument settings fairly promptly in response to new information, recognizing that if they wait until all the indicators are pointing in one direction, it will be too late. Flexibility implies a willingness to act in advance of problems, to take some risks, and to reverse field when necessary.

An overlooked element in maintaining flexibility is the nature of the decision itself and how it is made. Poole's monetary policy car is being driven by a committee, and it is filled with vocal backseat drivers. Over the years, the Federal Reserve has moved toward greater clarity, accountability, and transparency in its decisions about instrument settings. I refer not only to the publication of transcripts and announcement of decisions, initiated this year, but also to the tighter federal funds rate targeting that evolved over the 1980s and the more explicit confirmation of instrument settings in open market operations. These changes have contributed positively to the accountability of the Federal Reserve within the government and to reducing uncertainty in markets.

Some have wondered why these changes were not made sooner, or why additional steps along these lines have not been taken. The main reason has been concern about the feedback on the decision process itself, including the potential loss of flexibility. One can see this clearly in the debate about the borrowing allowance versus a federal funds objective, so prominent in the transcripts for the latter part of 1987 and 1988. Changes in discount window borrowing objectives filtered into the market slowly; the Federal Reserve really did have an instrument without an announcement effect, until shifts in borrowing behavior made this impossible to maintain. FOMC members are going to need to take care that the current focus on every small change in the federal funds rate—a focus made all the more intense by its announcement, which seems to elicit public comment from other addresses in Washing-

ton—does not detract from prompt adjustments in instrument settings. Concerns about maintaining flexibility also have arisen in considerations of releasing the language in the directive governing inter-meeting changes in instrument settings; immediate publication of such language, with the threat of attendant market reaction, could constrain the use of this source of flexibility. And feedback on the deliberative process has been a prominent point in discussions of transcript publication.

To date, the evolution of the Federal Reserve's decisions and announcements has not deterred needed actions. But reducing market uncertainty and increasing public openness and accountability may have subtle costs in terms of arriving at the right decisions, especially in terms of keeping flexibility in policymaking, an attribute Poole has quite correctly highlighted in his paper.