Stabilization, Accommodation, and Monetary Rules

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A central feature of the monetarist approach to the problem of inflation is a preannounced gradual reduction in monetary growth. This reduction is to be sustained until a monetary growth consistent with a zero, or an acceptably low, target rate of inflation is reached. Thereafter, monetary growth is to be held constant at this new rate. The specifics of this prescription differ by the type of monetary measure used for calculating growth rates—either high-powered money, a monetary aggregate, or nominal *GNP*—and by the length of the transition period during which the noninflationary growth is approached.[1] The prescriptions are alike in ruling out contingent deviations from the plan should economic conditions change, either during the transition period or after the beginning of the constant growth rate rule. The plans are rigid, having no explicit contingencies.

This rigidity has been the target of most critiques of monetarism. Stressing the inefficiencies which a noncontingent monetarist rule would entail, many economists have pointed out the advantages of alternative rules which react to economic events in a structured and stable way. Stanley Fischer and J. Phillip Cooper showed, through a series of examples, that these inefficiencies of monetarist rules exist even when lags are long and variable.

The present paper is an attempt to examine quantitatively which operating characteristics of a monetarist rule are inefficient, and which are relatively efficient. Certain, if not all, features of monetarism could operate efficiently within the context of a particular model and a certain set of parameter values. Few econometric studies, however, have been designed to estimate the specific differences between a monetarist rule and an efficient rule, and to determine whether these differences are statistically significant. Is the monetarist rule inefficient because it is not countercyclical, or is it inefficient because it does not accommodate inflation? Or is it inefficient on both counts?

The particular model used for this analysis is adopted directly from my 1979 econometric investigation. It is a small model with rational expectations and certain rudimentary types of inflation inertia. The model fits the *U.S.* economy fairly well, and some new complex variable techniques developed and applied to the model by David Livesey, enable a simple analytic treatment of efficient policy choice in place of less transparent numerical analysis. Using the results of Livesey, the differences between monetarist and efficient rules can be clearly and rigorously shown without reliance on numerical optimization or simulation techniques.

The results indicate that the monetarist nonaccommodation of inflation seems to work reasonably well and, although some value judgements are required, does not generate significant output instabilities. On the whole, however, the monetarist rule is inefficient. The inefficiencies arise mainly because of its rigidity with respect to business cycle developments. Some moderate countercyclical monetary responses can help to stabilize the economy. In fact, a classic countercyclical monetary policy combined with no accommodation of inflation is nearly efficient.

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[1]Allan Meltzer concentrates on the monetary base, while at the other extreme, William Fellner concentrates on general monetary-fiscal aggregate demand management and the growth of nominal *GNP*. Milton Friedman and Robert Lucas focus on monetary aggregates for the constant growth rate rule. Lucas presents a more general treatment of gradualism than that described here, and Phillip Cagan discusses gradualism in terms of the degree of economic slack.

I. A Macro-Economic Model

The model assumes that there is a natural or average rate of unemployment which is insensitive to aggregate demand policy, and that the role of monetary policy is to stabilize fluctuations in unemployment around this average rate. Relative to some views of policy activism, this framework already assumes away a certain role for aggregate demand policy—that of sustaining unemployment rates below this natural rate through the use of stimulative policy.[2] According to the model, such low rates could only be sustained with constantly accelerating inflation (at best) and therefore are not consistent with any reasonable notion of price stability. Of course, the remaining role for monetary policy is by no means unimportant or trivial in a quantitative sense, even in relative terms. Another feature of the model, which a few years ago would have made it seem monetarist from the start, is that the main instrument of aggregate demand management is assumed to be the money supply, not fiscal policy or explicit interest rate policy.

Algebraically the model can be represented in the following equations:

$$(1)\quad y=\beta_1 y_{-1}+\beta_2 y_{-2}+\beta_3(m-p)+\beta_4(m_{-1}-p_1)+\beta_5\hat{\pi}+\eta+\theta_1\varepsilon_{-1}$$

$$(2)\quad \pi=\pi_{-1}+\gamma\hat{y}+\varepsilon+\theta_2\varepsilon_{-1}$$

where y is the percentage (positive) deviation of real output from potential output, m is the *log* of the money supply, p is the *log* of the price level, and π is the rate of inflation. The hats represent rational forecasts, and η and ε are serially uncorrelated shocks to aggregate demand and inflation, respectively. A theoretical rationale for these equations is provided in my earlier paper. The first equation represents the impact of money on aggregate demand, and the second equation represents the impact of expected aggregate demand on inflation. In my earlier paper I tested, along with other things, whether the constraints that money does not appear directly in equation (2) are satisfied and found that it was difficult to reject that hypothesis. It is important to note that the measure of potential output used in (1) must be such that when the economy is operating at that level there is no tendency for inflation to accelerate according to (2). According to my previous calculations, this property is satisfied by a potential output measure which is uniformly about 3 percent below the measure of potential output published in the 1980 Annual Report of the Council of Economic Advisers. Quarterly data for the United States during the period 1954–75 yield the following parameter values for the model: the β parameters are 1.17, −.32, .58, −.48, −.45, and $\gamma=.02$, $\theta_1=.38$, $\theta_2=-.67$.

The shocks to the equations are important for our analysis of monetary accommodation. According to most interpretations of the price shock and accommodation issue (see Edward Gramlich, for example), there are certain shocks to the price level (energy, agriculture, a wage push passed through to prices, etc.) which are temporary in that they do not get incorporated in the underlying rate of inflation. The argument for accommodation rests on the temporary nature of these shocks: because they are short-lived they should be matched point-for-point by an increase in the money supply to prevent a decline in aggregate demand. The main problem with this argument is that it is extremely difficult to determine in practice whether such a shock will get incorporated in the inflation rate or not. In reality we observe a mixture of shocks, some which are temporary and some which are permanent. The case for accommodation then rests on playing the statistical averages, partially accommodating by a proportion equal to the fraction of shocks which are temporary

[2] It is possible within this framework to interpret this average unemployment rate as related to the average (target) inflation rate. This relationship would simply be another consideration in determining these targets. One reason for such a relationship might be that stabilization of aggregate demand requires fluctuations in the real rate of interest below zero which is not possible with a zero rate of inflation. A target inflation rate of 3 percent rather than zero would permit such fluctuations and thereby raise the average rate of unemployment.

on average. Of course, eventually it becomes evident whether a shock gets incorporated in the rate of inflation or not. If it does, then the accommodation issue has a different form: it involves a question of accommodating—presumably at most partially—the underlying rate of inflation.

These kinds of considerations enter the present model through the moving average error term in equation (2). A well-known time-series result is that a mixture of a temporary shock (serially uncorrelated) and a permanent shock (random walk) results in a moving average relationship like that shown in (2). If θ_2 is negative, then it represents the proportion of a mixed shock which on average is temporary.

A neglected part of most discussions of accommodation is whether these temporary price shocks have any direct influence on aggregate demand. In terms of the behavior of real balances, it seems reasonable to expect that money demand would respond differently to a price which was known with some probability to be temporary. While measured real balances would surely fall due to the price shock, the demand for measured real balances might also fall. To capture these possible influences the lagged price shock is added to equation (1).

II. Efficient Policies

As stated earlier the objective of policy in this model is to stabilize the fluctuations of output around potential output. The instrument of stabilization policy is m. However, according to (2), inflation is influenced by the behavior of output as well, so stabilization efforts must balance two goals—inflation and output stability—according to the weights in the objective function. The stabilization problem gives rise to a tradeoff between output and price stability.

The efficient stabilization policy rule given these objectives has the form

$$(3)\quad m-m_{-1}=h_1y_{-1}+h_2(y_{-1}-y_{-2})+h_3(m_{-1}-p_{-1})+h_4\pi_{-1}+h_5\varepsilon_{-1}$$

The first two terms represent what is usually called proportional and derivative control: if h_1 and h_2 are negative, high output levels and speedups in the business cycle call for lower monetary growth. The h_3 parameter is a corrective factor for the level of real balances and acts much like an integral control. The accommodation parameters are h_4 and h_5. If h_4 is positive, then there is at least partial accommodation of inflation inertia, while h_5 determines the accommodation of inflation surprises. Note that the h_3 parameter also involves some accommodation because the lagged price p_{-1} enters through this term.

Using complex variable techniques, Livesey has derived a set of convenient analytic expressions for the h parameters. These are given by

$$(4)\quad h_1=-(\beta_2+\beta_1)/\beta_3$$

$$(5)\quad h_2=\beta_2/\beta_3$$

$$(6)\quad h_3=-1-\beta_4/\beta_3$$

$$(7)\quad h_5=-\theta_2(h_4-1)+\theta_1/\beta_3$$

The objective of this paper is to determine under what conditions h_1 through h_5 will equal zero, for this defines the monetarist rule. Equations (4) through (6) uniquely determine h_1 through h_3 given the parameters of the model. No value judgement is required to determine these parameters. The parameter h_4 and hence h_5 depend on the weights of inflation fluctuations and output fluctuations in the social welfare function, however, and therefore require a value judgement.

III. Accommodation or Countercyclical Stabilization

Examining first the countercyclical parameters h_1 and h_2, it is clear that these parameters are large and negative (-1.81 and $-.55$, respectively) when evaluated at the estimated structural parameter of the model. Even with considerable damping of the stabilization policy to reflect parameter uncertainty as described by William Brainard, these parameters would not be set

to zero as with a monetarist rule. According to these estimates, a countercyclical stabilization policy whereby monetary growth increases when the economy is in a recession, but not so fast if the recovery appears to be proceeding too rapidly, would significantly reduce business cycle fluctuations.

To judge the appropriate values for the accommodation parameters h_4 and h_5, the variance of output and inflation associated with these parameters must be evaluated. When $h_4=0$ (the monetarist value and the nonaccommodative value for the efficient rule) the variance of output is not at its minimum. By raising h_4 above 0 and at the same time adjusting h_5 according to (7), policy becomes more accommodative and this reduces the size of the business cycle swings in output as one would expect. However, the quantitative reduction in output fluctuations is relatively small. The standard deviation of these output fluctuations is reduced by about .18 percentage points while the standard deviation of inflation fluctuations is increased by about 1.5 percentage points. At the value of $h_4=0$, the tradeoff is rather unfavorable if one is interested in reducing output swings any further. It is not unreasonable to suggest that $h_4=0$ is near the socially preferred point. Viewed geometrically with output stability on the vertical axis and inflation stability on the horizontal axis, the tradeoff between these two goals is very flat at this point. According to (6), when h_4 is near zero, we also have that h_5 is near zero (specifically, if $h_4=0$ then $h_5=-.02$). That is, if there is no accommodation of inflation inertia, it is optimal not to accommodate inflation surprises either. This result depends heavily on the estimated value of θ_1 which measures the extent to which the negative impact of a price shock on aggregate demand is attenuated if the price shock is temporary, and on the estimated value of θ_2 which measures the inflation durability of a price shock. Both of these values are large enough that no special accommodation of price shocks (in the specific sense described here) is required.

The final parameter to consider is h_3. The size of this parameter depends on whether the level or the change in money balances dominates in the monetary impact on the deviations of output from potential. If $\beta_4=-\beta_3$, then only the change matters and $h_3=0$. If $\beta_4=0$, then only the level matters and $h_3=-1$. For the estimated structural values the change effect dominates ($\beta_4/\beta_3=-.83$), so that h_3 is small ($-.17$), though not as negligible as h_4 and h_5.

To summarize, the efficient rule is unlike the monetarist rule in its countercyclical reaction to the state of the economy (h_1 and h_2 are far from the zero values of the monetarist rule), but surprisingly similar to the monetarist rule in not accommodating inflation (h_3, h_4 and h_5 are relatively close to zero). It is in this sense that a nonaccommodative countercyclical policy would work well and might be close to efficient. It would perform better than a monetarist rule which is nonaccommodative but which is also noncountercyclical.

IV. Transitional Problems

Little has been said in this technical analysis about the transition problem of moving from one policy rule to another. Clearly the countercyclical policy suggested here in which money growth is permitted to deviate from its long-run target (say 3 percent per year for $M1$-B) only when the economy drifts away from potential, is not the policy which has been in operation on average over the last ten or fifteen years in the United States. Hence a transition problem arises if one is interested in implementing this countercyclical policy.

Although very little research has been done on the subject, one suspects that transitions will be smoother if the policy operating *rules* change slowly. It is the policy rule which in part determines the economic environment in which individual expectations and decisions are made. A rule is technically defined as a set of feedback parameters which describe how monetary policy operates. In this paper a rule is defined by the five h parameters. A small change in a rule corresponds to a small change in these parameters. If a smooth transition requires slow change in rules, in this sense, then the gradualist monetarism prescription de-

scribed in the introduction to this paper will not result in a smooth transition. Gradualism involves a quick switch from an apparently very accommodative policy rule to one with no accommodation (a change from h_4 near 1 to h_4 near zero in the notation used above). Perhaps a smoother way to proceed would be to shrink h_4 slowly. Such an alternative transition method could be applied to the rule suggested here as well as to the monetarist rule. Practical implementation of this transition method is as difficult to describe as implementation of policy rules in general. Econometricians estimating policy rules during the next ten years may find that h_4 is shrinking, but will probably find it difficult to pinpoint a sharp break. If so, then the transition will be about as smooth as one could expect.

V. Concluding Remarks

The aim of this paper has been to point out some of the good and bad characteristics of monetarist rules. In a particular sense, and for a particular model, I showed that monetarism scored relatively high on the accommodation issue, but low on countercyclical stabilization issues. The low score may not be surprising given the nature of this model, but the high score does seem surprising. The obvious policy implication is to suggest rules which score high on both issues. These would react to business cycle developments, but would not accommodate inflation. Further research to determine whether these results are robust to plausible modifications of the model would be useful. One modification which is the subject of my current research would place more emphasis on anticipatory wage determination by distinguishing between contracts and expectations as the source of the inflation inertia.

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