

Should the Federal Reserve Fine Tune Monetary Growth?

By Bryon Higgins

A number of economists have criticized the Federal Reserve for allowing too much short-run variation in monetary growth. These critics maintain that the Federal Reserve can and should take policy actions to produce constant monetary growth over periods as short as a few months. Only in this way, they allege, can monetary policy contribute to overall economic stability.

However, Federal Reserve actions affect monetary growth with a lag. As a result, attempting to achieve precise short-run control over monetary growth may be inadvisable. Policy actions necessary to achieve precise short-run monetary control could set in motion forces that would require offsetting policy actions in the future to keep monetary growth on track. Thus, the Federal Reserve must take account of the future as well as the immediate effects of policy actions in order to avoid whipsawing the economy and interest rates.

In October 1979, the Federal Reserve adopted a reserve aggregate approach for policy implementation to improve monetary

control. However, after the change in the method for conducting monetary policy, volatility of interest rates and economic activity increased. Some analysts allege that the fluctuations in the economy and interest rates since October 1979 have resulted because the Federal Reserve has not been aggressive enough in attempting to achieve steady short-run monetary growth.¹

The purpose of this article is to analyze the implications of lags in the effect of monetary policy actions for the Federal Reserve's ability to exercise close short-run monetary control and to investigate the possible impact on the economy and interest rates of closer control over monetary growth since October 1979. The first section explains why Federal Reserve actions affect monetary growth with a lag. The next section analyzes how these lags affect the Federal Reserve's ability to exercise monetary control. The final section presents evidence from a simple empirical model with lags regarding the possible impact of closer short-run monetary control since October 1979.

Bryon Higgins is an assistant vice president and economist at the Federal Reserve Bank of Kansas City. Jon Faust provided research assistance in the preparation of this article. Lawrence J. Radecki furnished valuable comments at several stages of this research project.

¹ See, for example, Milton Friedman, "The Fed Fails—Again," *Newsweek*, December 1, 1980. For a conflicting view, see Congressman Reuss's opening statement on February 5, 1981, in *The 1981 Economic Report of the President: Hearings Before the Joint Economic Committee*.

WHY FEDERAL RESERVE ACTIONS AFFECT MONETARY GROWTH WITH A LAG

The Federal Reserve influences monetary growth primarily by affecting depository institutions' reserves through the purchase or sale of government securities in the open market. The resulting changes in reserves and hence in interest rates have both direct and indirect effects on monetary growth.² For example, an increase in interest rates caused by an open market sale of securities—which drains reserves—directly reduces the public's demand for money by raising the opportunity cost of holding transactions balances. The increase in interest rates also indirectly reduces money balances by reducing the level of income, thereby reducing the public's demand for transactional money balances.

Monetary growth may respond with a lag to policy actions that result in changes in market interest rates either because of lagged response of money demand to changes in income and in-

² The Federal Reserve could use either an interest rate or a reserve aggregate as the operating variable to achieve monetary control. Which is preferable depends on a number of factors, including the sources of uncertainty confronting the Federal Reserve. Although important in practice, it is useful to abstract from uncertainty in order to analyze how lags in the effect of policy actions affect monetary control. In this context, the choice of operating procedures is unimportant. The Federal Reserve can alternatively be viewed as choosing the level of reserves that would lead depository institutions to supply the targeted amount of money or as choosing the level of interest rates that would lead the public to demand the targeted amount of money. Thus, it is possible to omit explicit consideration of money supply relationships. For convenience, it will be assumed in this article that the Federal Reserve uses an interest rate operating variable since ultimately it is through the resulting changes in interest rates that monetary policy actions affect monetary growth. However, when abstracting from uncertainty as in this article, the results would be identical if it were assumed that the Federal Reserve used nonborrowed or total reserves rather than an interest rate as the operating variable.

terest rates or because of lagged response of income to changes in interest rates. In practice, both types of lags are important in determining the total lag in the effect of monetary policy actions on the rate of monetary growth.

Lags in the Money Demand Relationship

Changes in either market interest rates or income lead to changes in the amount of money desired by firms and households. For a variety of reasons, however, the public's response to a change in income or interest rates may be spread out over a year or more. Analysts typically assume that the public first determines desired money balances and then adjusts actual money balances to the desired level over time. Within this framework, there are two basic reasons for lags in the money demand relationship.

First, firms and households may alter their desired level of money balances in response to changes in interest rates or income only if those changes are expected to persist for a considerable time.³ Some firms and households may be reluctant to undertake the expense and effort necessary to transfer funds out of transactions balances in response to a change in market interest rates or income unless that change is expected to persist for a prolonged period. For this reason, aggregate desired money balances would not change much initially in response to a change in interest rates or income. However, if the change persists, an increasing fraction of the public would come to view the change as something other than a transitory deviation and would adjust desired money balances accordingly. Thus, a maintained change in market interest rates or income

³ For a more detailed analysis of the rationale for lags in the money demand function as well as empirical estimates of those lags, see Stephen M. Goldfeld, "The Demand for Money Revisited," *Brookings Papers on Economic Activity* (1973:3).

would have a cumulative impact on desired money balances over time.

Second, even after the public has altered desired money balances, there may be a lag in adjusting actual money balances to the desired level because of institutional constraints on the ability to transfer funds. For example, after the public has fully adjusted desired money balances upward as a result of a sustained increase in income, it may not be possible to increase actual money balances immediately to the desired higher level because funds are tied up in assets with a fixed maturity and heavy penalties for early withdrawal. Thus, even if monetary policy actions affected income quickly, lags in the money demand relationship would cause a delay in the public's adjustment of money balances in response.

Lags in the Effect of Interest Rates on Income

Although descriptions of the mechanism by which monetary policy actions affect the economy differ somewhat in their details, it is generally believed that monetary policy actions affect spending by changing the prices and yields of a wide variety of assets. The initial change in spending ultimately leads to changes in the levels of production and income, which, in turn, further affect spending through their multiplier effects.

An example may help demonstrate why changes in interest rates resulting from monetary policy actions may affect income and spending with a considerable lag. An open market purchase of Treasury bills by the Federal Reserve initially raises the price and lowers the yield of Treasury bills. The change in the yield on short-term government securities relative to other assets leads to a chain of portfolio substitutions throughout the entire spectrum of real and financial assets that raises the price of existing capital goods relative to their replacement costs. This causes an increase in

the desired capital stock that ultimately is translated into increased business spending on plant and equipment and increased consumer spending on durable goods. The resulting depletion of existing capital goods inventories leads to increased production of those goods, thereby increasing incomes of those involved in capital goods production. The increased income is spent on a variety of goods and services, thereby leading to a generalized increase in production, income, and perhaps prices throughout the entire economy. This multiplier process continues until production and income are equal to desired spending and may take months or even years to be completed.

Interaction Between the Lags in Money Demand and Lags in Other Relationships

Throughout the process described in the preceding section, the demand for money would rise as a result of both the direct and indirect effects of lower interest rates caused by the monetary policy action. The direct effects result from the decrease in the opportunity cost of money, which causes firms and households to increase their demand for money. The indirect feedback effects occur as lower interest rates stimulate increases in the level of income and spending, thereby further increasing the public's money demand. Moreover, the initial drop in interest rates is partly offset as increased spending and income generate additional demand for money and credit, thereby causing upward pressure on interest rates. The entire adjustment to the initial monetary policy action is complete only when the quantity of money demanded is equal to the quantity of money supplied and spending is equal to output at the existing values of income and interest rates. Before the ultimate equilibrium is reached, however, both interest rates and income may overshoot their new equilibrium values, thereby prolonging the period of adjustment.

THE IMPLICATIONS OF LAGS FOR MONETARY CONTROL

The existence of lags in the public's response to monetary policy actions has important implications for monetary control. These implications vary depending on the nature of the lags and the length of the period over which the Federal Reserve attempts to control monetary growth. The basic principles of how lags affect monetary control can be illustrated by considering alternative monetary control horizons and alternative lag patterns characterizing the public's response to monetary policy actions.

Implications of Lags for Long-Run Monetary Control

Lagged adjustment to policy actions does not limit the Federal Reserve's ability to control monetary growth over longer run periods. Except for unavoidable monetary control errors resulting from uncertainty, it would be possible to achieve monetary growth objectives by choosing a sufficiently long-run policy horizon regardless of the nature of the lags in money demand and other economic relationships. For example, if the direct and indirect effects of policy actions are completely realized within a year, the Federal Reserve could achieve annual monetary growth targets without introducing cyclical fluctuations in interest rates and income. In the absence of uncertainty, the simplest strategy would be to determine the interest rate consistent with the desired rate of monetary growth over the year and to take policy actions necessary to keep the interest rate at that level.⁴

⁴ In practice, of course, uncertainty of various kinds would make it difficult for the Federal Reserve to discern the interest rate consistent with achieving monetary growth targets. Moreover, maintaining the interest rate at an inappropriate level for a prolonged period would lead to cumulative errors in monetary control that could exacerbate inflation or depress real economic activity. It was

Although this strategy would ensure attainment of long-run monetary objectives under the assumption of no uncertainty, the pattern of monetary growth within the year would depend on the lags in the economy. The lag structures characterizing the response of money demand and spending decisions by the public to changes in interest rates are particularly important in this regard. Assume, for example, that the Federal Reserve establishes an annual objective for monetary growth that would require restrictive policy actions to increase interest rates. In these circumstances, monetary growth might well remain above the long-run target rate for several months because of lagged adjustment to the higher interest rates. However, as the direct and indirect effects of restrictive policy work their way through the economy and the financial system, the public would eventually adjust money balances to the level consistent with the Federal Reserve's long-run growth objectives. Thus, if the Federal Reserve chooses a long-run horizon for monetary control, lags in the response to policy actions do not impair ability to achieve monetary growth objectives but do determine the timing of the response within the control period.

Implication of Lags for Short-Run Monetary Control

Lags in the response of income to changes in interest rates and of money demand to changes in income and interest rates can pose serious problems for the Federal Reserve's ability to control monetary growth over a horizon as short as a few months. For example, policy actions necessary to reduce monetary growth in the current quarter may continue to depress monetary growth for several subsequent

largely because of these problems that the Federal Reserve switched from an interest rate approach to a reserve approach for monetary control in October 1979.

quarters also. In these circumstances, restrictive actions by the Federal Reserve this quarter could set in motion forces that would require offsetting expansionary actions later to stimulate monetary growth. Moreover, these expansionary actions in turn might necessitate another round of restrictive actions still later if the lagged impact of past expansionary policy actions threatens to produce unacceptably rapid monetary growth.

Because the effects of monetary policy actions are distributed over several periods, attempts to achieve short-run monetary control would lead to an initial overshooting of the equilibrium interest rate that sets in motion forces causing subsequent oscillations in interest rates and perhaps income.⁵ Moreover, under certain lag structures, the severity of the fluctuations in interest rates and income would increase over time. Thus, the feasibility of fine tuning monetary growth depends in large part on whether these lag structures are favorable or unfavorable for monetary control.

If the lag structures characterizing the public's response to changes in interest rates happen to be favorable, efforts to achieve precise short-run monetary control would lead to only temporary fluctuations in interest rates and income whose severity would decline over time.⁶ In contrast, if the lag structures in money demand and other economic relationships were unfavorable for monetary control, efforts to achieve constant quarterly growth in the money stock would produce explosive oscillations in interest rates and perhaps the economy.

⁵ A possible exception to this general rule occurs in the special case where the lag structures on income and interest rates in the money demand function are exactly parallel. For example, the Koyck lag structure implied by inclusion of a lagged dependent variable in a money demand function implies the timing of the public's response in adjusting money balances to a change in income is exactly the same as the timing of the response to a change in interest rates.

Lag structures most favorable for monetary control are those characterized by a contemporaneous effect of interest rates on money demand that is large relative to the lagged effect, after taking account of both the direct and indirect feedback impact of interest rates on the public's demand for money.⁷ For example, if the primary effect of interest rates on money demand is realized within three months and the total effect is realized within six months, then precise quarterly control of the money stock would not cause explosive movements in interest rates and income. To see why this is so, consider the chain of events that would result from a policy of precise short-run monetary control following a shock, such as an unexpected surge in consumer spending, that threatened to produce monetary growth above the Federal Reserve's target rate. Initially, restrictive policy actions would be required to increase interest rates immediately by enough to reduce money demand to levels consistent with the desired quarterly growth rate of the money stock. The initial increase in interest rates would continue to depress money demand in the following quarter, however, thus requiring

⁶ Strictly speaking, oscillations in interest rates or income resulting from precise short-run monetary control would continue indefinitely for almost any lag structure. However, if the lag structure is favorable for monetary control, the magnitude of the oscillations soon becomes negligible. For all practical purposes, therefore, the oscillations can be thought of as being temporary. A policy of precise short-run monetary control might be considered to be undesirable even in the most favorable case, however. For example, some analysts believe that short-run interest rate volatility adversely affects the stability of financial markets and the economy.

⁷ For a more rigorous explanation of the conditions under which lags do not preclude precise attainment of policy objectives with a short-run control horizon, see Robert S. Holbrook, "Optimal Economic Policy and the Problem of Instrument Instability," *American Economic Review*, March 1972. For an analysis that combines the effects of uncertainty and lags in the effect of policy actions, see Stephen J. Turnovsky, "The Stability Properties of Optimal Economic Policies," *American Economic Review*, March 1974.

expansionary policy actions to lower interest rates and encourage faster monetary growth. In each subsequent quarter, the Federal Reserve would need to take policy actions to offset the lagged impact of policy-induced interest rate changes in the preceding quarter. However, because interest rates are assumed to have their primary impact on money demand within a quarter, the magnitude of changes in interest rates necessary to achieve steady quarterly growth of the money stock would decline over time, as would any associated fluctuations in income. As a result, precise short-run monetary control would be feasible.

Lag structures least favorable for monetary control are characterized by a contemporaneous effect of interest rates on money demand that is small relative to the lagged effects. For example, assume that the total effect on money demand of changes in interest rates is realized within six months but that less than half of the impact occurs in the first three months. In this case, aggressive policy actions to raise interest rates enough to slow monetary growth to the desired rate in one quarter would slow monetary growth in the following quarter even more. Since the lagged impact of the first period's policy action is larger than the impact on an offsetting policy action of the same magnitude in the second period, an even greater change in interest rates is necessary in the second period to compensate for the lagged impact of the initial change in interest rates. Indeed, the initial policy-induced change in interest rates would set in motion forces requiring ever larger changes in interest rates to achieve precise quarterly control of the money stock if the primary impact of interest rates on money demand occurs with a one-quarter lag of the type assumed in this example. This volatility of interest rates might well induce economic instability, thereby ruling out precise short-run monetary control as a feasible policy alternative.

THE POTENTIAL IMPACT OF CLOSER SHORT-RUN MONETARY CONTROL SINCE OCTOBER 1979

The simple examples described above demonstrate the importance of lags in determining the feasibility of short-run monetary control. In practice, though, the lag structures in the money demand and other economic relationships are likely to be much longer and more complex than those assumed for illustrative purposes in the examples. Empirical estimates suggest that changes in interest rates may continue to have a direct effect on money demand for a year or more and may affect spending and output decisions for several years.⁸ The implied reduced-form relation between monetary growth and interest rates when both the direct and indirect impacts are taken into account would be too complicated to analyze directly. Instead, simulation of an estimated empirical model is the only practical way to determine the implications for short-run monetary control of lagged response to policy actions.

Any model used for this purpose must include behavioral relationships explaining the public's money demand and spending decisions. To the extent that models differ with regard to the nature of these relationships, their policy implications will also differ. For example, models in which the lagged effect of interest rates on money demand is large relative to the contemporaneous effect are more likely than others to imply that the Federal Reserve cannot achieve smooth quarter by quarter monetary growth without inducing even greater volatility of interest rates. Thus, the particular formulation of the lag structure in the money

⁸ See, for example, Frank DeLeeuw and Edward M. Gramlich, "The Channels of Monetary Policy: A Further Report on the Federal Reserve-MIT Econometric Model," *Journal of Finance*, May 1969, or *Federal Reserve Bulletin*, June 1969.

demand equation is critical in assessing the extent to which fine tuning of monetary growth would increase or decrease fluctuations in interest rates and the economy.

In this section, models containing money demand functions with different lag structures are simulated over the period since October 1979. The simulations are conducted under alternative assumptions about Federal Reserve policy to provide evidence on whether closer short-run monetary control over this particular period would have resulted in greater economic and financial stability. This period was chosen because the Federal Reserve adopted a reserve aggregate approach to monetary policy implementation in October 1979 with the stated intention of gaining closer control over monetary growth. Since that time, though, fluctuations in monetary growth, interest rates, and the economy have increased.⁹ Some analysts have argued that smoother monetary growth since October 1979 would have resulted in greater stability in interest rates and the economy.

The Model

The basic model used in this study includes four equations.¹⁰ The first equation explains changes in real income in terms of current and past changes in fiscal policy and long-term interest rates as well as past changes in the price of imported goods. The second equation relates inflation to past changes in real income and import prices. The third equation is a term structure relationship that explains changes in long-term interest rates as a function of current and past changes in short-term interest rates. The

fourth equation, which is most crucial for analyzing monetary control issues, is a money demand function relating changes in the public's demand for nominal M1-B balances to current and past changes in the price level, real income, and short-term interest rates. Taken together, these four equations yield a compact representation of the various interrelationships between important macroeconomic variables and can be solved simultaneously for four endogenous variables in terms of the monetary policy, fiscal policy, and other exogenous variables.

An attractive feature of the model is that it allows for both the direct and indirect effects of interest rates on monetary growth with lagged adjustment in both types of effects. For example, there are two basic channels through which an increase in short-term interest rates reduces monetary growth in the context of the model. First, an increase in short-term interest rates directly reduces the demand for money by inducing the public to economize on M1-B balances. Secondly, an increase in short-term rates causes an increase in long-term rates through the term structure equation, and the change in long-term rates reduces real income and inflation, thereby indirectly reducing the public's demand for M1-B balances. Thus, for given values of the other exogenous variables, the model can be used to predict the short-term interest rate consistent with any given growth rate of M1-B after taking account of all the interrelationships and lags in the various behavioral relationships incorporated in the four equations of the model.

Estimation Results

The equations comprising the model described above were estimated with data from the first quarter of 1960 through the third quarter of 1981 using annualized percentage changes in all variables. The estimation results are reported in Table 1. To simplify estimation,

⁹ Economic and financial volatility in 1980 is explored from a number of points of view in *New Monetary Control Procedures*, Federal Reserve Staff Study, February 1981.

¹⁰ The model used in this study is similar to one reported in Benjamin M. Friedman, "The Inefficiency of Short-Run Monetary Targets for Monetary Policy," *Brookings Papers on Economic Activity* (1977:2).

lagged dependent variables implying simple lag structures in which the contemporaneous effect is larger than any of the lagged effects were used in the real income, inflation, and term structure relationships in equations (1) through (3). However, because of their importance in determining the feasibility of short-run monetary control, the lag structures in the

money demand function were estimated with the less restrictive Almon lag technique, which assumes that the true lag structure can be approximated by a polynomial function. The total effect on money demand of a change in short-term interest rates, real income, and inflation was assumed to be completed within five quarters. Thus, the money demand function in-

Table 1
A SIMPLE MACROECONOMIC MODEL

(1)	$RGNP_t = 2.29 - .002 T_t + .051 G_t - .100 IMP_{t-1} - .050 LTR_t + .482 RGNP_{t-1}$	$\bar{R}^2 = .484$
	(4.7) (-0.2) (1.5) (-3.3) (-2.1) (5.4)	
(2)	$P_t = .181 + .045 IMP_{t-1} + .044 RGNP_{t-1} + .886 P_{t-1}$	$\bar{R}^2 = .934$
	(0.8) (4.3) (1.6) (24.1)	
(3)	$LTR_t = .284 + .172 STR_t - .072 STR_{t-1} + .854 LTR_{t-1}$	$\bar{R}^2 = .747$
	(0.4) (7.2) (-2.8) (13.8)	
(4a)	$M1-B_t = -1.203 + 1.000 P + .708 RGNP - .048 STR - 3.596 DUM1 - 11.772 DUM2 - 8.325 DUM3$	$\bar{R}^2 = .627$
	(-2.4) (5.8) (-3.7) (-3.9) (-7.9) (-6.0)	
(4b)	$M1-B_t = -1.249 + 1.000 P + .717 RGNP - .049 STR - 3.631 DUM1 - 10.727 DUM2 - 7.798 DUM3$	$\bar{R}^2 = .645$
	(-2.5) (5.9) (-3.5) (-3.9) (-7.2) (-5.4)	

where P is the GNP deflator,
 IMP is the import price deflator,
 RGNP is GNP in constant (1972) dollar terms,
 T is full employment net tax receipts of the federal government,
 G is federal government purchases of goods and services,
 LTR is the yield on Baa corporate bonds,
 STR is the yield on commercial paper,
 M1-B is nominal M1-B (adjusted for shifts into NOW accounts in 1981), and
 DUM1, DUM2, DUM3 are dummy variables intended to capture shifts in the money demand function with zero values except:

$$DUM1 = 1 \text{ after } 1974; DUM2 = \begin{cases} 1 & \text{in } 1980:QII \\ -.5 & \text{in } 1980:QIII \text{ and } 1980:QIV \end{cases}; DUM3 = 1 \text{ after } 1980.$$

Notes:

All variables except the dummies are expressed as annualized percentage changes. Numbers in parentheses are t-statistics. In the money demand equations, the current and four lagged values were included for the GNP deflator, real GNP, and the commercial paper rate. The lag structures were estimated using the Almon lag technique with a fourth degree polynomial for the GNP deflator (on which the coefficients were constrained to sum to unity), a third degree polynomial for real GNP, a first degree polynomial for the commercial paper rate in equation (4a), and a third degree polynomial for the commercial paper rate in equation (4b). The individual lag coefficients are not reported but are available from the author upon request.

cluded the current and four lagged values for each of these explanatory variables.

Two alternative versions of the basic model were constructed by including alternative money demand functions. The first version of the model includes the money demand function in equation (4a), in which the lag structure on interest rates was estimated using a first degree polynomial, thereby implying the lag coefficients lie on a straight line. The second version of the model includes the money demand function in equation (4b), in which the lag structure on interest rates was estimated using a third degree polynomial, thereby allowing for the possibility that the lag weights may first increase and then decrease. In most respects, the alternative money demand functions are quite similar. Each equation explains about the same percentage of the variance in money demand and implies similar long-run elasticities of money demand with respect to real income and interest rates. Thus, there is no obvious reason for preferring one specification for the money demand function rather than the other. Indeed, both are representative of money demand functions that have been estimated by other authors.¹¹

The alternative money demand functions differ substantially, however, in one crucial respect. Whereas the estimated lag structure on interest rates is favorable for monetary control in the money demand function in equation (4a), the estimated lag structure on interest rates is unfavorable for monetary control in the money demand function in equation (4b). The coefficients comprising the alternative lag structures

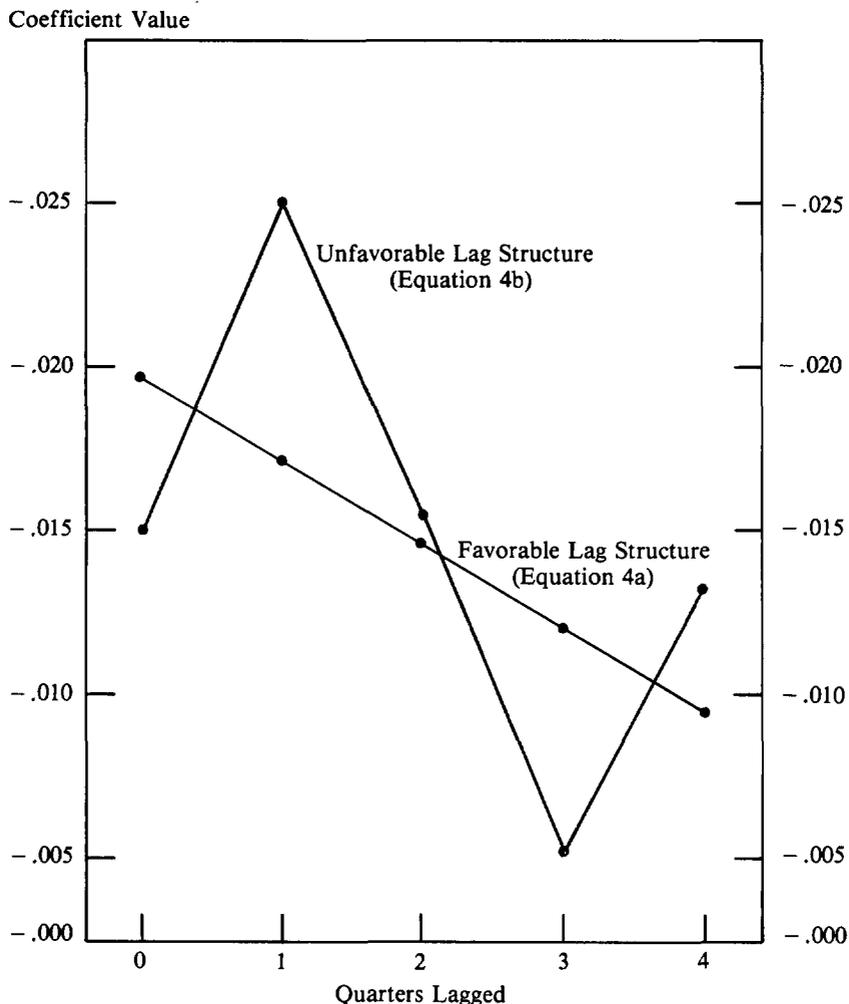
are depicted in Figure 1. The lag structure for equation (4a) implies that a change in interest rates has a relatively large impact on money demand within the quarter it occurs and progressively smaller effects in each subsequent quarter. If this represents the true timing of the public's response in adjusting money balances to changes in interest rates, Federal Reserve actions would have a large immediate impact on monetary growth and relatively small impacts that might have to be offset in subsequent quarters. In this sense, the lag structure in equation (4a) is favorable for monetary control. In contrast, the lag structure for equation (4b) implies that a change in interest rates has a relatively small impact on money demand within the quarter the change occurs but has a large impact the following quarter. If this lag structure represents the true timing of the public's response in adjusting money balances to changes in interest rates, the primary effect of Federal Reserve actions to achieve the desired monetary growth rate in one quarter would not be realized until the next quarter. Thus, aggressive monetary policy actions would be required to offset the lagged impact of policy actions in the previous quarter. With this unfavorable lag structure, the Federal Reserve would find it difficult to exercise precise quarterly control of monetary growth. The implications of the alternative lag structures for the feasibility of short-run monetary control can be demonstrated by simulating the alternative versions of the model.

Simulation Results

Both versions of the basic model were simulated for the period from the fourth quarter of 1979, when the Federal Reserve changed the method of implementing monetary policy, through the third quarter of 1981. The simulations were conducted under the assumptions that the Federal Reserve took policy actions necessary to keep M1-B growth constant

¹¹ For a summary of empirical money demand estimates, see Edgar L. Feige and Douglas K. Pearce, "The Substitutability of Money and Near-Monies: A Survey of Time-Series Evidence," *Journal of Economic Literature*, June 1977. The implications for short-run monetary control of several money demand equations are analyzed in Lawrence J. Radecki, "Monetary Targeting and Interest Rate Cycles," mimeo, Federal Reserve Bank of New York, August 1981.

Figure 1
ALTERNATIVE LAG STRUCTURES ON INTEREST RATES
IN THE MONEY DEMAND FUNCTION

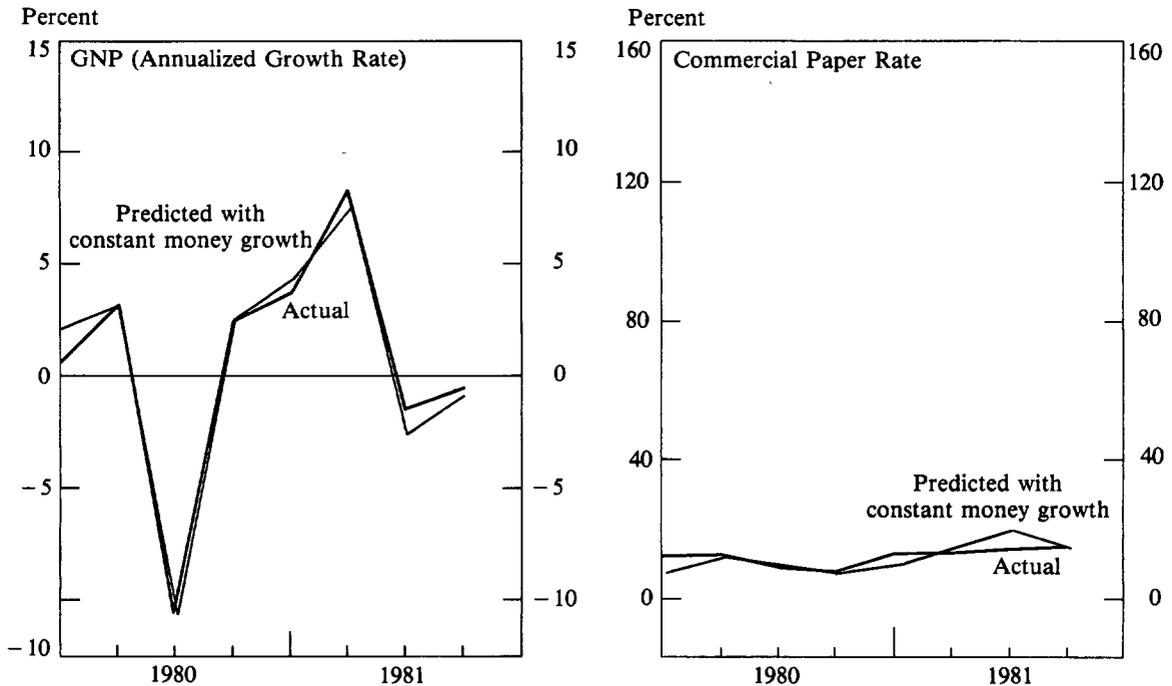


in each of the eight quarters of the simulation period and that the Federal Reserve knew the precise structure of the economy and the values of all other exogenous factors influencing the economy and interest rates over this period.¹² Although unrealistic, abstracting from uncertainty focuses attention on the importance of lags in the effect of policy actions on the

Federal Reserve's ability to exercise precise short-run monetary control.

¹² Consistent with the assumption that the Federal Reserve knew both the structure of the economy and the values of all exogenous variables during this period, the residuals from estimation of the model were added back into each equation for purposes of simulation. The constant growth rate of M1-B used in the simulations was created in a man-

Figure 2
RESPONSE TO CONSTANT MONETARY GROWTH
WITH A FAVORABLE LAG STRUCTURE



The simulated reaction of real GNP growth and the commercial paper rate for constant M1-B growth are shown in Figure 2 for the version of the model with a lag structure favorable

for monetary control.¹³ For comparison, the actual values of real output growth and the commercial paper rate are also shown for the simulation period by dashed lines. This version

ner assured to replicate the average historical growth rate over the simulation period. The Federal Reserve's series on M1-B adjusted for the impact of nationwide NOW accounts was used, and this series was adjusted further to remove the effects of shifts in the demand for money that occurred during the simulation period. To do this, the money demand equations were dynamically simulated from 1979:Q4 through 1981:Q3 with the dummy variables DUM2 and DUM3 omitted and without adding in the estimation errors. A constant growth path for M1-B was created with a growth rate equal to the average growth rate predicted from this initial simulation. This constant growth path was then adjusted for shifts in money demand by subtracting the simulation errors in predicting the level of M1-B. The resulting M1-B series is consistent with the assumption that the Federal Reserve kept the growth rate of M1-B constant after appropriate compensation for the shifts in money demand.

Use of the compensated constant growth rate path for M1-B in the experiments is consistent with the assumption that the Federal Reserve had perfect knowledge of the economy and could compensate for any structural shifts in time to avoid any impact on the economy, interest rates, or monetary growth. In reality, of course, the Federal Reserve cannot predict and offset the effects of structural shifts. Thus, the simulations undoubtedly understate the true difficulty that would have been encountered if the Federal Reserve had attempted to fine tune monetary growth. For example, a constant growth rate for M1-B not compensated for the effects of shifts in money demand was also used for simulations, but in these simulations, extreme interest rate volatility accompanied constant monetary growth even for the version of the model with a lag structure favorable for monetary control.

¹³ The inflation rates are not shown because the simulated rates are virtually identical to the actual rates.

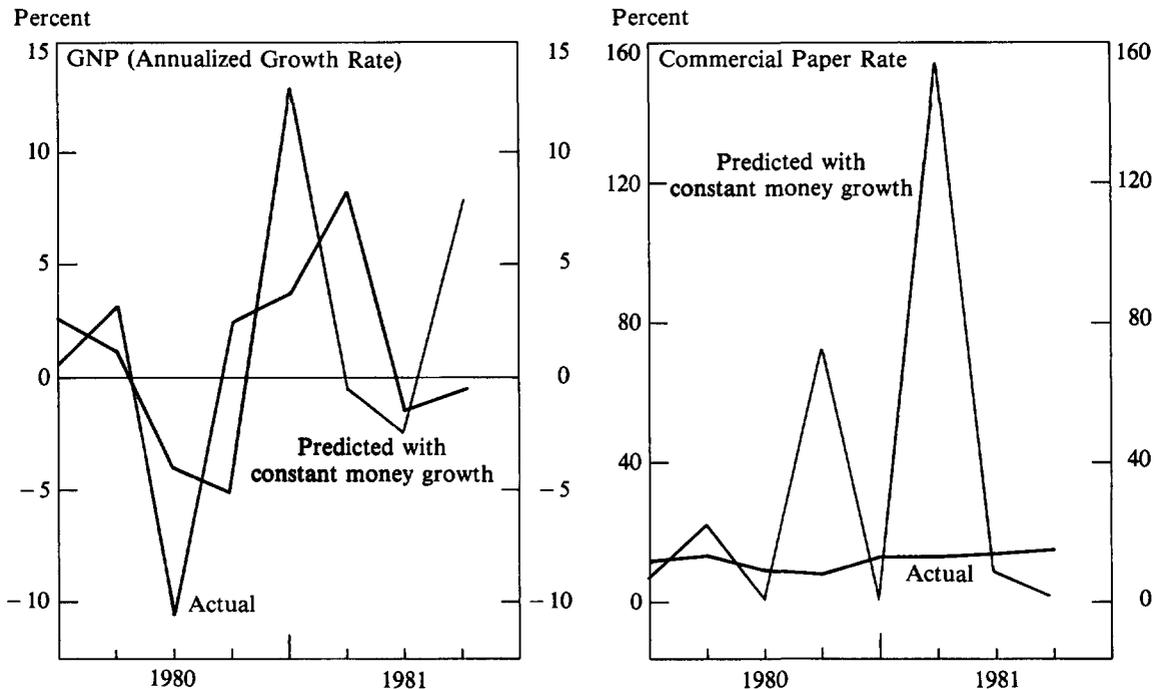
of the model indicates that a Federal Reserve policy of maintaining constant M1-B growth would not have significantly altered the behavior of the economy or interest rates over the past two years.

The model predicts that the economy would have experienced a brief recession in the second quarter of 1980 followed by a sharp rebound through the first quarter of 1981 and essentially no growth in the second and third quarters of 1981 even if the Federal Reserve had held to a course of steady monetary growth throughout this period. Similarly, the model predicts that interest rates would have declined as money demand was depressed by the decline in income during the recession but would have risen

thereafter to levels comparable with those actually experienced. Thus, the version of the model with a lag structure favorable for short-run monetary control suggests that fine tuning monetary growth would not have the undesirable effect of substantially destabilizing interest rates, but neither would it contribute significantly to stabilizing the economy in the circumstances that have prevailed since the fourth quarter of 1979.

The results are quite different, however, when the version of the model with a lag structure unfavorable for short-run monetary control is simulated for the same period under the assumption of a constant rate of monetary growth. These results are shown in Figure 3.

Figure 3
RESPONSE TO CONSTANT MONETARY GROWTH
WITH AN UNFAVORABLE LAG STRUCTURE



This version of the model predicts that constant monetary growth would have yielded a less pronounced though more prolonged decline in economic activity in 1980 and a more erratic recovery thereafter.

However, the most dramatic effect of maintaining a constant rate of monetary growth according to the model is the extreme volatility of interest rates that would accompany such a policy. In this version of the model, the lag structure in the money demand function indicates that policy actions have a relatively small impact on monetary growth in the quarter those actions are taken. As a result, the Federal Reserve would have needed to force interest rates down to 1.7 percent to stimulate monetary growth as the economy entered the recession in the second quarter of 1980. Subsequently, it would be necessary to offset the lagged impact of that decline in interest rates by raising interest rates to 73.1 percent during the second quarter of the recession in order to keep M1-B growing at a constant rate. During the recovery, even wider swings in interest rates would have been necessary to maintain constant monetary growth each quarter in the face of the erratic swings in the economy. Thus, simulation of the version of the model with a lag structure unfavorable for short-run monetary control suggests that aggressive policy actions necessary to stabilize monetary growth during the past two years would have destabilized both the economy and interest rates over the period.

Implication of the Empirical Results for the Conduct of Monetary Policy

Simulations of the alternative versions of the basic model used in this study emphasize the importance of lags in the effect of monetary policy actions. Somewhat different results would, of course, be obtained if a different model were used or if different assumptions

were made.¹⁴ However, the basic conclusion that close short-run monetary control could destabilize interest rates and perhaps the economy if the lag structure in key behavioral relations were unfavorable would hold for a wide variety of models. In particular, almost any model that includes a money demand equation indicating a relatively small contemporaneous effect of interest rates on the public's money demand would predict that extreme interest rate volatility would result if the Federal Reserve attempted to fine-tune monetary growth. Thus, before embarking on such a policy, it would be advisable to make sure that the lag structure in the money demand function is favorable for short-run monetary control.

Unfortunately, there is no consensus about the lag structure that best captures the public's response in adjusting money balances to changes in income and interest rates. A recent study at the Federal Reserve Bank of New York investigated the feasibility of close short-run monetary growth with several alternative money demand functions estimated by others. The conclusion from this analysis was that: "Despite all the effort expended in empirical research on the demand for money, no firm conclusion can be made concerning the behavior of short-term interest rates under quarter-by-quarter or month-by-month monetary targeting. According to this analysis,

¹⁴ A "monetarist" model in which spending depends directly on the money stock rather than on interest rates would predict that smoother economic growth would accompany smoother monetary growth regardless of the accompanying behavior of interest rates. However, if a reduced-form spending equation relating nominal GNP to growth in the money stock were combined with a standard money demand function with distributed lags, the volatility of interest rates would be comparable with that reported in this study and would depend on the lag pattern on interest rates in the money demand function. Moreover, it seems likely that the degree of interest rate volatility reported in this study would disrupt spending and output decisions even if it were true that the more modest interest rate fluctuations that have occurred in the past did not.

slowly damped cycles are a distinct possibility, and explosive cycles cannot be eliminated entirely from the set of potential outcomes.”¹⁵ These and other findings tend to confirm that attempts to fine tune monetary growth could induce instability. Thus, it is incumbent on those who advocate fine tuning of monetary control to provide reliable empirical evidence that short-run monetary control is feasible given the lags in the effect of policy actions. Without such evidence, it seems highly advisable that the Federal Reserve continue to take a longer run view of monetary control that minimizes the possibility of monetary policy actions inducing instability in interest rates and the economy.

CONCLUSION

This article has examined the feasibility of short-run monetary control given the lags in the effect of monetary policy actions. It was shown that changes in interest rates resulting from monetary policy actions affect income and the demand for money with a lag that is distributed over several quarters or more. The possibility of exercising precise short-run monetary con-

trol depends in large part on the nature of the lag structures in characterizing the public's response to changes in interest rates. However, traditional statistical procedures frequently are inadequate to discriminate between lag structures favorable for monetary control and lag structures unfavorable for monetary control. For example, it was found that money demand equations with similar statistical properties imply very different behavior of interest rates and the economy since October 1979 if the Federal Reserve had attempted to fine-tune monetary growth. Specifically, a money demand equation with a lag structure favorable for monetary control implies that fine-tuning of monetary growth would not have substantially altered the behavior of interest rates and the economy in the last two years. In contrast, an equally plausible money demand equation with a lag structure unfavorable for monetary control implies that efforts to achieve precise short-run monetary control would have resulted in extreme interest rate volatility and somewhat greater fluctuations in real output. Thus, attempts to fine-tune monetary growth might induce instability of both interest rates and the economy if the lags in money demand and other behavioral relationships are unfavorable for monetary control.

¹⁵ Radecki, "Monetary Targeting," pp. 3-10.